IMPLEMENTATION OF ELECTRONIC COMMUNICATIONS ACT 2011
ADVISORS' PRELIMINARY RECOMMENDATIONS

Pre-Consultation:

Market Review Process (Part A)-- Market Definition

Pre-Consultation Document

Matter: PC12/03-A

Date: 10th October 2012

Responses Due: 21st November 2012

NOTICE

PURPOSE OF PRE-CONSULTATION PROCESS AND DOCUMENTS

This pre-consultation document has been prepared by a team of legal, regulatory and economic advisors retained by the Government of Bermuda to assist in implementing the provisions of the Electronic Communications Act 2011 ("ECA").

The purpose of this pre-consultation is to provide industry participants and the general public with an opportunity to comment on the advisors' preliminary recommendations and, where possible, to focus on key issues so that the Regulatory Authority can conduct a more efficient and productive consultation process when it begins operations in January 2013. All references to "consultation" in this document should be construed as "pre-consultation", that is, as the preliminary draft of a future consultation document. The responses to this pre-consultation will be important inputs in the preparation of the consultation document, on which the Regulatory Authority will request and consider comments, prior to issuing a preliminary decision, order and general determination proposing to designate operators as having significant market power in one or more relevant electronic communications markets.

For the avoidance of doubt, the analysis, conclusions and proposals contained in this pre-consultation document are preliminary in nature and have been developed by the Government's advisors. Notwithstanding any references to the "Regulatory Authority" in this pre-consultation document, the preliminary analysis, conclusions and proposals set forth herein do not in any way bind the Regulatory Authority, the Government or its advisors.

FILING INSTRUCTIONS

Responses to this pre-consultation document should be submitted in MS Word or Adobe Acrobat format by email to reform@gov.bm no later than 6:00 PM on 21 November 2012. All comments should be clearly marked "Response to Pre-Consultation Document PC12/03: Comments on Market Review Process." Commenting parties submitting information that is confidential in nature should refer to Part A, Paragraph 14 of the pre-consultation document.

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1 STRUCTURE OF THE MARKET REVIEW CONSULTATION DOCUMENTS

1. The Pre-Consultation Market Review Process is contained in two files: Part A and Part B. The focus of this first file is market definition. Accompanying the many body of the text is a number of annexes. Included in the annexes is a draft of the Candidate Markets Notice which will be issued in January 2013 pursuant to ECA §22, as well as draft "Guidelines for Market Assessment," drafted pursuant to ECA §23. Part B contains the evaluation of Significant Market Power (SMP), as well as an annex that contains a list of indicative remedies that might be proposed if the logic and data in this pre-consultation document remains largely unchanged.

2 EXECUTIVE SUMMARY (PARTS A & B)

2. The Electronic Communications Act (ECA) and the Regulatory Authority Act (RA Act) establish a new framework for regulation of electronic communications services in Bermuda. This new framework requires the Regulatory Authority (RA) to, among other things, define relevant product and geographic markets appropriate to national circumstances according the principles and procedures outlined in Sections 21 through 23 of the ECA. Conjoint with this exercise the RA is further instructed to conduct an analysis of the relevant markets to determine whether or not they are effectively competitive and, if not, to identify any competition problems and to propose appropriate regulatory measures to address them following the procedures generally outlined in Section 24 of the ECA.

3. The Regulatory Authority (RA) has identified, based on a forward-looking assessment, the relevant markets that it considers likely to be susceptible to the imposition of ex ante remedies (referred to hereafter as the "Candidate Markets") based on the test set out in sec. 22(2) of the ECA. Those markets as identified in Appendix C are set out in Box 1.

Box 1: Markets susceptible to *ex ante* regulation

Retail markets

1. Retail fixed narrowband access lines and local calls for all areas of Bermuda other than Southside for (a) business customers; and (b) non-business customers
2. Retail broadband services provided at fixed locations in all areas other than Southside
3. Retail mobile services
4. Retail leased line services in all areas other than Southside
5. Retail subscription TV services

Wholesale markets

6. Call origination on fixed networks in all areas other than Southside
7. Call termination on individual fixed networks
8. Wholesale narrowband access lines and local calls in all areas other than Southside
9. Wholesale broadband access on fixed networks in all areas other than Southside
10. Wholesale MVNO access on mobile networks
11. Origination of international calls on mobile networks
12. Call termination on individual mobile networks
13. Wholesale provision of terminating segments of leased lines in all areas other than Southside

14. Wholesale supply of access to local network infrastructure facilities
15. Wholesale subscription TV services to deliver broadcast content to end users

4. Part A of this consultation document contains a detailed market definition analysis of each of the Candidate Markets. The analysis has involved the definition of markets using internationally accepted methodologies and principles that the RA has tailored to meet the unique demands and circumstances of Bermuda's electronics communications markets. The methodology employed by the RA in its analysis is set out and described in Appendix G, "Guidelines for Market Assessment in the Electronic Communications Sector" (Guidelines).

5. The RA's tentative conclusions on the relevant product market definitions are set out in Table 1.

6. Part B of this consultation contains an analysis of the supply and demand factors that affect the operations of the defined markets. This analysis is then used to evaluate the degree to which one or more carriers has Significant Market Power in the defined market. The RA's tentative conclusions on Significant Market Power are set out in Table 1.

Table 1: Summary of <u>tentative</u> findings on market definition and SMP

Service	Definition of candidate markets	SMP operators?
Retail fixed narrowband access lines and local calls	A national market (excluding Southside) for the supply of retail fixed narrowband access lines and local calls to residential customers	Yes: BTC
	A market for the supply of retail fixed narrowband access lines and local calls to business customers in the City of Hamilton	Yes: BTC
	A market for the supply of retail fixed narrowband access lines and local calls to business customers outside of the City of Hamilton and Southside	Yes: BTC
Retail broadband access	A national market (excluding Southside) for the supply of retail fixed broadband access and Internet services to residential customers	Yes: BTC and BCV

Service	Definition of candidate markets	SMP operators?
	A market for the supply of retail fixed broadband access and Internet services to business customers in the City of Hamilton	Yes: BTC and BCV
	A market for the supply of retail fixed broadband access and Internet to business customers outside of the City of Hamilton and Southside	Yes: BTC and BCV
Retail mobile services	A national market for the supply of retail mobile services, including voice and data.	Yes: BDC and Digicel
Retail leased lines	A market for the retail supply of low-speed retail leased lines in the City of Hamilton	Yes: BTC
	A market for the retail supply of low-speed retail leased lines outside of the City of Hamilton and Southside	Yes: BTC
	A market for the retail supply of high-speed retail leased lines in the City of Hamilton	No
	A market for the retail supply of high-speed retail leased lines outside of the City of Hamilton and Southside	Yes: BTC
Retail subscription TV services	A national market for the supply of retail subscription TV services	Yes: BCV
Wholesale call origination on fixed networks	A wholesale market for the origination of calls on fixed networks in the City of Hamilton	Yes: BTC
	A wholesale market for the origination of calls on fixed networks in areas other than the City of Hamilton and Southside	Yes: BTC
Wholesale call termination on fixed networks	Markets for the supply of call termination on each individual fixed network	Yes: all fixed network operators have SMP for call termination on their network
Wholesale fixed narrowband access and local calls	A wholesale market for the supply of fixed narrowband access and local calls in the City of Hamilton	Yes: BTC
	A wholesale market for the supply of fixed narrowband access and local calls in areas other than the City of Hamilton and Southside	Yes: BTC
Wholesale broadband access	A wholesale market for the supply of fixed broadband access in the City of	Yes: BTC and BCV

Service	Definition of candidate markets	SMP operators?
	Hamilton	
	A wholesale market for the supply of fixed broadband access in areas other than the City of Hamilton and Southside	Yes: BTC and BCV
Wholesale MVNO access on mobile networks	A national market for the supply of wholesale access and local call origination on mobile networks	Yes: BDC and Digicel
Origination of international calls on mobile networks	A national market for the supply of wholesale origination of international calls on mobile networks	Yes: BDC and Digicel
Call termination on individual mobile networks	Markets for the supply of call termination on each individual mobile network	Yes: BDC and Digicel
Wholesale provision of terminating segments of leased lines	A market for the wholesale supply of low speed data tails in the City of Hamilton	Yes: BTC
	A market for the wholesale supply of low speed data tails outside of the City of Hamilton and Southside	Yes: BTC
	A market for the wholesale supply of high speed data tails in the City of Hamilton	No
	A market for the wholesale supply of high speed data tails outside of the City of Hamilton and Southside	Yes: BTC
Supply of access to infrastructure facilities	A market for the wholesale supply of access to facilities used to construct fixed local access networks	Yes: Belco, BCV, and BTC
	A market for the supply of access to facilities used to construct wireless radio access networks.	Yes: BDC and Digicel
Wholesale subscription TV services to deliver broadcast content to end users	A wholesale market for the supply of subscription TV market to deliver broadcast content to end users	Yes: BCV

7. As a comparison of Box 1 with Table 1 will show, the market definition exercise has resulted in a greater differentiation of the Candidate Markets listed in Box 1 into the more numerous geographic, product, and customer submarkets appearing in Table 1.

8. Concerning the geographic market differentiation, as explained in more detail in section 6.5, the RA's examination into this possibility first considered what features of demand or supply were likely to vary sufficiently within Bermuda as to cause

differences to arise in the incentives and ability for competitive entry and expansion between areas. Next the RA examined whether significant variation in the extent of actual and potential competition (particularly between networks) existed within Bermuda. Analysis suggests that for some services (Fixed access lines, local calling, broadband access, and domestic leased lines) further market differentiation along the geographic lines depicted in Table 1, above, and Table 6, below, may be called for.

9. As discussed in section ii the RA's demand and supply side substitution analysis for leased lines suggests that, for the purposes of examining SMP, it is reasonable to examine two separate bandwidth markets: one which includes speeds less than 1 Mbps and another which includes speeds of 1Mbps or more.

10. Finally, the examination of customer markets undertaken by the RA as part of its market definition analysis (described in section 6.4) suggests that for retail access and local calls and broadband access: (1) all residential customers (and those who can disguise themselves as residential customers) are likely to form a single market; and, (2) large business customers could potentially form a separate market from other business customers but given the small number of these customers the RA takes the pragmatic approach of defining a single customer market for all business customers.

3 CONSULTATION PROCEDURE

11. This consultation is being undertaken in accordance with Sections 69 to 73 of the Regulatory Authority Act 2011 ("RAA"). The consultation period will run from 10th October 2012 to 21st November 2012. Written comments should be submitted before 4:00PM on 21st November 2012.

12. The Regulatory Authority invites comments from members of the public, operators of electronic communications networks and providers of electronic communications services, and other interested parties. The Regulatory Authority requests that commenting parties, in their responses, reference the numbers of the relevant questions, as set forth in this consultation document, to which they are responding. A complete list of questions presented by this consultation document appears in Appendix A hereto.

13. Please submit your responses in MS Word or Adobe Acrobat format by email to reform@gov.bm. All comments should be clearly marked "Response to Pre-Consultation Document PC12/03: Comments on Market Definition: Application of the Market Review Process" (please specify which part – A, B or both) and should otherwise comply with Sections __-__ of the Regulatory Authority's Administrative Rules, which are posted on the Regulatory Authority's official website, at www.rab.ba.

14. The Regulatory Authority intends to make responses to this consultation available on its website. If a commenting party's response contains any information that is confidential in nature, a clearly marked "Non-Confidential Version," redacted to delete the confidential information, should be provided together with a complete version that is clearly marked as the "Confidential Version." Redactions should be strictly limited to "confidential information," meaning a trade secret, information whose commercial value would be diminished or destroyed by public disclosure, information whose disclosure would have an adverse effect on the commercial interests of the commenting party, or information that is legally subject to confidential treatment. The "Confidential Version" should highlight the information that has been redacted.

15. Nakia S. Smith is the principal point of contact at the Regulatory Authority for interested persons during this consultation. She may be contacted by email at nssmith@gov.bm or by telephone at 441-298-7442.

16. In this document, except insofar as the context otherwise requires, words or expressions shall have the meaning assigned to them by the RAA, the Electronic Communications Act 2011 ("ECA") and the Interpretation Act 1951.

17. This consultation document is not a binding legal document and does not contain legal, commercial, financial, technical or other advice. The Regulatory Authority is not bound by the consultation document, nor does it necessarily set out the Regulatory Authority's final or definitive position on particular matters. To the extent that there might be any inconsistency between the contents of this document and the due exercise by the Regulatory Authority of its functions and powers, and the carrying out of its duties and the achievement of relevant objectives under law, such contents are without prejudice to the legal position of the Regulatory Authority.

4 INTRODUCTION AND CONTEXT

4.1 Context

18. The purpose of this document is to conduct a market analysis of the markets identified by the RA in the "Notice identifying the electronic communications markets susceptible to *ex ante* regulation". In particular, the current consultation document first conducts a market definition analysis to determine the specific definitions that should be applied to the Candidate Markets. After having identified the appropriate market definitions, the RA examines each market to consider whether one or more operator holds SMP.

19. In carrying out this analysis the RA has had regard to information on market outcomes and regulatory precedents from other jurisdictions. However, ultimately the conclusions drawn in this consultation document focus heavily on the specifics of the Bermudan market place and regulatory framework.

20. Particular characteristics of Bermuda that are relevant the market analysis process and the selection of remedies and which distinguish Bermuda from many other countries include the small size and the licensing framework that has been in place to date. The small size of Bermuda's population has implications for competition and market structure – for example, small scale can make competitive entry more difficult. However, it also has implications for the tradeoff between administrative costs and competition benefits of regulatory intervention. This tradeoff will be particularly relevant to the assessment of regulatory remedies, however has also been taken into account during the market definition and SMP assessment. An example of the impact of this tradeoff in Bermuda is that the RA has not proposed that unbundled copper loops be a candidate market, because the administrative costs of implementing local loop unbundling seem prohibitively high given the low number of lines.

21. The RA has taken the current market structure and outcomes as the starting point when assessing market definition and SMP, but has taken into account, to the extent possible, foreseeable changes due to the new regulatory framework and other expected market developments over next 3 years.

4.2 Data collection and submissions process

22. This consultation document, and the analysis informing it, relied on extensive qualitative and quantitative data collected from a variety of external and internal sources. In particular, the RA's examination into the functioning of Bermuda's electronic communications markets necessitated extensive requests for data from Bermuda's providers of electronic communications networks and services.

23. The RA recognizes that responding to these requests required the dedication of time and resources to collect and compile data that the parties may not have previously been called upon to provide as part of their normal business practices. While, at times, this may have appeared unduly burdensome, the depth and breadth of insight this provided into the workings of Bermuda's electronic communications markets was crucial to the RA's investigation. Accordingly, the RA wishes to thank all parties for their cooperation and hard work in contributing to this effort.

24. The worldwide economic crisis unfortunately delayed the completion the RA's market analysis by a couple of years. Because of this, beginning in July of 2012, the RA issued a series of data requests to the parties so as to refresh the record and ensure that the analysis being performed was based on the most current data available concerning Bermuda's market operations.

25. Where information used in this consultation document has been deemed to be confidential it has been labelled [C-I-C] and redacted from the public version of this document.

4.3 Overview

26. In the following sections, the RA:

(a) Discusses the market definition and SMP methodology relied on in prepared this consultation document (section 5)

(b) Examines market definition issues that are common to multiple markets;

(c) Carries out market definition analysis for each of the following groups of markets:

- Fixed access and local calls (section 7)
- Broadband access (section 8)
- Mobile services (section 9);
- Leased lines (section 10);
- Infrastructure access (section 11); and
- Pay TV services (section 12).

27. Examines in sections 13 to 18 of the *Application of the Market Review Process: Significant Market Power* document whether any one or more parties hold SMP in each of the defined markets.

5 MARKET DEFINITION METHODOLOGY AND GUIDELINES

28. The RA has developed a set of guidelines - the "Guidelines for Market Assessment in the Electronic Communications Sector" appearing at Appendix G– which set out in detail the methodology that the RA uses for market definition and SMP assessment. In developing those Guidelines the RA had particular regard to the approach outlined by the European Union as this has been articulated in official documents issued by the European Commission, such as the following:

(a) Commission Working Document On Proposed New Regulatory Framework for Electronic Communications Networks and Services, COM (2001) 175, Brussels, 28.3.2001;

(b) *On Market Reviews under the EU Regulatory Framework; Consolidating the internal market for electronic communications*, **Communication From The Commission To The Council**, The European Parliament: The European Economic And Social Committee

And The Committee Of The Regions, {SEC(2006) 86}, Brussels--6.2.2006, COM(2006) 28; and

(c) Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services, European Commission (EC), 2002, (2002/C 165/03

29. The RA has drawn on regulatory approaches and precedents from application of the market analysis process by various EU regulatory authorities such as Ofcom in the United Kingdom, ComReg in Ireland, and ANACOM in Portugal.

30. The RA has also had regard to the methodologies used outside of the EU to consider market definition and market power, especially in the US, Australia and New Zealand, and resulting decisions.

31. In addition, the RA drew liberally upon the academic literature and case law relating to such relevant topics as cluster market analysis, mergers and acquisitions guidelines, and antitrust analysis in shaping the Appendix G guidelines. The overarching focus for the whole endeavour of developing these Guidelines, however, was tailoring them to meet the specific demands of Bermuda's electronic communications markets.

32. While the market analysis and definition methodology presented in the Guidelines is not the subject of this consultation, comments and additional suggestions by the parties are welcome and will be taken into consideration by the RA.

5.2 Existing license types and implementation of the ICOL

33. A distinguishing feature of the Bermudian e-commerce sector is the licensing regime, which has resulted in an industry structure in which many firms engage in supply of a narrower range of services than is common internationally. Another feature of the sector in Bermuda is that it currently has a fairly limited range of regulated wholesale services – for example, services such as wholesale bitstream, unbundled local loop, wholesale line rental and wholesale leased lines are not regulated in Bermuda.

34. By way of background this section provides a description of the current license types and a discussion of the new unified licenses which will soon be implemented.

35. At the present time the Bermudan telecommunications market is split among three separate licence groups:

(a) Class A Licences: This class of licences covers the building and operation of international telecommunications facilities and the provision of international telecommunications services. Class A licensees can also offer ISP services to Business customers;

(b) Class B Licences: This class of licences covers the building and operation of domestic telecommunications facilities (fixed and

wireless) and the provision of domestic telecommunications services; and,

(c) Class C Licences: This class of licences covers the provision of Internet Service Provider services in Bermuda. Class C licences do not allow licensees to build or operate own telecommunications infrastructure. Class C licensees can also offer VoIP services.

There are two other relevant licence groups that should be considered together with the above list as well,

(d) Subscription Radio Service License: This class of licences cover the building and operation of domestic wireless subscription TV and subscription radio services in Bermuda.

(e) Cable Television Service Licence: This class of licences covers subscription cable TV networks and services provided using wireline facilities (HFC, fibre, etc.)

36. These latter categories includes, among others, Bermuda Cable Vision ("BCV") and WOW (World on Wireless). BCV's license has been expanded so as to permit the company to supply cable modem service for Internet access service. The license does not permit the company to transport digital signals off or onto the Island, or to provide web based services, such as e-mail.

37. As articulated in the Policy Document[1] under the new regulatory regime the first three licence categories are to be moved into a single standard integrated communications operating licence ("ICOL") which would authorise a licensee to offer all communications services and to build and operate all communication infrastructure and apparatus as it sees fit. The ICOL will be a standard document for all licensees and will include provisions for the RA to impose, enforce, and monitor compliance with regulatory remedies and restrictions on licensees found to have significant market power in one or more relevant telecommunications markets in Bermuda.

38. Subsequent to the issuance of the Policy Document it was determined that current and prospective subscription TV service providers such as BCV, World On Wireless (WOW), and Bermuda Digital Broadband (BDB) shall be granted ICOLs as well.[2] In turn, carriers that have Class A, B or C will be authorised to provide subscription TV service.

39. These policy intentions are now captured in the EC Act, notably at §18(1):

An ICOL shall constitute a particular type of COL authorizing the licence holder to operate and provide public electronic communications networks and electronic communications services transmitted by means of such networks, within the territorial limits of Bermuda or between Bermuda and another

[1] *Telecommunications Regulatory Reform Policy*, The Hon. Terry E. Lister, JP, MP Minister of Energy, Telecommunications and E-Commerce 18 November 2008, starting at page 19.

[2] Schedule 1, EC Act.

country, subject to the availability of spectrum and the grant of any necessary spectrum licences or permits in accordance with Part 7.

40. The ICOL was proposed as it had become increasingly apparent that artificial boundaries created by the old licensing regime had become untenable. The old licensing regime was perceived as preventing investment in new technologies and services, preventing operators from achieving synergies through vertical integration, as well as preventing consumers from potentially obtaining access to cost saving service bundles, such as subscription-TV bundled with voice and data services. It was believed that replacing the service-specific licences with the ICOL, which permits providers to compete across the full set of communications services (subject to spectrum availability in the case of wireless services), would encourage innovation and investment by, among other things, enabling providers to access economies of scope that had previously been denied them under the existing service-specific licences.

41. The EC Act requires that a forward-looking approach must be taken when carrying out the market analysis exercise for the purpose of identifying SMP operators. The change in the licensing regime has the potential to materially alter the way in which competition operates in the Bermudan electronic communications markets. Although the exact effects are uncertain, the RA has taken into account its expectations of the effects of the ICOL introduction during the two-to-three year forecast period, having reference to the transition timetable set out in Part 12 of the ECA, and also drawing on international evidence as well as information specific to the Bermudan context, when carrying out the market definition and SMP analysis exercise.

6 MARKET DEFINITION – ISSUES COMMON TO MULTIPLE MARKETS

42. This section examines issues that are common to numerous markets. Examining these issues in the current section rather than on a market-by-market basis minimises the need for duplicating the analysis for each market.

43. The issues examined in this section are:

(a) Are retail access and local calling in the same market? (section 6.1) This issue is relevant to both the fixed and mobile markets.

(b) Which technologies fall into the fixed access and calling markets? (section 6.2) This discussion relates to the fixed access, local calling and international services. Mobile technologies are not discussed in this section (being discussed subsequently).

(c) Are fixed and mobile services sufficiently substitutable that they lie in the same market? (section 6.3)

(d) Are there distinct markets for different customer types, and if so what are the customer market delineations? (section 6.4) This issue is relevant to all retail markets considered.

(e) Are the markets national or are there distinct geographic markets? (section 6.5) This issue is relevant to all markets considered.

6.1 Are access and calling in the same market?

44. This section is concerned with access and local calling service markets. It first considers whether retail access and local calls could be in separate markets (section 5.1(a)). It finds that, in the context of Bermuda, retail access and local telephony are best considered part of a bundle, and hence lie within a single market for that bundle. Section 5.1(b) considers retail access and international calling, finding that international calls constitute a separate market.

45. For analytical convenience, this section considers both fixed and mobile supply of access, but its conclusions are not affected by whether fixed and mobile services are considered to be in the same or different markets (on which see section 6.3 below). Moreover, it makes no assumptions about divisions along other market dimensions (for example, customer and geographic markets).

a. Retail access and local calling

46. Three retail product lines are suggested when considering access and calling: retail access on a standalone basis; local calling on a standalone basis; and the bundle of access and local calling.[3] This section considers whether these services lie in the same or different markets.

(i) Bermudan practice suggests a market for the bundle of telephony access and local calling

47. Market expectations and commercial and regulatory practice in Bermuda strongly suggest a market for the bundle of telephony access and local calling.

48. In Bermuda, narrowband access and local calling have been almost universally retailed only as a bundle. Consequently, on the demand side of the market, it is likely that the vast bulk of retail customers view access and local calls as a single service.[4] This is consistent with the nature of demand: no retail customer is interested in access for its own sake. Rather, the demand for access is derived from the demand for call receipt and the demand to make calls, and hence there is no demand for narrowband access without calling. Thus, a monthly access charge is not a price for a service separate from calling. Instead, it is the price for the right to make and receive calls, just like a literal access charge at an amusement park is the price to enter the park so one can get on the rides (which may or may not cost extra).

49. On the supply-side of the market, network access must be supplied if local calls are to be made and received. Only Class B licensees can provide access and

[3] Narrower potential retail product markets are the capacity to make, without the capacity to receive, calls and the obverse. However, the RA knows of no examples in which a carrier retails one of these services without retailing the other, an outcome likely dictated by telephony's cost structure. The same network must largely be built, and hence largely the same costs incurred, whether a customer wants to only receive or only make or both receive and make calls. In all cases, an access line has to link each customer to an exchange, and exchange or exchanges must be built, with transmission between exchanges. A consequence of this economy of scope is that efficiency dictates joint, though not necessarily bundled, retailing of the capacity to make and to receive calls. An efficient firm that supplied one of these services would supply the other.

[4] Ofcom, 2009, Fixed Narrowband, at ¶4.36, also rely on customer perceptions in defining whether a bundle exists, but find for separate markets because of continued, albeit increasingly limited, separate supply of those services (see discussion in the main text below).

local calling. Current B licensees that retail these services include fixed line suppliers, BTC,[5] QCL, fixed wireless provider, NRC; and cellular providers, BDC, DCB and M3.[6]

50. None of the BTLs retail fixed access independent of local calling or *vice versa*. Currently:

51. BTC offers a variety of fixed telephone service options to residential customers, as depicted in the table below:

Table 2: BTC residential voice service plans[7]

Residential Voice Service Plans	Monthly Charge	Free Call Allowance
Residential Economy Line	$14.00	50
Residential Basic	$26.00	50
Residential 100	$35.00	100
Residential 150	$45.00	150
Residential 200	$55.00	200
Unlimited	$59.00	unlimited
DSL 4.0 Unlimited Local calling	$89.00	unlimited
DSL 4.0 Premium With Calling Features	$99.00	unlimited
DSL 6.0 Unlimited Local calling	$99.00	unlimited
DSL 6.0 Premium With Calling Features	$109.00	unlimited
DSL 8.0 Unlimited Local calling	$109.00	unlimited
DSL 8.0 Premium With Calling Features	$119.00	unlimited
DSL 10.0 Unlimited Local calling	$119.00	unlimited
DSL 10.0 Premium With Calling Features	$129.00	unlimited

* For the Residential Economy line through Residential 200 services calls over the free calling allotment are priced at $0.20 per call/per hour.[8] BTC similarly bundles access and voice.[9]

(a) QCL service is largely confined to the Hamilton and Southside areas.[10] QCL provides services primarily to business customers,[11] but

[5] Table 24 provides a list of full company names.

[6] While the cable television providers, BCV and WOW have Class B licences, they do not presently market any telephony services.

[7] See http://www.btc.bm/Residential/LocalPhone/Default.aspx and http://www.btc.bm/Residential/DSL/Pricing/Default.aspx, viewed 21 July 2012

[8] Other calling features are offered separately; http://www.btc.bm/ProductsPrices/Default.aspx, viewed 21 July 2012.

[9] http://www.btc.bm/ProductsPrices/Default.aspx, http://www.btc.bm/Business/DSL/Pricing/Default.aspx, viewed 21 July 2012.

they have also recently begun offering a virtual internet phone service (Qvip) aimed at the retail and business markets.[12] QCL bundles access with unlimited calls.[13]

(b) NRC bundles access, local telephony and differing speeds of broadband access. None of these services are offered separately, but different calling features can be added to the package.[14]

(c) As in virtually all other countries in the world, the mobile providers, BDC, and DCB retail mobile telephony access bundled together with local calling. BDC also offers a "fixed" wireless telephony service over their Yak product, which also bundles access with local calling.[15]

52. The regulatory environment in Bermuda has also been, and presently is, consistent with access and local calls being bundled as a single service. No wholesale services are currently required or supplied that would allow a Class B licensee to supply local calling on its own, though that is not true for international calling (see section 5.1(b) below).

53. Customer expectations, and firm and regulatory practice thus suggest there is a product market for a single service, the bundle of access and local calling, and nothing else.

(ii) Bundling access and local calling creates economies in production and consumption

54. The almost universal bundling of access and local calling in Bermuda is also consistent with efficient production and consumption. The bundling of these services creates significant economies of scope, and hence cost savings, in both consumption, and especially production. Thus, absent regulatory distortions, it would not be commercially sensible to offer unbundled supply of one or both services.

55. Starting on the demand-side of the market, customers face lower costs in consumption when access and local calling are bundled:

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[10] http://www.quantum.bm/index.php/page/about-quantum and http://www.quantum.bm/index.php/page/overview, viewed July 2012.

[11] http://www.quantum.bm/index.php/page/overview and http://www.quantum.bm/index.php/page/voice-services, viewed July 2012.

[12] See, http://www.quantum.bm/index.php/page/qvip, viewed July 2012. The Qvip service operates on mobile phones and/or personal computers and is not available to be used with a regular home phone. It appears to be a Skype like service.

[13] http://www.quantum.bm/index.php/page/voice-services; viewed July 2012.

[14] See, http://northrock.bm/internet/wireless and http://northrock.bm/pdf/forms/phone_wireless.pdf; viewed July 2012.

[15] http://www.cellone.bm/plans/plans_yak.html.

(a) When shopping around for services, the customer does not have to separately investigate access suppliers and local call providers.

(b) Once a subscription decision is made, the customer does not have to undertake the difficult task of determining whether any service problems they are experiencing are due to one provider or the other. Instead, of having to potentially make many calls to get two separate parties to sort out where the fault lies, the customer can simply call the unique responsible party, the bundled service provider.

(c) The customer only need pay a single, rather than two, bills.

(d) To make billing and service changes, the customer again need only make one, rather than two, calls.[16]

56. On the supply-side, bundling access and calling reduces carriers' costs. Bundling allows carriers to:

(a) integrate network development, such as when and where to install a new switch, or to engage in concentration of access traffic without costly negotiations between the access and exchange/interexchange network providers;

(b) engage in integrated network fault detection and repair, avoiding costly interactions between different network providers;

(c) focus their marketing on what drives demand, calling, rather than trying to separately market access;

(d) provide a single customer help desk and customer service (rather than two separate ones, especially important in terms of costs savings for small networks such as those of Bermuda); and

(e) significantly reduce billing costs, since only one bill, rather than two, must be mailed and serviced.[17]

57. The preceding demonstrates that there is a commercial imperative to supply both access and local calling services together, but it also shows that there are commercial benefits to only selling them together in a bundle. For example, bundling provides the beneficial effects of a single bill to both carriers and end-users.

(iii) International practice and the impact of regulation on bundling

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[16] JD Power research, as cited by the US National Cable Television Association, 2007 Industry Overview, page 19, http://i.ncta.com/ncta_com/PDFs/NCTA_Annual_Report_04.24.07.pdf (visited 25 May 2010). And, Michael Pastore, Consumers Prefer Local Telco for Bundling, October 2001, http://www.clickz.com/stats/sectors/hardware/article.php/899271 (visited 25 May 2010).

[17] Bell Atlantic Annual Report 1997, http://investor.verizon.com/financial/quarterly/pdf/97BEL_AR.pdf (visited 25 May 2010).

58. International practice is also consistent with a market for only the bundle of access and local calling. Most tellingly, in markets outside of Bermuda, it is rare for local calling to be supplied separately from, that is, not bundled with, access. Further, while it is not uncommon for domestic (as well as international) long distance to be separately supplied, in most if not all cases, this is so due to a regulatory mandate. In particular, in these cases the incumbent access provider typically was (and often still is) required to supply to long distance carriers: (1) a long distance call origination and termination service (much like the case for international service in Bermuda); (2) the ability for the long distance carrier's customer to directly dial long distance with a single digit access code (a service called preselection); and in many cases, (3) billing services. Sometimes, for example, as in the UK, but less commonly, such requirements were also applied to local calls.

59. Moreover, the evidence from these regulated exceptions tends to suggest that local and/or long distance retail call supply without access would not exist in the absence of mandated call origination and termination, whether with or without preselection and wholesale billing services. For example, in countries where wholesale regulation allows for bundling access and calling, notably through full service resale and local loop unbundling, there have been substantial declines in the use of preselection service, and a shift toward supply of the access and local and long distance calling bundle. Thus, for example, for many years, British Telecom was forced to supply domestic long distance calling separately from access, and to wholesale preselection enabling separate call provision. Yet, today in the UK, separate purchase of access without calling is becoming increasingly rare. In 2009 80% of BT's residential customers bought access bundled with calling, and all other carriers did not even market the services separately. Presently, all of the access services that BT actively advertises include some free calling.[18] Despite this, in 2009, somewhere between 24% and 38% of customers still thought of access and calling as separate purchases, and for this and other reasons Ofcom found for separate markets.[19]

[18] It is still possible to buy access only, although BT includes free weekend calling with a commitment to a 12 month contract. The access only plan is also difficult to find on BT's website—see http://www.productsandservices.bt.com/consumerProducts/displayTopic.do?topicId=31674&packid=uwp, sighted August 2012.

[19] Ofcom, 2009, Fixed Narrowband, ¶4.35-39. The RA considered conducting a consumer survey in Bermuda, but considered this unnecessary given the prevalence of the access plus local calling bundle. Moreover, such surveys do not establish how consumers behave, but merely indicate their views. Thus, such a survey would not provide definitive evidence of whether the services are the same or separate markets. The RA obtained quotes and concluded that these costs would be unjustified given the limited additional clarity such surveys would bring.

60. Similarly, in the US, unbundled long distance supply is increasingly uncommon,[20] and the largest long distance carriers have long since been absorbed by access providers.[21]

61. The EC 2003 markets listed two separate fixed product markets, one for fixed access and another for fixed calls (though in practice local calls were often bundled with access),[22] in large part due to the availability of regulated pre-selection. Even then, the EC considered that the wholesale mobile market (market 15) was for an access plus calling bundle. The EC 2007 markets maintained an access and calling distinction in the fixed voice market.[23]

(iv) Conclusions on access and local calling

62. The RA draws the conclusions that access and local calling are in the same market on the basis that:

(a) in Bermuda bundling of access and local calling is the predominant norm (Section (i).);

(b) cost savings in both consumption and production explain the market's preference for bundled provision of these services (Section (ii)); and

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[20] BusinessWeek Online, 'For Whom the Baby Bells Toll' May 1996, http://www.businessweek.com/archives/1996/b3474050.arc.htm, (visited 25 May 2010).

BusinessWeek Online, 'Telecom: What Happens When the Walls Falls?' January 1996, http://www.businessweek.com/archives/1996/b3457157.arc.htm (visited 25 May 2010).

SBC News Release, 'SBC-Ameritech Merger Will Jumpstart Competition' October 1998, http://www.sbc.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=2715 (visited 25 May 2010).

"On December 3, 2003, the final Bell operating company's application (Qwest) was approved to provide in-region interLATA service in the state of Arizona." FCC (2004) Trends in Telephone Service, Washington DC, Federal Communications Commission. p. 9-3; Table 9.11 provides a list of the Bell operating companies' applications and their outcomes; see also Table 9.12.

[21] In July 2004, the then largest US long distance carrier, AT&T withdrew from the residential market, where it largely did not provide access services (Martha McKay, "AT&T halts pursuit of residential customers", The Record, Hackensack, N.J., Knight *Ridder/Tribune Business News*, 23 July 2004). MCI was the second largest long distance carrier. In a two-month period in the same year, MCI's customer base fell from 20 to 9 million, largely due to lost long distance only residential customers (*Washington Post*, "MCI May Write Down Value of Assets," August 2004, http://www.washingtonpost.com/ac2/wp-dyn/A53037-2004Aug9?language=printer; viewed 25 May 2010). Both carriers were subsequently taken over incumbent access providers.

[22] Each product market was split by customer group into markets 1 and 2 for access, and markets 4 and 5 for domestic calling (Annex to EC 2003 markets).

[23] EC, 2007, COMMISSION RECOMMENDATION on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (Second edition)—see Annex.

(c) overseas regulation intended to allow supply of (generally long distance) calling separate from access (much as is the case for international long distance in Bermuda), led to separate provision of access and (typically long distance) calling, but that this division typically disappeared as regulation progressed (see Section iii).

63. The RA finds that the conclusion that access and local calling are in the same market holds for both fixed and mobile services.

Consultation question 1: Do you agree that fixed narrowband access and local calling form a single market?

Consultation question 2: Do you agree that mobile access and local calling form a single market?

(b) Retail access and international calling

64. This section considers the question of whether international calling is in the same market as retail access and local calling.

65. The existing telecommunications licensing regime prevents the joint supply of international calls with retail access. Class A licence holders (other than Brasil Telecom) are permitted to retail non-VoIP international calls. Class B license holders are permitted to own domestic networks (fixed or wireless). These two classes of license are distinct meaning that a firm cannot currently hold both a Class A and Class B license. By regulatory design, therefore bundling of non-VoIP international calls with retail access and/or local calls for either fixed or mobile services is restricted. The RA notes, however, that DCB currently supplies its prepaid customers with international calling. The RA presumes that in doing so DCB is reselling the international services of a Class A license holder.

66. Class C license holders are authorized to provide VoIP international calls. Because of this, NRC is able to (and does) jointly supply retail access, local calls and international calls over its WiMAX network. As NRC states on its website, "North Rock Wireless is better than ever with a low price, higher speeds, and enhanced calling features! Simplify your life and get your Local Calls, Internet, and Long Distance all on one bill, and all from one company."[24] As will be discussed in section 5.2(b), NRC's calling services are provided using WiMAX.

67. In other countries, international calls from mobile phones are generally supplied as part of a bundle with access and domestic calling. With respect to calls from fixed lines, international evidence on the commercial reality is somewhat mixed, especially for residential customers. In the UK, regulatory analysis has found a movement towards bundled calling markets. For example, in 2003 Oftel treated international calling as a distinct market from access lines and domestic calls[25], but in 2009 Ofcom found that international call services formed a bundled market with other

[24] http://www.northrock.bm/residential/access/access_wireless.html

[25] Oftel (28 November, 2003), *Fixed Narrowband Services: Identification and analysis of markets, making of market power determinations and setting of SMP conditions – Final Explanatory Statement and Notification.*

types of calls that originated on fixed lines[26]. However, international experience also shows that there is a large number of independent international calling providers (most notably international calling cards operators) offering low rates for calls from fixed lines and that these are popular internationally, such that even if customers purchase bundled offerings of access, domestic calls and international calls from a single supplier, they may actually make use of calling cards for a large part of their international traffic.

68. Turning to the specifics of the Bermudan markets, it seems likely that the implementation of the new unified (ICOL) licenses will lead to an increasing amount of bundling over time. However, the RA concludes that over the period of four years covered by this analysis there is likely to continue to be a significant amount of unbundled international service supply and as such considers it appropriate to that international calls are not part of the same market as narrowband access and local calls. International calls will be priced differently, in part, because termination rates vary considerably between international jurisdictions and Bermuda. A domestic call has a zero termination rate, while calls terminated abroad can have a sizable termination fee. The variation in termination rates makes it difficult to price international and domestic calls on a bundled basis.

Consultation question 3: Do you agree that international calls are not part of the market that contains retail fixed narrowband access and local calling?

6.2 Means of delivering fixed access and local calling

69. The option and ability to make and receive local calls, hereafter referred to as local voice telephony, can be provided to end users via fixed or mobile technologies. The ensuing discussion examines whether fixed local voice telephony provided over different means are close substitutes. The questions of whether fixed services are in the same market for mobile services and *vice versa* are respectively postponed to section 6.3.

70. Traditionally, voice telephony was supplied from a fixed location connected to an exchange by a pair of copper cables (standard telephony). This technology allows sound to be transferred in an analogue format at a bit-rate of 64Kb/s. Standard telephony service includes access to emergency 911 service and, where available, to enhanced or e-911 service, which identifies a caller's physical location when a 911 call is placed. Standard telephony service also does not rely on commercial power supply as low voltage electrical power is provided over the phone line. This allows the telephone service to remain operational in the event of a power outage at the customer's premises (so long as the line connecting the customer is not cut, and the provider's switches remain powered).

71. It is unlikely that there is a product market that is narrower than the demand for, and supply of, standard telephony. However, fixed telephony can now be delivered over a range of physical infrastructures other than copper cable: hybrid fibre coaxial cable (HFC);[27] various forms of fixed wireless, also called wireless local

[26] Ofcom (15 September, 2009), *Fixed Narrowband Retail Services Markets : Identification of markets and determination of market power*.

[27] This type of cable is most commonly first installed to provide subscription TV services.

loop (WLL);[28] various versions of fibre, denoted as fibre-to-the-x or FTTx;[29] VoIP; copper wire again, using an integrated service digital network (ISDN); and even the mobile phone network. Consequently, a market definition that only encompassed standard telephony may be too narrow.

72. This section examines in turn each of these physical infrastructures, determining whether the telephony service delivered over them is a close substitute for, and hence should be considered in the same market as, standard telephony.

(a) HFC and DOCSIS

73. Cable operators typically offer voice over the Internet, or VoIP telephony on their HFC networks using the PacketCable IP-Based architecture enabled by the Data Over Cable Service Interface Specification (DOCSIS) standard.[30] DOCSIS VoIP offers similar or better voice quality service to standard telephony. It is capable of providing e-911 services, where that service is available, and of staying live during power outages at the customer's home or at the network node.[31]

74. Summarising the preceding, DOCSIS VoIP produces a service that is in most respects functionally identical or better than standard telephony (the only material respect in which it is worse is the need to register for e911 service). As a consequence, DOCSIS VoIP would be a close substitute for standard telephony if it could be profitably supplied at a price that reflected competitive rates for standard voice telephony. That in fact is the case. Where it is offered, DOCSIS VoIP has

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[28] Using a variety of technologies including WiMax and microwave relay.

[29] FTTx is an acronym that is commonly used to refer to the several distinct fibre configurations available. For example, fibre-to-the-node (FTTN), which refers to the configuration where fibre is terminated at a telecommunications company street cabinet that may be up to several kilometres from a customer premise with the connection to this premise being copper; fibre-to-the-curb (FTTC), which refers to a configuration that is similar to FTTN, but with the fibre cable being brought much closer to the customer premise; and, fibre-to-the-premise (FTTP), which refers to the configuration where fibre is brought directly to the customer's premise.

[30] See, for example, McIntosh, David and Maria Stachelek, *VoIP Services: PacketCable™ Delivers A Comprehensive System*, NCTA 2002, available at www.cablelabs.com/packetcable/downloads/NCTA02_VOIP_Services.pdf DOCSIS 3.0 is the standard presently being adopted by cable companies the world over, see, for example, *DOCSIS 3.0 Takes Off Worldwide*, available from http://www.cablelabs.com/news/newsletter/SPECS/OctNovDec_2009/story6.html. See also, Waverman, Leonard, Kaylan Dasgupta, and Erik van der Merwe, *Connectivity Scorecard 2010*, at page 17, where it is noted that a high degree of ultra-high-speed broadband is being delivered in Europe, Canada and Europe by cable companies using the DOCSIS 3.0 standard. Report is available at http://www.connectivityscorecard.org/.

[31] At premise power can be supplied directly over the HFC cable, as, for example, Cox Cable have chosen to do in some regions (for example, in Louisiana, see http://www.cox.com/support/louisiana/telephone/telephonefaq.asp, visited 26 May 2010), or by providing cable modems with power backup (for example, Comcast's cable modems have 8-hour battery backup—https://digitalvoice.comcast.net/Comcast/DVPPortal/com/comcast/online/dvp/presentation/pageflows/Help/getFAQ.do). Cable providers must provide generator backup at network nodes (just as is required at any powered node, such as an exchange, on a standard telephone network).

proved to be highly competitive with standard telephony.[32] For example, DOCSIS VoIP has a customer base in the tens of millions in the US alone.[33]

75. On this basis, the RA concludes that DOCSIS VoIP is a close substitute for, and therefore lies in the same market as, standard telephony.

(b) WLL, with a focus on WiMAX

76. WLL technologies may also be used to provide fixed telephony. The sole WLL provider in Bermuda is NRC[34], which has deployed a fixed WiMAX[35] network so we focus on this technology.

77. WiMAX standards now support quality of service (QoS) technologies[36] that allow the provision of voice services comparable to those that can be obtained through standard telephony and DOCSIS VoIP. Such voice over WiMAX (VoWiMAX) service can also provide e-911 services, though this typically (but not necessarily) requires customers to go through the extra step of registering their service location.[37] As with some forms of cable telephony, WiMAX service requires the use of a back-up power source to keep any phone service operational during a power outage.

78. Clear Communications is competitively providing VoWiMAX against standard telephony and DOCSIS VoIP in more than two dozen U.S. cities with further rollouts planned.[38] For example, in Las Vegas Clear, is offering an Internet and home phone bundle for $55 per month. This compares favourably to AT&T's home phone and

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[32] This conclusion is not due to the cellophane or reverse cellophane fallacies discussed in Appendix G. Given US standard telephony rates are generally regulated, or, in some locations, have been regulated until very recently, existing prices for standard telephony are unlikely to reflect substantial market profits, but rather are likely to be not too dissimilar from competitive prices. Accordingly, the fact that DOCSIS VoIP appears a close substitute at current prices for standard telephony is not due to the cellophane fallacy. At the same time, the fact that commercial supply of DOCSIS VoIP occurs at these prices rules out any reverse cellophane fallacy.

[33] Federal Communications Commission, Industry Analysis and Technology Division, Wireline Competition Bureau, *Local Telephone Competition: Status as of June 30, 2011*, June 2012, pp.1-2.

[34] See Table 24 for a list of company abbreviations.

[35] WiMAX—Worldwide Interoperability for Microwave Access—or the IEEE 802.16 standard—see http://www.wimax.com/education.

[36] http://wimax.com/education/faq/faq26.

[37] See http://www.anderhancommunications.com/911.htm for an explanation of the differences between access to 911/e-911 services using a VoIP network such as Clear's and accessing these services over the traditional PSTN.

[38] See, for example, http://www.clearwirelessinternet4g.com/clear-questions-answers.html and http://www.clearwirelessinternet4g.com/clear-coverage.html. Clear claims the service is identical to standard voice telephony (http://www.clearwirelessinternet4g.com/clear-questions-answers.html). Irish Broadband's *Talk Home* WiMAX voice product provides a European example (http://www.irishbroadband.ie/products_display.php?id=17).

Internet bundle priced at $59.95 per month.[39] On the basis of its functional similarity to standard telephony and because it is being commercially used in other jurisdictions as a substitute for standard telephony service, the RA concludes that VoWiMAX service is in the same market as standard telephony service.

79. The preceding implies that NRC's VoWiMAX service is in the same market as BTC's standard telephony service. NRC's service provides all the functional benefits of BTC's telephony product, except that the service is inoperable in the event of a power outage at the end-user premises. NRC has advised the RA that its WiMAX network provides carrier grade local and international telephony service that is identical in quality to BTC's telephony service, and, as with BTC, 911, but not e911, service.

80. Another way of testing whether the two services are in the same market is to consider how they are priced, how customers respond to these prices, and whether one supplier could not profitably engage in a SSNIP if the other supplier were a fully effective competitor. BTC's present standard telephony prices are not directly comparable to those of NRC. NRC offers VoWiMAX residential standard access at $49.95 per month, which includes unlimited local calls and optional broadband access at speeds up to 1Mbps (not offered on BTC's standard plan).[40] BTC's rate for residential standard access is $26 per month, which includes 50 local calls. Overage calls are then charged at $0.20 per call/per hour. Consequently, NRC's residential service customers gain broadband access and do not have to worry about the time they spend on the telephone. In contrast, BTC's residential standard service customers likely do keep in mind that each call, or call over one hour, brings additional costs. They also do not obtain broadband access. BTC now also offers several other plans, including one with unlimited calling for $59 per month.

81. Focusing on calls alone, BTC's residential standard service customers are financially better off on BTC's standard plan so long as they can expect to make, beyond the first 50 local calls, less than 115 local calls that do not exceed an hour in length. Approximately [CIC --%] standard plan customer base fall into this category.[41] Despite this, NRC has only [CIC --%] of BTC's plus NRC's residential customers.[42] This lack of customer switching weakly suggests NRC's service may be in a separate market to BTC's. Switching costs may explain why some of these customers are still on the BTC standard plan, including the lack of LNP and learning costs (which delay rather than permanently prevent switching). Customers may also consider that NRC's service provides lower quality calling or customer service or is less reliable in a power outage.

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[39] Both bundles have comparable Internet speeds and calling features as part of their offerings. For the Clear offering see, http://wimaxlasvegas.net/home_services.html. For the AT&T offering see http://www.att.com/gen/general?pid=11098&CID=IBA-CSlg287104109147g1

[40] See http://www.northrock.bm/downloads/Local-Phone-Only.pdf. NRC also offers local voice service bundled with Internet access and broadband services. Bundled options will be addressed at a later section in this document.

[41] Based on BTC data submitted to RA, 12 June 2009.

[42] Based on NRC data submitted to RA in February 2010; BTC data submitted to RA, 12 June 2009.

82. To consider this question further, the RA estimated the financial impact on BTC of a SSNIP of 5% and of 10% on its residential standard plan (see Appendix B for details). An approach was taken that would overestimate the profitability of a SSNIP because no allowance was made for low demand customers that might switch to, for example, BTC's residential Economy Line service. The results of the SSNIP analysis suggest that BTC could make small profits by increasing price by 5%, and larger profits by increasing price by 10%. However, as discussed below, this does not allow drawing the conclusion that fixed wireless telephony is in a different market to standard telephony.

83. Turning to business offerings, NRC provides a single line business service with unlimited local calling for $50 per month, BTC's standard single line business service is $32 per month, which includes 50 local calls. Overage calls charged at $0.20 per call/per hour. Thus, BTC's business customers would be better off so long as, beyond the first 50 calls, they do not make more than 90 local calls, so long as each call lasts less than an hour. Consequently, the difference between BTC's and NRC's plans again is that NRC seeks the custom of those that expect to make many calls, and/or those who are willing to pay an upfront "insurance" fee in return for a stable bill. However, the difference between BTC's and NRC's business tariffs is narrower than the difference in the residential market, and hence NRC's business tariffs are more competitive.

84. A SSNIP test was applied to BTC's business tariff by applying the same methodology and assumptions from the residential analysis (see Appendix B). That analysis demonstrates that both a 5% and 10% SSNIP on BTC's standard single line business service would be profitable under all of the avoided cost and take-up scenarios depicted.

85. While the SSNIP evidence is suggestive that the two services belong in separate markets, other factors suggest an opposite conclusion:

- As noted, the analysis was conducted on assumptions likely to exaggerate BTC's profits from the SSNIP, hence in actuality the small profits reported here would likely be even smaller.
- As was also noted, switching costs, notably those related to the lack of number portability in Bermuda, are likely an explanatory factor in the observed lack of customer switching even among those customers who would be economically better off on NRC's network. Support for this supposition may be found by looking at churn rates in those countries where LNP is present. For example, a 2009 reports notes that the average annual churn rate for fixed-line telephone service in European countries is 18%.[43] And there is the added factor that pent-up demand due to lack of number portability can be significant. One study found that during the first several months after LNP was introduced monthly average churn rates jumped from 2.5% – 3.5% to 9% – 10%.[44] If churn rates such

[43] *Consumers' views on switching service providers*, a report for the European Commission, Directorate-General "Health and Consumer Protection", January 2009, at page 10. Available at http://ec.europa.eu/public_opinion/flash/fl_243_sum_en.pdf.

[44] *A Global Perspective on Number Portability*, Syniverse Technologies, Inc., May 2004, at page 16. Available at

as these hold true in Bermuda post introduction of LNP (and there is no reason to suppose they would not) the likelihood of BTC being able to profit from the imposition of SSNIP would be significantly reduced if not eliminated altogether.

- The presented estimates are not sophisticated, and hence carry significant "forecasting" error, especially so in the case of the lower profit estimates, which may not be different from zero.
- It is possible that BTC's current prices, which are set subject to regulatory approval, are below competitive levels. For example, BTC's current rates were set with regulatory approval and have been in place for the past eleven years, and BTC has petitioned the Commission to increase the rates of its residential standard access service, along with the rates for overage calls, on the grounds that the current rates did not recover BTC's costs of providing the service. Rates regulated below competitive levels make a SSNIP toward competitive levels profitable, but this does not show that the services are in separate markets. That would be to commit the reverse cellophane fallacy (see Appendix G, section 3.3). If BTC's prices are, in fact, *below competitive levels* (so would fail to recover efficiently incurred costs) then the preceding SSNIP tests would exaggerate the degree to which BTC could profitably engage in a SSNIP given NRC's presence. Consequently, such tests could erroneously conclude that BTC's and NRC's telephony services belong in separate markets (the reverse cellophane fallacy). This possibility is cast into doubt by a benchmarking sturdy performed by the Commission in August 2009. The results of that study indicated that BTC's current prices are above those of other island jurisdictions, implying that they may not be below competitive rates. This leads to the conclusion that placing BTC's and NRC's telephony services in separate markets may not be erroneous.
- Even accepting the assumptions of the SSNIP test conducted and assuming BTC's prices are set at competitive levels, the results of the tests that suggest BTC's and NRC's services are in separate markets could be misleading if BTC has SMP. Even if the two services are in the same market, it may be that, unregulated, BTC could profitably engage in a SSNIP because competition from NRC is weak (a version of the cellophane fallacy). NRC's weakness as a competitor to BTC's service is highlighted by the company's small share (approximately [CIC --%]) of the fixed wireline access market).

86. The RA is unable to determine whether BTC's present standard telephony tariffs are below competitive levels. In 1999, the Commission put the current tariffs into place, but in reaching this decision made no ruling concerning whether or not the new rates covered BTC's cost of providing standard telephony service. Moreover, the Commission's recent enquiry into BTC's proposed changes to its tariff concluded there was not sufficient cost data before it to determine what cost-recovering prices would look like.

87. Concerning NRC's rates, the RA is of the view that it is unlikely that these are not competitive given:

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http://www.ocecpr.org.cy/media/documents/Reports/ElectronicCom/EC_Report_SyniverseMNPPortability_EN_05-2004_AP1.pdf.

- BTC's prices have been heavily regulated. Thus, even if, despite such regulation, BTC's price, as experienced by high demand customers, incorporated economic rents, presumably for most customers, those rents are not exorbitant. Because NRC's prices for high demand customers are lower than those BTC has recently introduced, even if they were supra competitive, NRC's prices would embody even less rents.
- NRC is a relatively new entrant using a new technology to compete against an established firm. Consequently, it must price so as to overcome customer inertia due to switching costs, including inertia due to a lack of local number portability, and customer ignorance as to the availability of NRC's service, as well as customer fears about the quality of the new service and the reliability of NRC. This is likely to have required NRC to price more competitively than monopolistically in order to convince end-users to try the new service (a conclusion supported by NRC's relatively small residential customer base—approximately [CIC -- %] of residential fixed line customers[45]).

88. BTC also offers a residential price plan that provides unlimited calling for $59 per month and so in structure mimics NRC's plan, but at a price which is 20% higher than NRC's present prices. BTC's price for unlimited local calling is inconsistent with the two services presently being in the same market (assuming NRC is an effective competitor), but does not conclusively demonstrate this (for example, the RA does not, at this time, possess data that would enable it to analyse how this recent tariff change has affected BTC's market share vis-à-vis NRC's).

89. BTC's recent tariff changes also include a Simply DSL 1Mbps product, which permits a customer to purchase broadband access at 1Mbps for $19.00 per month. This can be combined with BTC's Residential Basic service of $26.00 for a price of $45.00 for a bundle of broadband access and local telephony (though with only 50 local calls) which is 9% less than NRC's price for bundled unlimited local telephony and 1Mbps broadband access. This pricing strategy appears to be designed to appeal to a customer strata similar to that targeted by NRC: more cost conscious consumers who desire lower priced broadband access coupled with fixed local telephony service. Consequently, this price move suggests that the two services may be in the same market.

90. Finally, a third way of considering whether the services are in the same market is to look at how suppliers of the services view each other. BTC's data submissions portray NRC as one of its competitors in the fixed access market and depict BTC's recent tariff modifications as being a competitive response to NRC's offerings, among others.[46] NRC views BTC similarly.[47]

91. Summarising: (1) international and product functionality evidence strongly suggest BTC's standard, and NRC's VoWiMAX, telephony are in the same market;

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[45] Calculation based on confidential data submitted by NRC in February 2010 in response to a RA data request and from BTC's confidential response of June 12, 2009 to a RA data request of April 20, 2009.

[46] See, for example, BTC's confidential response of June 12, 2009 at page 48, Table 6.

[47] See, for example, NRC's confidential response of June 10, 2009 at page 6, where the company designates itself as being the first competitor to BTC in Bermuda.

(2) the SSNIP exercise and price comparisons only weakly suggest that BTC's and NRC's basic product offerings belong in different markets; and (3) BTC and NRC see themselves as direct competitors.

92. The RA finds the SSNIP tests and price comparison unpersuasive for the reasons given in the preceding paragraphs. More persuasive, in the RA's view, is the fact that the two services are functionally equivalent, are in competition with each other in other jurisdictions and that the history of NRC's and BTC's relations in Bermuda has been one of competitive rivalry. For these reasons the RA concludes that the two services belong in the same market. [48]

(c) Fibre

93. Voice telephony can also be delivered by way of various fibre configurations, generally denoted as FTTx.[49] These types of fibre configurations are being rolled out by PSTN operators around the world as they struggle to keep up with the growing bandwidth demands end-users are placing on their networks. They are also being rolled out as a competitive response to cable-TV operators. Verizon's deployment of a FTTP network against Comcast HFC network is an example from the US.[50] Verizon's Fiber Optic Service (FiOS) is now available to approximately 16.5 million premises, or to about one-third of the households in Verizon's service territory and the FiOS digital phone service that is provided over the network is viewed by the company as a replacement for its current voice systems.[51] These FTTx networks provide support for voice QoS technologies that is at least equivalent to what is currently available on standard telephony and DOCSIS VoIP and standard telephony networks. 911 and e-911 service are also supported by FTTx networks.

94. That telephony over fibre is competitive with DOCSIS is further suggested by cable companies' rapid upgrades to the DOCSIS 3.0 standard, which appears to be in part a response to the PSTN operators' FTTx deployments.[52]

95. Because FTTx (1) is being employed by telephone companies as a replacement for the standard telephony network, (2) supports QoS technologies allowing equally high, if not better, quality calls than those available on a standard telephony network, (3) is being rolled out as a response to competitive pressures generated by cable company DOCSIS networks, and (4) is prompting competitive

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[48] The RA is convinced, for the reasons given in the main text above, that NRC has no SMP *even if NRC's service were in a market separate from that of BTC's*. Further, if NRC's service were excluded from the market containing BTC's standard telephony plan, it would still be necessary to account for it in considering whether BTC has SMP in standard telephony (on which see section 13 in the *Application of the Market Review Process: Significant Market Power* document). The RA therefore concludes that the inclusion or exclusion of NRC's service in the market that contains BTC's standard plan would not materially change any analysis as to whether either carrier has SMP.

[49] See footnote 29 above.

[50] See, for example, http://www.high-speed-internet-access-guide.com/dsl-vs-cable.html.

[51] See, for example, http://fiberforall.org/verizon-fios/; and http://newscenter.verizon.com/kit/vcorp/factsheet.html.

[52] See, for example, http://www.docsis-30.com/.

responses from cable companies, the RA concludes that voice over FTTx is in the same market as standard telephony service.

96. In Bermuda, the principal supplier of fibre-based services is QCL, which supplies voice over fibre, in addition to other services, to commercial customers.[53] (BTC is also upgrading its network infrastructure. It has transitioned its core network to a Next Generation Network based on the Internet Protocol, which included pushing fibre closer to the customer. However, its network still cannot be described as employing an FTTx technology.[54]) QCL's lowest level service offering is a standard single line business service at $56.50 for unlimited local usage. However the main focus of the company's marketing and service delivery efforts is on the high capacity, high volume commercial market.[55]

97. Here again it is difficult to determine whether QCL, given its current price of $56.50, would constrain competitive supply of voice service for three independent reasons: first, the price is not readily comparable with BTC's present prices; second, even if it were clear that QCL's price would not prevent BTC from engaging in a SSNIP (say by raising its present business monthly fee 15% from $32 to $36.80), this might be due to the reverse cellophane fallacy (that is, BTC's business price may be regulated below competitive levels); and third, even if BTC's prices were competitive, it may be that QCL has market power and so is able to impose a higher price for its business services than BTC (a form of the cellophane fallacy). For these reasons, the RA is not able to determine whether BTC's business standard telephony price is competitive, but considers it unlikely that QCL's price incorporates substantial economic rents.

98. Using the same methodology employed in Appendix B, the RA estimated the financial impact on BTC of a SSNIP of 5% and of 10% on its standard single line business plan when measured against QCL's standard single line business offering. The results of the analysis were sensitive to the assumptions, notably the extent to which learning and LNP would increase switching, and the extent to which BTC avoids costs when it loses a customer. The results of this analysis are presented in Table 3, below.

[53] See, for example, Quantum Confidential Response of February 26, 2009 and the QCL website at http://www.quantum.bm/local_voice_services.htm.

[54] See for example, 2009 Keytech Annual Report at page 8.\; and "BTC launches new PRISM fibre-optic network," http://www.royalgazette.com/article/20120522/BUSINESS03/705229967.

[55] See, for example, Quantum Confidential Response of February 26, 2009 and the QCL website at http://www.quantum.bm/local_voice_services.htm.

Table 3: BTC profitability scenarios for 5% and 10% SSNIPs against QCL's tariff [CIC]

SSNIP	Avoided Cost Scenarios	Per customer avoidable cost	Take Up Rate Assumptions	Percentage increase in revenues net of avoided costs
5%				
	BTC Cost Estimate		No Change	
			10 percent increase	
	LAC NTS Cost Estimate		No Change	
			10 percent increase	
10%	BTC Cost Estimate		No Change	
			10 percent increase	
	LAC NTS Cost Estimate		No Change	
			10 percent increase	

Notes as per Table 25 in Appendix E.

99. As was the case with NRC's standard business line offering (see Table 26), both a 5% and 10% SSNIP on BTC's standard single line business would be profitable under all of the avoided cost and take-up scenarios depicted. While this evidence suggests that the standard single line business offerings of QCL and BTC belong in separate markets, other factors strongly support an opposite conclusion.

100. First (and, perhaps, foremost) there is the incontrovertible fact that, for the reasons presented on the preceding page, voice and data over fiber is viewed in most of the world's jurisdictions as being in the same market as standard telephony service. And second, the factors raised in support of setting aside the evidence of the SSNIP analysis performed on NRC's standard single line business offering (see pages 23 to 25) are equally valid when applied to QCL.

101. Two other factors suggest QCL's FTTx VoIP services are in the same market as standard telephony: QCL's high end commercial enterprise product rollouts in the Hamilton area met with competitive responses from BTC,[56] and QCL made significant inroads into the high end commercial enterprise market and now serves all, or almost all, of the large businesses in Bermuda.

[56] BTC Confidential Response of June 12, 2009, at pages 36 and 53.

102. In summary, the RA finds QCL's FTTx VoIP services to be in the same market as standard telephony on the basis that (1) QCL's FTTx VoIP services are functionally equivalent to the services deployed by telecommunications operators around the world as a replacement for their standard telephony networks, and (2) evidence of competition between BTC and QCL, and QCL's strength in this market.

(i) VoIP

103. Voice services may also be supplied to end users utilizing various forms of VoIP carried over a broadband access line and using the public Internet. The European Regulators Group (ERG) has identified six main types of VoIP:

1. VoIP services in corporate private networks limited to internal communications within large companies.

2. VoIP services which are used within public operator's core networks (essentially being the carrier's choice of network protocol, at least over some links, for call carriage) that do not impinge on retail offers to customers nor their quality.

3. VoIP involving no access to or from the PSTN and for which no telephone numbers are assigned that are part of a national or international telephone numbering plan. Peer-to-peer services conducted entirely through the internet via computer-to-computer communication are an example of this. Computer-to-computer calls over Skype or iChat or [MS's service] provide examples. Such calls are typically free.

4. VoIP involving only outgoing access to the PSTN and for which no telephone numbers are assigned that are part of a national or international telephone numbering plan. Skype57 is an example of this type of service. A subscriber to these services place calls to standard telephony users from a computer or by using a handset plugged into a computer. Calling charges apply but are typically significantly lower than traditional calling.

5. VoIP involving incoming access only from the PSTN for which a telephone number is assigned that is part of a national or international telephone numbering plan. An example of such a service is Reliance iCall, which provides subscribers with a US or UK incoming telephone number. Once purchased, this number works like a normal US or UK local phone number (Reliance iCal numbers are sold for $15 per quarter or $59 per year for unlimited incoming calls). Using this number a customer can then receive calls on their PC based soft phone at no additional charges, no matter which country they have logged into the Internet from. Because the number purchased is a local number calls to that number will only be charged applicable local calling rates, no matter what country the number owner is logging in from.58

[57] http://www.skype.com.

[58] http://www.relianceicall.com/servicesIncomingNo.aspx.

6. VoIP involving both incoming and outgoing access to the PSTN and for which a telephone number is assigned that is part of a national or international telephone numbering plan.59 Examples are given below.

104. VoIP types 1 and 2 are not part of the standard retail telephony market. VoIP type 1 calls are carried on corporate private networks solely for internal communications, typically tailored to meet specific client needs. The systems are designed in house, by third party providers such as Avaya Unified Communications,[60] or by the corporate voice and data subdivisions within incumbent telecommunications companies. These networks, and the VoIP services provided over them, are not publicly available and in most jurisdictions are largely unregulated. While to some degree, VoIP type 1 is competitive with standard voice services, it is unusual for demand for internal voice communications to drive private network deployment. Rather, data needs drive such deployment. Once the data network is in place, it costs little to provide internal voice to locations on the data network.

105. VoIP type 2 is not comparable to standard voice service. It does not provide end-to-end communications, and is not retailed. Rather, it refers to use of Internet protocols to carry voice traffic over telecommunications carriers' core networks (so is not even a service, but rather one means by which transport services are supplied).

106. The RA is also of the view that VoIP types 3-5 are not part of the standard telephony market definition, because they are not similar enough to standard telephony to be considered close substitutes for that service.[61] VoIP types 3-5 typically have lower QoS standards (as anyone familiar with Skype can testify),[62] require the customer to have a computer (sometimes type 6 requires a computer to set up the service), and do not provide access to 911 or e-911 calling services. Indeed, in most locations, including Bermuda, VoIP types 3-5 are primarily used for international calling purposes, typically to enable people travelling abroad to maintain low cost voice contact with friends and family when doing so.[63] For example, Bespoke Solutions Limited (Buzz), which sells VoI handsets, cautions against customers using their service in place of their landline for several reasons: the quality of the calls are often be poorer than a fixed line call, there is no connection with the 911 dispatch centre, local numbers cannot be assigned to end-users, and local VoIP calls in Bermuda would be more expensive than BTC calls.[64]

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[59] *Report on "VoIP and Consumer Issues"*, European Regulators Group (ERG), ERG (06) 39, 2006, at page 7. See also, *The Regulation of VoIP in Europe* (WIK 2008), A Study for the European Commission, WIK-Consult, 19 March 2008 at pages 1-2. Available from http://ec.europa.eu/information_society/policy/ecomm/doc/library/ext_studies/voip_f_f_master_19mar08_fin_vers.pdf

[60] See http://www.avaya.com/usa/topics/unified-communications/

[61] These services will be considered again when the international calling market is examined.

[62] It is not uncommon for a Skype call to have to be reinitiated to obtain a connection, and Skype calls can have moments, sometimes extended, where the signal becomes garbled, lost or subject to a sufficiently severe echo to make conversation difficult or impossible. See also http://www.buzz.bm/faq.htm.

[63] See, for example, http://www.relianceicall.com/servicesIncomingNo.aspx and http://www.buzz.bm/users.htm.

[64] See http://www.buzz.bm/faq.htm.

107. VoIP types 3-6 all require a broadband connection at the customer's premises and a local power source. Consequently, in all these cases, the VoIP service fails if the broadband connection fails, or if there is a power outage on the user's premises. These facts reinforce the view that VoIP types 3-5 (VoIP 6 is discussed immediately below) are not in the same market as standard voice telephony (though the presence of these services may have a material impact on the SMP analysis).

108. For the purposes of market definition, a number of European jurisdictions have found it useful to consider VoIP type 6 services as falling into the following two categories:

- VoIP provided as part of a combined offering that includes the provision of a broadband access line and voices services by a single company, generally referred to as voice over broadband (VoB). This is a service that is supplied and managed by the broadband access provider. Examples are VoWiMAX, DOCSIS VoIP and FTTx VoIP,[65] which have been discussed above; and

- Voice over the Internet (VoI) in most respects is identical to standard telephony. The end-user has a standard telephone number, call quality is typically at least as good, if not better than, standard telephony,[66] and e-911 service can be provided (but, unlike standard telephony, the service can be ported to any location with a computer and broadband access, in which case the e-911 location service does not work). VoI, however, differs from standard telephony: the end-user obtains broadband access from one provider, for example, in the form of naked DSL, and VoI from another;[67] and VoI does not work in the event of a broadband or power outage.[68] Further, the VoI service provider generally does not have a commercial relationship with the network operator and so the VoI is generally provided without use of QoS standards and service level agreements. Despite this, VoI call quality can be higher than standard telephony. Moreover, VoI typically comes with free calling features or with features that are unavailable on standard service. Finally, VoI numbers are portable in the sense that the user can effectively act as if they have a local phone number from wherever they have Internet access (though e911 service fails when the user is not at their registered location).[69]

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[65] QCL'hs voice over fiber service for business customers.

[66] See, for example, http://www.vonage.com/how_vonage_works_faq/?lid=sub_nav_faq&refer_id=WEBHO0706010001W.

[67] See, for example, WIK 2008 at pages 1-2.

[68] See, for example, http://www.vonage.com/how_vonage_works_faq/?lid=sub_nav_faq&refer_id=WEBSP091020001W1.

[69] magicJack and Vonage work in a similar fashion to the Reliance iCal service, with the exception that both outbound and inbound calls are permitted. For example, a customer purchasing a magicJack device, upon plugging the device into a computer and registering it, selects a local phone number from either the US or the UK. This then becomes the phone number assigned to that device. As the device is completely mobile, the number is too. Thus, a magicJack customer having a device with a London number assigned to it and living in Bermuda can make calls to and receive calls from London, which calls would be treated as if they had originated and terminated in London and so only local calling charges would apply (see, for example,

Vonage[70] and magicJack [71] are two examples of VoI providers (but do not offer local Bermudan numbers).

109. Consistent with the RA's conclusions above on DOCSIS, WiMax and FTTx VoIP, Ofcom has declared that VoB is in the same market as fixed calls[72] and other European jurisdictions have found VoB to be an effective substitute for standard telephony.[73] These determinations were made on the basis that VoB service in the UK and parts of Europe is classified as a Publicly Available Telephony Service (PATS)[74], meaning that it has met the following criteria established by the European Union's (EU) *Frameworks Directive*:

1. The service is publicly available;
2. The service is for the purpose of originating and receiving national and international calls;
3. The service requires a number or numbers in a national or international telephone numbering plan;
4. The service provides access to emergency services.[75]

110. In the UK, Ofcom found Vonage's VoI service meets the PATS criteria and so is an effective substitute for standard telephony service.[76] Despite the need for a separate broadband connection, and onsite power backup to ensure service in a power outage, the RA finds that VoI, being otherwise indistinguishable or better than standard telephony, belongs in the same market as standard telephony. The RA is not aware that domestic VoI service is presently offered in Bermuda. This is not to

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http://www.magicjack.com/5/faq/ and http://online.wsj.com/article/SB10001424052748703444804575071582715212268.html). However, the magicJack subscriber must also purchase Internet access and Internet service in Bermuda.

[70] See, for example, the discussion concerning VOI at WIK 2008, pages 1-2 and then the description of Vonage's service at http://www.vonage.com/how_vonage_works/?refer_id=WEBSP091020001W1&lid=main_nav_how_works.

[71] See, for example, the discussion concerning VOI at WIK 2008, pages 1-2 and then the description of magicJack's service at http://online.wsj.com/article/SB10001424052748703444804575071582715212268.html.

[72] *Fixed Narrowband Retail Services Markets: Consultation on the identification of markets and determination of market power* (Ofcom 2009), Ofcom, 19 March 2009, at ¶4.51-4.52

[73] WIK 2008 at page 48.

[74] PSTN, or standard telephony, is an example of PATS. See, for example, Ingram, Peter, Chief Technology Officer, Ofcom, *Voice over Internet Protocol: An Introduction*, Ofcom, 18 January 2005, at page 12. Available at www.ictregulationtoolkit.org/en/Document.3254.pdf.

[75] *The treatment of Voice over Internet Protocol (VoIP) under the EU Regulatory Framework: An Information and Consultation Document*, Staff of the European Commission, 14 June 2004, at §4.3, http://ec.europa.eu/information_society/policy/ecomm/doc/library/working_docs/406_14_voip_consult_paper_v2_1.pdf. Under EU law, a provider of PATS must meet the same regulatory obligations as providers of standard telephony. But, it also grants those providers the same rights as providers of standard telephony. For example, only subscribers of PATS have the right to port numbers from other undertakings providing PATS.

[76] WIK 2008 at page 48.

say people in Bermuda do not use services like that of Vonage and magicJack, but not with local numbers. Consequently, it is unlikely such services provide material competition with local telephony, since to place or receive a local, that is, Bermudan call, would result in the calling party paying international rates.

(ii) ISDN

111. Voice service can also be supplied over ISDN. This can be provided in two forms; basic rate interface (BRI) or primary rate interface (PRI). While ISDN provides a functionally identical service to traditional voice services, as well as limited data services, implying it likely belongs in the same market as standard telephony, there are few jurisdictions where it has been widely used,[77] and is largely being phased out.[78] On this basis, the RA concludes that while this legacy service may lie in the same market as that for standard telephony, being a service in sharp decline, including in Bermuda, ISDN is not relevant to a forward-looking analysis of SMP.

(iii) Mobile delivery of fixed service—the Yak

112. Another, though not very common, way of delivering fixed telephony is over a mobile telephony network. In Bermuda, BDC's Yak provides in home service via a non-mobile desk phone unit[79] (femtocells and wifi enabled mobile phones are discussed in section 5.3(f) below). The Yak service provides unlimited local calling and voicemail, call forwarding, caller ID, three-way calling, and allows texting ($0.05 per outbound text, and free inbound texts),[80] but does not work during a power outage. It is relatively expensive: $59 per month and has only attracted limited demand. In the past, BTC did not provide new telephone service in a timely fashion, making the Yak more attractive than BTC's service to those with time-sensitive demands (notably expatriates). However, as BTC's service delivery problems were resolved, subscribership to the Yak service decreased by [CIC---%][81] and currently amounts to approximately [CIC--%] of BTC's residential fixed line demand. The severity of this decline, coupled with the fact that it coincides with the ironing out of BTC's service delivery problems, suggests that Bermudan consumers do not perceive the Yak, at its price, to be an adequate substitute for BTC's standard telephony service. For these reasons the RA believes that the Yak should not be

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[77] In 2004, in Germany there were 33.3 ISDN lines per 100 inhabitants (Economics: Digital economy an structural change, Deutsche Bank Research 54, 30 August 2005, http://www.google.com/url?sa=t&source=web&ct=res&cd=1&ved=0CBIQFjAA&url=http%3A%2F%2Fwww.dbresearch.de%2FPROD%2FDBR_INTERNET_EN-PROD%2FPROD0000000000190978.pdf&ei=YxoATI21G8OB8gbH3qDkDQ&usg=AFQjCNH07rQ3kRspI9z5YBMJUzlCQxIBIw), which was unusual by the standards of the rest of the world. In all cases, ISDN usage has experienced sharp declines.

[78] For example, British Telecom decided to drop consumer ISDN services on the grounds that more small businesses, home office workers, etc. were connecting via DSL service. See http://www.computerweekly.com/Articles/2007/04/10/222940/bt-sounds-death-knell-for-isdn.htm. See also http://en.wikipedia.org/wiki/Isdn.

[79] See, http://cellularone.bm/unlimited_yak_package.asp.

[80] See http://cellularone.bm/yak.asp sighted 24 May 2010.

[81] May 21, 2010 submission by BDC to the RA.

included in the same product market as standard telephony (though its presence is relevant to the SMP analysis).

(d) Conclusion on the means of delivering fixed access and calling

113. The RA concludes that in addition to traditional PSTN services, the market for narrowband fixed access and calling also includes:

- DOCSIS VoIP;
- VoWIMAX;
- FTTx VoIP; and
- VoIP type 6.

114. The RA also finds that VoIP types 1-5 are not part of the fixed narrowband access and local calling market and neither are fixed services that are delivered over a mobile network (eg, the Yak service)

Consultation question 4: Do you agree with the finding that voice over broadband services (namely DOCSIS VoIP, VoWIMAX, FTTx VoIP and VoIP type 6) are all in the same market as narrowband access and local calls but that other types of VoIP and fixed services delivered via mobile networks are not?

6.3 Fixed and mobile services are not good substitutes for access and local calling

115. The preceding section concluded that standard telephony, DOCSIS, WiMax, and FTTx VoIP, and VoI lie in the same market. This section considers whether the mobile telephony market contains standard telephony and *vice versa*.

116. At face value, standard and mobile telephony are in separate markets: they offer different services (that might be too glibly described as a choice between reliability and mobility), at materially different prices. However, it is still possible that a hypothetical monopolist over one service would be unable to profitably engage in a SSNIP above competitive prices due to substitution toward the other service. If this were so, then the two services would lie in the same market.

117. In the discussion to follow, section (a) provides a brief review of the academic literature on the subject of fixed mobile substitution (FMS) along with a survey of recent regulatory activity in other jurisdictions. The literature review suggests that substitution effects between fixed and mobile services are not yet strong enough to warrant placing the two services in the same market. The RA's survey of regulatory activity found no determination by another regulatory authority that fixed and mobile standard telephony services belong in the same market. Section (c) shows that fixed and mobile are viewed by end-users as being fundamentally different products. The differences in favour of fixed services, however, are not as sharp as the mobility difference that favours mobile service. In particular, it is less clear that these fixed qualities are viewed as possessing enough intrinsic value that a significant number of customers would retain fixed services in the event of a price increase significantly above competitive levels given the presence of competitively priced mobile services. Consequently, these differences only suggest, rather than definitively show that mobile services should be excluded from the fixed service market. Section (d) shows that fixed and mobile firms face substantially different cost structures, and hence, in

competitive markets would likely set quite different prices. Since such prices would lead to quite different customer usage, this further suggests the two services are not in each other's' market. In section (e) a series of price comparisons between fixed and mobile services are performed. As these comparisons will demonstrate mobile services are, in almost all cases, materially more expensive than fixed. Moreover, this is the case even under tests designed to make mobile plans more attractive. Section (f) considers whether femtocells and mobile phones that are wifi enabled can bring mobile services into the market for fixed telephony. Finally, section (g) concludes.

118. In 2009 a number of industry participants responded to an information request distributed by the DoT. A summary of the views expressed by respondents on the topic of substitution between fixed and mobile services may found in Appendix D. The RA acknowledges that as 3 years have elapsed since these responses the parties may wish to revise their views to account for recent developments and may do so in response to this consultation paper

(a) Fixed versus Mobile—A brief review of the literature and regulatory activity in other jurisdictions

119. A recent survey of the literature on the relationship between mobile and fixed-line communications concludes, while existing evidence indicates that substitution is occurring between the two products, the substitution effects are not yet strong enough to warrant placing them in the same market.[82] Other academic studies have come to similar conclusions.[83] That being said, one study of Austria found substantial substitutability between fixed and mobile national calls, though far less between fixed line and mobile access: "…the retail market for national calls of private users can probably be deregulated due to sufficient competitive pressure from mobile. Access-substitution on the other hand does not seem to be strong enough to justify de-regulation."[84] However, given calling services cannot be purchased separately from access services in Bermuda, RA considers that a narrow focus on calling would be misleading (because market power could be exercised through the access fee). Furthermore, the Austrian study focused on national calls which are priced in a manner that is similar to the pricing for international calling and so involves a market that is different from the local calling market under consideration here. The RA's survey of recent regulatory activity in other jurisdictions where there is strong competitive pressure from mobile services on fixed wireline finds no evidence of an RA concluding that mobile and fixed services belong in the same market.

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[82] Vogelsang, Ingo, *The relationship between mobile and fixed-line communications: A survey*, Information Economics and Policy 22(1), pp. 4-17, (2010), available from www.elsevier.com/locate/iep.

[83] See, for example, Ward, Michael R. and Glenn A. Woroch, *The Effect of Prices on Fixed and Mobile Telephone Penetration: Using Price Subsidies as Natural Experiments*, July 2009, available from http://businessinnovation.berkeley.edu/Mobile_Impact/Ward_Woroch_Fixed_Mobile_Penetration.pdf. This study found only modest substitutability between fixed and mobile access.

[84] Briglauer, Wolfgang, Anton Schwarz, and Christine Zulehner, *Is Fixed-Mobile Substitution strong enough to de-regulate Fixed Voice Telephony? Evidence from the Austrian Markets*, September 2009, at page 1. Available from http://homepage.univie.ac.at/Christine.Zulehner/fixed%20mobile%20substitution.pdf

120. In March of 2009 Ofcom opened an extensive enquiry into the fixed narrowband retail services market in the UK.[85] During the course of this consultation Ofcom determined that fixed and mobile access and calling services belong in separate markets for residential and business customers.[86] In making this determination, Ofcom noted that residential customers predominantly view mobile and fixed access as meeting different needs and have shown a strong preference for purchasing both.[87] Ofcom noted that business customers appear to attach a similar or greater importance to retaining a landline than residential customers[88] and that the decline in business calling volume observed was largely due to longer term business trends, particularly a switch towards email over voice calling as a preferred mode of business-to-business communication.[89] In its concluding statement closing this consultation Ofcom determined that it had found no reason to change its position concerning its decision to exclude mobile access and calling services from the business and residential fixed narrowband retail services markets.[90]

121. In a decision from Italy, another country where mobile services are providing strong competitive pressure to fixed, AGCOM, the Italian RA concluded that mobile networks are not part of the fixed access market.[91]

122. Likewise in Australia, the Australian RA (ACCC), concluded that fixed services are not included in the mobile market:

> "While the ACCC found there were some signs of fixed-to-mobile substitution developing in relation to telephony services, and an increased incidence of bundling, the ACCC considered that differences in price, functionality and

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[85] See, for example http://www.ofcom.org.uk/consult/condocs/retail_markets/

[86] *Fixed Narrowband Retail Services Markets: Consultation on the identification of markets and determination of market power*, Ofcom, Publication Date 19 March 2009 (Ofcom 2009 Consultation). For the determination concerning residential customers see ¶4.31 and ¶4.78. For the determination concerning business customers see ¶4.89 and ¶4.100.

[87] See, for example, Fixed Narrowband 2009 Consultation at ¶4.31-¶4.34. Also see *The Communications Market—2009*, Ofcom. Available at http://www.ofcom.org.uk/research/cm/cmr09/.

[88] This has been noted elsewhere as well. See, for example, *Market Analysis—Retail Fixed Narrowband Access Markets: (Response to Consultation 06/39 and Consultation on Draft Decision)* ("ComReg 07/26"), Commission for Communications Regulation (ComReg), 04 May 2007, Document No. 07/26, available at http://www.comreg.ie/_fileupload/publications/ComReg0726.pdf, at ¶3.56 ("some consumers seem to attach less confidence to companies which are available only via mobile numbers")

[89] Fixed Narrowband 2009 Consultation at ¶4.85-¶4.99.

[90] *Fixed Narrowband Retail Services Markets: Identification of markets and determination of market power*, Statement, 15 September 2009 (Fixed Narrowband 2009 Statement) at ¶4.94. Available at http://www.ofcom.org.uk/consult/condocs/retail_markets/statement/statement.pdf.

[91] *Identificazione e analisi dei mercati dell'accesso alla rete fissa (mercati n. 1, 4 e 5 fra quelli individuati dalla Raccomandazione 2007/879/CE)*, Delibera n. 314/09/CONS, June 2009, at ¶67. Available at http://www.agcom.it/default.aspx?message=viewdocument&DocID=3189.

accessibility were such that fixed telephony services should not be included in the market for mobile telecommunications services."[92]

123. A report by the European Regulator's Group (ERG) found that for several reasons, but mostly due to the pricing differential between the two services, it cannot conclude that mobile and fixed services are substitutes,[93] and could discern no clear trend in fixed-mobile substitutability among European countries.[94]

124. The US RA of Justice has found competition from mobile service "…has not effectively constrained the prices consumers pay for access to landline services…"[95] In a 2010 order the US Federal Communications Commission concurs with this conclusion, finding that "because… the majority of residential customers continue to subscribe to both mobile wireless and wireline services, it appears that most mass market consumers use mobile wireless service to supplement their wireline service rather than as a substitute for their wireline service,"[96] and that, "…while the increasing number of wireless only households suggests that more consumers view mobile wireless as a closer substitute for wireline voice service than in the past…there is insufficient data in the record to make such a determination here."[97]

125. US survey data estimates that as at June 2011 31.6% if households did not have a landline but did have a wireless telephone.[98] While this is a significant volume of substitution, it is consistent with the FCC's observation that the majority of residential subscribers do not substitute away from mobile. Moreover, the fixed access line retail prices increases that occurred in California when regulation was scaled back are not indicative of strong competitive pricing pressure from mobile services: the price of basic telephone service went from $10.69 to $21.00.[99]

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[92] *Public Competition Assessment – Vodafone Group plc and Hutchison 3G Australia Pty Limited – proposed merger of Australian mobile operations*, Australian Competition and Consumer Commission (ACCC), at ¶52, 2009. Available at http://www.accc.gov.au/content/index.phtml/itemId/874445/fromItemId/751043.

[93] *Report on Fixed-Mobile Convergence: Implications on Competition and Regulatory Aspects*, European Regulator's Group, ERG (09) 06, 2009 March at page 15. Available at http://www.erg.eu.int/doc/publications/2009/erg_09_06_report_on_fixed_mobile_convergence.pdf

[94] *Id.* at page 20.

[95] Vogelsang at page 10.

[96] Before the Federal Communications Commission, *In the Matter of: Petition of Qwest Corporation for Forbearance Pursuant to 47 U.S.C. § 160(c) in the Phoenix, Arizona Metropolitan Statistical Area*, WC Docket No. 09-135, Memorandum Opinion and Order, FCC 10-113, Released: 22 June 2010, at ¶59. Available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-10-113A1.doc.

[97] *Id.* at ¶60.

[98] Center for Disease Control, CDC, Stephen J. Blumberg, and Julian V. Luke. *Wireless Substitution: Early Release of Estimates From the National Health Interview Survey*, December 21, 2011.

[99] Sources: (1) FCC, Reference Book of Rates, Price Indices, and Household Expenditures for Telephone Service, 2008 edition); (2) https://www.shop.att.com/plancomparison.jsp; (3) http://articles.latimes.com/2010/jan/27/business/la-fi-lazarus27-2010jan27; (4) http://stopthecap.com/2012/01/17/att-gouges-californians-with-25-telephone-rate-increase/

126. These US views are particularly important for Bermuda, because, unlike in most other countries, the receiving party pays principle applies in both Bermuda and the US.

127. In summary, generally, and even in jurisdictions where mobile services provide strong competitive pressures on fixed services, there has been no finding known to the RA that fixed and mobile standard telephony services belong in the same market. Furthermore, no party to these proceedings has yet provided compelling enough evidence to warrant their placement in the same market.

(b) Lack of mobility implies fixed services are not in the same market as mobile

128. The most obvious difference between fixed and mobile service is that the former cannot provide mobile access. Moreover, access while being mobile is a highly valued service, as two pieces of evidence demonstrate: the price comparisons undertaken in section (e) below; and the willingness of many customers to pay extremely high prices in the early days of mobile telephony.[100] Since fixed service simply cannot meet demand for mobility, anyone who places material value on mobility would be willing to pay prices well in excess of competitive levels despite the availability of competitively supplied fixed services. Consequently, in the RA's view, it is implausible that a customer switching toward fixed services could prevent a hypothetical monopolist over mobile services from profitably engaging in a SSNIP above competitive rates. On this basis alone, the RA considers that the mobile market excludes fixed telephony.

(c) Quality of service differences between fixed and mobile telephony

129. In the immediately preceding section, the RA was able to conclude that because mobility was highly valued, and could not be provided by fixed service providers, fixed services were not in the same market. This does not determine whether mobile services are in the same market as fixed. However, in respects other than mobility a fixed line service is qualitatively superior to a mobile service, notably reliability in an emergency, fewer dropped calls and better calling quality.[101] This suggests the services are in different markets (since, with product differentiation, customers with a preference for one service may not switch even if prices for that service are set at 10% above the competitive level).

130. Standard telephony has reliability and call quality advantages over mobile telephony: mobile service is more likely to involve dropped calls and poor quality connections, while a fixed line, linked to the central office exclusively by a copper loop, does not fail if there is a power outage at the customer's premises.[102] For these

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[100] The degree of such demand is illustrated in Garry A. Garrard, *Cellular Communications: Worldwide Market Development* (Artech House Publishers: Boston) 1998, pages 19-20,

[101] See, for example, Jan Lauren Boyles and Lee Rainie, "Mobile Phone Problems", Pew Research Center, August 2, 2012, available at http://pewinternet.org/~/media//Files/Reports/2012/PIP_mobile_phone_problems.pdf, viewed August 2012.

[102] See, for example, Li, Janet, *Smartphone Study: Overall Call Quality Performance Declines as Frequency of Dropped Calls Increases*, 08 March 2010 at http://unified-communications.tmcnet.com/topics/unified-communications/articles/77853-smartphone-study-overall-call-quality-performance-declines-as.htm, Overall and *Wireless Carriers Reduce Dropped Calls, Failed Connections and Static, Driving an Improvement in Call*

reasons, fixed service is better suited for remote monitoring (for example, of alarm systems), provision of fax services and Internet access (currently in Bermuda DSL service also provides higher quality broadband access than is currently available on mobiles over the same copper pair that is used for voice service, so access to DSL on the same copper loop again presents a quality difference that may prevent customers from switching to mobile services given monopoly prices for voice services). There is also value in redundancy, since, in an emergency, the probability of both services failing at the same time is lower than the probability of only one failing.

131. While the preceding applies to all customer types, non-residential/business customers are more reluctant to substitute mobile for fixed service for several additional reasons:

- A fixed phone number is seen as adding credibility to a business enterprise, which may otherwise be perceived as being fly-by-night if the sole point of connection was a mobile number.
- The potential cost to an end-user from dropped or poor quality calls business calls would often be higher for businesses than for residence (if, for example, it led to misunderstanding that caused a business deal to fail).
- Poor mobile call clarity and dropped calls likely also harm business credibility, leading to another reason why business would not substitute mobile for fixed service.
- Coverage can be poorer in office buildings.
- Businesses typically require broadband Internet access. Thus, given the purchase of broadband service, the incremental cost of fixed telephony service is generally quite low, and hence fixed voice is less likely to be given up to save money by relying solely on mobile service.[103]

132. End users also prefer fixed telephony to mobile telephony because it is typically priced quite differently to mobile telephony and in particular, is typically more cost effective for longer calls (this is in part related to the cost differences of supplying the two services—as is explained more fully in section (d), below). For example, in Bermuda, BTC's standard calling plans offer various buckets of free minutes with calls beyond those (unlimited calling excepted) charged on a per call per hour basis. The standard telephony plans offered by other fixed providers (BDC's YAK and NRC) have unlimited local calling. In contrast, mobile telephony prices may include a certain amount of free minutes (not calls), with minutes beyond that amount being charged per minute (not per call)—see Table 28 and Table 29 below).

Quality Performance, J.D. Power and Associates Reports, 27 August 2009 at http://businesscenter.jdpower.com/news/pressrelease.aspx?ID=2009155.

[103] See, for example, Briglauer, also *Market Analysis—Retail Fixed Narrowband Access Markets: (Response to Consultation 06/39 and Consultation on Draft Decision)* ("ComReg 07/26"), Commission for Communications Regulation (ComReg), 04 May 2007, Document No. 07/26, available at http://www.comreg.ie/_fileupload/publications/ComReg0726.pdf. at ¶3.56, or the discussion in Fixed Narrowband 2009 at ¶4.79 to ¶4.89.

133. Moreover, standard telephony is almost universally priced on a calling party pays basis (as is so in Bermuda), and it is rare that subscribers face a charge for inbound calls (unless they specifically wish to pay for those calls, as happens with 800 services in most countries outside of Bermuda). In contrast, mobile services in some countries, including Bermuda, operate on the receiving party pays principle, thus receiving a call on a mobile is generally more expensive than receiving a call on a fixed line (In Bermuda there is no charge for incoming calls). This again provides fixed service with an advantage over mobile.

134. Another advantage of fixed line service over post-pay mobile service for residential users is that they are offered free of any contractual obligation regarding service time and the necessary equipment, a telephone, is considerably cheaper. Post-pay mobile service, on the other hand, typically requires the purchase of a much more expensive handset or entering into a contracted service period of one to two years, with penalties for early termination, for access to "free" or steeply discounted handsets.[104]

135. All of these reasons suggest that some customers might not switch from their fixed line service toward competitively provided mobile service if a hypothetical fixed line monopolist engaged in a SSNIP. That is, customers with remotely monitored alarms, a second line for a fax, a demand for either dial-up or DSL Internet access, or a desire for redundancy, and especially business customers, might be willing to maintain their service in the face of a SSNIP. If this were true for enough customers, then competitive mobile services could not constrain a SSNIP by a fixed hypothetical monopolist, and that would suggest mobile services should be excluded from the market for fixed services.

(d) Cost and hence pricing differences between fixed and mobile telephony

136. This section demonstrates how fixed and mobile cost structures differ. In particular, the costs of fixed telephony are largely fixed, with very low incremental and marginal costs, while mobile costs at the margin are much higher, and can be particularly high due to congestion. Consequently, the efficient pricing structures of the two services are likely to be substantially different, with fixed services tending to have much lower usage prices relative to mobile services, but higher total prices for lower volume users (as in fact is observed—see section (e) below). This again suggests that competitively provided mobile services may not be a good substitute for fixed services, because mobile services may not provide particularly effective competition for the price of additional calls or call minutes (or data services).

137. The fixed telephony local access network has an enormous capacity advantage over mobile networks. A customer's wish to make a call is largely unaffected by other customers' decisions to make calls. In contrast, congestion can (and does) occur on mobile networks. Thus a customer's capacity to make a call can be constrained by other customers decisions to simultaneously make calls at the same time. Thus, once installed, the wireline network's capacity ensures that congestion in the access network rarely occurs. The possibility of congestion is

[104] See, for example, CellularOne's website at http://www.cellularone.bm/cellphones.aspx?type=PDA. Of course customer's wishing to obtain mobile service free of contracted time periods may do so by purchasing handsets at their full price and picking a post-pay plan of their choice or by subscribing to prepaid mobile service.

further mitigated by the fact that the essentially point-to-point nature of wireline communications makes traffic planning and engineering more predictable. However, initial cost of deployment for wired networks are characterized by very high up-front costs. This is due to the fact that wireline networks, designed as they are to provide access to a particular customer at a specific location, must be designed to pass every location that might possibly be served by the network. This, combined with the high capacity of the installed network, implies very low marginal costs resulting from increased access traffic, or from the adding customers to the network (as long as they are within the network footprint).

138. While the fixed network is best characterized by the cost of providing access to an individual subscriber at a specified location, the mobile network is best characterized by the cost of providing coverage for a subscriber. Meaning that in a mobile network a subscriber expects to be able to access the network at any point, not just at one point. Thus, all access points are shared and so are considered to be traffic sensitive.[105] The fact that mobile networks are designed to provide coverage rather than point-to-point service enables mobile network operators (MNOs) to deploy networks incrementally, thereby incurring lower up-front development costs. This can be done initially by setting up a cell pattern consisting of only a few large cells and a small number of base transceiver stations (BTSs) operating at high power in order to meet projected demand.[106]

139. However, as coverage requirements for a particular cell network increases due to an increase in the number of subscribers requiring coverage in an area the capacity of the cells in the area must also be increased. As the ability to increase existing cell capacity is constrained by the amount of available spectrum, and/or tower space, and because the acquisition of new spectrum is usually not an option, MNOs typically must resort to the splitting of larger cells into smaller cells.[107] Cell splitting causes MNOs to incur additional costs to increase the number of BTSs (and their associated towers) in the coverage area requiring greater capacity. Increasing the number of BTSs will result in additional backhaul costs from those BTSs to their associated base station controllers (BSCs). Additional costs may also be incurred if the increased number of BTSs requires that the number of BSCs also be increased. As one study has found, these capacity related infrastructure costs increase almost linearly with the capacity required.[108]

140. While mobile carriers in Bermuda do not, apparently, face any spectrum constraints, they do suffer from a lack of tower space for the placement of additional

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[105] See, for example, Europe Economics, *Cost Structures in Mobile Networks and their Relationship to Prices, Final Report for the European Commission*, Contract No. 48544, 28 November 2001, at pages 24-28. Available at http://ec.europa.eu/information_society/topics/telecoms/regulatory/studies/documents/2001_mobilecosts_final.pdf

[106] See, for example, Lehr 2009 at page 14 and Europe Economics, at pages 24-28.

[107] *ibid*.

[108] Klas Johansson and others, *Relation Between Base Station Characteristics And Cost Structure In Cellular Systems* at page 1. Available at http://ieeexplore.ieee.org/Xplore/login.jsp?url=http%3A%2F%2Fieeexplore.ieee.org%2Fiel5%2F9435%2F29952%2F01368795.pdf%3Farnumber%3D1368795&authDecision=-203

equipment the increasing capacity demands they are facing. Existing towers are often full and there is a moratorium on erecting new towers. Because of this, mobile operators in Bermuda have had to resort to erecting masts. Because of their smaller size relative to towers, where one tower would have been sufficient to meet increased capacity needs, several masts are required. Given the high incremental costs associated with the masts, mobile operators in Bermuda are in the same position as mobile operators elsewhere who are forced to increase cell capacity via cell splitting—they face high incremental costs in increasing cell capacity to handle increasing traffic flows.

(e) Summary of price level differences between fixed and mobile telephony

141. In Appendix F the RA performed a detailed examination of the proposition that prices for standard fixed and mobile telephony services by Bermudan providers supports the placement of mobile telephony service in the same market as fixed, and *vice versa*. The RA tested this proposition using a variety of analytical techniques, the results of which, in every instance, support the proposition that mobile and fixed telephony services belong in separate markets. This section summarizes the findings of the various analyses performed in Appendix F.

142. Appendix F, section 1.1 demonstrates that there are substantial price differences between unlimited plans on fixed and mobile networks, with mobile services being much more expensive. The magnitude of these price differences suggest that mobile and fixed telephony belong in separate markets.

143. Appendix F, Section 1.2 examined low demand users. The analysis of these users showed material price differences between fixed and mobile services, this time favouring mobile services, and more to the point the RA's analysis showed that a SSNIP for fixed services aimed at low volume users would be profitable despite the existence of the cheaper prepaid mobile alternatives. In fact, according to the RA's analysis, approximately 50% of BTC's low volume users would have to migrate from BTC's network in order to make a 5% SSNIP unprofitable. To make a 10% SSNIP unprofitable approximately 90% of low volume users would have to leave BTC's network. The RA considers that such high rates of customer defection would be unlikely within the permissible two year time frame of a SSNIP analysis. Thus, for low volume users, it would appear, on the basis of price alone, that prepaid mobile telephony and fixed telephony are in separate markets.

144. Finally, in Appendix F, section 1.3, the RA examined fixed and mobile telephony calling plans aimed at neither the lowest nor the highest volume users nor those users that desire unlimited local calling. To undertake this analysis requires comparing the cost of different plans for users with quite different calling patterns, and consequently requires identification of some "typical" customers. The RA first considered three actual or realistic customers and then, as a robustness test, three customers that had calling patterns that would reduce the cost of using a mobile service. The results strongly suggest that mobile services are substantially more expensive than fixed, and hence are unlikely to be in the same market as fixed. The RA then created an even more unrealistic robustness test using assumptions designed to make mobile telephony plan prices even more attractive vis-à-vis fixed telephony plan prices. The results again indicate that prices for BTC's actual and proposed standard telephony calling plans are sufficiently different from those offered by the mobile carriers that the two services belong in separate markets.

(f) Femtocells and wifi phones

145. ECL opined that femtocell technology is going to have a dramatic impact on mobile business in Bermuda.[109] In this section the RA explores the possible competitive impacts of increased deployment of femtocells and wifi phones on Bermuda's telecommunications markets.

146. A femtocell is essentially a small-scale cellular base station designed for indoor use that connects to a service provider's network via fixed-line broadband infrastructure.[110] Currently, femtocells for the home market can support around two to five 3G handsets over a small area, while business units can support three or four times as many lines.[111] Femtocells serve two purposes. First, they provide mobile service where either the operator's spectrum is incapable of penetrating buildings, or because it is a cheaper means of reaching the customer than building new towers and splitting cells, or otherwise amplifying signal strength. Second, femtocells reduce spectrum and backhaul demands (including avoiding lease line costs[112]) by taking a voice and data traffic off the macro cell network (as much as 60% of traffic is generated indoors).[113] Thus, femtocell deployment can save on network costs holding network coverage and quality constant,[114] allowing carriers to offer consumers better quality-adjusted prices

147. Femtocells can enable mobile operators to provide in-home or office telephony of comparable quality to fixed service at lower costs. For those users who already have a broadband connection at home or in the workplace, femtocells may allow mobile carriers to offer a telephony service of comparable quality to fixed service at comparable prices, while still providing mobile service (at mobile prices) out of the femtocell's range.[115] This is because the incremental cost of femtocell deployment, allowing for savings in network costs, may allow pricing that is competitive with fixed service. Thus, subscribers are able to obtain mobile communication outside the home and fixed-liked quality of service and pricing in the home.

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[109] ECL confidential submission of June 12, 2009 at page 27.

[110] See, for example, *Assessment of the UK mobile sector; Final report for Ofcom* (Analysys Mason 2008), Analysys Mason, 28 August 2008, at ¶183. Available from www.ofcom.org.uk/consult/condocs/msa08/msaanalysys.pdf.

[111] ibid. For business usage see http://en.wikipedia.org/wiki/Femtocell.

[112] *Mobile citizens, mobile consumers; Adapting regulation for a mobile, wireless world* (Mobile citizens), Consultation, Ofcom, 28 August 2008, at page 48. Available from http://www.ofcom.org.uk/consult/condocs/msa08/msa.pdf .See also, *Report on fixed mobile convergence: Implications on competition and regulatory aspects* (ERG 2009 Mobile Report), European Regulator's Group (ERG), March 2009, ERG (09) 06 at page 8. Available from http://www.erg.eu.int/doc/publications/2009/erg_09_06_report_on_fixed_mobile_convergence.pdf

[113] Analysys Mason 2008 at ¶186 and ERG 2009 Mobile Report at page 8.

[114] ERG 2009 Mobile Report at page 8.

[115] See, for example, Mobile Citizens, at ¶7.33. Also, ERG 2009 Mobile Report at page 8.

148. WiFi enabled mobile handsets provide very similar benefits to femtocells, but connect via a WiFi router with fixed broadband access. [116] Such phones must be WiFi enabled. In contrast, no additional hardware must be incorporated into the handset for femtocell use. However, a WiFi enabled phone can connect to the mobile operator's network wherever it can connect to a WiFi network. This may include a home WiFi network, similar to the femtocell, but also any public or private (corporate WLAN) WiFi hotspots, but to obtain optimal voice service requires a specialized WiFi router.[117] Because of their ability to connect to any WiFi hotspot, WiFi enabled handsets may provide greater cost savings to mobile carriers than femtocells.

149. The deployment of femtocell and WiFi telephony technology may provide mobile carriers with the capacity to compete directly in the market for standard (fixed) telephony. However, that has not yet been demonstrated to be the case in any market, and no such services are presently available in Bermuda (except, in the case of WiFi phones, where the customer directly adopts this solution themselves). Further, it is the RA's view that in Bermuda competition from such technologies is unlikely to emerge within the next four years. Despite this, the effects of that competition whenever (and if) it emerges are likely to be muted for two reasons: (1) such service can only be attractive to customers who already have fixed broadband connections; and more importantly (2) voice service on a broadband network is increasingly a minor source of capacity use. Thus, looking to the future, in a competitive market, voice is likely to be a minor part of the price of a voice plus broadband service. The result will be that femtocell/WiFi voice competition will merely make broadband service more attractive allowing, in the absence of competition, a higher price to be charged for that service, even if voice service becomes cheaper (on these issues see also sections 8 and 9.2, below). However, the potential for femtocell and WiFi deployment is very relevant to the SMP analysis.

(g) Conclusion: the mobile market excludes fixed services and *vice versa*

150. The preceding analysis has noted that fixed services have a range of positively valued characteristics that are not available on mobile phones, have a substantially different cost structure, notably in terms of the marginal costs of delivery, and are, in almost all cases, materially cheaper than mobile services. The RA also concluded that femtocells and wifi phones do not presently change these conclusions. As a result, the RA finds mobile services are not part of the fixed market.

151. This is not to say that mobile services do not place some constraints on fixed services and *vice versa*. For example, BTC's share of originating MOUs has fallen from [CIC --%] in 2008 to [CIC --%] in 2009, while the share of originating MOUs for

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[116] See, for example, Reardon, Marguerite, *Wi-Fi rides to wireless networks' rescue*, 12, February 2010 available at http://news.cnet.com/8301-30686_3-10451819-266.html

[117] For example, the WiFi for business users feature available with the new Blackberries has been designed to work with Cisco Unified Communications Manager (Mies, Ginny, *RIM Launches Two New BlackBerrys and Voice-Over-Wi-Fi Service*, 26 April 2010, http://www.pcworld.com/businesscenter/article/194990/rim_launches_two_new_blackberrys_and_voiceoverwifi_service.html). Similarly, T-mobile provides maximal quality connections in the home over its specialized WiFi routers, though excellent service can be provided over any WiFi router (see, for example, http://support.t-mobile.com/doc/tm23449.xml.

the mobile carriers combined has risen from [CIC --%] in 2008 to [CIC --%] in 2009 (the other percentage difference in both years is split between Quantum and NRC).[118] At the same time, BTC has recently announced new fixed prices that appear aimed at reducing call loss from high volume customers toward mobile service. This, of course, does not demonstrate that the two forms of service are in the same market. For example, other processes unrelated to substitution may be driving these results, notably the decline in dial-up Internet access. Yet, it may also be that after years of essentially offering a one-size-fits-all standard telephony package, competition from mobile services has led BTC to set prices that reflect the economies associated with servicing higher levels of demand. To the extent that is true, mobile services have placed some competitive pressure on BTC. Yet, for the reasons outlined above, it is the RA's view that such pressure is unlikely to prevent a hypothetical monopolist over standard telephony from earning returns in excess of the competitive level over an extended period.

Consultation question 5: Do you agree with the finding that fixed and mobile services are in separate markets? Explain.

6.4 Customer markets

152. This section examines whether distinct customer markets exist for each of the following types of service:

(a) Retail services provided over fixed telecommunications networks – that is, retail access and local calls, broadband access, and leased lines;

(b) Retail services provided over mobile networks; and

(c) Pay TV.

(a) Customer markets for fixed network services

153. In what follows the issue of whether residential and business customers lie in the same or separate markets is considered first. The RA finds that there are separate residential and business customer markets for fixed network services. The next analysis undertaken is of whether the markets are further segmented within the residential and business customer groups. The conclusions of this analysis are that: (1) all residential customers (and those who can disguise themselves as residential customers) are likely to form a single market; and (2) large business customers could potentially form a separate market from other business customers but given the small number of these customers the RA takes the pragmatic approach of defining a single customer market for all business customers.

154. The RA reiterates the purposive nature of market definitions (as discussed in Appendix G) which implies that in other contexts, such as antitrust investigations,

[118] The DoT had requested up dated traffic volume data from all carriers and is presently waiting on clarification concerning the traffic volume data submitted by the carriers on 31 July 2012. BTC has informed the DoT that they can provide originating calls data only, but cannot provide any information concerning originating MOUs.

customer delineations may be relied on that differ from those concluded in the current consultation.

(i) Are residential subscribers (and those who can disguise themselves as residential subscribers) in a separate market from business customers?

155. An obvious starting point for customer market definition is to examine whether there is a residential customer market that is distinct from one or more business customer markets. Definition of separate residential and business customer markets is well accepted internationally. The EC in its 2003 Market Recommendation identified separate residential and business markets for access, domestic calls and international calls. In the 2007 Market Recommendation the EC identified a market for access lines which includes both residential and business customers, but noted that national regulatory authorities may segment the market further on the basis of national circumstances and competition law principles. Numerous national regulators in the EU continue to adopt separate residential and business markets. For example:

- Ofcom adopted separate residential and business markets for retail narrowband access and calling in its 2009 report;[119]
- the Italian regulator, AGCOM, concluded that there are separate residential and business customer markets in its 2009 analysis of retail access lines;[120] and
- The French Regulator, ARCEP, concluded that there are separate residential and business customer markets in its 2008 analysis of retail access lines.[121]

156. Turning to the specifics of the Bermudan markets we look first at the potential for demand-side substitution to defeat a SSNIP by a hypothetical monopolist of residential or business customers. The scope for residential customers to substitute to the pricing and services offered to business customers, and vice-versa, is fairly limited for the primary reason that suppliers are typically able to identify whether a customer is a residential or business customers (with the possible exception of very small businesses and home offices) and will assign business pricing plans to business customers and residential pricing plans to residential customers. In addition, residential customers and business customers have different telecommunications needs and priorities. Residential customers typically place a particularly strong emphasis on price and, in the case of international calls especially, may be more willing to delay placing calls until off-peak hours. Business customers, while still sensitive to price at least to some extent, are more likely to have a

[119] Ofcom (15 September 2009), *Fixed Narrowband Retail Services Markets: Identification of markets and determination of market power*, p.18.

[120] AGCOM (June 2009), *Delibera n. 314/09/CONS Identificazione e analisi dei mercati dell'accesso alla rete fissa (mercati n. 1, 4 e 5 fra quelli individuati dalla Raccomandazione 2007/879/CE*, para 84.

[121] ARCEP (June 2008), Summary notification form relating to a draft decision of the Autorite de regulation des communications electronique es des postes (ARCEP) according to article 7 of directive 2002/21/CE – Markets 1, 2 and 3. Available at:
http://circa.europa.eu/Public/irc/infso/ecctf/library?l=/france/registeredsnotifications/fr20080783-0784/marchs_tlphonie/notification_arceppdf/_EN_1.0_&a=d

preference for higher levels of: service quality, customer support and account management. These differences lessen the scope for demand-side substitution between the two customer groups.

157. On the supply-side, differing marketing and sales channels are commonly used for residential customers as compared with business customers. For example, residential consumers are mainly targeted through general advertisements in the national press and direct marketing, with sales and customer support typically being provided via phone. In contrast, businesses customers may be targeted, for example, through associations. Business customers may be offered with tailored general packages offered to suit individual business needs aided by customer account management where required. More generally, business customers place a high value on the supplier's reliability and reputation. These factors reduce the likelihood of prompt supply-side substitution occurring between residential and business customers.

158. As a matter of commercial reality, prices for residential customers are often significantly different from those offered to business customers.

159. BTC's pricing of the standard access rental package which includes 50 local calls is 23% higher for business customers than for residential customers[122]: the standard access rental for residential customers is $26 per month while business customers are charged $32 per month. BTC has introduced the following additional rate plan options for residential users: Residential Basic, Residential 100 (100 free calls), Residential 150, 200, and Unlimited.[123] Business users do not have similar rate plan options at this time.

160. With regard to broadband, BTC's pricing of access lines and ADSL packages incorporate a differential of $30 per month between residential and business customers.

[122] The pricing for access lines and local has significant regulatory input and it may be that the price differential between residential and business customers would be different if there were no regulatory intervention.

[123] http://www.btc.bm/Residential/LocalPhone/Default.aspx

Table 4: BTC DSL pricing

Bandwidth (Downstream/ Upstream)	Additional services included	Residential	Business (SOHO)	Price differential
1 Mbps/1 Mbps	No voice services	$19.00	N/A	
2 Mbps/1 Mbps	No voice services	$29.00	N/A	
4Mbps/1 Mbps	No voice services	$39.00	N/A	
6 Mbps/1 Mbps	No voice services	$49.00	N/A	
8 Mbps/1 Mbps	No voice services	$59.00	N/A	
10 Mbps/1 Mbps	No voice services	$69.00	N/A	
4Mbps/1 Mbps	Unlimited local calling	$89.00	$119.00	34%
6 Mbps/1 Mbps	Unlimited local calling	$99.00	$139.00	40%
8 Mbps/1 Mbps	Unlimited local calling	$109.00	N/A	
10 Mbps/1 Mbps	Unlimited local calling	$119.00	N/A	
4Mbps/1 Mbps	Unlimited local calling + Vertical Services*	$99.00	$129.00	30%
6 Mbps/1 Mbps	Unlimited local calling + Vertical Services*	$109.00	$149.00	37%
8 Mbps/1 Mbps	Unlimited local calling + Vertical Services*	$119.00	N/A	
10 Mbps/1 Mbps	Unlimited local calling + Vertical Services*	$129.00	N/A	

Source: BTC website - viewed July 2012
* Vertical services provided are: Caller ID, Caller ID Deluxe, 3-way calling, call forwarding, voice mail

161. The above price comparisons are consistent with the hypothesis that residential customer form a separate market for services provided over fixed networks. The observed price differentials between business and residential customers are highly unlikely to simply reflect differences in cost of serving residential and business customers.

162. The RA notes that leased lines are not generally purchased by residential customers, and therefore there is no separate residential market for leased line services.

(ii) Are there multiple distinct residential and business customer markets?

163. While the set of residential customers is not completely homogenous, it seems unlikely that there are multiple distinct residential customer markets. This is primarily because there are no obvious significant investments that a supplier to one segment would need to carry out in order to substitute capacity from one residential customer segment to the supply of another segment in response to a SSNIP by a hypothetical monopolist. Therefore the RA concludes that all residential customers fall into a single market for the purposes of the current analysis.

164. In respect of business customers, it is possible that there are distinct customer types that could potentially constitute separate markets. In particular it appears that large business and government customers could fall into a separate market from small to medium sized customers.

165. Large business and government customers often have more demanding requirements in terms of account management and higher quality of service (for example, requiring stronger network resilience, higher grades of service quality and higher levels of customer support) than small businesses – a characteristic that applies similarly across all fixed network services. This reduces the propensity of these customers to demand-side substitute to the service offerings available to residential and small/medium business customers. It also means that swift supply-side substitution is difficult because of the need for account management expertise required to serve large customers. It therefore appears that large business customers may form a separate market to other business customers.

166. The finding of a separate large business customer market as part of regulatory analysis is not common internationally, although there is at least some precedent in the antitrust arena. [124] However, there has also been a degree of recognition by regulators that large business customers have characteristics that are different to that of smaller business customers. For example, Ofcom identified that in the UK customers that have an annual expenditure of £1 million per annum or more generally have account managers. In Australia, the regulator is required to publish an annual report examining competition in the corporate customer segment which has been defined as "the top 1,200 companies (by revenue) and government customers with contracts valued in excess of $2 million."[125]

167. The purpose of the current market definition exercise is to identify markets in which one or more firms holds SMP and to then identify appropriate remedies where SMP is held. Therefore issues to consider in determining whether to define a separate corporate customer market in Bermuda are whether it would aid in the identification of SMP, and whether it would be consequential to the outcomes of the market analysis process. Anecdotal evidence suggests that the number of large business customers in Bermuda is small (ie, less than 20) although of course the actual number would depend on the way in which the boundary between large and small business customers is set. The definition of a separate market for such a small customer group and the complexity that it adds to the market analysis process will impose additional cost on the carriers. This is due to the need for the RA to obtain data from the carriers that is disaggregated between large business customers and small customers to examine, among other things, market share, observed price-cost margins and price trends. Given this and the small number of large business customers in Bermuda, the definition of a separate customer market for large business customers does not seem justifiable, however the RA seeks the views of respondents on this matter.

168. The RA highlights that the definition of a single business customer market does not preclude the application of different remedies to different customer segments within that market. An example is the decision by Ofcom to allow BT the freedom to offer customised pricing to large business customers (those projected to

[124] The *Atlas* decision defined a market for telecommunications services catering to customers such as multinational and extended enterprises which had huge telecommunications needs and often acquired expertise in managing their own internal networks

[125] ACCC (June 2004), *Competition in the corporation customer segment of telecommunications markets July–December 2003,* p.1.

spend in excess of £1 million per annum on communications services in the UK) without obtaining prior regulatory approval.[126]

(b) Mobile customer markets

169. The most obvious customer market delineations to consider within the mobile market are residential and business customers. This is discussed below. The issue of whether prepaid and postpaid services are in the same market is assessed separately as part of the product market definition in section 9.1.

(i) Residential vs business customers

170. Looking first at demand-side substitution, it is generally possible for suppliers to separately identify residential and business customers, aside from very small businesses customers which could register themselves as either business or residential customers. This, plus the fact that residential and business customers have different preference and needs[127] means that while demand-side substitution is likely to occur between residential customers and some small businesses, it is unlikely to occur between medium-large business customers and residential/small business customers.

171. Similarly, while substantial supply-side substitution would likely occur between residential and small business customers due to the ease of switching between the two groups in response to a SSNIP by a hypothetical monopolist, the extent of substitution between those customers and medium-large business customers may be more limited because:

- Large business customers would be hesitant to switch to a supplier that has previously only served residential/small business customers as it would not have a reputation of being able to cater to the needs of large businesses. While this is a factor that can be overcome with time, it would likely prevent prompt supply-side substitution in response to a SSNIP by a hypothetical monopolist of large business customers.
- As mentioned above, serving large business customers would require specialised account teams to provide account management support.
- The focus of large business customers on mobile data services and the application of those services to their business means that a supplier would need to have specialised expertise and services that a supplier to small customers would not have.

172. However, given that the services provided to all customers are fairly homogeneous and that both mobile providers serve all customer groups, it does not seem necessary for the purposes of the SMP and regulatory remedies analysis to define separate customer markets for mobile services.

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[126] Ofcom (29 May 2007), *Replicability: the regulation of BT's retail business exchange line services—Consent,* at ¶1.15 and Annex 4. Available at http://stakeholders.ofcom.org.uk/binaries/consultations/draftconsent/consent.pdf (Last viewed on August 16, 2010.)

[127] For example, many business customers have a special focus on data services and how they can be used to improve business efficiency, as well as also having a need for customer account management and high levels of customer service support.

(c) Single customer market for subscription television services

173. The RA considers that there is a single customer market for subscription television. While different groups of customers will have preferences for different types of programming, supply-side substitution and economies of scope mean that all customers are likely to fall into a single market.

174. In the analysis of the telecommunications markets above, a distinction was made between residential and business customers. In the telecommunications context, the services provided to business customers are used as a communications tool to carry out their business activities efficiently. In contrast, business customers of Pay TV services (eg, hotels) do not use Pay TV services as an intermediate input but rather pass-on the service "as is" to end-customers. As a result, the actual service demanded by business customers is essentially identical to that demanded by residential customers. Given this, supply-side substitution would occur quickly and easily in response to a SSNIP of a hypothetical monopolist over either residential or business customers.

175. The conclusion that there is a single customer market is reinforced by the fact that the subscription television providers market their service to all customers. For example, both BCV and WOW provide services to all customers passed by their respective networks. This is also true for satellite coverage (even if it is illegal).

(d) Conclusions on retail customer markets

176. The RA tentatively concludes that:

- there are separate markets for residential and business customers for retail fixed line services, namely retail access and local calls and retail broadband
- no customer market delineations for leased lines, mobile services; or subscription TV services

Consultation question 6: Do you agree with the finding that there are separate residential and business customer markets for (1) retail fixed access and local calls; and (2) retail broadband?

Consultation question 7: Do you agree with the conclusion that for the purposes of the SMP and remedies it is not necessary to define separate customer markets for either of: (1) leased lines; (2) mobile services; or (3) subscription TV services?

6.5 Geographic markets

177. This section examines whether there are distinct geographic markets within Bermuda for electronic communications services. As was discussed in Appendix G, while the SSNIP test is relied on to determine product and customer market delineations, sole reliance on the SSNIP test when defining geographic markets will often result in extremely narrow market definitions which are inconsistent with commercial reality. Given this, an approach to geographic market definition that has wide international precedent is to assess geographic market boundaries by examining whether the degree of actual competition varies significantly by geographic area, or is likely to do so in the near future. For example, as explained by the European Commission:

According to established case-law, the relevant geographic market comprises an area in which the undertakings concerned are involved in the supply and demand of the relevant products or services, in which area the conditions of competition are similar or sufficiently homogeneous and which can be distinguished from neighbouring areas in which the prevailing conditions of competition are appreciably different.[128]

178. Therefore, to carry out the analysis of geographic markets, the RA:

- firstly, considers what features of demand or supply are likely to vary sufficiently within Bermuda such that the incentives and ability for competitive entry and expansion will differ significantly between areas; and
- secondly, examines whether there has been there has been significant variation in the extent of actual competition (particularly between networks) within Bermuda.

(a) Features of demand and supply in Bermuda

179. There are numerous drivers of differences in the level competition by geographic area. These include variations in:

- **subscriber density:** Higher subscriber density will generally reduce unit costs and hence increase profits. This means that areas with high subscriber density are often the areas that are targeted by entrant networks. By international comparison, in Bermuda the subscriber density (especially of residential customers) is relatively uniform - for example, there are no sparsely populated rural areas. Therefore in Bermuda subscriber density, while it may have some impact on which areas competitors commence network roll-outs in, does not on its own point to a strong likelihood of distinct geographic markets.

- **density of high value customers:** Areas where high value customers are concentrated – for example, central business districts where there is a high concentration of medium to large business with intense telecommunications needs – will tend to be the focus of more intense network competition than other areas.[129] As will be discussed in more detail below, this is a feature of the City of Hamilton that has likely been a key factor in the build of the Quantum network.

- **geographical characteristics:** Geographic features can make some areas more difficult, and thus, costly to serve. In Bermuda, while there are undoubtedly some challenges faced in providing electronic communications services as a result of the geography, it is not apparent

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[128] European Commission (2002), *Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services,* para 56.

[129] This has led regulators in some jurisdictions to reduce or remove regulation in CBD and heavily populated metropolitan areas. See for example Australian Competition and Consumer Commission (October 2008), *Telstra's PSTN Originating Access exemption applications – CBD and Metropolitan areas - Final Decision and Class Exemption.*

that geographic features are likely to cause substantial differences in the extent of competitive entry by area.

- **differing legal barriers:** To the extent that processes for obtaining permission to dig trenches in order to lay cables or to install new cellsites differ within a country this could mean that the extent of competition vary between districts (eg, because different regional councils may impose different rules. Because of the small size of Bermuda the legal barriers are fairly uniform.

- **access to key inputs:** This includes access to sites (for example, for the location of mobile network base stations and other transmission equipment), as well as access to wholesale services and facilities. The most obvious example of how this could affect the geographic markets in Bermuda is the availability of wholesale services and facilities access from BLDC in Southside.

180. The extent to which these factors differ by geographic area varies with the type of service.

Fixed access lines and local calls and broadband

181. Decisions to enter the provision of fixed access and local calls will often depend on the extent of demand for other services that can be jointly supplied with access and local calls. For example, in the business market(s) network entry is often targeted at acquiring customers who purchase the higher value leased lines services, and though the provision of access lines and local calls are additional services that the entrant network is able to provide, it is not the driver of the network investment. In the residential market, the deployment of fixed networks is more likely to be driven by demand for broadband and subscription TV. Subscriber density and customer demand will typically be a significant factor influencing where fixed (and fixed wireless) networks will be built.

Domestic Leased lines

182. High speed networks operators are likely to focus on clusters of key business districts where there is a high density of medium to large business customers. In this respect, the central business area of the City of Hamilton is the most likely candidate for being a separate market for leased lines services.

Mobile services

183. Spectrum, which is a key input into mobile network service provision, is acquired on a national basis. This means that networks have a strong incentive to provide service to a large customer base in order to defray costs over a higher volume of traffic. While there may be some populated areas of Bermuda that are more difficult to cover than others, it does not seem likely that there are any sizeable areas where conditions are such that entry by only a subset of operators would be viable. Thus it seems likely that the mobile market would be national. In addition, because of the nature of mobile services, customers derive benefit from being connected to a network that has high coverage. Therefore, coverage becomes a factor over which firms compete and further incents firms to achieve (near) national coverage.

Subscription TV

184. Because Bermuda is a small country, it does not have local programming that is specific to particular areas of Bermuda. Rather programming is the same for all locations. Whether a supplier focuses on a specific area or supplies service on a national basis will depend on the type of technology it employs – ie, competition from a new cable network would, at least initially, likely be limited to particular areas, whereas wireless networks can quickly achieve much more widespread coverage.

(b) Current domestic networks in Bermuda

185. The RA has collected information from the parties and from public sources regarding the current geographic extent of electronic communications networks in Bermuda. Table 5 provides a summary of the coverage of domestic networks and shows which types of service each party currently provides.

Table 5: Coverage of domestic networks

	Fixed access and local calling	Fixed broadband access	Pay TV	Leased lines	Mobile
BTC	✓ 100% of households	✓ 100% of households (check)	×	✓	×
Northrock (NRC)	✓	✓	?	✓	×
Quantum (QCL)	✓ City of Hamilton + some spurs	✓	×	✓	×
Cablevision (BCV)	×	✓ National coverage except in parts of Hamilton	✓ National coverage except in parts of Hamilton	×	×
BLDC	✓ Southside	✓ Southside	×	✓ Southside	×
WOW	×	×	✓ close to national coverage[130]	×	×
Digicel	×	×	×	×	✓ ≈ National
CellularOne	×	×	×	×	✓ ≈ National

[130] As the WOW website explains, there are: *"shadow areas" in valleys, at the base of steep hills, or behind large buildings where the WOW signal will not be strong enough for reliable reception.* (http://www.wow.bm/Pages/FAQs.htm viewed August 25th, 2012)

186.

187. It is evident from the above table there is likely to be a single national market for mobile services, with both networks having close to 100% population coverage. This is consistent with: *a priori* expectations as discussed above in section (a); international experience[131] (ie, internationally mobile markets have generally been defined as national); and with the marketing approach taken by both Bermudan networks in that both take a national approach to pricing.

188. A further market in which all current networks have roughly 100% coverage is Subscription TV provision.

189. Services for which some networks have full national coverage and other have partial network coverage are: local and access, broadband and leased lines. We now examine the coverage of networks providing these services in more detail.

(i) Details of networks providing access lines and local calls, broadband or leased lines

BTC

190. BTC owns a PSTN that covers all residential and business customers, except customers in the Southside BLDC development. The PSTN is used in combination with DSL equipment to provide national broadband coverage. Inside the City of Hamilton, BTC recently deployed a new fiber optic network.[132] Although information on the geographic coverage of specific types of leased line services has not been collected, the RA understands that lower speed leased services are provided nationally with certain higher speed services being available in only certain locations.

[131] For example, national mobile markets have been adopted by: (1) New Zealand Commerce Commission (22 February, 2010), *Final Report on whether the mobile termination access services (incorporating mobile-to-mobile voice termination, fixed-tomobile voice termination and short-message-service termination) should become designated or specified services* p. 50.; and (2) Australian Competition and Consumer Commission (24 June 2009), *Public Competition Assessment - Vodafone Group plc and Hutchison 3G Australia Pty Limited - proposed merger of Australian mobile operations*, p. 10.

[132] BernNews, "Launch of BTC's New PRISM Network," May 19, 2012, http://bernews.com/2012/05/launch-of-btcs-new-prism-network/

NRC

191. NRC uses a WiMax network to provide access, local calls, international calls and broadband. The coverage of Northrock's WiMax, which was 80% as at August 2010, has grown over time.[133]

Quantum

192. Quantum states that it provides:

> *Quantum provides high quality, resilient voice and data services utilizing a fiber backbone network with interconnects over 130 buildings primarily in the City of Hamilton, with service extensions through Devonshire eastwards towards Southside.*[134]

193. Using its optical fibre network, Quantum provides data services as well as voice services using VoIP. It provides services to both residential and business customers. For example, in respect of residential customers, Quantum states on its website that it:

> *... provides local loop access services and Voice Over IP services. Many of our customers utilize our high speed transparent Local Area Network (LAN) services in order to work remotely. If you are within the Quantum network footprint, we can service your access requirements.*[135]

194. In terms of network expansion, Quantum states on its website that:

> *At Quantum Communications, we're always looking to expand our network. If your building is in close proximity to our fibre, it may be possible to provide our services to your company. We encourage you to contact us to fully qualify the possibilities.*[136]

BCV

195. Cablevision's cable network passes all of Bermudan residential and business premises, aside from some parts of Hamilton. Cablevision provides digital Pay TV services and broadband access over its network. It does not currently provide access or calls over its network.

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[133] As at 28 August, 2010, Northrock's website stated that: "With our current infrastructure North Rock is able to provide service to just over 80% of the island. North Rock presently has 12 base stations around the island with plans for more to be added in the future."

[134] http://www.quantum.bm/index.php/page/about-quantum viewed 25 August, 2012. Quantam, in response to an information request, provided maps that showed a detailed layout of its fiber network. The maps showed a network layout that was consistent with the description of the network that appears on the company's web site.

[135] http://www.quantum.bm/index.php/page/frequently-asked-questions, viewed 25 August, 2012.

[136] http://www.quantum.bm/index.php/page/frequently-asked-questions, viewed 25 August, 2012.

BLDC

196. BLDC owns copper and fibre optic network installed at its Southside development in St David's. These BLDC networks cover [CIC --% of the Southside area]. It offers wholesale services as well as retail services to business customers, [CIC ----------].

(c) Implications of fixed access network coverage for geographic market definition

197. Focussing first on residential customers, the information presented above shows that the networks that currently provide access and local calls to residential customers are BTC, NRC and Quantum. BTC's network has 100% household coverage while NRC's coverage is strongest outside of Hamilton and Quantum's is primarily within Hamilton. This implies that the extent of competition is reasonably similar nationally for fixed access and local calls. To the extent that there some areas of Bermuda where BTC does not face competition from NRC (or any other network) for the supply of fixed access lines and local calls, it seems likely that:

(a) customers in those areas will benefit from a spill-over effect of competition from NRC footprint areas: for example, if BTC responds to competition from NRC it is likely to do so on a national basis: because of (1) the complexity in determining which customers are not covered by the NRC network; (2) the difficulty and cost of implementing price and service changes in only the areas covered by the NRC network[137]; and (3) regulatory and legal barriers to offering geographically disaggregated pricing and service offerings.

(b) BTC will already effectively face some competitive constraint from NRC in areas that it expects NRC will extend its network.

198. In respect of broadband access for residential customers, the relevant networks are BTC which provides national coverage, NRC which provides near national coverage outside of Hamilton, Quantum which provides services in Hamilton, and has announced its intention to extend its network to the remainder of Bermuda,[138] and BCV which provides national coverage, with the exception of some areas in Hamilton. The RA considers that the relevant market containing residential broadband access is national, for the same reasons discussed above in the context of residential fixed and local calls.

[137] Although in the case of broadband this is possible through focussing DSL equipment upgrades on areas with NRC network coverage.

[138] http://www.royalgazette.com/article/20120927/BUSINESS/709269905

199. In respect of fixed network services provided to business customers, the relevant networks are BTC, NRC, QCL, BLDC and potentially BCV. The QCL network and the BLDC are more geographically limited than the BTC, BCV and NRC networks, and as a result the RA considers that it is possible that the conditions of competition within the areas of the City of Hamilton and Southside are significantly different from other areas of Bermuda for: fixed access and local calls provided to business customers; broadband services provided to business customers; and leased line services.

(d) Summary of geographic market conclusions

200. Given the above considerations, the RA proposes to adopt the geographic market definitions contained in Table 6 below.

Table 6: Proposed geographic market definitions

Service	Geographic markets
Retail access lines and local calls	Residential customers: National (excluding Southside) Business customers: Two separate geographic markets that are (1) central Hamilton; (2) the rest of Bermuda (other than Southside)
Wholesale fixed narrowband access lines and local calls Wholesale call origination on fixed networks	Two separate geographic markets being (1) central Hamilton; and (2) the rest of Bermuda.
Wholesale call termination on individual fixed networks	The geographic footprint of the network providing the termination service
Retail Broadband	Residential customers: National (excluding Southside) Business customers: Two separate geographic markets being that are (1) central Hamilton; (2) the rest of Bermuda (other than Southside).
Wholesale Broadband	Three separate geographic markets being (1) central Hamilton; (2) the rest of Bermuda (other than Southside).
Retail Mobile	National
Wholesale MVNO access	National
Wholesale origination of international calls on mobile networks	National
Domestic leased lines	Two separate geographic markets that are (1) Hamilton central; (2) the rest of Bermuda (excluding Southside)
Wholesale terminating segments of leased lines	Two separate geographic markets being (1) Hamilton central; (2) the rest of Bermuda (excluding Southside).
Infrastructure services	Separate geographic markets for (1) Southside; and (2) the rest of Bermuda.
Retail subscription TV services	National
Wholesale subscription TV services	National

Consultation question 8: Do you agree with the finding that there is a separate geographic market for Central Hamilton for the supply of:

retail access lines and local calls to business customers;

wholesale fixed narrowband access lines and local calls;
wholesale call origination on fixed networks;
retail broadband to business customers;
wholesale broadband services;
retail domestic leased lines; and
wholesale terminating segments of leased lines?

Consultation question 9: How should Central Hamilton be defined?

7 MARKET DEFINITION – FIXED ACCESS AND CALLING MARKETS

201. This section examines the definitions of the retail and wholesale markets relevant to the supply of fixed access and calling. The Market Notice identified the following markets as being susceptible to *ex ante* regulation:

- The retail market for the supply of fixed narrowband access lines and local calls for (a) business customers; and (b) non-business customers;
- The wholesale market for call origination on fixed networks;
- The wholesale market for call termination on fixed networks; and
- The wholesale market for narrowband access lines and local calls.
- In what follows, each of these candidate markets is examined in turn.

7.1 Retail market for fixed narrowband access and local calling

202. The key issues surrounding the definition of the retail fixed access and local calling markets have been addressed in section 6. In particular, that section concluded that:

- Access and local calls are in the same market (section 6.1);
- Mobile services are not sufficiently substitutable for fixed access and local calling services such that they would fall in the same market (section 6.3);
- Types of VoIP that would lie in the same market as fixed access and local calling services are: (1) DOCSIS VoIP; (2) VoWiMAX; and (3) FTTx VoIP (section 6.2). It was also concluded that, although they are not currently offered in Bermuda, Voice over the Internet (VoI) services that provide the end-user with a standard local telephone number, would also be in the same market as standard fixed access and local calling.
- There are separate residential and business customer markets for retail fixed access and local calling services (section 5.4(a));
- There is a single national geographic market dimension for residential access and local calls, but for business services there are distinct markets for (1) the City of Hamilton; and (2) the rest of Bermuda. (See section 6.5).

203. On the basis of the above conclusions, the RA therefore concludes that the appropriate retail market definitions for fixed access and local services are:

Table 7: Retail fixed access and local calling markets

Services	Definition of candidate markets
Retail fixed access lines and local calls	A national market for the supply of retail fixed access lines and local calls to residential customers A market for the supply of retail fixed access lines and local calls to business customers in the City of Hamilton A market for the supply of retail fixed access lines and local calls to business customers outside of the City of Hamilton

204. Underlying cost conditions, as recognized by international regulatory developments, suggest that access and local calling are efficiently supplied as a bundle. Moreover, this is supported by Bermudan practice and hence consumer expectations. Accordingly, the RA concludes that access and local calling belong in a single bundled market. The RA consider that while the conditions of competition are likely to differ as between (1) the City of Hamilton, and (2) the rest of Bermuda (as was discussed in section 6.5), barriers to entry are likely to be significant in both of these sets of areas (even if the exact extent of those barriers differ between the two).

7.2 Fixed access and local calling – wholesale markets

(a) Wholesale fixed access and local calls

205. For the same reasons discussed in the context of retail fixed access and local calls, the RA concludes that the appropriate retail market definitions for wholesale fixed access and local services are:

Table 8: Wholesale fixed access and local calling markets

Services	Definition of candidate markets
Wholesale fixed access lines and local calls	A market for the supply of wholesale fixed access lines and local calls in the City of Hamilton A market for the supply of wholesale fixed access lines and local calls outside of the City of Hamilton

(b) Call origination on fixed networks

206. The RA considers that there is a relevant market for the supply of origination of international calls on fixed networks and that there are separate markets for (1) the City of Hamilton; and (2) other areas of Bermuda.

(c) Call termination on individual fixed networks

207. The RA considers there to be a relevant market for call termination on individual fixed networks. Call termination is currently supplied for the termination of local calls from other local fixed networks and all mobile networks as well as for inbound international calls. Given that termination on one fixed network is not generally a demand-side substitute for termination on another network, and supply-side substitution is not possible, this implies that termination of calls on each network will constitute separate markets. The definition of a separate termination market for each network is consistent with the approach taken in the EU.[139] The RA considers that the extent of SMP in the termination market of an individual network will be uniform across all areas covered by that network and therefore the geographic aspect of the termination markets will be determined by the coverage of each network.

8 MARKET DEFINITION: BROADBAND ACCESS

208. This section focuses on defining the retail markets for the delivery of broadband access to an end user. The two relevant markets included in the Markets Notice are:

- Retail broadband services provided at fixed locations; and
- Wholesale broadband access on fixed networks.

209. The discussion to follow starts by providing an overview of the way in which broadband access and ISP services are currently supplied (Section 8.1). Section 8.2 examines the likelihood that Bermuda's current standalone retail broadband access market will continue to exist once the ICOL is implemented. The RA concludes that under the new regulatory regime there is a strong probability that ISP services will be bundled with broadband access services for mass market customers. It is to be expected that these Internet access providers will also offer a similar, though more differentiated, bundle to larger, non-mass market customers. However, these customers may prefer to purchase Internet services separately from broadband access.

210. Section 7.2(c) discusses standalone Internet service provisioning. It points out that Internet services, though usually provided as a bundle by broadband providers (as discussed previously in section 8.2), are also commercially provided separately from broadband access in many parts of the world. For this reason the RA felt it prudent to examine standalone Internet services. In so doing the RA arrived at the conclusion that barriers to entry into this market are low enough that *ex ante* regulation is unwarranted.

211. Following this, section 8.3 looks at the combined fixed broadband access and ISP services market. (Hereafter this bundled service will be referred to as "broadband" or "broadband services".) It begins by examining the different technologies used to provide fixed broadband services, reaching the conclusion

[139] The EC 2007 Market Recommendation defines the fixed call termination markets as "Call termination on individual public telephone networks provided at a fixed location."

that they are in the same market. Next, in section 7.2(b), consideration is given to determining whether this market also contains mobile broadband services. The RA concludes it does not. The discussion on the bundled provision of broadband access and Internet services concludes by finding, due to its high potential for SMP, *ex ante* regulation may be beneficial to the fixed broadband services market.

212. A summary of the views submitted by stakeholders on this is topic is available at Appendix D.

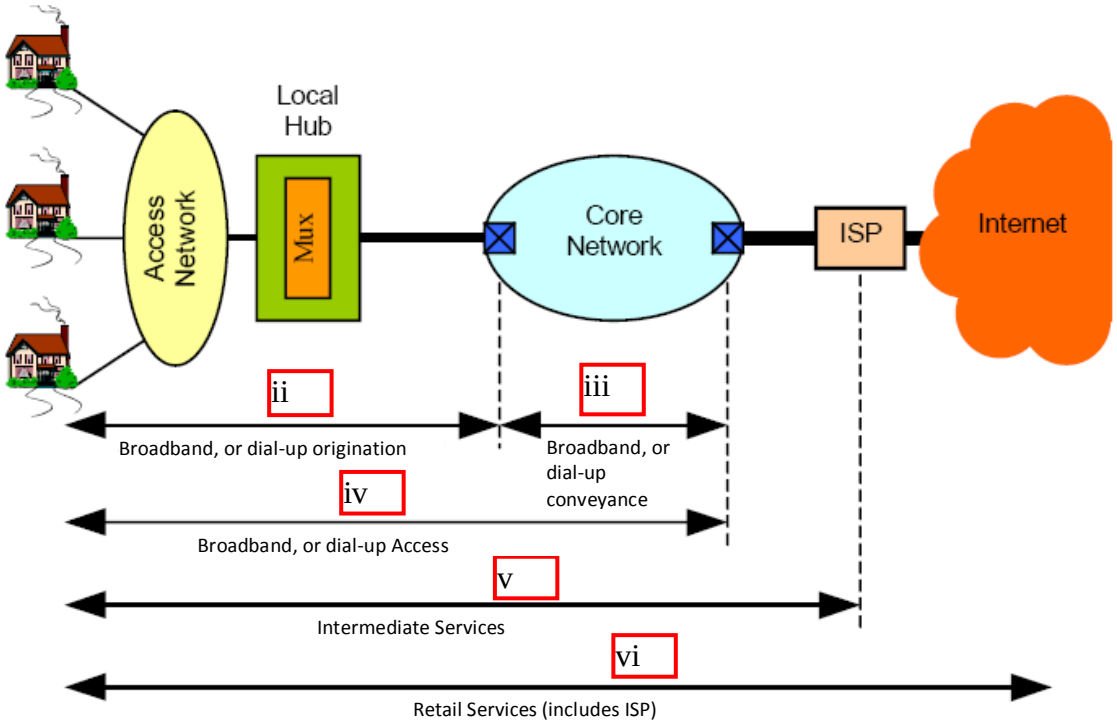
8.1 Overview of services as they are currently supplied

213. The provisioning of retail broadband services consists of the following vertical supply levels:

- Local access network;
- Broadband, or dial-up origination;
- Broadband, or dial-up conveyance;
- Broadband or dial-up access;
- Intermediate services delivered to service providers (eg resale services or an aggregated access connection to an ISP); and,
- Retail services, including ISP services.

214. A graphic depiction of these levels is presented below:

Figure 1: Broadband service provisioning



215. Due to Bermuda's current and legacy regulatory structure the provisioning of broadband services to end-users at a fixed location (item vi) requires the purchase of two retail products: A local broadband or dial-up access link from a Class B provider such as BTC or BCV (item iv), and ISP services from a Class C provider such as LCL or NRC. The complete link provided by a Class B carrier between an end-user and an ISP is depicted by item v. This link comprises local access, backhaul, and data stream aggregation, terminating at an ISP provider's premises. The ISP then provides access to local and international Internet networks along with Internet services such as web hosting and email accounts.

216. Previously, only Class C licensees could be ISPs. FKB, LCL, and NRC[140] are the ones that are currently acting in this capacity. This situation has subsequently changed, there now being several other means of obtaining ISP services in Bermuda. For instance, the two mobile operators in the country (BDC and DCB, which are Class B licensees) offer mobile data plans enabling customers to both access the Internet and utilize Internet services such as web

[140] For full names of companies see Table 24 above. Transact is not mentioned as it has combined with FKB and became FKB Transact Ltd., This company has recently been bought by Digicel and is now part of the Digicel group of companies. Digicel, on its website, states that ISP services are provided Transact Ltd. See, http://www.digicelbermuda.com/en/internet/digicel-internet/residential-and-small-office-internet.

surfing, checking email, and downloading movies and music.[141] One of these, BDC, also provides mobile broadband access and ISP services to residential users through its Bull product. In addition, three Class A carriers (TBI, LBM and CCL) are now licensed to provide ISP services, albeit to business customers only. At present, only TBI and CWB provide these services (CCL currently offers no retail ISP services, while BRT cannot act as an ISP). The table below depicts the various companies offering broadband (or dial-up) access, ISP services, or both.

Table 9: Broadband and Dial-up Access and Internet Service Providers

ISP Name	License Class	Services Provided				Authorized Customer Class	
		Local Fixed Access	Local Mobile Access	ISP Services (Mobile)	ISP Services (Fixed)	Residential	Business
LCL	C	No	No	No	Yes	Yes	Yes
NRC	B/C	Yes	No	No	Yes	Yes	Yes
BDC	B	Yes*	Yes	Yes	Yes*	Yes	Yes
BTC	B	Yes	No	No	No	Yes	Yes
BCV	B	Yes	No	No	No	Yes	Yes
DCB	B	No	Yes	Yes	Yes	Yes	Yes
QCL	B	Yes	No	No	No	No	Yes
TBI	A	No	No	No	Yes	No	Yes
LBM	A	No	No	No	Yes	No	Yes
CCL	A	No	No	No	Yes	No	Yes

* Limited in that internet access is provided through their easyconnect plan and ISP services are only available through that plan, not to any and all fixed line subscribers.

217. At the present time there are two basic means by which end-users in Bermuda may obtain broadband services:

- Subscribe to a bundle of mobile broadband access and ISP services. BDC,[142] and DCB[143] offer such a bundle to their mobile customers, on

[141] Some of these services are similar to fixed broadband. For example, DCB provides ISP and broadband access services to laptop or desktop computers using either a USB or WiFi modem, which makes it possible for a customer to use the service either as a fixed like service at home or, using a laptop, as a mobile broadband service at locations away from home. See, http://3gplus.digicelbermuda.com/en/about-3g/3g-for-your-computer also Alex Wright. "Digicel launches wireless modem", available from http://www.royalgazette.com/rg/Article/article.jsp?articleId=7da7b3f30030007&sectionId=65

[142] http://cellularone.bm/data_packages.asp (sighted 3 June 2010).

mobile smartphones, PDAs and similar devices, and via portable data devices, such as data cards and USB modems for use with computers.[144] BDC also offers a broadband access and ISP service bundle via its Bull product, which is marketed as a fixed internet access solution.[145]

- Subscribe to two separate services: (1) broadband access, and; (2) Internet access and services through an ISP.

218. Fixed broadband access can be obtained from BTC, NRC, BCV (which is licensed as a "carriers' carrier" for ISPs.[146]), or via the EasyConnect service formerly offered by M3 and continued under BDC, with whom it merged.[147] With the exception of NRC, which is able to offer ISP services because it holds a Class C as well as a Class B license, none of these local access providers are currently able to provide Internet access and services. Business and residential customers may obtain ISP services from any of the Class C providers listed in Table 9, above. Business customers, but not residential customers, also have the option to obtain ISP services from the Class A providers depicted in Table 9 as well as from QCL.

219. This means that presently in Bermuda there are five different local access and ISP services, being:

- standalone dial-up access provided by Class B carriers (that is, telephone service);
- standalone broadband access provided by Class B carriers, and BDC in the case of EasyConnect;
- standalone dial-up Internet access and service provided by ISPs;

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[143] http://www.digicelbermuda.com/en/plans/addons/digicel_data; http://www.digicelbermuda.com/en/3G+ (sighted 3 June 2010). M3 also offered bundled service before merging with BDC. http://www.m3wireless.bm/plans/data/ (sighted 3 June 2010)

[144] Connection via a USB modem provides service similar to fixed broadband. For example, DCB provides ISP and broadband access services to laptop or desktop computers using either a USB or WiFi modem, which makes it possible for a customer to use the service either as a fixed like service at home or, using a laptop, as a mobile broadband service at locations away from home. See, http://3gplus.digicelbermuda.com/en/about-3g/3g-for-your-computer also Alex Wright. "Digicel launches wireless modem", available from http://www.royalgazette.com/rg/Article/article.jsp?articleId=7da7b3f30030007&sectionId=65

[145] The Bull connects customers to the Internet over CellularOne's mobile network, creating a local wifi network. It is less portable than the devices just listed (http://cellularone.bm/bull.asp, sighted 1 June 2010).

[146] Communication from the then Minister of Tourism, Telecommunications and E-commerce, Renee Webb, 15 August 2003.

[147] EasyConnect is similar to the Bull, but requires separate Internet service (http://www.easyconnect.bm/WhatIs/index.html, sighted 1 June 2010).

- standalone broadband Internet access and service provided by ISPs;
- local access bundled with Internet access and services, presently only provided by mobile carriers (including the Bull service).

220. The first of these, dial-up access, only requires a telephone line that provides standard telephony call quality, and may be provided by any of the basic telephony providers mentioned in the fixed access and local calling portion of this document (section 6.2). As such the supply of this service is a part of the telephony market discussed in that section.

221. Dial-up service is in decline with many customers switching to a direct, always on, connection to the Internet that permits the simultaneous use of voice and data services at speeds that (typically substantially) exceed those of dial-up (typically 64Kbps or lower); hereafter this is referred to as broadband access. For example, NRC's dial-up customer base has declined approximately [CIC --%] between 2005 and 2009, dropping from [CIC -,---] customers to [CIC---] customers. Stated another way, in 2005 dial-up customers constituted [CIC --%] of NRC's residential ISP customers. By 2009 this value had fallen to [CIC --%]. This decline has been reported elsewhere as well. The *State of I.C.T. in Bermuda 2008* report states that 20% of residents reported using dial-up as there means of connecting to the Internet, by the third quarter of 2009 this had dropped to 11% of residents.[148] Furthermore, a review of LCL's webpage advertising its residential ISP services shows that dial-up ISP services are no longer being advertised.[149] Additionally, the types of traffic currently being sent over the Internet has changed dramatically since the early days of dial-up access. Presently the vast majority of this traffic consists of such activities as interactive voice and video communication, the downloading and uploading of content such as movies, music and video, streaming music, and streaming TV programming. The low transfer speeds of dial-up service (56Kbps to 64Kbps) make it incapable of providing these types of services with any reasonable degree of quality, if at all.

222. For the reasons articulated in the preceding paragraph, the RA finds that dial-up Internet access is not part of the broadband access market under consideration here and so will not be discussed further.

8.2 There is no forward-looking standalone retail broadband access market

223. Present license conditions in Bermuda prevent fixed carriers from jointly supplying broadband access and ISP services (with the sole exception of NRC, as was noted earlier). This creates a separate market for the provision of standalone broadband access that might not otherwise exist. This situation will change once the regulatory reform goes into effect and carriers are issued the

[148] Government of Bermuda, Ministry of Energy, Telecommunications, and E-Commerce, *The State of I.C.T. in Bermuda 2008,* at page 4 and the *Third Quarter 2009 report of The Bermuda Omnibus,* at page 15.

[149] http://www.logic.bm/residentialInternet.aspx, sighted 30 August 2010.

new ICOLs, which will allow, among other things, carriers to operate both as access providers and ISPs.

224. This section considers standalone broadband access looking forward, that is, in the context of the new regulatory regime. It finds that when supplying residential and business customers with less than a handful of access lines (call these mass market customers), broadband access will be bundled with ISP service. Consequently, the RA concludes that the SMP analysis of the current market for *standalone* broadband access, at least as far as mass market customers are concerned, is unnecessary. Instead, attention must be focused on a market in which firms supply both broadband access and Internet services (as is done, for fixed services, in section 8.3, and for mobile services, in section 7.3(b) and section 9.2.

225. The section is arranged as follows: evidence from Bermuda and overseas, respectively provided in section (a) and section (b), suggests the bundling of Internet access and Internet services will quickly become the norm in Bermuda. This is supported by cost analysis that suggests efficient supply of these services will generally result in them being bundled together (section (c)). This leads to the conclusion (section (d)) that the market for Internet access includes Internet services.

(a) Bundling broadband Internet access and Internet service in Bermuda

226. Fixed access providers are not allowed to provide Internet access and services and instead require customers to sign up with a Bermudan ISP for access to these services. Mobile customers, on the other hand, are able to obtain Internet access, and Internet services if the MNO provides them, from their mobile operator directly without going through an ISP. The mobile carriers currently provide Internet access services, along with associated data plans, with their more advanced handsets; Blackberries and iPhones, for example. BDC and DCB also include Internet access services as part of their respective mobile broadband plans, which are offered via USB or wireless modem that are then attached to laptop or desktop computers.

227. The likelihood of this occurring is strongly supported by the statements of various parties (Appendix D) to the effect that the present separation of broadband access provisioning from the provisioning of Internet access and services is an artificial construct of the current regulatory regime that will disappear once the new regime is in place (See, for example, the comments of BTC, LCL, and TNL). Furthermore, broadband access provider QCL points out [CIC ----------[150] ----------.] In addition, NRC, which has both a Class B and Class C license and so can provide Internet services along with broadband access, advertises its WiMax High Speed Data

[150] *Ibid.*

and Telephone service with the slogan: “Simplify your life and get your Local Calls, Internet, and Long Distance all on one bill, and all from one company.”[151] A perusal of NRC’s residential application form for this product gives no indication that signing up for this service requires a customer to select an ISP, that role presumably being filled by NRC.[152] Thus, like BDC and DCB with their mobile broadband products, NRC appears to be bundling its broadband access product with its own Internet access and services offering.

(b) Bundling broadband Internet access and Internet service internationally

228. The international evidence also strongly suggests that without a regulatory separation between broadband access and Internet services, broadband access providers will, at least for residential and small business customers, bundle that service with Internet services provision (the reverse is not necessarily true—as commercial ISPs exist that do not supply Internet access—see section (c) below). For example, in the UK British Telecom’s (BT) various flavours of its *BT Total Broadband* product line all come packaged with various Internet services such as on line data storage, Internet security packages, and BT Yahoo! Email accounts and 24/7 Internet customer service support.[153] Virgin Media, the UK’s largest cable operator, also bundles its broadband products with Internet services similar to those offered by BT.[154] Furthermore, the RA’s review of other UK fixed broadband access providers indicates that broadband access bundled with Internet services is the norm rather than the exception.[155] A similar situation obtains in the US, as a glance at the websites of major broadband access providers demonstrates. Verizon, for example, provides up to nine email accounts along with personal web space with its broadband access services as does Comcast, one of the larger cable access providers in the US.[156]

229. New Zealand provides another example. Initially in New Zealand, broadband access services were supplied independently of Internet services. In particular, only the incumbent fixed network operator, Telecom NZ, supplied broadband access to customers and ISPs (one of which was Telecom’s own ISP)

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[151] http://www.northrock.bm/residential/access/access_wireless.html

[152] See, http://www.northrock.bm/downloads/Res-PhoneWirelessInternet.pdf

[153] See, http://www.productsandservices.bt.com/consumerProducts/displayCategory.do?categoryId=CON-TOTAL-BB-R1

[154] See, for example, http://shop.virginmedia.com/broadband/up-to-20mb.html

[155] For example, the RA’s review of the UK’s top ten retail fixed line broadband providers by subscriber size on the ISPreview website (http://www.ispreview.co.uk/review/top10.php) found that all of these providers bundled a variety of ISP services with their broadband access services.

[156] See, respectively, http://www22.verizon.com/Residential/HighSpeedInternet/Features/Features.htm and http://www.comcast.com/Corporate/Learn/HighSpeedInternet/highspeedinternet.html?INTCMP=ILCCOMCOMHS20906

provided the services of authentication, email and hosting. This approach to service delivery was not driven by regulation but rather was simply how the market evolved. In 2005, the Unbundled Bitstream Service (UBS) was introduced by government mandate. UBS provided a means for ISPs to supply customers with the bundle of broadband access and ISP service. Subsequent to the introduction of UBS, Telecom removed the previous arrangements leaving UBS as the sole means for ISPs to provide customers with broadband ISP services and so the main ISPs in the market began to bundle Internet access with Internet service.

(c) Bundling of Internet access and Internet services is efficient

230. The market developments outlined in the preceding sections suggests that bundling of Internet access and services is not accidental, but driven by market forces. The RA considers that in particular, such bundling occurs because a significant number of especially smaller unsophisticated Internet subscribers greatly benefit from being able to purchase Internet access and services jointly (economies of scope in consumption). Such subscribers benefit from immediately obtaining, rather than from having to separately seek out, basic services like assignment of email and instant messaging addresses, email and website hosting, and customer service in service setup and management. Thus, carriers that bundle access and Internet services meet those consumer needs more effectively and efficiently than carriers that only provide access service, leaving it to the customer to obtain Internet services.

231. This is supported by the fact that large customers often do not rely on their Internet access providers to supply Internet services. Such large customers presumably value tailored solutions sufficiently highly to prefer to build these internally or under contract, rather than rely on off-the-shelf packages supplied by their Internet access providers. Moreover, these customers are typically better placed to evaluate such choices and to self provide, already have their own information technology RAs.

232. Thus, suppliers of broadband access will not always bundle the service with Internet services. However, even though some large technologically sophisticated users may choose not to purchase Internet services from their access provider, most access providers have Internet services RAs solely dedicated to working with this customer class to design more tailored Internet service packages to meet their needs. And so, while in some instances broadband access suppliers will provide this service on a stand-alone basis, these suppliers are usually in a position to offer customers the option of purchasing tailored Internet solutions in addition to the basic, plain vanilla, Internet services offered to mass market customers.

(d) Conclusion on broadband Internet access and Internet services

233. On the basis of the preceding, the RA concludes that once the ICOL is available, standalone supply of broadband access (on fixed networks as well as on M3's EasyConnect) will essentially disappear, and instead, companies currently providing broadband access will begin to supply Internet access and

services as well. Specifically, broadband access will be bundled with Internet access and, most likely, with Internet service to mass market customers. Furthermore, the ICOL may also create new opportunities for current broadband access suppliers to enter into the business of providing larger business and government customers with Internet access and the tailored Internet services packages they may require.

8.3 Fixed broadband Internet access and Internet service provision

234. It was previously concluded that broadband Internet access and Internet services (hereafter referred as "broadband" or "broadband services") will be in the same market under the new regulatory regime and will likely be bundled together for retailing purposes. This section first shows that different fixed broadband technologies belong in the same market (section 7.3(a)), then finds that the market for fixed broadband services does not contain mobile broadband services (section 7.3(b)) and *vice versa*.

(a) Fixed broadband

235. In section 6.2., above, the RA examined the range of physical infrastructures besides that of copper cable that may be used for the delivery of fixed telephony services: hybrid fibre coaxial cable (HFC) such as that used by cable TV network operators; wireless local loop (WLL) using a fixed WiMAX network; and, various fibre configurations (FTTx). The RA's analysis concluded with the finding that fixed telephony services provided over these various alternative infrastructures were in the same market as telephony services provided over the traditional copper cable network. In this section the RA will consider whether a similar conclusion may be reached regarding the delivery of fixed broadband services.

(i) Fixed broadband over cable TV networks

236. Cable operators provide broadband services using the same DOCSIS standard employed to delivery their VoIP services, which was discussed in section 5.2(a). This standard is capable of delivering broadband at speeds comparable to, or faster than, the copper based DSL technology.[157] Moreover, as evidence from other jurisdictions amply demonstrates, broadband service via cable is seen by consumers, and marketed by its providers, as a competitive alternative to broadband services provided via DSL. In the US, for example, the cable provider Comcast touts its broadband services as being "…way faster than

[157] See, for example, *DOCSIS 3.0 Takes Off Worldwide*, available from http://www.cablelabs.com/news/newsletter/SPECS/OctNovDec_2009/story6.html. See also, Waverman, Leonard, Kaylan Dasgupta, and Erik van der Merwe, *Connectivity Scorecard 2010*, at page 17, where it is noted that a high degree of ultra-high-speed broadband is being delivered in Europe, Canada and Europe by cable companies using the DOCSIS 3.0 standard. Report is available at http://www.connectivityscorecard.org/.

DSL"[158] while Verizon's high speed Internet website contains a table comparing its high speed broadband service via DSL offerings to broadband service via cable, to cable's disadvantage.[159] Similar activity can be seen in the UK where cable provider Virgin Media advertises its broadband packages as being twice as fast as those offered by BT.[160] Furthermore, a look at the UK's ISPreview website shows that BT and Virgin Media are, respectively, the number 1 and number 3 providers of fixed broadband service by subscriber size, with BT approximately 5 million subscribers to Virgin Media's approximately 4 million.[161] Arguably, a strong indication that consumers view broadband over cable and broadband over DSL as providing equivalent service.

237. The situation is the same in Bermuda. As was pointed out by BCV (see Appendix D, section **Error! Reference source not found.**), BCV and BTC have onsistently countered each other's pricing offers for broadband service since BCV started providing it in 2007. A further indication of the rivalry between BTC and BCV's broadband services is the increase in BCV's share of total residential fixed broadband customers from approximately [CIC --%] to approximately [CIC --%] During this same period BTC's share of these customers has declined from approximately [CIC --%] to approximately [CIC --%].[162] This data suggests that residential customers in Bermuda view BCV's broadband over cable service as an alternative to BTC's broadband over DSL service.

238. Summarising the preceding, cable broadband service is in most respects functionally identical or better than broadband service provided by DSL. As a consequence, cable broadband service would be a close substitute for broadband service via DSL if it could be profitably supplied at a price that reflected competitive rates for the DSL service. This is in fact the case. Where it is offered, cable broadband service has proved to be substitutable with DSL broadband service.

239. For the reasons stated above, the RA concludes that broadband service over cable networks is a close substitute for, and therefore lies in the same market as, broadband service via DSL.

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[158] See, http://www.comcast.com/default.cspx, requires clicking on the "Faster Internet for $19.99 per month" box to see the quoted advertisement.

[159] See, http://www22.verizon.com/Residential/HighSpeedInternet/HSIvsCable/HSIvsCable.htm

[160] See, http://shop.virginmedia.com/broadband/compare-broadband-packages.html

[161] See, http://www.ispreview.co.uk/review/top10.php

[162] These estimates were derived from confidential data responses submitted by the parties during May and June of 2010 and from confidential data responses submitted by the parties in July 2012.

(ii) Fixed broadband over wireless networks

240. At the present time the only fixed broadband over wireless service available in Bermuda is the broadband services from NRC using their WiMAX network. Concerning this, the discussion in section 5.2(b) pointed out that the functional similarity of WiMAX service to fixed telephony service, along with the fact that it is being commercially used in other jurisdictions as an alternative for that service, support a conclusion that voice service provided over a WiMax network is in the same market as voice service provided over the fixed telephony network. WiMAX service is also being used in other jurisdictions to provide broadband services along with voice services as an alternative to fixed broadband over wireline services. Section 5.2(b) mentioned that NRC has assured the RA that its WiMax network provides carrier grade local and international telephony service that is identical in quality to BTC's telephony service. Given that NRC's network is robust enough to provide carrier grade voice service of a quality that is on par with that provided by BTC, it follows that the broadband service currently being provided over the company's network is also similar enough in quality to suggest that it belongs in the same market as BTC's fixed broadband service.

241. Summarising: (1) international and product functionality evidence strongly suggest that the fixed broadband access services provided by BTC and NRC are in the same market; (2) As was noted in section 5.2(b), BTC and NRC see themselves as direct competitors; (3) The RA has previously concluded that the fixed voice services provided by NRC and BTC belong in the same market; and, (4) Quality of service standards and network robustness requirements for the provision of carrier grade voice service is similar to what is required for the delivery of quality broadband services, which suggests that broadband access service provided by NRC's WiMAX technology would lie in the same market as broadband access service supplied by BTC using its DSL technology.

242. For these reasons the RA concludes that the two services belong in the same market.

(iii) Fixed broadband over FTTx networks

243. Broadband services can also be delivered by way of various fibre configurations, generally denoted as FTTx.[163] These types of fibre configurations are being rolled out by PSTN operators around the world as they struggle to keep up with the growing bandwidth demands end-users are placing on their networks. They are also being rolled out as a competitive response to cable-TV operators. Verizon's deployment of an FTTP network against Comcast's HFC network is an example from the US.[164] Verizon's Fiber Optic Service (FiOS) is now available to approximately 16.5 million premises, or to about one-third of the households in

[163] See footnote 29 above.

[164] See, for example, http://www.high-speed-internet-access-guide.com/dsl-vs-cable.html.

Verizon's service territory.[165] These networks offer broadband at speeds equivalent to those available from cable operators and at roughly equivalent rates. For example, Verizon's FiOS Internet service offers broadband service with down load speeds up to 15 Mbps at $69.99 per month[166] while Comcast offers a broadband service with download speeds up to 20 Mbps at $48.95 per month.[167]

244. Because FTTx (1) is being employed by telephone companies as a replacement for their existing copper telephony networks, (2) supports QoS technologies allowing equally high, if not better, broadband service quality than those available via DSL on the standard telephony network, (3) is being rolled out as a response to competitive pressures generated by cable company DOCSIS networks, and (4) is prompting competitive responses from cable companies, the RA concludes that broadband service over FTTx is in the same market as broadband service using DSL.

245. In Bermuda, the principal supplier of fibre-based services is QCL, which supplies voice and data services, including Internet access, over fibre to commercial customers, with one exception in the residential market.[168] At the present time QCL's data and Internet products are provided on a dedicated base via leased lines only and so, from a demand side perspective, are not part of the market under consideration here as the discussion concerning leased lines takes place in section 10.

246. BTC is also upgrading its network infrastructure. BTC has transitioned its core network to a Next Generation Network based on the Internet Protocol, which included pushing fibre closer to the customer. However, its network, outside Hamilton, still cannot be described as employing an FTTx technology.[169]

247. From a supply side perspective, it is possible that, in response to a SSNIP by BTC on its DSL products, QCL could supply broadband services to BTC's DSL business customers within its service footprint. However, the fact that QCL has chosen not to provide business broadband services at rates comparable to those currently available under DSL, even though its current license does not prohibit it from doing so, may suggest that QCL does not believe there is a business case for its entry into this market at the present time. If this is

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[165] http://newscenter.verizon.com/kit/vcorp/factsheet.html

[166] See, http://www22.verizon.com/Residential/FiOSInternet/Overview.htm#plans. FiOS (Fiber Optic Service) is a fiber to the premises (FTTP) service

[167] See, https://www.comcast.com/shop/buyflow2/productsexisting.cspx?Inflow=1

[168] See, for example, Quantum Confidential Response of February 26, 2009 and the QCL website at http://www.quantum.bm/local_voice_services.htm.

[169] See for example, 2009 Keytech Annual Report at page 8; and BernNews, "Launch of BTC's New PRISM Network," May 19, 2012, http://bernews.com/2012/05/launch-of-btcs-new-prism-network/.

indeed the case, then it is highly doubtful that a SSNIP imposed on current business DSL rates would induce a responsive entry into this market by QCL.

248. From a forward looking perspective, the ICOL will give QCL regulatory permission to expand its service offerings into other markets that it is currently barred from entering. Given the extent and capacity of its fiber network, as depicted in the network maps the company provided to the RA as part of its data submission, expansion into new markets would make economic sense once regulatory barriers preventing this have been lifted. In section 5.2(c) the RA concluded that QCL's FTTx VoIP services were in the same market as standard telephony. For reasons similar to those presented in the preceding paragraph, this suggests that any non-leased line fixed broadband access service QCL may choose to provide under the ICOL would belong in the same market as the broadband access services BTC provides over its fixed network.

249. Summarising: (1) international and product functionality evidence strongly suggest that any non-leased line fixed broadband access service that may be provided by QCL under the ICOL would lie in the same market as BTC's fixed broadband access service; (2) The RA has previously concluded that the fixed voice services provided by QCL and BTC belong in the same market; and, (3) Point number 2 suggests that any non-leased broadband service provided by QCL would also lie in the same market as broadband service provided by BTC.

250. For these reasons the RA concludes that the two services belong in the same market.

(b) Are mobile and fixed broadband part of the same market?

251. In section 5.3(g) the RA concluded that fixed voice was not part of the mobile voice market on the grounds that fixed service cannot meet the demand for mobility. On similar grounds the RA concluded, in section 8.2(b). fixed broadband services are not part of the mobile broadband services market. This section examines whether mobile broad band services are part of the same market as fixed broadband services.

252. In the discussion to follow, section (i) provides a brief review of the regulatory activity in other jurisdictions concerning this issue. The RA's survey of regulatory activity found only one instance where a regulatory authority determined that mobile and fixed broadband services belonged in the same market. As discussed below, the circumstances supporting this decision are not present in Bermuda at this time. Section (ii) examines whether Internet access through handheld devices such as smartphones, Blackberries, PDAs[170], and the like is equivalent to mobile broadband access using a netbook or a laptop connected to a mobile network via USB or WiFi modem. This section shows that mobile network operators (MNOs) have differentiated marketing and pricing structures for these two services that are significant enough to warrant placing these services in different markets. This view is supported by evidence indicating

[170] Personal digital assistants such as the Palm Pilot.

that consumers view this services as being different products and so not equivalent to one another. The RA's conclusion is that Internet access through handheld devices is not part of the mobile broadband market. Section (iii) briefly recaps the quality and cost differences between fixed and mobile services that were discussed in the section dealing fixed and mobile voice telephony as many of those differences are pertinent to the present discussion. This material is supplemented by additional information specific to the differences observed between fixed and mobile broadband qualities and capabilities. It is the RA's belief that, while the differences in favour of fixed broadband are sharper than those observed for fixed voice, these differences may not be strong enough to definitively show that mobile broadband should be excluded from the fixed broadband market. Section 5.3(e) presents price comparisons between fixed and mobile broadband services. These comparisons demonstrate that mobile broadband as currently offered by DCB and BDC is materially more expensive than fixed broadband, though this difference narrows when the price for fixed broadband is increased by 10%. Finally, section (v) concludes.

(i) Fixed versus Mobile Broadband—A brief review of the regulatory activity in other jurisdictions

253. International regulatory bodies generally consider fixed and mobile broadband access services to be in different markets. An exception was the Austrian regulator, which found the two services to be in the same market. This position was upheld by a EC demanded review by the Independent Regulator Group (IRG). [171] The EC had expressed serious doubts related to whether mobile services could provide equivalent quality and security, whether there was a role for the triple play that suggested exclusion of mobile services, and as to the nature of fixed and mobile broadband contract lengths. The IRG Expert Group concluded "that Austrian consumers use mobile broadband connections in an almost identical manner that they use fixed ones."[172] The Expert Group was also struck by the unusually deep penetration of mobile use in Austria, and by the relatively low cost of mobile services.[173] Indeed, mobile broadband is the largest form of Internet access, and mobile calling the largest form of calling in Austria (77% of all calls minutes in Austria were made on mobiles).[174] In the UK, on the other hand, Ofcom found;

> Despite the high rate of take up, mobile broadband is largely seen as complementary to existing fixed broadband access, in the sense that most mobile customers also purchase fixed access, rather than as a substitute: 75% of those with a mobile broadband connection also have a

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[171] IRG Expert Group Report Opening of Phase II investigation Pursuant to Article 7(4) of Directive 2002/21 EC: Case AT/2009/0970 – Wholesale broadband access at page 14.

[172] *Ibid* at page 8.

[173] *Ibid*

[174] *Ibid*

fixed-line connection. This is likely to be a result of constraints associated with the speed and capacity of mobile broadband, making it less appropriate for in-home use where users may be more inclined to use data hungry services…[175]

254. The RA's review of the data available to it indicates that the situation in Bermuda is not comparable to what was observed in Austria. In Bermuda, for example, approximately 49% of total originating calls minutes were made from mobiles as compared to the 77% obtaining in Austria. Moreover, the majority of Austrian mobile broadband plans have very large download caps, up to 15 GB. In Bermuda the top download cap available with a mobile broadband plan is 10 GB.

255. In summary, aside from the action of the Austrian regulator, there has been no other finding known to the RA that fixed and mobile broadband services belong in the same market. Furthermore, the Bermuda specific data presented in the preceding paragraph does not provide support for reaching a conclusion similar to the one reached by the Austrian regulatory authority. Additionally, no party to these proceedings has provided compelling enough evidence to warrant placement of fixed and mobile broadband services in the same market.

(ii) Is Internet access via Smartphones, Blackberries, PDAs[176] and the like in the mobile broadband market?

256. Internet access by devices such as Smartphones and Blackberries has increased exponentially over the past several years and afford their owners the opportunity to do many of the activities that are normally associated with broadband service; downloading songs and moves for example. However, evidence indicates that mobile operators around the world view mobile Internet access using these devices as being materially different from mobile broadband access. For example, in Bermuda, as the tables below demonstrate, both mobile providers offer separate data plans to Smartphone users and mobile broadband users.

[175] Ofcom, *Review of the wholesale broadband access markets: Consultation on market definition, market power determinations and remedies* (Ofcom March 2010 Consultation), Consultation, 23 March 2010 at ¶3.106. Available at http://stakeholders.ofcom.org.uk/binaries/consultations/wba/summary/wbacondoc.pdf

[176] Personal digital assistants such as the Palm Pilot.

Table 10: Post-paid Smartphone plans

Plan	Digicel[177]			CELLONE	
	Monthly Rate	Data Overage Rate (per MB)		Monthly Rate	Data Overage Rate (per MB)
15 MB	$10	$5.00		n/a	n/a
40 MB	$20	$4.00		n/a	n/a
100 MB	$35	$3.00		n/a	n/a
200 MB	n/a	n/a		$25.00	$0.05
1 GB	$45	$0.05		$45.00*	$0.05
3 GB	$70	$0.04		$75.00	$0.04
7 GB	$90	$0.03		$95.00	$0.03

*Minimum plan for all iPhone users and select Android device users. The above packages must be in conjunction with a voice plan.

Table 11: Post-paid mobile broadband plans[178]

Plan	Digicel			CELLONE	
	Monthly Rate	Data Overage Rate (per MB)		Monthly Rate	Data Overage Rate (per MB)
1 GB	$49	Capped		$45.00	$0.05
5 GB	$79	$0.05 or Capped		$75.00	$0.04
10 GB	$99	$0.05 or Capped		$95.00	$0.03

257. These tables illustrate the fact that Smartphone data plans have more variety in terms of data options and higher prices for equivalent data caps than are observed in the mobile broadband data plans. Additionally, CELLONE explicitly informs customers that its Smartphone plans cannot be used as a modem for a PC or Laptop. Customers who desire that functionality, commonly referred to as "tethering", are directed to sign up for a mobile broadband plan.[179]

[177] Digicel also has a variety of bundled data and voice plans for Smartphones, which are not depicted here. All the plans are priced at $100 per month for various combinations of data and voice usage.

[178] Data for both tables taken from http://www.digicelbermuda.com/en/postpaid/data-plans and http://www.cellone.bm.

[179] See, http://www.cellone.bm/plans/plans_data.html

This is a common practice in other jurisdictions. In the US, for example, AT&T offers a variety of data plans to its Smartphone customers, but explicitly states that customers wishing to tether their Smartphones to a laptop, PC, or other device need to purchase the company's top tier 5GB, $50 per month, data plan to do so.[180]

258. Moreover, many of the premium "all-you-can-eat" data plans associated with Smartphones have fair usage restrictions associated with them. Digicel, for example states that once its Ultimate Unlimited (Unlimited data and unlimited voice) customers reach a threshold of 7 GB of usage Digicel cannot guarantee speeds above 128Kbps and the company reserves the right to modify a customer's plan, or terminate service, if this threshold continues to be exceeded.[181]

259. In addition to the differences in pricing and data caps between Smartphone and mobile broadband plans there are also differences in a user's Internet experience under each of these options. To begin with, Internet web pages were originally designed for viewing on the larger screens associated with desktop or laptop computers and so are optimized to that end. While this is changing, with more websites offering mobile optimized viewing options[182], or due to the increasing availability specific applications designed for enabling a Smartphone to view sites not easily, or currently, visible via a Smartphone[183], the fact remains that surfing the Web using a Smartphone is just not the same as doing so using mobile broadband via a laptop.[184] Furthermore, there is the fact that a Smartphone's small screen size makes viewing and navigating between multiple web pages extremely challenging, which makes activities such as comparing prices between products very difficult.

260. For the reasons stated in the preceding paragraphs, the RA concludes that mobile Internet access via Smartphones and other such devices is materially different enough from mobile broadband Internet access that the two services do not belong in the same market.

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[180] See, http://www.att.com/shop/wireless/data-plans.html#fbid=vfDRzzY3jQE.

[181] See, for example, http://www.digicelbermuda.com/en/help_faqs/4g-faq.

[182] See, for example, http://mobilebeyond.net/mobilizing-and-making-money-with-a-wordpress-blog-or-mobile-website/, which mentions a plugin that enables bloggers to resize a blog for mobile handset viewing.

[183] See, for example, http://www.wired.com/gadgetlab/2010/06/att-adds-iphone-tethering-kills-unlimited-data-for-ipad-smartphones/, which mentions the need for and iPhone application, yet to be designed, to enable access to Hulu via an iPhone.

[184] See, for example, http://www.useit.com/alertbox/mobile-usability.html, which provides a good discussion of some of these issues.

(iii) Quality of service differences between fixed and mobile broadband

261. Many of the quality differences between fixed and mobile voice services discussed in section 5.3(c) pertain to fixed versus mobile broadband as well. Reliability for mobile broadband is just as much of an issue as it can be for mobile voice. On mobile broadband this can manifest itself in the form of lost packets, dropped Internet connections, high latency (delay in packet delivery) resulting in increased time for downloading documents or viewing web pages, and increased jitter (variability in packet latency over time), which degrades the quality of streaming audio and video content.[185] This can become even more of a problem for a household network seeking to connect multiple PC's and internet devices to the Internet. Typically this is done by way of DSL or cable wireless router. While mobile broadband routers are available and marketed as replacements for ADSL or cable routers, tests indicate that simultaneously operating multiple internet devices through them causes performance to degrade to quality below that achievable through DSL or cable modems

262. Given the issues mentioned above, the probability of business users switching to total reliance on mobile broadband is, at the present time, highly unlikely. High jitter and latency, dropped connections and speeds below that of ADSL could be disastrous for a business depending on time critical Internet access for such things as shared application usage and video conferencing. [186] Businesses do, however, view mobile broadband access as an important complement to the fixed broadband access relied upon in the office. This is why operators that are able to do so are offering combined fixed and mobile broadband packages targeted to business users. BT in the UK, for example, offers *Go Anywhere* broadband product, which combines unlimited fixed broadband with mobile broadband, though this is capped at 1Gbps per month, albeit with free, unlimited Wi-Fi acess.[187]

263. In addition to the quality of services issues mentioned above, the other advantage fixed broadband has over mobile broadband is that fixed broadband typically have unlimited data usage plans available. While mobile broadband plans, as was mentioned in section (ii), typically have data caps that are much lower and do not, as a rule, offer unlimited data usage as an option and even

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[185] See, for example, "Mobile broadband speed and latency testing" at http://apcmag.com/mobile_broadband_speed_and_latency_testing.htm, which noted that, while there has been improvements in latency issues (here discussed as "ping time"), latency is still a problem relative tothat obtainable using fixed broadband via ADSL2. See also, http://www.talk3g.co.uk/showthread.php?8030-Vodafone-Mobile-Broadband-Service-Quality-Testing&p=38757, which notes that latency tests indicate that Vodafone mobile broadband is fine for general purpose Internet use but not for things such as on line gaming, streaming audio, and VoIP.

[186] Collins, Barry , "Businesses", 11 Feb 2009. Available at http://www.pcpro.co.uk/features/247071/businesses

[187] See, http://business.bt.com/packages/broadband-phone-and-mobile/ viewed July 2012.

when they do, fair use restrictions typically apply. For example, Virgin Mobile USA offers unlimited data as part of their *Beyond Talk* plans, but speeds will slow to 256Kbps if the monthly cap of 2.5GB is reached (3.5GB if the customer purchases the company's *Mobile Hotspot* product).[188] T-Mobile also offers a Smartphone with mobile hotspot unlimited data plan, but it too has a fair use restriction, imposing a 5Gbps threshold during the course of a month.[189] In contrast, Comcast, the largest cable provider in the US, is not currently applying a monthly data consumption threshold.[190]

264. While mobile broadband download speeds are improving, they are still lower than those obtainable on fixed broadband connections and can vary considerably depending on signal strength and network congestion. For example, a recent posting on the BroadbandGenie website in the UK pointed out that the top download speed observed in their mobile broadband test was 4.44 Mbps, but involved a high degree of fluctuation.[191] A recent mobile broadband test conducted in the US similarly found a high degree of fluctuation in mobile broadband speeds, but showed higher average download speeds than are apparently available in the UK.[192] Furthermore, the data capacity of fixed broadband networks has also been expanding quickly as network owners upgraded their networks to handle the rapidly increasing Internet traffic. Operators around the world are rolling out various FTTx networks and the DOCSIS 3.0 supports broadband rates on par with those available by FTTx.[193] Because of the high degree of variability in the quality-of-service and reliability of transmission and transport in mobile broadband networks, it is expected that the peak and average data rates available to mobile broadband consumers will remain below those available on fixed broadband networks.[194]

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[188] See, http://www.virginmobileusa.com/cell-phone-plans/beyond-talk-plans/overview/#faqs

[189] See, http://www.t-mobile.com/shop/plans/cell-phone-plans-detail.aspx?tp=tb1&rateplan=Classic-Ultd-Talk-Ultd-Text-Ultd-Data-5-GB

[190] See, http://www.comcast.com/Corporate/Customers/Policies/HighSpeedInternetAUP.html, viewed July 2012.

[191] Matt Powell, *Mobile Broadband Genie Road Trip 2012: overall analysis*, 2 July 2012. Available at http://www.broadbandgenie.co.uk/blog/20120621-mobile-broadband-genie-road-trip-2012-overall-analysis viewed July 2012.

[192] See, for example, Mark Sullivan, "3G/4G Performance Map: Data Speeds for AT&T, Sprint, T-Mobile, and Verizon", *PCWorld*, 7 May 2012, at http://www.pcworld.com/article/254888/3g4g_performance_map_data_speeds_for_atandt_sprint_tmobile_and_verizon.html viewed July 2012.

[193] See, for example, Lehr, William, "Mobile Broadband and Implications for Broadband Competition and Adoption" available at http://people.csail.mit.edu/wlehr/Lehr-Papers_files/LehrMobileandBroadbandCompetition%20RELEASED%20Nov%2022%202010.pdf

[194] *Ibid* at page 19.

265. The situation in Bermuda in regards to mobile broadband is similar in many respect to what has been reported in the preceding paragraphs. The mobile operators BDC and DCB impose data caps on their mobile broadband plans, the highest being 10GB. And, as was mentioned earlier on page 80, even DCB's unlimited data plan is subject to a fair use restriction after the 7 GB per month ceiling is reached. CELLONE does, however, offer unlimited data usage, with no data caps or fair use restrictions, with its easyConnect plan. Average download speeds for this service are only up to 1MB, however, which is very low compared to those available from fixed broadband.[195] In comparison, BTC and BCV offer broadband access at speeds of up to 10Mbps and 8Mbps, respectively.[196] Furthermore, it is possible for customers using BTC's DSL service to obtain service at equivalent, and more consistent, speeds as those offered by DCB and BDC at lower rates, as will be discussed in section 7.3(b)(iv).

266. Furthermore, as was discussed in section 5.3(d), fixed services have very low incremental and marginal costs, while mobile costs at the margin are much higher, and can be particularly high due to congestion causing fixed services to have much lower usage prices relative to mobile services. Thus competitively provided mobile services may not be a good substitute for fixed services, because mobile services may not provide particularly effective competition for the price of additional data usage.

267. All of these reasons suggest that some customers might not switch from fixed to competitively provided mobile broadband if a hypothetical fixed broadband monopolist engaged in a SSNIP. That is, customers who desire the ability to access the simultaneously from several internet devices linked to one router, enjoy data intensive activities such as on line gaming, listening to streaming audio, watching streaming video, or have data intensive business related needs, may be willing to maintain their fixed service in the face of a SSNIP. If this were true for enough customers, then competitive mobile broadband could not constrain a SSNIP by a hypothetical fixed broadband monopolist, which would suggest that mobile broadband should be excluded from the market for fixed broadband.

268. That said, however, the RA is aware that both DCB and BDC have recently stated that they have introduced 4G technology and this could cause these figures to change. This new service has been found to provide download speeds ranging from 1.6Mbps to 3.58Mbps[197], which are comparable to the lower

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[195] See, http://www.cellone.bm/plans/plans_wireless.html.

[196] However, as a recent article in the *Royal Gazette* notes, both BCV and BTC have higher broadband access speed service options in the offing, with speeds up to 25 Mbps. See, Marcia Breen, "BTC to launch higher speed broadband access", 25 September 2012, *The Royal Gazette*, available at http://www.royalgazette.com/article/20120925/BUSINESS03/709259945, viewed 28 September 2012.

[197] Alex Wright, "Digicel launches wireless modem," *The Royal Gazette*, July 22, 2010. Available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=65&articleId=7da7b3f3003000f

speed options offered by BTC and at prices that are, as will be demonstrated in section (iv)., considerable cheaper. As will also be discussed in that section, it is possible that prices for fixed broadband services may be above competitive levels.

269. While the RA acknowledges this service may have a significant competitive impact on the other mobile broadband providers, as well as the fixed broadband providers, the service is so new it is difficult to gauge with any accuracy what customer take-up rates for the service will be or how those take-up rates may affect the average achievable down load speeds as Digicel's network becomes more congested as more data users sign on to the service. As pointed out in section 5.3(c) congestion on mobile networks is a frequent occurrence, a situation not faced on fixed networks. A prime example of this is the severe network congestion problems AT&T experienced on its network due to the huge data usage resulting from the introduction of the iPhone.[198] It is possible that DigiCel could experience similar problems if its offering attracts more data users than its network can efficiently handle. Furthermore, as was also pointed in section 5.3(d)., there is a lack of available tower space for the placement of any additional equipment that Digicel may require to deal with any increased capacity demands resulting from its service offering, this could also cause Digicel to experience quality of service problems in delivering this service.

270. Even if these problems do not materialize, the RA is of the opinion that the infirmities of mobile broadband relative to fixed broadband, mobile's low data usage caps, and the fact that mobile broadband is not yet capable of providing the triple and quadruple play service bundles that fixed broadband is capable of, will not alter consumers' view that mobile service is a complement to fixed service and not a substitute for it. However, the RA will monitor the situation closely and make any appropriate adjustments in the fixed broadband market definition that are deemed to be necessary. This development is, of course, very relevant to the SMP analysis and will be considered in more detail there.

(iv) Price level pattern differences between fixed and mobile broadband

271. The disparities in the structures between the various broadband offerings of the mobile and fixed providers made examining the financial impact on BTC of a 5% and 10% SSNIP on its broadband services difficult to the point of rendering such an exercise essentially useless for the purposes of providing greater clarity to the market definition exercise. For example, the majority of BTC's data plan customers take data service bundled with voice service. Therefore, performing a SSNIP analysis on BTC's data service alone would require making speculative assumptions as to how much customers value the voice portion of the bundle and what effect that value may have on their willingness to stay with BTC's service in the event of a SSNIP. Other assumptions, also extremely speculative, would have to be made concerning the value consumers place on the convenience of the bundle itself so as to estimate the probability of consumers

[198] See, for example, Vogelstein, Fred, "Bad Connection: Inside the iPhone Network Meltdown", Wired Magazine, 19 July 2010. Available at http://www.wired.com/magazine/2010/07/ff_att_fail/all/1

unbundling the data portion so as to switch their data usage to a competitively priced mobile broadband data plan. Rather than engaging in speculative exercises of this sort, the RA chose to refrain from attempting a SSNIP analysis. Never the less, useful insights may still be gleaned from comparing the prices for the stand-alone broadband plans offered by the fixed and mobile providers. These are depicted in the tables below.

Table 12: Price comparisons of the stand-alone broadband plans offered by fixed and mobile broadband providers—High End Price

Company	Mobile Broadband Plan	Mobile Plan Price	Fixed Provider Equivalent Plans		
			BTC	BCV	NRC
Digicel	1 GB	$49.00	$129.00	$125.00	$124.95
Digicel	5 GB	$79.00	$129.00	$125.00	$124.95
Digicel	10 GB	$99.00	$129.00	$125.00	$124.95
CELLONE	1 GB	$45.00	$129.00	$125.00	$124.95
CELLONE	5 GB	$75.00	$129.00	$125.00	$124.95
CELLONE	10 GB	$95.00	$129.00	$125.00	$124.95

Table 13: Price comparisons of the stand-alone broadband plans offered by fixed and mobile broadband providers—Medium Price

Company	Mobile Broadband Plan	Mobile Plan Price	Fixed Provider Equivalent Plans		
			BTC	BCV	NRC
Digicel	1 GB	$49.00	$89.00	$85.00	$94.95
Digicel	5 GB	$79.00	$89.00	$85.00	$94.95
Digicel	10 GB	$99.00	$89.00	$85.00	$94.95
CELLONE	1 GB	$45.00	$89.00	$85.00	$94.95
CELLONE	5 GB	$75.00	$89.00	$85.00	$94.95
CELLONE	10 GB	$95.00	$89.00	$85.00	$94.95

Table 14: Price comparisons of the stand-alone broadband plans offered by fixed and mobile broadband providers—Low End Price

Company	Mobile Broadband Plan	Mobile Plan Price	Fixed Provider Equivalent Plans		
			BTC	BCV	NRC
Digicel	1 GB	$49.00	$44.00	$50.00	$59.95
Digicel	5 GB	$79.00	$44.00	$50.00	$59.95
Digicel	10 GB	$99.00	$44.00	$50.00	$59.95
CELLONE	1 GB	$45.00	$44.00	$50.00	$59.95
CELLONE	5 GB	$75.00	$44.00	$50.00	$59.95
CELLONE	10 GB	$95.00	$44.00	$50.00	$59.95

Notes: Digicel and CELLONE both claim to have rolled 4G networks. 4G networks (depending on how the network has been designed, average traffic loads, and congestion) are capable of achieving download speeds as high as 9.12 Mbps and upload speeds as high as 4.91 Mbps.[199] The prices for the equivalent fixed provider plans depicted in the last three columns of the above tables were calculated using the providers' prices for broadband access to which were added the prices for Digicel's fixed line ISP service plans for download speeds of 4 Mbps for high-end price, 2 Mbps for the medium price, and 1 Mbps for the low-end price. Digicel's prices were utilized over Logic's and North Rock's because they were the lowest priced ones. The speed choices were governed by the fact that the overwhelming majority of BTC's broadband access customers have chosen access plans between 1 and 4 Mbps.

272. As Table 12 illustrates, the available mobile broadband plans are all cheaper (significantly so in most cases) than the comparable fixed broadband plans when those plans include ISP service plans offering 4 Mbps download speeds. However, in the middle price scenario of Table 13 (where ISP service plan speeds are at 2 Mbps), this pricing advantage narrows considerably, even disappearing altogether for mobile broadband plans with 10 GB caps. While in the low end pricing scenario (where ISP service plan speeds are at 1 Mbps) of Table 14 mobile's pricing advantage almost entirely disappears. As is illustrated in the table below, the ISP portion of the total price of fixed broadband access plans `comprises the major share of the plans' final retail prices.

[199] See, for example, Mark Sullivan, "3G/4G Performance Map: Data Speeds for AT&T, Sprint, T-Mobile, and Verizon", *PCWorld*, May 7 2012, at http://www.pcworld.com/article/254888/3g4g_performance_map_data_speeds_for_atandt_sprint_tmobile_and_verizon.html viewed July 2012.

Table 15: Percentage of total fixed broadband service price attributable to ISP charges

Broadband Access and ISP Speeds	BTC	BCV	NRC
1 Mbps	57%	50%	42%
2 Mbps	67%	71%	63%
4 Mbps	70%	72%	72%

273. To summarize the situation thus far:

(a) The price comparisons depicted in Table 12 through Table 14 suggest that mobile pricing may not constrain fixed service prices, thereby indicating these two services are more correctly placed in separate markets.

(b) The price differences between the two services, and the patterns of those differences, observed in the three tables above also suggest the two services operate in separate markets and price their products accordingly.

274. For example, fixed broadband networks are the networks of choice for long term video viewing, either via streaming or downloading, and audio streaming by consumers in a home or office environment. This is because fixed broadband networks have greater connection reliability and lower jitter and latency rates than do mobile broadband networks, factors which are crucial for ensuring a quality consumer experience for real time applications such as video, VoIP, or listening to audio. Plus, fixed broadband networks typically do not impose data caps or fair use restrictions on their users, however, when they do, those are much higher than are available from mobile broadband providers, a crucial factor as downloading, or streaming, video and audio services is data intensive.[200] Services such as these are best experienced at speeds of 4 Mbps or greater. And so in Table 12, which compares fixed broadband plans utilizing speeds of 4 Mbps (the minimum required for quality video viewing) to mobile broadband plans, arguably what we are seeing is that the fixed broadband providers and the ISP's are pricing their services at levels they know consumers are willing to pay for these speeds given the advantages (previously discussed) that fixed broadband has to offer over mobile broadband for delivering video and audio services.

[200] For example, a 90 minute movie from Netflics consumes approximately 225 Mbps, while using a streaming audio service such as Pandora (an internet radio service) consumes approximately 24 Mbps per hour. See, for example, Liane Cassavoy, "Phone Data Caps: Five Things You Shouldn't Do (Too Often)", *PCWorld*, 9 August 2011, at http://www.pcworld.com/article/237345/phone_data_caps_five_things_you_shouldnt_do_too_often.html viewed July 2012.

275. In Table 13 and Table 14, which compare mobile broadband plans to fixed broadband plans utilizing speeds of 2 and 1 Mbps, respectively, we see fixed broadband prices becoming less expensive relative to mobile broadband until, at speeds of 1 Mbps, fixed broadband becomes, for the majority of cases, cheaper than mobile. Arguably, the fixed providers and the ISP's are here lowering their prices due to the fact that these lower speeds not conducive to delivering the high quality video and audio services that fixed broadband excels at providing and which command higher premiums.

276. Continuing with this theme, it could also be argued that DCB is pricing their offerings to appeal to that segment of the market that values mobility of broadband access and is willing to put up the low data caps while using broadband services away from a home or office.

277. At the present time this interpretation would be supportable given the low penetration of mobile broadband services relative to fixed, 18% to 82%, and the high ratio of fixed to mobile broadband customers, 4.5 to 1. However, DCB and BDC only recently introduced their new 4G services in Bermuda and the RA has no current data indicating the rates of customer defection the fixed broadband providers may be experiencing, if any have occurred, as a result. Thus it is too early to tell if the mobile broadband offerings of DCB and BDC will act as a competitive constraint on fixed providers' broadband access prices.

278. The pricing structures for fixed broadband service plans depicted in Table 15 show that a significant proportion of total fixed broadband services is due to the Internet access and service charges levied by the ISP providers. Arguably, once the ICOL is issued and fixed access providers are free to provide fixed broadband services to their customers without having to "partner" with an ISP for doing so, fixed broadband prices may drop below those of mobile. The differences in fixed and mobile cost structures discussed in section 6.3(d) suggest competitively provided mobile services may not be a good substitute for fixed services, because mobile services may not provide particularly effective competition for the price of additional data services.

279. The pricing differences depicted Table 12 to Table 14, while extreme, are not suggestive of any interpretation at this time given the recent introduction of 4G service offerings and the lack of data concerning customer response. At most, the pricing data weakly suggest placement of fixed and mobile broadband in separate markets. Furthermore, any interpretation of this data is cast into confusion given that fixed broadband providers are currently required to provide broadband services in conjunction with ISP, while mobile providers are not. As Table 15 indicates ISP related charges may be having a distorting effect on fixed broadband prices, causing those prices to be larger than they would be under more competitive conditions.

(v) Conclusion: mobile broadband is not part of the fixed broadband market

280. The preceding analysis has noted that fixed broadband services have a range of positively valued characteristics that are not available via mobile

broadband. Mobile broadband services have a substantially different cost structure, notably in terms of higher marginal costs of data delivery, have data delivery speeds lower than those available from fixed providers, and have stringent monthly data usage caps that prevent consumers form enjoying the full range of Internet service and entertainment options that are available using fixed broadband services. For these reasons it is the RA's view that mobile broadband prices have not had a significant competitive effect on the prices of fixed broadband services and that mobile broadband is properly viewed as being a complementary product to fixed broadband at the present time.

281. However, as noted in section (iii), DCB's recently introduced offerings may cause this situation to change in a manner that could lead to an increase in the competitive effect of mobile broadband services on those of the fixed providers. This is a situation the RA intends to monitor closely. Be that as it may, DCB's new offering, attractively priced though it may be, does not negate the infirmities of mobile broadband services relative to those of fixed, as noted in section (iii). Because of these, it is the RA's view that it is unlikely that a provider of mobile broadband services would prevent a hypothetical monopolist over fixed broadband services from earning returns in excess of the competitive level within the timeframe required by a SSNIP analysis.

(c) Conclusions on fixed broadband Internet access and Internet service provision

282. During the course of the preceding discussion the RA variously concluded:

1. Under the new regulatory regime there is a strong probability that ISP services will be bundled with broadband access services for mass market customers, Section 8.2;
2. That the various technologies used to provide fixed broadband services (HFC, WLL via WiMax, and FTTx) are in the same market, section 7.3(a), and that;
3. Mobile broadband is not part of the fixed broadband market, section 7.3(b).

8.4 Conclusions on retail broadband market definitions

283. Given the above discussion, the RA finds the relevant markets for SMP analysis to be:

- A national market for the supply of retail fixed broadband access and Internet services to residential customers
- A market for the supply of retail fixed broadband access and Internet services to business customers in the City of Hamilton
- A market for the supply of retail fixed broadband access and Internet services to business customers outside of the City of Hamilton

Consultation question 10: Do you agree with the conclusion that mobile

broadband is not in the same market as fixed broadband?

Consultation question 11: Do you agree with the conclusion that the relevant forward-looking definition of the retail broadband market is one that includes the bundle of broadband access and Internet services?

8.5 Wholesale broadband access

284. In contrast to the retail market, the wholesale broadband market includes broadband access only – ie it would not include Internet access. However, the geographic and product delineations of the market would be the same as is the case for the retail broadband market. Therefore, the RA finds that the relevant markets are:

- A wholesale market for the supply of fixed broadband access in the City of Hamilton; and
- A wholesale market for the supply of fixed broadband access in areas other than the City of Hamilton.

9 MARKET DEFINITION – MOBILE SERVICES

285. A number of issues relevant to the definition of mobile markets were examined in section 6. In particular, it was concluded that:

- Mobile access and local calls are in a single bundled retail market;
- Fixed services are not a sufficiently good demand-side or supply-side substitute for mobile services that they would lie in the mobile service markets, with the exception of international calls;
- International calls from mobiles are in the same market as international calls from fixed lines due to supply-side substitution; and
- There are not distinct geographic markets within Bermuda for mobile services.

286. Other issues relevant to the definition of the relevant markets are:

1. Are prepaid and postpaid services in the same market? And
2. Are mobile broadband and Internet services in a bundled market with mobile voice?

287. After considering these questions in the sections below, the RA concludes the following definitions:

- A national market for the retail supply of the bundle of mobile voice and data services;
- A national market for the wholesale supply of MVNO services;
- A national market for the wholesale supply of international call origination on mobile networks; and

- Markets for the supply of call termination on each individual mobile network.

9.1 Prepaid and postpaid services are in the same market

288. Looking first at the distinction between prepaid and postpaid services, the RA finds that the two types of services are likely in the same market by virtue of supply-side substitution.

289. On the demand-side, while some customers would consider switching between postpaid plans and prepaid services, many would not. Reasons why a number of customers would not view the two types of service as being good substitutes are:

- Business customers, and even some non-business customers, would require invoices for tax purposes and therefore prepaid services would not be suitable;
- Business customers would also consider prepaid services to be cumbersome because of the need to top-up;
- Travellers to Bermuda would use prepaid services but postpaid services would not be appropriate because the service would only be required temporarily; and
- Customers without credit ratings or a permanent address may not be eligible for postpaid services.

290. On the supply-side, in order to switch capacity from the supply of postpaid services to prepaid services, a supplier would need to:

- Devise a set of prepaid tariffs – this could be done quickly by its existing marketing RA;
- Establish sales channels to sell top-up cards and prepaid SIMs – this could also be done fairly quickly by, in the first instance, selling through existing postpaid dealers and then expanding to other retailers;
- Establish a phone top-up system – it seems unlikely that this would require a significant investment given that the mobile operator would already have phone services available for payment of postpaid bills;
- Alter its billing system so that it could handle prepaid services – to the extent that the mobile billing systems already have this capability built in there would be little further investment required.

291. Therefore the RA concludes that significant supply side substitution would likely occur from postpaid suppliers fairly quickly if a hypothetical monopolist of prepaid suppliers attempted to implement a SSNIP.

292. Switching supply in the opposite direction – that is from prepaid to postpaid customers – seems also possible within a short period of time. In doing so a prepaid supplier would need to:

- Prepare a set of postpaid tariffs – this could be done quickly by its existing marketing RA;
- Alter its billing system so that it could issue invoices – as above this capability may well already be provided by the firm's existing billing system; and
- Establish sales channels to sign up customers to contracts – this could likely be carried out reasonably quickly by teaming up with existing retailers.

293. Given the above considerations, the RA considers that prepaid and postpaid services are in the same market.

9.2 Mobile broadband services

294. Mobile broadband services are becoming an increasingly important feature of the mobile markets in Bermuda and worldwide. This includes the use of: (1) mobile Internet services (eg, email, social networking and use of the web) on devices that also provide voice; as well as (2) mobile broadband on data-only devices (that is, devices that are not used for voice) such as laptops and iPads.

(a) Are mobile broadband services in the same market as mobile voice services?

295. Supply of both mobile voice and broadband services is the commercial norm in Bermuda with both networks providing both voice and broadband.[201] The huge economies of scope between mobile voice and broadband provision associated with managing network explain this with the radio access network (that is, sites, towers, base station equipment and transmission) being required by both services.

296. Bermudan retail customers have the option to purchase mobile broadband on its own, for example for providing mobile connectivity for laptops[202], or as part of a bundle so that voice and data can be used on a single device such as a smartphone[203]. The RA does not have information on the

[201] New entrants sometimes initially focus on voice but generally move onto supply broadband as well.

[202] See for example, CellONE Wireless Broadband Internet, which depicts the company's internet access plans for USB modems, WiFi modems, notepads and tablets at http://www.cellone.bm/plans/plans_wireless.html, viewed August 2012. Digicel also has mobile internet plans for USB modems, WiFi modems, notepads and tablets which can be viewed at http://www.digicelbermuda.com/en/internet/mobile-internet , viewed August 2012.

[203] Digicel and CellONE both offer data plans that are add-ons to their various voice service plans. These plans can be viewed at http://www.digicelbermuda.com/en/postpaid/data-plans , http://www.digicelbermuda.com/en/postpaid/smartphone-plans , and http://www.cellone.bm/plans/plans_data.html. Viewed August 2012.

proportion of customers that purchase mobile broadband on a standalone basis as compared with how many purchase it as part of a bundle. It is plausible, however, that for business customers in particular a standalone mobile broadband is attractive to many customers as well as a separate bundled offering of voice and broadband for use on a mobile phone. To the extent that data-only devices such as iPads become popular in the near future demand for broadband-only services could potentially grow rapidly.

297. The RA therefore considers it possible that there may a separate market for mobile broadband services, in addition to a market for the bundle of mobile voice and data services. However, the RA does not consider that it would further illuminate SMP issues to define a separate market for mobile broadband services as well as a market for provision of voice and data services. The commercial reality is that both mobile networks supply both voice and data services and it seems highly unlikely that the extent of SMP and conditions of competition differ between voice and data services. Therefore, the RA concludes that the relevant market, for the purposes of the current analysis is one that contains both voice and data services.

(b) Are mobile broadband services in a separate market from fixed mobile services?

298. As was discussed in section 6.3, fixed access and voice services are in many instances not a good substitute for mobile services due to the lack of mobility of fixed services. Similarly, a fixed broadband connection is in many instances not a good substitute for mobile broadband in many cases although the ability of a number of mobile devices such as laptops, iPhones and iPads to use WiFi networks when in WiFi range does increase the substitutability of fixed services for mobile services to some extent. The ability to use WiFi at times in order to use broadband on mobile devices will likely have some constraining effect on mobile pricing, however it is likely that the total mobility associated with mobile broadband is such that fixed broadband services are not sufficiently substitutable for mobile services that they would lie in the same market.

9.3 Wholesale mobile services

(a) Origination of international calls

299. Mobile networks currently effectively provide a service of originating calls to international destinations. The RA finds that the relevant market for the origination of mobile international calls does not include fixed origination on the basis of earlier findings that fixed services are not sufficiently close substitutes for mobile services as to lie in the same market.

300. Therefore the RA finds that the relevant definition of the market is a national market for the supply of wholesale origination of international calls on mobile networks.

(b) Mobile termination

301. For the same reasons discussed in the context of fixed termination, the RA considers that there are separate markets for the termination of calls on each mobile network. Therefore the RA considers the relevant markets to be:

- Markets for the supply of call termination on each individual mobile network.

(c) Wholesale MVNO access

302. The Markets Notice identified a market for wholesale MVNO (mobile virtual network operator) access. The RA considers on the basis of earlier analysis in this document that:

- The relevant market is national; and
- That fixed services are not sufficiently substitutable for mobile services such that they would lie in the same market.

303. Therefore, the RA concludes that the relevant market is a national market for the supply of wholesale access and local call origination on mobile networks.

10 MARKET DEFINITION – LEASED LINES

304. Domestic leased lines are a service that provides a permanent link between two points within Bermuda. Leased lines can be used for providing voice services, other analogue services, and/or data services either directly to end users (e.g. private networks for large companies) or to other telecommunications services providers who would then use the leased lines in question as an input for the provision of services to their own customers. This section examines the relevant market definitions for the retail and wholesale leased line services and then assesses which of those are susceptible to *ex ante* regulation by applying the criteria from section 22 of the EC Act. The leased lines markets that the RA recommended for inclusion in the Notice on Candidate Markets are:

- Retail leased line services in all areas other than Southside; and
- Wholesale provision of terminating segments of leased lines in all areas other than Southside.

The following discussion examines the market delineations for both the retail and wholesale markets.

10.1 Definition of leased lines markets

305. In order to assess which service types ought to be included in the relevant leased lines markets the RA starts with a discussion of the data services currently offered by BTC. BTC's services are considered an appropriate starting point given that BTC is the incumbent provider of data services and is therefore

the primary candidate for SMP designation in respect of leased line services. The RA then applies demand- and supply- side analysis to consider:

- which BTC data services are included in the domestic leased lines markets and which alternative networks are substitutable for leased lines;
- whether the markets are delineated by bandwidth; and
- whether any other services offered by BTC (namely DSL) are substitutes for leased lines.

306. Conclusions are then presented on the relevant definitions of the retail and wholesale domestic leased line markets.

(i) Analysis of which data services lie in the domestic leased lines markets

307. The dedicated leased line services provided by BTC are as follows:

- Sub rate access of up to 64 kbps
- Fractional T1 services: Fractional T1 services provide a dedicated circuit in 64kbps increments from a minimum speed of 128kbps which can be used either for point-to-point voice or data transmission, or to connect to the point-of-presence (PoP) of an international service provider.
- Voice and Data T1 services: A full T1 circuit provides a dedicated connection at a 1.5Mbps capacity.
- DS-3: DS-3 services provide 45Mbps of bandwidth.

308. Other data services provided by BTC include Frame Relay, SMDS (Switched Multi Megabit Data Service) and Gigabit Ethernet services. BTC offers customers:

- Frame Relay services in bandwidth increments of 64kbps from a minimum of 64kbps up to 1034kbps.
- SMDS which provides packet-switched bandwidths of 10 Mbps and 100 Mbps. SMDS is sold as a single-ended service.
- Gigabit Ethernet services: BTC provides an option of either half or full circuits.

309. A first issue to consider is whether services such as Frame Relay and SMDS which do not provide dedicated connections are in the same market as dedicated leased lines. Frame Relay services, for example, provide customers with a permanent virtual circuit which results in a cost that is significantly lower than a dedicated T1 (or Fractional T1) service. Frame Relay does not provide the same bandwidth guarantees as a leased line, although customers do have the option of paying a premium for a Committed Information Rate (CIR). The differential in BTC's pricing between a 128kbps Fractional T1 and a 128 kbps

Frame Relay services is 32%, but this falls to 13% if the Fractional T1 price is compared with the CIR Frame Relay service. It is likely that some customers would see Frame Relay as a substitute for TI and Fractional T1 services, while others would not. Therefore it is difficult to say conclusively, without further analysis of customer perceptions and historic substitution rates, whether a hypothetical monopolist of dedicated leased lines that increased the price of leased lines services by 5-10% would lose sufficient market share to suppliers of services such as Frame Relay and SMDS that the price increase would be unprofitable.

310. In any case, supply side substitution may imply that the services are in the same market. This is because if a hypothetical monopolist of a traditional leased line service attempt to increase price by 5-10%, suppliers of frame relay services could likely readily switch to the supply of traditional leased lines, using the same underlying network infrastructure used to supply T1/Fractional T1 services and Frame Relay.[204]

311. Ethernet connections are provided by both BTC and QCL. BTC provides services at speeds 10 Mbps, 100 Mbps and 1Gbps with a range of Quality of Service (QoS) options. BTC is well positioned to provide Ethernet service in the City of Hamilton due to the construction of its new fibre rings.[205] QCL provides Ethernet based services within the City of Hamilton, and out to CWC Teleport in Devonshire. Quantum also has a service at Southside in St. David's.

312. Fixed wireless either on its own, or in conjunction with optical fibre, is another way in which leased lines are provided in Bermuda.

313. Internationally there has been divergence in the approach taken by regulators as which technologies are included in the leased lines markets. For example, Ofcom came to the conclusion that: (1) the relevant market includes dedicated connections only; and (2) traditional networks and alternative networks (which includes Ethernet networks) are in separate markets.[206] In contrast the Irish regulator, ComReg concluded that "products which offer dedicated, symmetric, point-to-point connection to a network termination point at least on one end belong in the market for terminating segments. This is the case irrespective of the technology used to deliver the product."[207]

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[204] A caveat to this reasoning is that supply-side substitution could be limited if there is a lack of inter-exchange domestic transmission, because the supply of dedicated leased lines would require a larger amount of domestic transmission bandwidth than, say, Frame Relay.

[205] BernNews, "Launch of BTC's New PRISM Network," May 19, 2012, http://bernews.com/2012/05/launch-of-btcs-new-prism-network/

[206] Ofcom (13 February 2009), *Business Connectivity Market Review – Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets.*

[207] ComReg Document No. 08/63, paragraph 3.122.

314. In the Bermudan context, Section 21 of the EC Act requires the RA to:

> *"establish ex ante remedies that apply on a technology-neutral and service-neutral basis whenever feasible"*

315. Given this, and the lack of any evidence presented to the RA to suggest otherwise, the RA tentatively suggests that all technologies be included in the same market, and suggests respondents provide comment to the RA on whether there are strong reasons to believe that this is or is not the case.

(ii) Are there separate markets for different bandwidths?

316. In many jurisdictions, leased line markets have been delineated by bandwidth. For example, in respect of traditional leased lines, Ofcom defined markets for low, high and very high speeds for services that had speeds of (a) 8Mbps and lower (b) greater than 8Mbps up to and including 45Mbps and (c) from 45 Mbps to 155 Mbps; and (d) from 155 Mbps to 622 Mbps.[208]

317. Applying the SSNIP test, the RA considers that there is likely to be some demand-side substitution between bandwidth but not sufficient that all bandwidths would fall into the same market. However, it is possible that there is a chain of substitution linking together a wide range of bandwidths.

318. Turning to the issue of supply-side substitution, the relevant question is whether a supplier of one bandwidth could reasonably quickly substitute its capacity into the supply of another bandwidth. The answer to this question depends to some extent on the type of network used by the firms that are contemplating supply side substitution. Quantum uses its network to provide services that range in speed from 1 Mbps up to 1 Gbps. This implies that supply-side substitution could be engaged in by an Ethernet network owner for bandwidths within this range. NRC's fixed wireless services are provided at various speeds ranging from fractional wireless T1 services for corporate customers starting at 128 Kbps up to Internet access services for residential and business customers at a maximum speed of 4 Mbps. The RA considers it reasonable to conclude that for the purposes of examining SMP it is relevant to examine two separate bandwidth markets: one which includes speeds less than 1 Mbps and another which includes speeds of 1Mbps or more.

[208] Ofcom (13 February 2009), *Business Connectivity Market Review – Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets,* p. 4.

Table 16: BTC data service pricing

Service	Monthly Rate	1 yr term	2 yr term	3 yr term	Setup
Sub rate up to 64 kbps	$125	$115	$105	$95	$135
Fractional T1 - Min of 128kbps	$195	$180	$160	$150	$450
Each increment of 64kbps	$25				
Frame Relay 64kbps	$122	$115	$107	$100	$225
Each increment of 64kbps	$25				
Committed Information Rate (CIR)	$25				
Each increment of 64kbps (below 64kbps)	$10				
T-1 (Quantity 1-4)	$420	$378	$356	$336	$800
T-1 (Quantity 5-20)	$420	$357	$336	$315	$800
T-1 (Quantity of 21+)	$420	$310	$273	$252	$800
DS-3	$3,975	$3,775	$3,575	$3,375	$800
SMDS (10 Mbps)	$500	$450	$425	$400	$1,050
Each increment of 1Mbps (up to 100Mbps)	$50				$250
Gigabit Ethernet (1000 Mbps)					
Full circuit		$10,120	$9,614	$9,018	$3,000
Half circuit		$5,060	$4,807	$4,509	$1,500

Source: http://www.btc.bm/Business/DataSolutions/Rates/Default.aspx

(ii) Are DSL services in the leased lines market(s)?

319. A second issue is whether BTC's broadband services are part of the leased lines market. BTC offers asymmetric DSL throughout Bermuda. An obvious difference between ADSL and leased lines is that by definition, ADSL has a substantially higher download data rate than its upload data rate. As highlighted by Ofcom, the upload speed will limit the extent to which ADSL services can provide an alternative to symmetric leased lines. The RA agrees with Ofcom that the asymmetry in download and upload speeds does limit the ability of ADSL to be an effective demand-side substitute for leased lines. The maximum speed upload speed that can currently be achieved through the BTC ADSL service is 1 Mbps. A further difference between ADSL and leased lines highlighted by Ofcom is that ADSL services do not provide uncontended bandwidth. The RA notes that it is possible for suppliers to provide business grade services by adjusting the contention ratio used to dimension backhaul which diminishes this difference between ADSL and leased line services.

320. The RA concludes that while there may be some constraining effect of ADSL services on low-speed leased lines, this effect is unlikely to be sufficiently strong that the two should be in the same market.

10.2 Conclusions of the definition of retail markets for leased lines

321. The RA concludes that there are two service markets for the supply of retail leased lines, regardless of the underlying technology used to provide the service. The two service markets are: (1) low-speed leased lines – that is, leased lines that provide a capacity of less than 1 Mbps; and (2) high-speed leased lines – that is, leased lines with a capacity of 1 Mbps or more. These service markets are further disaggregated into two geographic markets being services that are provided (1) inside the City of Hamilton; and (2) elsewhere in Bermuda.

Consultation question 12: Do you agree with the conclusion that there are separate retail markets for low-speed leased lines (that is, leased lines that provide a capacity of less than 1 Mbps) and high-speed leased lines (that is, leased lines with a capacity of 1 Mbps or more)?

10.3 Wholesale leased line market definition

322. A number of carriers currently supply wholesale services to other carriers. BTC is clearly a key supplier, whose customers purchase, on average, between 29 and 39 circuits each, with some purchasing over 98 to 108 circuits each.[209] (see Table 17). A range of wholesale leased line types are purchased from BTC with the top four being: T1 data circuits; DS-3 data circuits; SMDS/Ethernet services; and voice T1 services.

Table 17: BTC wholesale leased lines - number of customers and circuits provided [CIC]

Wholesale Customer Information	As of 3/31/12
Local Circuits	
Average Number of Local Circuits Per Wholesale Customer	--
Median Number of Local Circuits Per Wholesale Customer	--

323. Examples of wholesaling by other carriers includes:

- [CIC --- -------- --------- ------ ----- -- -----, --- --- ---]; and
- [CIC ---- --- ------- -------- --------- ------ ---- -------- -- --- --- ------l].

324. There appear to be two types of wholesale services provide, which are:

[209] For circuits at T-1 speeds or below, circuit counts are given in DS0 equivalents (I T-1 circuit equals 24 DS0 circuits). For circuits above T-1 speeds, circuit counts represent the number of circuits of that speed being provided. Thus, a customer being provided with DS3 service will be said to be provided with one or more DS3 circuits.

- Wholesale data transmission used by, for example, mobile networks and ISPs for backhaul; and
- Access to data tails which provide a connection to an end customer. This is used, for example, by international leased line providers so that they can provide an end to end service to their retail customers.

325. In the RA's view, these are distinct services which are not linked through either demand-side or supply-side substitution. It is only the latter service which is identified as a relevant market in the Markets Notice.

326. Following the same reasoning as for retail leased lines, the RA concludes that there are separate markets for low-speed and high-speed terminating segment of leased lines (data tails).

Consultation question 13: Do you agree with the conclusion that there are separate wholesale markets for low-speed leased lines (that is, leased lines that provide a capacity of less than 1 Mbps) and high-speed leased lines (that is, leased lines with a capacity of 1 Mbps or more)?

11 MARKET DEFINITION – INFRASTRUCTURE ACCESS

327. The Markets Notice identifies a wholesale market for the supply of access to local network infrastructure facilities used to provide fixed and mobile electronic communications and subscription TV services to end users.

328. It seems likely that there are two separate infrastructure markets: one for the supply of access to facilities used to construct fixed local access networks, and another for the supply of access to facilities used to construct wireless radio access networks.

329. Focussing first on the facilities used to construct fixed networks, key facilities include poles and ducts. Other facilities would include access to local exchanges and street cabinets.

330. Deployment of wireless networks, whether for the purposes of supplying mobile, fixed wireless or broadcasting, involves either acquiring site access and building towers, or obtaining access to existing towers. Given the existing moratorium on building new towers, obtaining access to existing towers is essential for further wireless competition.

331. Access to wireless access network facilities and fixed access network facilities are not good substitutes on either the demand or supply-side as would be indicated by application of the SSNIP test. A 5-10% increase in the price of towers by a hypothetical monopolist would not likely result in a wireless provider switching to the provision of fixed service. Neither would a 5-10% increase in the price of ducts and poles result in a wireline switching to the provision of a wireless network. Supply-side substitution between wireless and fixed access

network facilities is not possible due to the fundamental differences in infrastructure.

Consultation question 14: Do you agree with the conclusion that there is a market for the supply of fixed access network facilities that includes ducts, towers, and poles? Are there are other facilities that should be included in this market?

Consultation question 15: Do you agree with the conclusion that there is a market for the supply of wireless network facilities that includes tower and mast access? Are there other services that you consider lie in this market?

12 MARKET DEFINITION – TELEVISION SERVICES

332. The Markets Notice identified two subscription TV markets as being susceptible to *ex ante* regulation. These are the markets for:

- retail subscription TV services; and
- wholesale subscription TV services to deliver broadcast content to end users.

333. This section looks at each of these in turn and considers the precise definition of these markets in detail.

12.1 Retail subscription TV services

334. Television services, whether free or paid for by subscription, require two basic inputs: content that subscribers consider attractive enough to purchase, or watch despite advertising interruptions, and a means of delivering that content to the subscriber. This section finds:

- Free-to-air broadcasting in Bermuda to be in a different market from subscription television. The possibility that the free-to-air services provided by DBC and, especially, the BBC (through its partnership with DMTV) may provide some competitive constraint on the subscription television providers is acknowledged and the RA proposes addressing this possibility in the SMP analysis;
- Mobile TV and over-the-top (OTT-TV) or Web-TV to also be in separate markets from that of subscription television. Again the RA acknowledges that these services may provide competitive constraint on subscription TV services and proposes addressing that possibility in the SMP analysis;
- There to be a single pay-TV service market in Bermuda irrespective of the means by which these services are delivered. The RA finds this market to consist of BCV, WOW, and satellite –TV, which appears to be a declining service and whose operators are not subject to the RA's authority. The RA also concludes that under the ICOL there is a

strong probability that BTC will enter this market as well and is in a position to do so before the next review;

- That subscription television services are in a single geographic market with no customer differentiation; and,
- The retail market for subscription TV services is undifferentiated on the basis of channels.

(a) Television broadcasting services

335. Section 2(1) of the EC Act defines subscription television as a paid for audiovisual programming service delivered to more than five dwelling houses, or five persons in one or more contiguous multiple unit dwelling(s) under common ownership, control or management.[210] Suppliers of subscription television services are distinguished from television broadcasters, who supply *free* television services.[211] This section begins by discussing non-subscription broadcasting services (section (i)). This is followed by an examination of the recent, and growing, phenomenon of mobile-TV (section (ii)). The discussion continues with a look at some of the newer, alternative means of delivering video content to retail customers in their homes via the Internet, a practice also referred to as over-the-top (OTT) video services.[212] Next consideration is given to subscription broadcasting services (section (b)(i)), which commences by looking at the various means of providing these services at the retail level in other

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[210] "subscription television service" means a service provided by a body corporate consisting of programmes and other services to persons for their instruction, information and entertainment by means of visual images and sounds conveyed by wire or wireless communication from a common centre but does not include—

(a) any such service that serves—

(i) fewer than five dwelling houses; or

(ii) persons in one or more contiguous multiple unit dwelling (or dwellings) under common ownership, control or management; and

(b) any service for which—

(i) no fee or charge is levied or made in respect thereof; and

the transmission includes only content which is being simultaneously broadcast to the public in Bermuda by a licensed broadcasting station;"

[211] "'broadcasting" means the act of transmitting or re-transmitting in the frequency band allocated for broadcasting radiocommunications intended for direct reception and use by any member of the public without charge …" section 2(1) EC Act.

[212] It is called over-the-top (OTT) because it involves the utilization of video services over a broadband network independently of any video services that may be provided by the network operator. A customer subscribing to Netflix online and accessing that service via a broadband connection supplied by cable network operator or a telco IPTV operator is an example of a customer utilizing an OTT video service.

jurisdictions and considers whether these different means are in the same market The focus then shifts to an examination of how these services are currently provided to retail end-users in Bermuda and the different means by which they may prospectively be provided during the period this market review is in force (section (b)(ii)). Also considered in this section is whether the market definition for subscription broadcasting services in other jurisdictions is applicable to the situation in Bermuda.

(i) Non-subscription broadcasting services

336. Non-subscription broadcasting services do not fall under purview of the proposed EC Act and companies providing those services are not among those listed in the First Schedule to Part XII of the EC Act.[213] Therefore, television broadcasters will not be issued an ICOL under the Act's transitional provisions and will not be able to obtain one for at least one year following the date of the commencement of the Act.[214] Nevertheless these services need to be examined to determine if they may be considered close enough substitutes for subscription television services to warrant including them in the subscription television market.

337. Regulatory Authorities in other jurisdictions have routinely found free-to-air and pay-TV services to be in separate markets. For example, the European Commission has repeatedly held that there are two primary TV services markets: the retail market for the distribution of pay-TV, and; the retail market for free-TV.[215] Recently, however, the distinctiveness between these two markets appears to be blurring in some jurisdictions as more TV channels are made available to free-TV providers. For example, in the UK the free-to-air Digital Terrestrial Television (DTT)[216] provider, Freeview, has experienced rapid growth in subscribership as a result of the expanded breadth of free-TV channel offerings available to viewers. In recognition of this development, OFCOM examined whether basic-tier pay-TV services and free-to-air services should be considered to be in the same economic market.[217] Ofcom ultimately concluded that, while Freeview provides services that are an increasingly close substitute to

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[213] EC Act preamble and First Schedule at page 70.

[214] EC Act Section 75(1).

[215] See, for example, Institute of European Media Law e.V. (EMR), *Media Market Definitions – Comparative Legal Analysis: Final Report*, Report to the European Commission, 18 July 2005, at pages 8 – 9. Available at http://ec.europa.eu/competition/sectors/media/documents/2005_media_market_definition_study_en.pdf

[216] In other jurisdictions, such as the U.S., digital terrestrial television (DTT) is also referred to as digital television (DTV). This document will adhere to the European convention and use DTT in reference to digital over-the-air TV. This choice was made because it was felt that the term DTV was open to confusion given that digital television can also be delivered over cable and satellite networks as well as the Internet.

[217] Ofcom, *Pay TV market investigation: Consultation document*, 18 December 2007, ¶3.12 to ¶3.16 and ¶5.47 to ¶5.52. Available at http://www.ofcom.org.uk/consult/condocs/market_invest_paytv/pay_tv.pdf.

basic-tier pay-TV services, the two services were likely in separate markets but did not see this as an overwhelmingly strong conclusion.[218]

338. Bermuda has two television broadcasters, the Bermuda Broadcasting Company (BBC) and DeFontes Broadcasting Company Ltd. (DBC). The free-to-air channels of both companies are broadcast using analogue technology and are also available over BCV's cable network and WOW's fixed wireless digital network as part of the economy, or basic, tier offerings of these firms.[219] The BBC owns two stations broadcasting in the VHF band[220]; ZFB-TV (Channel 7), which is an affiliate of the ABC network in the US and BBC World news in the UK; and, ZBM-TV (Channel 9), which is an affiliate of the CBS network in the US. Both of these stations are broadcast throughout Bermuda as well as being available on the WOW and BCV networks. DBC owns one station, VSB-TV (VHF Channel 11), which is an affiliate of the NBC network in the US. VSB is also broadcast throughout Bermuda and is available via WOW and BCV.

339. On the demand side, subscription television requires a monthly fee for service and so is substantially more expensive than free-to-air broadcasting, providing prima facie evidence that the two services are in different markets. Other evidence suggesting that these services belong in separate markets is the difference in programming content (subscription television offers premium programming largely free of advertising) and number of channels (free-to-air television typically has far fewer channel offerings compared with pay-TV). This is especially the case in Bermuda where the number of free-to-air channels is extremely limited unlike, for example, in the UK where Freeview offers 50 digital TV channels on a non-subscription basis via DTT.[221]

340. On the supply side, the RA considers it unlikely that DBC is in a position to become an effective competitor in the subscription television market within the next three years. To begin with it will be unable to obtain an ICOL until at least one year after commencement of the EC Act and then only if the RA, following a review of the electronics communications markets, determines it would be in the public interest to issue additional ICOLs.[222] Moreover, entry into the subscription TV market would likely require DBC to switch its broadcasting to digital format, acquire more content to supply the additional channels this switch may open up,

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[218] *Ibid* at ¶5.52.

[219] See http://www.WOW.bm/Pages/ChannelLineUp.htm and http://www.cablevision.bm/index.php/digital-cable310/digital-channels/economy-tier429.

[220] Very High Frequency. Channels 7, 9 and 11 fall into the high band portion of the VHF range, band III—174 MHz to 216 MHz. Band III is allocated to channels 7-13 in the US, with each channel occupying 6 MHz. (See http://www.adec.edu/tag/spectrum.html and http://www.csgnetwork.com/tvfreqtable.html)

[221] See Freeview's website at http://www.freeview.co.uk/Services/Freeview2

[222] EC Act § 75

acquire additional spectrum[223] and undertake network and equipment upgrades so as to support the new digital format and any new channel and/or service offerings. The time it would take DBC to raise the necessary capital to undertake these operations and then to execute them would likely be at least 12 to 18 months. Thus, the minimum one year moratorium on the issuance of any new ICOLs combined with the time frame likely required for DBC to enter the subscription TV services market make it highly unlikely that it would be able to respond to a SSNIP on current subscription TV services within the permissible two year time frame of a SSNIP analysis.

341. The BBC, however, is in a different position from that faced by DBC. The BBC, through its solely owned subsidiary Digital Mobile Television Ltd. (DMTV), possesses a cable TV license and was granted an amendment to that license to utilize UHF spectrum to provide digital TV service to mobile devices in 2010.[224] According to pronouncements by the BBC's CEO, Mr. Rick Richardson, the BBC has also been taking steps to transition to digital broadcasting. If this is indeed the case, and if the BBC is able to obtain sufficient spectrum enabling it to broadcast multiple channels in its new digital format, then the BBC could, potentially, launch a multi-channel free-to-air DTT service. It is also possible that the BBC could launch, through the cable license owned by DMTV, a subscription based DTT service, such as is currently offered by WOW.

342. Concerning the BBC's possible foray into the provision of mobile-TV services, for reasons that will be discussed more fully in the following section, the RA is of the opinion that mobile-TV is not in the same market as traditional subscription TV. Turning to the BBC's announced transition to digital broadcasting and the potential for a launch of a multi-channel free-to-air, or subscription DTT service, the RA offers these observations:

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[223] The additional spectrum would likely be required because: 1) While digital compression enables a broadcaster to provide several standard definition digital programs in place of one 6 MHz analog channel, it only enables the broadcast of one sharp high definition (HD) channel. So, given the broadcaster's current spectrum holdings, more spectrum would be required if multiple HD channels were to be delivered (See, for example, the FCC website— http://www.dtv.gov/whatisdtv.html and http://www.pbs.org/opb/crashcourse/digital_v_analog/squeeze.html); and, 2) BBC and DBC's spectrum holdings are not sufficient to provide additional services such as voice and broadband access in the event they wanted to provide a bundled double or triple play service.

DMTV was issued a Cable Television Service License by the RA on July 15, 2010. This license grants DMTV the right to provide cable television service to the residents of Southside, St. David's. The system must be capable of providing to each and every subscriber simultaneously a minimum of 35 channels of cablecasting.

[224] See, for example, Alex Wright, "DMTV plans to beam TV pictures to mobile devices", *Royal Gazette*, 29 October 2010. Article available at http://www.royalgazette.com/article/20101029/BUSINESS/310299962 viewed August 2012. Also see, René Hill, "GoMedia to launch live TV on mobile devices", *Royal Gazette*, 26 February 2010. Article available at http://www.royalgazette.com/article/20100226/BUSINESS/302269953 viewed August 2012.

1. Even if the BBC were to launch a non-subscription DTT service within the next two years, for the reasons presented earlier in this discussion (the example of Freeview's non-subscription DTT service in the UK being especially pertinent) the RA would likely find that service to be in separate market from traditional subscription TV service.
2. On the other hand, if the BBC were to launch a subscription based DTT service within the next two years, then that service would be considered to be in the same market as the services provided by WOW and BCV.
3. It should be noted that, while the BBC's transition to digital format was to have been completed at the end of 2011, the company is not currently broadcasting in digital format. Furthermore, while DMTV was granted two 6Mhz channels in the UHF broadcasting range in 2010, as of this writing the company has not utilized those channels to provide any service of any kind. At this point, therefore, any further discussion as to the possible effects of a DTT service roll-out by the BBC, either alone or in conjunction with DMTV, would be highly speculative and not particularly fruitful for the purposes of market definition and would be better left for consideration in the SMP analysis.

343. For the reasons stated in the preceding paragraphs, the RA finds free-to-air broadcasting in Bermuda to be in a different market from subscription television. The RA acknowledges that it is possible the free-to-air television services provided by BBC and DBC may provide some competitive constraint on the subscription television providers. The discussion of this possibility will be taken up in the SMP analysis. The SMP analysis will also take into consideration the possibility of the BBC providing DTT service within the next two years.

344. The next section will examine the burgeoning phenomenon of mobile-TV and considers whether this service belongs in the same market as traditional subscription TV.

(ii) Mobile-TV

345. There are two principle means of delivering mobile-TV (m-TV) at the present time: Using broadcast type technology, such as DTT, to blanket an entire area with an m-TV signal which can be received by any mobile device in the area that has been enabled to do so (a one-to-many service distribution); and, Streaming TV services over a cellular network to individual mobile devices (a one-to-one service distribution).[225] The number of m-TV enabled phones and viewers has been rapidly increasing in the past couple of years, a trend that is likely to continue, and probably accelerate, due to advances in technology and

[225] See, for example, the International Telecommunications Union's information and communication technology (ICT) regulation tool kit available at http://www.ictregulationtoolkit.org/en/Section.3427.html.

transmission standards.[226] Despite this increase, it remains the case that the vast majority of TV viewing still takes place in front of a TV screen in the home. For example, a Nielson report notes that of the nearly five hours a day of video viewing engaged in by the average American, 94 per cent of that is watched on a traditional TV set.[227]

346. The preference for seeing video on a TV screen at home is likely due to the fact that it is extremely difficult to observe the rich detail of programming on a small screen. For example, it is extremely challenging to follow the movement of a rapidly moving ball on the small screens available on a cell phone, table, or laptop computer. Or when watching an action film, like *Jurassic Park*, the full effect of a stalking cloned dinosaur cannot be truly felt when watching the movie on a small screen.

347. Moreover, many of the quality of service differences between fixed and mobile voice services and fixed and mobile broadband services discussed earlier in sections 6.3 and 8.3 hold true for the delivery of video services as well. Mobile video delivery is much more subject to packet loss, dropped connections, high latency (delay in packet delivery) resulting in increased time for downloading videos, and increased jitter (variability in packet latency over time), which degrades the quality of streaming audio and video content.[228] In addition high quality streaming video viewing requires data speeds of at least 4 Mbps, with speeds above this being preferable. While mobile data speeds are improving, they are still lower than those obtainable on fixed broadband connections and can vary considerably depending on signal strength and network congestion. For example, a recent posting on the BroadbandGenie website in the UK pointed out that the top download speed observed in their mobile broadband test was 4.44 Mbps, but involved a high degree of fluctuation.[229] A recent mobile broadband

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[226] http://www.mobiletvworld.com/documents/Bringing%20Mobile%20Multimedia%20to%20Best-In-Class%20Smartphones.pdf; and http://blog.nielsen.com/nielsenwire/online_mobile/report-how-americans-are-spending-their-media-time-and-money/

[227] "Cross-Platform Report: How We Watch From Screen to Screen", *nielsenwire*, 3 May 2012. Available at http://blog.nielsen.com/nielsenwire/online_mobile/cross-platform-report-how-we-watch-from-screen-to-screen/ viewed July 2012.

[228] See, for example, "Mobile broadband speed and latency testing" at http://apcmag.com/mobile_broadband_speed_and_latency_testing.htm, which noted that, while there has been improvements in latency issues (here discussed as "ping time"), latency is still in relative that obtainable using fixed broadband via ADSL2. See also, http://www.talk3g.co.uk/showthread.php?8030-Vodafone-Mobile-Broadband-Service-Quality-Testing&p=38757, which notes that latency tests indicate that Vodafone mobile broadband is fine for general purpose Internet use but not for things such as on line gaming, streaming audio, and VoIP.

[229] Matt Powell, *Mobile Broadband Genie Road Trip 2012: overall analysis*, 2 July 2012. Available at http://www.broadbandgenie.co.uk/blog/20120621-mobile-broadband-genie-road-trip-2012-overall-analysis viewed July 2012.

test conducted in the US similarly found a high degree of fluctuation in mobile broadband speeds, but showed higher average download speeds than are apparently available in the UK.[230] This variability in data speeds makes it unlikely that mobile-TV service can provide a video streaming (or live TV) experience of comparable quality to what is obtained via a traditional broadcast or cable TV network.

348. Finally, there is the fact that providers of traditional subscription TV services do not impose data caps or fair use restrictions limiting their customers viewing time. Mobile providers, on the other hand, do impose data caps and fair use restrictions on their customers and this is a crucial distinguishing factor between the two services as downloading, or streaming, video and audio services is data intensive.[231] For example, a 30 minute TV programme streamed online would use around 175MB, a monthly 1GB download limit could only provide less than 3 hours worth of video streaming a month.[232] These factors help explain why the aforementioned Nielson data suggests the majority of users sees mobile-TV as being a complementary service to subscription TV service.

349. As of this writing the RA has not found any ruling in other jurisdictions indicating that mobile-TV ought to be placed in the same market as subscription-TV. Ofcom, for example, in its first consultation on pay-TV in 2007 merely pointed out that mobile-TV was still so relatively new that it had not yet achieved mass market appeal.[233] This finding by Ofcom is consistent with the Nielsen data for the United States and the Nielsen Global Survey data findings that mobile-TV is not seen as a substitute for subscription-TV but rather as a compliment to that service.

350. In summary, the RA is of the opinion that the infirmities of mobile-TV relative to subscription TV, along with the expense of watching streaming video on a mobile device, especially programs provided with a high-definition resolution, implies that mobile service is a complement to fixed service and not a substitute for it.

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[230] See, for example, Mark Sullivan, "3G/4G Performance Map: Data Speeds for AT&T, Sprint, T-Mobile, and Verizon", *PCWorld*, 7 May 2012, at http://www.pcworld.com/article/254888/3g4g_performance_map_data_speeds_for_atandt_sprint_tmobile_and_verizon.html viewed July 2012.

[231] For example, a 90 minute movie from Netflics consumes approximately 225 Mbps, while using a streaming audio service such as Pandora (an internet radio service) consumes approximately 24 Mbps per hour. See, for example, Liane Cassavoy, "Phone Data Caps: Five Things You Shouldn't Do (Too Often)", *PCWorld*, 9 August 2011, at http://www.pcworld.com/article/237345/phone_data_caps_five_things_you_shouldnt_do_too_often.html viewed July 2012.

[232] See, for example, Ofcom at http://stakeholders.ofcom.org.uk/consultations/wba/wba-statement/

[233] Ofcom, first pay-TV consult at page 31-32.

351. Parenthetically we note that we have not identified mobile-TV as a relevant market. Rather mobile-TV is part of the broader mobile broadband market. Subscription TV service is not part of the mobile broadband market because subscription TV service cannot meet the demand for mobility.

(iii) Over-the-top TV or WebTV

352. Television programming is provided in two distinct ways using the Internet Protocol, over-the-top TV (also referred to as OTT-TV) and IPTV. The International Telecommunications Union defines IPTV as the provision of "multimedia services such as television/video/audio/text/graphics/data delivered over IP based networks managed to provide the required level of quality of service and experience, security, interactivity and reliability."[234] IPTV service such as that provided by a telephone, or cable, company over its network is thus a carefully managed service delivered using an operator's proprietary end-to-end platform and possessing QoS standards that guarantee picture quality that is as good as, or better than, traditional TV.

353. The key word in this definition is managed. IPTV is not delivered over the public Internet, rather programming is delivered to homes through a managed network. The private, managed network does not suffer from the same congestion problems that exist on the public Internet and therefore IPTV delivers the same service quality as traditional TV, along with the many advantages the Internet offers in terms of choice and interactivity.[235]

354. Over-the-top programming, on the other hand, refers to video services delivered over the Internet by an on-line video distributor (OVD), such as Netflix, that are not part of a carrier's own video service. This type of programming is delivered over the public Internet and not via the carrier's managed video service delivery network. Because of this it is not always possible for OVD's to ensure that OTT-TV programs will be delivered with the level of picture quality, service reliability, and program availability comparable to that of traditional TV service. Nevertheless, OTT-TV does provide customers with a diverse array of multimedia services at a quality-of-service that is acceptable to a wide-array of customers. [236] Furthermore, some providers, Netflix being one, are able to ensure a QoS comparable to that of traditional TV service in many markets because of the QoS agreements they have been able to negotiate with network operators.

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[234] New IPTV standard supports global rollout, 03 February 2009, at http://www.itu.int/ITU-T/newslog/New+IPTV+Standard+Supports+Global+Rollout.aspx

[235] ITU Interop event highlights IPTV interoperability - Future of television will rest on stable global standards, say experts, July 27, 2010, http://www.itu.int/ITU-T/newslog/ITU+Interop+Event+Highlights+IPTV+Interoperability+Future+Of+Television+Will+Rest+On+Stable+Global+Standards+Say+Experts.aspx; and *ATIS IPTV Exploratory Group Report and Recommendation to the TOPS Council*, Alliance for Telecommunications Industry Solutions, July 2005, at page 7. Available at http://www.atis.org/tops/IEG/ATIS_IPTV_EG_RPT_final.pdf

[236] For example, the BBC iPlayer is widely popular within the U.K.

355. There are a wide range of OTT-TV content providers available, some of whom are providing free services, some a mixture of free and subscription services, and others are pure pay-TV offerings. One of the most popular free OTT-TV sites is YouTube. Once a mainly a portal for amateur and semi-professional videographers, YouTube has now added dozens of new channels featuring professionally created programming content produced by Google itself and offered to viewers free of charge.[237] Other firms, like Roku, Hulu, and Google-TV, provide a combination of free and pay-TV channels. And then there are those applications such as Comcast's Xfinity ap, which provides Comcast subscribers the ability to view any of the Comcast programs they currently subscribe to on any device they choose, anywhere at any time.[238]

356. There is no question that OTT-TV viewing has been on the rise and that some cord cutting may be occurring as a result of better programming options that are becoming available via OTT-TV. However, the available evidence strongly suggests OTT-TV is viewed as a complement to traditional TV and not a substitute for it.[239] For example, the Neilson organization reports that less than five percent of US households have broadband access but no cable television but goes to report that in these homes 123 minutes a day is spent watching traditional broadcast TV compared to 11.2 minutes a day for streaming media.[240] Furthermore, while internet enabled television penetration rates are on the rise (10.4 percent of homes in the US had an IP enabled TV as of February 2012 vs. 4.7 percent a year earlier), this feature is not heavily used; Only 5 percent of households owning these devices reported utilizing the internet feature on their IP enabled TV. [241] As the Figure below demonstrates, while a shift in viewing screens is happening, it is happening slowly and viewing on the traditional TV screen still overwhelmingly predominates in the US.

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[237] The head of Google TV, Mario Quieroz, says that the original YouTube content is intended to complement, not compete, with cable TV. http://www.nytimes.com/2011/10/29/business/media/youtube-plans-to-create-new-online-channels.html?_r=1

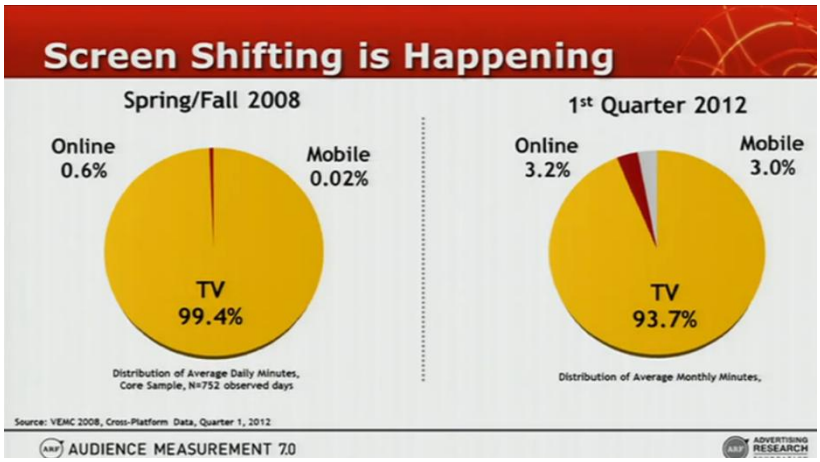
[238] See, for example, http://xfinity.comcast.net/learn/internet/mobile-tv-app/

[239] See, for example, *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, Further Notice of Inquiry*, Federal Communications Commission, MB Docket No. 07-269, FCC 11-65, 21 April 2011, at 5 n.16. Also, *Comments of Netflix, Inc.*, in FCC MB Docket No. 07-269, at 4-5, filed 8 June 2011. In its submission Netflix points out that the proposition that OVDs are a complement to and not a substitute for traditional subscription TV service is supported by the fact that the total number of U.S. subscribers to these services has been growing, even as OVD use has also been rapidly growing.

[240] http://blog.nielsen.com/nielsenwire/online_mobile/report-how-americans-are-spending-their-media-time-and-money/

[241] *I Want my IPTV! The Growth of the Connected Television*, 1 August 2012, available at http://blog.nielsen.com/nielsenwire/media_entertainment/i-want-my-iptv

Figure 2: Shifts in TV Viewing Habits[242]



357. Traditional TV still dominates globally as well. For example, a multi-country study conducted by Ericsson ConsumerLab found that eighty-five percent of respondents watch scheduled broadcast TV more than once a week.[243] Similar findings were made by Nielsen in its 2012 report *Global Online Consumers and Multi-Screen Media: Today and Tomorrow*.[244]

358. As far as the situation in Bermuda is concerned, the evidence to date suggests that OTT-TV has not been making any noticeable inroads on traditional subscription TV service. *The Bermuda Omnibus* reports that between September 2004 and 2011 the percentage of households subscribing to subscription television increased from 76 to 91%.[245] And, confidential data submitted by both WOW and BCV confirm that both firms have experienced increasing subscribership since 2009, which suggests that, in Bermuda, access to OTT-TV service has not led to a decline in traditional subscription TV services. This further suggests that in Bermuda, as elsewhere in the world, consumers see OTT-TV as complementing traditional subscription TV services, not as a substitute for them.

359. The RA concludes, based on the evidence presented and reviewed above, that OTT-TV services cannot, at this stage, be considered strong substitutes for traditional subscription TV services nor does it appear likely that they will become so within the three year time span until the next market review.

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[242] See, http://blog.nielsen.com/nielsenwire/category/media_entertainment

[243] See, *On-demand TV and social media change viewing habits*, **Ericsson ConsumerLab**, 14 October 2011, available at http://www.ericsson.com/news/111014_consumerlab_244188808_c?idx=10&categoryFilter=reports_1270673222_c&tagsFilter=ConsumerLab

[244] Available at http://blog.nielsen.com/nielsenwire/global/global-report-multi-screen-media-usage/

[245] *The Bermuda Omnibus*, September 2011, at page 18.

And so concludes that OTT-TV services do not belong in the same market as traditional subscription TV services. The RA is aware, however, that OTT-TV services may provide a competitive restraint on the pricing of traditional subscription TV services and will take that possibility into account in the SMP analysis. For example, the RA is aware of the fact a new type of OTT-TV service option has recently become available in Bermuda. This service, known as the "Netflix triple play" package, is available for $35 per month and apparently gives subscribers access to hundreds of sports programmes and events, TV shows, movies, and an on-line music library.[246] This service is relatively new and the RA has only anecdotal data concerning the number of subscribers the service currently has. The RA will monitor the impact this new OVD entrant has on Bermuda's television services market and its entry into this market will be taken up in the SMP analysis.

(b) Definition of the subscription TV market

360. In this section the RA examines in more detail the definition of the market(s) for subscription TV. The discussion begins by considering the various means by which retail subscription television services may be delivered (section (i)). Subscription television service in Bermuda is examined next, in section (ii). The examination concludes in section (iii) with a discussion of the geographic scope of this market in Bermuda.

(i) Means of delivering retail subscription television services

361. Retail subscription television services can be supplied over high bandwidth cable, such as HFC cable and fibre (BCV uses both) and sufficiently short copper loops using various flavours of xDSL or VDSL[247] which are currently used to supply service to 18% of European digital TV subscribers.[248] Subscription television services can also be supplied via satellite and with various forms of terrestrial wireless technologies, such as WiMAX and DTT over-the-air broadcasting (WOW provides an example of DTT in Bermuda).[249] Evidence from

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[246] See, "I've been offering Netflix for months – businessman", *Bermuda Royal Gazette*, 14 September 2011, available at http://www.royalgazette.com/article/20110914/BUSINESS03/709149914#comments

[247] For a discussion of IPTV over ADSL see Nate Anderson, "An Introduction to IPTV", *Ars Technica*, 12 March 2006. Available at http://arstechnica.com/business/news/2006/03/iptv.ars/.

[248] "Europe added 1 million DSL IPTV subscribers in Q1 2010", *Dataxis News*, 8 July 2010. Available at http://www.dataxisnews.com/?p=19056

[249] Many more digital than analogue channels may be broadcast using the same spectrum, and, as with analogue transmissions, these can be encrypted, enabling subscription (rather than free-to-air) television service. Concerning the spectral efficiency of digital versus analog transmission of TV channels see the references cited at footnote 223. Concerning the ability of DTT to provide subscription TV services a recent report notes that the Spanish pay-DTT service, Gol TV, had signed up one million subscribers within nine months of being launched. ("IPTV to Secure an 11% Share of Pay-TV Market by 2015, According to ABI Research", *Fierce Telecom*, 17 August 2010. Available at http://www.fiercetelecom.com/press_releases/iptv-secure-11-share-pay-tv-market-2015-according-abi-

international markets shows that such means of delivery are essentially viewed as identical by subscribers, and as a result, suppliers using these different delivery technologies are typically seen as being part of a single market. For example, in the US, cable operators using HFC cable[250], telephone companies that rely on fibre (as is the case for Verizon's FiOS[251]) or short copper loops (AT&T's U-verse[252]), satellite companies such as Dish Network[253] and DirecTV, and in some cases fixed wireless services, all directly compete with one another in the supply of subscription television services. In Europe competition among providers of subscription TV services using these various retail distribution platforms is also the norm and seen as interchangeable by subscribers. For example, Ofcom's consultation on pay-TV, found no compelling evidence of platform specific preferences among subscribers to home based pay-TV services and so concluded that provision of subscription TV via digital satellite, DTT,

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research). Also see, Farncombe Consulting Group, "Securing Premium Pay TV Channel Delivery over DTT and IPTV", 17 February 2010. Available at http://stakeholders.ofcom.org.uk/binaries/broadcast/reviews-investigations/pay-tv/Farncombe.pdf

[250] For example, Comcast, the largest cable provider in the US, compares Xfinity (the new brand for Comcast's technology platform, products, and services) with products and services offered by Verizon FiOS, Direct TV, and AT&T U-Verse at its website http://www.comcast.com/Corporate/Learn/Compare/index.html. The site claims that, in comparison to these other providers, Comcast's Xfinity offers: "The fastest Internet speeds, best HD picture quality, more HD On Demand choices and the ability to check voicemail online. Want more? How about the most live sports, movie sneak previews, reliable service, Caller ID on your TV and PC, and help 24/7."

[251] For example, the Verizon FiOS website (http://www22.verizon.com/Residential/FiOSTV/Overview.htm) advertises: "See why FiOS is the future of HD entertainment and why cable and satellite are soon to be a thing of the past." And "FiOS TV offers a truly flawless picture and more HD channels than most cable providers." An independent value comparison of Verizon's FiOS vs AT&T's U-verse states: "At this time I would have to say that Verizon FiOS has an overall edge on AT&T U-verse when it comes to features, but AT&T does have a few more budget-friendly options for those that are looking to skimp on features." (http://www.bukisa.com/articles/302804_verizon-fios-vs-att-u-verse-value-comparison)

[252] For example, the AT&T U-verse website, http://www.att.com/u-verse/explore/feature-landing.jsp?fbid=n5oD0SZ5PJv, claims that U-verse offers more HD channels than most cable providers.

[253] The website http://www.dish-television.com/2009/08/29/dish-network-att-uverse/ provides a comparison of various AT&T U-verse subscription packages to those offered by Dish Network and finds, for example, that U-verse's basic U100 package is offered for $49 per month compared to Dish Network's Classic Bronze 100 package at $39.99 per month. Also, the website http://www.dish-television.com/ states: "Often DISH Network and DIRECTV deals are 15-20% lower than a comparable cable TV package from a provider like Comcast, Time Warner, Cablevision or Cox cable." And goes on to argue that when it comes to providing high definition (HD) programming satellite TV has an inherent advantage of cable TV providers.

digital cable, and IPTV over DSL are all in the same market.[254] The European Commission has also consistently found, with few exceptions, that there is a single pay-TV services market with no distinction between the various means of providing those services to the home.[255]

362. The RA considers the evidence from international markets, as well as the findings of the European Commission, strongly suggest there is a single pay-TV services market in Bermuda as well, irrespective of the means by which these services are delivered.

(ii) Subscription television in Bermuda

363. Presently in Bermuda, retail subscription television is only legally available from BCV and WOW. A small percentage of residents also obtain subscription TV services from international satellite providers such as Direct TV, DISH satellite TV and C-Band.[256] But, satellite TV service is a "grey" market in Bermuda as the international satellite service providers that could cover the Bermudan market are prohibited by their licenses from providing services to customers outside of the US. In order to get around this prohibition Bermudan satellite subscribers either set up a subscription directly on their own using a US address, or they use a local company, such as Island Satellite, as an agent. In this latter case the local company is the one providing the US addresses and then using those to set up subscriptions with authorised US satellite dealers.[257] As Table 18 indicates, satellite subscribership appears to be declining, dropping by over 60 percent from 2004 to 2011.

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[254] Ofcom, *Market definition and market power in pay TV: Annex 13 to pay TV market investigation consultation*, 18 December 2007, Section 6. Available at http://www.ofcom.org.uk/consult/condocs/market_invest_paytv/an13.pdf

[255] See, for example, European Commission, *Commission Decision of 29/12/2003 relating to a proceeding under to Article 81 of the Treaty and Article 53 of the EEA Agreement*, (COMP/C.2-38.287—Telenor / Canal+ / Canal Digital), C(2003) 5192 final, 29 December 2003, at ¶30 to ¶50. Available at http://ec.europa.eu/competition/antitrust/cases/dec_docs/38287/38287_27_1.pdf.

[256] See, for example, *Bermuda Online*, at http://www.bermuda-online.org/media.htm.

[257] See, for example, Adam Cooper, "Dishing it: The alternative to cable television", *The Royal Gazette*, 7 September 2001. Available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=60&articleId=7d1938e30030009

Table 18: Bermudan TV Subscribership 2004 and 2011[258]

Companies	2011	2004
CableVision	78%	71%
WOW	13%	5%
Local Only	7%	14%
Satellite	3%	8%

364. BCV supplies retail subscription television and broadband Internet access service over its own HFC cable network (supplemented in spots by fiber) which is ubiquitous throughout the country, passing a substantial majority of Bermuda's households.[259]

365. WOW is a fixed wireless retail provider of subscription DTT services who entered the market in 2004.[260] Its service presently covers approximately 78 to 87% of the country.[261] WOW's spectrum lies in the [CIC -------] MHz range.[262] This range has been traditionally utilized for analogue UHF TV broadcasting, but with the transition to DTT that is occurring around the world, large amounts of this spectrum are being freed up for other potential uses; an occurrence referred to as the "digital dividend". Spectrum in this frequency range is valuable because its excellent propagation properties and building penetration abilities make it very useful for providing DTT services as well as mobile broadband and voice services.[263] This last aspect was recognized by the International

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[258] *The Bermuda Omnibus*©, September 2011, at page 18.

[259] See, for example, BCV's website at http://www.cablevision.bm/. Also, BCV confidential submission of February 2010 to the Commission as part of its Market Analysis enquiry.

[260] See, for example, , Matthew Taylor, "2,000 sign up for WOW", *The Royal Gazette*, 1 March 2004, which quotes WOW's Gavin Wilson as saying that WOW's first year target was to capture 20% of the 17,000 homes that were being served by BCV. Available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=60&articleId=7d4309230030002.

[261] From WOWs confidential submission of 23 July 2012 to the RA.

[262] METEC Frequency Allocation Table.

[263] See, for example, Oliver & Ohlbaum Associates Ltd and DotEcon Ltd., *The Effects of a Market-Based Approach to Spectrum Management of UHF and the Impact on Digital Terrestrial Broadcasting*, 27 February 2008, at page 38. Available at http://www.ebu.ch/CMSimages/en/UHF%20Spectrum%20Management_ENG_FINAL_tcm6-57755.pdf. See also, Analysys Mason, •econ, and Hogan & Hartson, *Exploiting the digital dividend—a European approach: Final Report*, Report for the European Commission, 14 August 2009, at page 15. Available athttp://www.analysysmason.com/Consulting/Services/Strategy-consulting/Spectrum-management/Digital-dividend/Exploiting-the-digital-dividend--a-European-approach/Final-report-for-the-European-Commission/

Telecommunications Union (ITU) at its World Radiocommunication Conference in 2007 (WRC-2007) where the band containing WOW's spectrum range was identified for International Mobile Telecommunications-2000 (IMT-2000, or 3G) service provision for Region 2 (which contains Bermuda, among others) and Region 3.[264]

366. In June of 2008, the Telecommunications Commission of Bermuda (TCB) determined, among other things, that there were no material differences between the delivery of pay-TV by WOW's DTT platform and BCV's cable platform, essentially finding the two companies to be in the same market.[265] As noted in the previous section this finding is in line with what RA's in other jurisdictions have found. It also reflects the situation on the ground in Bermuda where WOW and BCV have seen themselves as competitors and rivals from the beginning of WOW's entry into the market, as various pronouncements from company representatives demonstrate.[266] Customer behavior and statements also suggest the two services are seen as substitutes by consumers. For example, the internet forum, *Bermuda is another world*, contains spirited discussions concerning the relative merits (and demerits) of the respective services from a variety of customers: those who have switched from WOW to BCV and vice versa, supporters of each service, and those who made the decision to use satellite instead.[267] Letters to the editor of *The Royal Gazette* provide additional support for the perception of service substitutability. For instance, a letter of 12 February 2008 from a WOW customer voices dissatisfaction with the service's high price and low number of channels relative to what is available from BCV and states their intention to switch to BCV at the end of the month if WOW does not add more channels or lower its price.[268] And a letter of 9 December 2008 from a BCV

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[264] Kevin Hughes, *Key results of World Radiocommunication Conference (WRC-07)*, International Telecommunications Union, GSC13-GRSC6-12, 30 June 2008, at slide No. 3. Available at http://www.itu.int/dms_pub/itu-t/oth/21/04/T21040000030014PPTE.ppt.

[265] Bermuda Telecommunications Commission, *In the Matter of a tariff application data 16 March 2008 by Bermuda CableVision Ltd. ("BCV") and complaint by WOW Ltd., dated 8 April 2008, alleging anti-competitive behaviour by BCV*, at ¶14.

[266] See, for example, Matthew Taylor's article cited at footnote No. 260 and Alex Wright, "CableVision boss Roberson says telecoms future is 'as bright as you want to imagine'", *The Royal Gazette*, 11 February 2009 in the article Mr. Roberson states he welcomes rivals such as WOW as it pushes BCV and its employees to work harder and better. Available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=65&articleId=7d925b730030009

[267] See, for example, http://ri.bermudaisanotherworld.org/forum/index.php?topic=2439.0 and http://ri.bermudaisanotherworld.org/forum/index.php?topic=3009.0

[268] See, "Frustrated by local TV", letter to the editor of *The Royal Gazette*, 12 February 2008. Available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=75&articleId=7d8299130030017.

customer states that a shift in loyalties to WOW may soon occur if BCV does not restore the local ZBM and ZFB channels to its basic tier option.[269]

367. The finding of the Bermudan Telecommunications Commission, pronouncements of company spokesmen, consumer behaviour and the fact that BCV and WOW provide many of the same content channels add further supporting evidence that there is a single pay-TV services market in Bermuda consisting of BCV and WOW as the current actors in this market with "illegal" satellite service playing a minor, and declining, role. This conclusion is further supported by the pricing of the two firms' product offerings and the degree of similarity in the channels included in those offerings.

368. BCV offers subscribers a choice of four programming tiers, each upper tier containing the channels of the tier(s) below it in addition to the upper tier's new ones, these are depicted in Table 19 below. All of BCV's video programming tiers also come bundled with a wide variety of music channels, a feature that WOW does not offer.

Table 19: BCV Subscription Options[270]

Tier Levels	Economy	Deluxe	Super	Variety
Price	$30.00	$47.50	$57.50	$75.50
No. of Channels	21	49	66	121
Price Per Channel	$1.43	$0.97	$0.87	$0.62

369. In addition to these subscription tiers BCV offers the following premium content options as add-ons to any of the programming tiers listed above.

[269] See, "Resolve channel rift", letter to the editor of *The Royal Gazette*, 9 December 2008. Available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=75&articleId=7d8c8b730030005.

[270] Prices and channel counts taken from BCV's website at http://www.cablevision.bm/index.php/support189/rates-and-fees and http://www.cablevision.bm/index.php/digital-cable310/digital-channels/ viewed July 2012. Prices listed are per month.

Table 20: BCV Premium Content Add-on Options[271]

Tier Levels	HBO	Cinemax	Showtime	Starz	Maxpak (Sports)	HDTV Tier
Price	$14.00	$13.00	$13.00	$12.00	$22.00	$12.00
No. of Channels	8	6	10	5	2	32
Price Per Channel	$1.75	$2.17	$1.30	$2.40	$11.00	$0.38

370. In contrast to BCV, WOW only offers subscribers a choice of two programming tiers, which are depicted in Table 21 below.

Table 21: WOW Subscription Options[272]

Tier Levels	Basic	Classic
Price	$40.00	$68.00
No. of Channels	43	93
Price Per Channel	$0.93	$0.73

371. Like BCV, WOW also offers various premium content options to subscribers that may be added to any of the programming tiers subscribed to, these are depicted in Table 22 below.

Table 22: WOW Premium Content Add-on Options[273]

Tier Levels	HBO	Showtime	TMC	Cinemax	MaxPak (Sports)
Price	$14.00	$11.00	$11.00	$13.00	$22.00
No. of Channels	7	2	2	6	2
Price Per Channel	$2.00	$5.50	$5.50	$2.17	$11.00

372. As these tables illustrate, the prices for each firm's subscription-TV offerings are very close to one another. WOW's Basic 43 channel tier is $7.50

[271] *ibid*. Prices listed are price per month.

[272] Prices and channel counts taken from WOW's *Channel Programing and Product Information* brochure submitted to the RA on July 31, 2012. Prices listed are per month.

[273] *Id*. WOW also has a high definition package available containing 5 HD channels, but no pricing was available for this package and so it was not included in the table.

less than BCV's Deluxe 49 channel tier. WOW's Classic 93 channel tier is also $7.50 less than BCV's 121 channel Variety tier.[274] Furthermore, the two firms carry many of the same channels. For example, BCV's Deluxe option contains 27 channels that are also available to subscribers of WOW's Basic option (and vice versa),[275] thus over half of the channels offered under each of these subscription options are the same.[276] Arguably, this closeness in price and high degree of similarity in channel offerings are significant factors in creating the perception among consumers that the subscription offerings of the two firms are largely substitutable for each other; a conjecture somewhat supported by the consumer behaviour referred to earlier. A rigorous test of substitutability via a SSNIP analysis is not feasible, however. The principle reason for this has to do with the how each firm chooses to differentiate itself from the other by the choice of channels packaged into their respective subscription tiers.[277]

373. Continuing with the comparison of WOW's Basic tier with BCV's Deluxe tier, as each of these tiers contain 27 channels that are common to both, where each firm differentiates itself is in the other channels offered under these respective options. In BCV's case the number of these other channels is 21, while in WOW's it is 15.[278] BCV's Deluxe option offers customers 8 channels that are only available from WOW's higher tier Classic option and 13 that are exclusive to BCV. Concerning these latter offerings, 7 of the channels are local channels[279] and 5 are non-local channels available only from BCV. WOW's Basic option, on the other hand, offers customers 13 channels that are only available from BCV's higher tier Super and Variety offerings and 2 non-local channels that are exclusive to WOW.[280] As this suggests, performing a SSNIP analysis on

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[274] On the basis of absolute price, WOW's offerings are cheaper than comparable BCV offerings, but more expensive when considered from a per channel perspective.

[275] This analysis was performed by comparing the channels offered under BCV's Deluxe tier (which also contains Economy tier channels) obtained from BCV's website at http://www.omniexchange.net/cv_development/digital_channel_lineup.php and with the channels offered in WOW's Basic tier as listed in a programming sheet submitted to the RA on July 31, 2012.

[276] Of all the channels offered by BCV and WOW 89 of those are offered by both network operators. Stated another way, approximately 85 percent of WOW's channels are also available from BCV and approximately 56 percent of BCV's channels are available from WOW.

[277] Another significant factor is the lack of available channel level data such as the average number of viewers each channel has and the specific cost of providing each channel.

[278] This count excludes each company's informational channel.

[279] These such local channels as Onion TV, Look Bermuda, etc. The local broadcast channels, ZFB, ZBM, and VSB are carried by both companies.

[280] The WOW and BCV values discussed here were arrived at by performing a comparative analysis on channel offerings listed for the Deluxe tier option as those are depicted on BCV's website and comparing those to the channels available under WOW's Basic tier option as listed in WOW's programming sheet submitted to the RA on 31 July 2012.

BCV's Deluxe tier would necessitate making highly speculative assumptions as to the value Deluxe tier customers assign to the 13 BCV exclusive and 8 upper tier WOW channels that would be lost by a switch to WOW's Basic option relative to the value assigned to the 2 WOW exclusive and 13 upper tier BCV channels that would be gained by making the switch to WOW.[281] Thus rendering speculative as well, any estimates of demand elasticities assigned to either of these tiers along with any conclusions derived from them concerning the possible effectiveness, or lack thereof, of a SSNIP imposed on either tier.

374. The difficulties just discussed concerning the performance of an effective SSNIP analysis on WOW's and BCV's Basic and Deluxe tiers also apply to performing an analysis of both company's highest available programming tiers, the Classic (WOW) and Variety (BCV) tiers. These tiers also have a significant number of channels that are common to both tiers, 73 in fact.[282] This means WOW has 19 channels that are exclusive to its Classic tier, while BCV has 47 channels which are exclusive to its Variety tier. At first blush it would appear that a SSNIP imposed on the Variety tier could be sustainable given that in switching to WOW's Classic tier a BCV Variety subscriber would lose 47 channels while only gaining 19, for a net loss of 28 channels. On closer inspection, however, it appears that this seemingly reasonably straight forward supposition may not be as straight forward as it first appeared. For example, the 19 channels gained by switching to WOW contain five sports channels and seven movie channels, two of which are Starz! channels which are only available from BCV's $12 per month five channel Starz! premium add-on option. The 28 BCV channels lost by this switch include no movie channels but five sports channel. So, for movie fans, switching to WOW may be a highly attractive option in the event BCV attempted to raise prices on its Variety tier, while for sports fans it could be a wash, depending on how those fans felt about the five sports channels they would gaining in place of the five they would be giving up. But for those who highly value news and/or MTV programming switching from BCV would result in the loss of CNN International, C-Span and Fox Business along with three MTV channels. Furthermore, included among the 44 BCV channels are many, arguably, lower value niche channels such as Jewelry TV, the Home Shopping Network, and NASA-TV, which a number of subscribers may be indifferent to. So, in this case as well, assessing the impact a SSNIP imposed on BCV's Variety or WOW's Classic programming tier would require making highly speculative assumptions concerning the consumer value associated with the channels exclusive to each firm's respective tier and the effect that value may have on consumer willingness to stay with either of the tiers if a SSNIP were imposed.

375. The same problem occurs when consideration is given to the two company's premium content add-on options. With the exception of the sports

[281] This same difficulty would occur in the event of a SSNIP imposed by WOW on its Basic tier.

[282] Stated another way, approximately 79 percent of WOW's channels are also available from BCV and approximately 60 percent of BCV's channels are available from WOW.

Maxpak and the Cinemax options, WOW again offers fewer channels at a lower absolute price but a higher per channel price than BCV. Here again, analysis of the effect of a SSNIP imposed on any of these premium options requires making speculative assumptions concerning the value(s) to be assigned the channel offerings they contain. It could be, for example, that the additional channels bundled with BCV's premium options are not of interest to most subscribers who might, if given the option, prefer to subscribe to only a few of those channels, for instance the ones available through WOW's lower priced offerings.

376. Similar to our findings in section 7.3(b)(iv), the RA is of the opinion that the preceding discussion strongly suggests attempting to analyze the financial impact of a 5% and 10% SSNIP on the subscription-TV service offerings of either BCV or WOW would be a speculative endeavor likely not worth pursuing for market definitional purposes. The RA believes the evidence provided by consumer perceptions, the high degree of similarity in the channels offered by each firm, and the similarity in pricing, for example, strongly suggest that WOW's and BCV's respective subscription-TV offerings belong in the same market. A question raised by this determination, and one which will be addressed later in section 11.1(c), is—should this market be further subdivided by content/channel packages?

377. From a forward looking perspective, once the ICOL is issued, the two current providers of subscription TV service, WOW and BCV, will be able to add new services such as voice services to their product portfolios, enabling them to develop double and triple play bundles to offer their subscribers. BCV is already providing broadband Internet access services in addition to its subscription TV services and, as was discussed at section 6.2, cable network operators around the world typically provide voice telephony services using DOCSIS VoIP. Upon being issued an ICOL the RA perceives no technical reason why BCV would not do the same. [CIC ----------,--- - ---- ------ -- --- --,---- ------ ---- -- ----- -- ----- ----- ---- ---- -- ---- ---- -- --- ------ -- -- -- ------- ------ ---- ------- -- --- --------- --- -- ------- -- ------- ---- -- ----- ----- --------.][283]

378. Concerning WOW, as was pointed out earlier, the spectrum band currently occupied by the company is capable of providing DTT, voice and mobile broadband services. Furthermore, WOW had originally planned on rolling out high speed internet access along with phone services.[284] Once it is issued an ICOL, the RA sees no technical reasons that would prohibit WOW from carrying out its original intent and adding these services to its product line if it so desired.

379. Just as the ICOL will provide WOW and BCV the ability to expand into other markets if they so choose, so too will other operators be able to enter the

[283] Letter of 5 March 2007 from BCV to Mr. William Francis of the RA of Telecommunications.

[284] See, for example, "Companies bid to run improved satellite service", *The Royal Gazette*, 17 September 2002. Available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=60&articleId=7d2988e30030007

subscription TV market. Given that its DSL network is as extensive as BCV's cable network, it would be very feasible for BTC to provide pay-TV services using internet protocols (IPTV). BTC itself has stated that its core infrastructure could support pay-TV service easily but that some areas of its distribution plant would need upgrading in order to do so, which would require additional investment.[285]

380. BDC, through its BDB subsidiary, is another potential entrant into the subscription TV market via its control of the "Hardell" spectrum,[286] which is in the 2.5 to 2.686 GHz range (2.5 GHz band). This spectrum had originally assigned to Hardell for the provision of analogue television services. In the US this band was re-designated as the Broadband Radio Service (BRS) band in recognition of its capabilities to provide high-speed, high-capacity broadband service, including two-way Internet service, for the provision of integrated voice, data, and video services.[287] In 2000, the World Radiocommunication Conference (WRC-2000) identified the 2.5GHz band as a candidate band for 3G mobile systems (also known as International Mobile Telecommunications-2000 (IMT-2000)).[288] In 2007, the ITU made the decision to include WiMAX technology within the IMT-2000 standards framework.[289] Because WiMAX supports such technologies as multicasting and Quality of Service, it is capable of providing IPTV subscription television services as well as VoIP and broadband Internet access.[290] This all suggests that BDB's 2.5 GHz spectrum holdings could be utilized to provide a triple play bundle if it (or its parent, BDC) obtained an ICOL. The question is, would BDB opt to provide such a bundle as a mobile only option, a fixed wireless

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[285] BTC, *Public Response to Qualitative Questions Regarding Pay-TV*, 18 February 2010, at page 6.

[286] See, for example, Jonathan Kent, "CellularOne buys out Hardell", *The Royal Gazette*, 12 January 2007, available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=65&articleId=7d7161230030047 and Jonathan Kent, "Hardell licence still has value to us says CellularOne executive", *The Royal Gazette*, 19 January 2007, available at http://www.royalgazette.com/rg/Article/article.jsp?sectionId=65&articleId=7d7199330030024

[287] See, for example, http://wireless.fcc.gov/services/index.htm?job=service_home&id=ebs_brs

[288] See, for example, National Telecommunications and Information Administration, *Federal Operations In The 1755–1850 MHz Band: The Potential for Accommodating Third Generation Mobile Systems*: *Interim Report*, NTIA Special Publication 01–41, 15 November 2000, at page 7. Available at http://www.ntia.doc.gov/osmhome/reports/imt2000/index.html.

[289] See, *ITU Radiocommunication Assembly approves new developments for its 3G standards*, 19 October 2007, at http://www.itu.int/newsroom/press_releases/2007/30.html. This designation enables spectrum owners (specifically in the 2.5-2.69 GHz band at this stage) to use WiMAX equipment in any country that recognizes the IMT-2000.

[290] See, for example, Ning Liao, and others, "Optimized Multicast Service Management in a Mobile WiMAX TV System", Consumer Communications and Networking Conference, 2009. CCNC 2009. 6th IEEE, 10-13 Jan. 2009, at pages 1-5. Also, Francis E. Retnasothie and others, "Wireless IPTV over WiMAX: Challenges and Applications", October 2006, available at http://www.eng.usf.edu/~yucek/papers/yucek_wami06.pdf.

option, or a mixture of both as the this spectrum band could support both fixed and mobile wireless services? We note that the assigned spectrum has not been used to provide subscription television services despite being assigned a number of years ago.

381. Given that NRC is Bermuda's only WiMAX provider at the present time, the preceding discussion concerning WiMAX's potential for the provision of triple play services suggests that NRC is another possible future entrant into Bermuda's subscription TV market, especially given its dominance of spectrum assets in the desirable 3.5 GHz band, which is one of the three global WiMAX bands supported by the WiMAX forum and is pretty much the global band of choice for WiMAX deployment.[291]

382. The evidence and analysis presented in the preceding discussion leads the RA to conclude there is a single pay-TV services market in Bermuda consisting of BCV, WOW, and satellite –TV, which appears to be a declining service and whose operators are not subject to the RA's authority.[292]

383. The RA also concludes that under the ICOL there is a strong probability that BTC will enter this market as well and is in a position to do so before the next review.

(iii) There is a single national market for retail subscription television

384. The RA considers that there is a single national market for subscription television with no customer differentiation. This conclusion is based on commercial practice, which in all cases is to market essentially the same service to all customers in all reachable locations. As was pointed out in the previous section BCV's network passes the vast majority of households in Bermuda, while WOW's service is available in approximately 78 to 87% of the country. Satellite coverage is also available throughout the country, even though it is a "grey" market.

385. Such commercial practice likely arises because of the underlying cost structure of subscription television, in particular, the facts that (1) providing content for one subscriber generally means that content can be provided for all other subscribers; and (2), being a mass market, advertising is largely most efficient when applied uniformly across the nation.

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[291] See, for example, WiMAX Forum, "Industry Standards, Spectrum and Regulation", available at http://www.wimaxforum.org/resources/frequently-asked-questions/industry-standards-spectrum-and-regulation and *WiMAX Forum Industry Research Report*, October 2010, "Deployment by Frequency" table at page 3. Available at http://www.wimaxforum.org/resources/monthly-industry-report. However, it should be noted that the 3.5 GHz band is not readily available in the U.S. as it has been set aside for military use there. See http://www.wimax.com/wimax-regulatory/is-35ghz-available-in-the-us

[292] This is due to the "grey" market nature of satellite TV whose signals are not legally allowed to be viewed in the Bermudan households.

386. The fact that broadcast coverage is also national, and the broadcasters market their services on a national basis to all customers,[293] reinforces the conclusion that subscription television services are in a single geographic market with no customer differentiation.

(c) Content/Channel Market Definitions

387. In some jurisdictions RA's have further subdivided the pay-TV market into distinct and separable markets delineated on the basis of channels. For example, in the UK these submarkets consist of premium sports and movie channels at both the wholesale and retail levels, and (weakly) basic tier TV channels at the retail level.[294] While the EU has consistently found free-to-air and subscription TV to be in separate markets, it has also found there to be separate markets for the provision of premium content, with premium sports and movie channels being in separate markets.[295]

388. The RA declines to take similar action in regards to the pay-TV market in Bermuda. While the RA agrees with the findings of other RA's concerning the uniqueness of premium content, and consumer preferences and demand for such content, the RA believes there would be little to be gained by subdividing the Bermudan market in this fashion. To begin with, the market structure in Bermuda is different from that of the UK and the EU. In those jurisdictions full scale vertical integration, whereby a firm such as Sky or Virgin Media operate at the retail, platform operation, and wholesale channel provision levels of the value chain, is a common characteristic of the broadcast markets. Neither WOW, BCV, nor any potential entrant to the Bermudan broadcast market, are likely to ever become wholesale channel providers and so be able to operate as fully vertically integrated firms in this market.

389. The simple fact of the matter is that, due to the small scale of the Bermudan market and the subsequent lack of premium locally produced content, any provider of retail television programming services is equally dependent upon out of country third party content aggregators for access to wholesale premium content for their retail services.[296] Consequently, there is no danger of any individual provider obtaining significant market power over the wholesale provisioning of premium content channels in the country. Nor does the RA have the authority, or jurisdiction, to pursue regulatory interventions against any out of

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[293] See, for example, *Bermuda Online* at http://www.bermuda-online.org/media.htm.

[294] See, for example, *Pay TV market investigation: Consultation document*, at page 73.

[295] See, for example, Commission Decision, Case COMP/M.2876, 2 April 2003, Newscorp/Telepiù and Commission Decision of 23 July 2003 relating to a proceeding pursuant to Article 81 of the EC Treaty and Article 53 of the EEA Agreement (COMP/C.2-37.398 —Joint selling of the commercial rights of the UEFA Champions League)

[296] The sole exception to this being rights purchased for specific events such as the Olympics or World Cup.

country third party content aggregators supplying wholesale premium content channels to the Bermudan market in the event those parties choose to engage in anti-competitive pricing practices or content withholding actions. Thus, from a wholesale market perspective, there is no pressing regulatory reason to further subdivide the pay-TV market in Bermuda as there was in the UK and EU where the wholesale provisioning of premium content channels by full scale vertically integrated local firms such as Sky, Virgin Media, and Canal+ France pose significant threats of market distortion on downstream retail competition.

390. Turning now to the retail market for premium channel provisioning, the RA sees no pressing need for market subdivision here either. As was noted by Ofcom, the level of competition between retailers of premium content is largely dependent on what premium content is made available to them by the wholesalers of such content and on what basis.[297] As was noted in the discussion earlier, retailers of television services in Bermuda are all equally dependent on out-of-country third party wholesale channel providers for content. For the most part it appears that access to this content has been made equally available to retail providers of television services in Bermuda. For example, the previous discussion in section 11.1(b)(ii) illustrated the fact that the players currently in the market (WOW and BCV) offer packages similar to one another in terms of content (Both WOW and BCV offer a premium sports package consisting of the Fox Soccer Plus and the SportsMax channels), therefore, a move to increases prices on premium content by one provider could easily result in customer defection to the other provider who is providing the same content at a lower price.[298] Arguably, WOW, BCV, or any other potential entrant into the pay-TV service market in Bermuda are, and will be, equally able to access premium content for retail service delivery from out-of-country wholesale channel providers and will be limited in that access only by the cost of obtaining retransmission rights for those that content.

391. That said, as demonstrated in Table 18, above, BCV has become the single dominant retailer provider of pay-TV services in Bermuda. Given this position, and given the small size of Bermuda's market, it is entirely possible that wholesale premium content providers selling into the market may not want to see it fragmented further and so choose to deal with only the largest provider, BCV. For the most part this does not appear to have occurred and WOW has reported no difficulty in obtaining access to premium movie channels. However, in 2008 there was a problem regarding access to premium sports channels as provided by Setanta. In this instance Setanta purportedly chose to deal only with BCV given its status as the largest operator in the country. Acting on a complaint filed by WOW, the Telecommunications Commission held a hearing on the matter and ruled that the types of exclusivity arrangements BCV was negotiating with Setanta were not in the best interests of Bermuda's consumers. BCV appealed

[297] See, for example, *Pay TV market investigation: Consultation document*, pages 104 – 106.

[298] And, as was suggested by some of the customer remarks quoted earlier, customers appear to be willing to make such switches if they perceive they can get better content bundles elsewhere.

the ruling and a Ministerial decision of 12 June 2008 referred the matter back to the Commission for a full industry consultation on exclusivity agreements and instructed the Commission to investigate and report on the impact of exclusivity agreements on the market as a whole. This decision further stated that the Commission's original decision would remain in force until the consultation was completed and a final decision rendered. The consultation was never conducted as shortly after the Ministerial decision was issued WOW, BCV, and Setanta entered into private negotiations; reaching a mutually agreeable decision whereby WOW was, once again, granted access to premium content provided by Setanta.

392. For the reasons discussed above, the RA finds that there is no compelling regulatory reason to further subdivide the Bermudan pay-TV services market into additional distinct and separable submarkets delineated on the basis of channels. Accordingly, the RA finds that there is a national retail market for pay-TV services and this market is undifferentiated on the basis of channels. The RA additionally finds there to be no local wholesale market for the supply of premium, or other, content into the Bermuda market.

393. The RA is aware, as the discussion concerning the Setanta content in the previous paragraph illustrates, that BCV's current position of dominance in the market, combined with its first mover advantage, affords it the opportunity to engage in exclusive behaviour regarding access to premium channel content. This fact has no bearing on the market definitional exercise being undertaken but here, but it is, and will be, a matter to be addressed in the SMP analysis.

(d) Conclusion on the retail subscription TV market

394. The RA concludes that the relevant retail market includes subscription TV services only and that the market includes subscription services provided via different means. The relevant market is national, includes all retail customer types and is not disaggregated according to content.

Consultation question 16: Do you agree that the relevant retail market for the supply of subscription TV services to deliver broadcast content to end users includes subscription services provided via different means and is not disaggregated according to content?

12.2 Wholesale subscription TV service to deliver broadcast content to end users

395. The Markets Notice identified a wholesale subscription TV market to deliver broadcast content to end users. Following the same reasoning as discussed above in the context of retail services, the RA concludes that the relevant market includes subscription services provided via different means; is national and includes and is not disaggregated according to content.

Consultation question 17: Do you agree that the relevant wholesale market for the supply of subscription TV services to deliver broadcast content to end users

includes subscription services provided via different means and is not disaggregated according to content?

13 SUMMARY OF MARKET DEFINITIONS

Table 23—List of markets to be assessed for SMP

Service	Definition of candidate markets
Retail fixed narrowband access lines and local calls	A national market (excluding Southside) for the supply of retail fixed narrowband access lines and local calls to residential customers
	A market for the supply of retail fixed narrowband access lines and local calls to business customers in the City of Hamilton
	A market for the supply of retail fixed narrowband access lines and local calls to business customers outside of the City of Hamilton and Southside
Retail broadband access	A national market (excluding Southside) for the supply of retail fixed broadband access and Internet services to residential customers
	A market for the supply of retail fixed broadband access and Internet services to business customers in the City of Hamilton
	A market for the supply of retail fixed broadband access and Internet to business customers outside of the City of Hamilton and Southside
Retail mobile services	A national market for the supply of retail mobile services, including voice and data.
Retail leased lines	A market for the retail supply of low-speed retail leased lines in the City of Hamilton
	A market for the retail supply of low-speed retail leased lines outside of the City of Hamilton and Southside
	A market for the retail supply of high-speed retail leased lines in the City of Hamilton
	A market for the retail supply of high-speed retail leased lines outside of the City of Hamilton and Southside
Retail subscription TV services	A national market for the supply of retail subscription TV services

Service	Definition of candidate markets
Wholesale call origination on fixed networks	A wholesale market for the origination of calls on fixed networks in the City of Hamilton
	A wholesale market for the origination of calls on fixed networks in areas other than the City of Hamilton and Southside
Wholesale call termination on fixed networks	Markets for the supply of call termination on each individual fixed network
Wholesale fixed narrowband access and local calls	A wholesale market for the supply of fixed narrowband access and local calls in the City of Hamilton
	A wholesale market for the supply of fixed narrowband access and local calls in areas other than the City of Hamilton and Southside
Wholesale broadband access	A wholesale market for the supply of fixed broadband access in the City of Hamilton
	A wholesale market for the supply of fixed broadband access in areas other than the City of Hamilton and Southside
Wholesale MVNO access on mobile networks	A national market for the supply of wholesale access and local call origination on mobile networks
Origination of international calls on mobile networks	A national market for the supply of wholesale origination of international calls on mobile networks
Call termination on individual mobile networks	Markets for the supply of call termination on each individual mobile network
Wholesale provision of terminating segments of leased lines	A market for the wholesale supply of low speed data tails in the City of Hamilton
	A market for the wholesale supply of low speed data tails outside of the City of Hamilton and Southside
	A market for the wholesale supply of high speed data tails in the City of Hamilton
	A market for the wholesale supply of high speed data tails outside of the City of Hamilton and Southside
Supply of access to infrastructure facilities	A market for the wholesale supply of access to facilities used to construct fixed local access networks

Service	Definition of candidate markets
	A market for the supply of access to facilities used to construct wireless radio access networks.
Wholesale subscription TV services to deliver broadcast content to end users	A wholesale market for the supply of subscription TV market to deliver broadcast content to end users

Appendix A Summary list of consultation questions

Please support your responses with an explanation, evidence and data where available.

Consultation question 1: Do you agree that fixed narrowband access and local calling form a single market?

Consultation question 2: Do you agree that mobile access and local calling form a single market?

Consultation question 3: Do you agree that international calls are not part of the market that contains retail fixed narrowband access and local calling?

Consultation question 4: Do you agree with the finding that voice over broadband services (namely DOCSIS VoIP, VoWIMAX, FTTx VoIP and VoIP type 6) are all in the same market as narrowband access and local calls but that other types of VoIP and fixed services delivered via mobile networks are not?

Consultation question 5: Do you agree with the finding that fixed and mobile services are in separate markets? **Explain.**

Consultation question 6: Do you agree with the finding that there are separate residential and business customer markets for (1) retail fixed access and local calls; and (2) retail broadband?

Consultation question 7: Do you agree with the conclusion that for the purposes of the SMP and remedies it is not necessary to define separate customer markets for either of: (1) leased lines; (2) mobile services; or (3) subscription TV services?

Consultation question 8: Do you agree with the finding that there is a separate geographic market for Central Hamilton for the supply of:

retail access lines and local calls to business customers;
wholesale fixed narrowband access lines and local calls;
Wholesale call origination on fixed networks;
Retail broadband to business customers;
Wholesale broadband services;
Retail domestic leased lines; and
Wholesale terminating segments of leased lines?

Consultation question 9: How should Central Hamilton be defined?

Consultation question 10: Do you agree with the conclusion that mobile broadband is not in the same market as fixed broadband?

Consultation question 11: Do you agree with the conclusion that the relevant forward-looking definition of the retail broadband market is one that includes the bundle of broadband access and Internet services?

Consultation question 12: Do you agree with the conclusion that there are separate retail markets for low-speed leased lines (that is, leased lines that provide a capacity of less than 1 Mbps) and high-speed leased lines (that is, leased lines with a capacity of 1 Mbps or more)?

Consultation question 13: Do you agree with the conclusion that there are separate wholesale markets for low-speed leased lines (that is, leased lines that provide a capacity of less than 1 Mbps) and high-speed leased lines (that is, leased lines with a capacity of 1 Mbps or more)?

Consultation question 14: Do you agree with the conclusion that there is a market for the supply of fixed access network facilities that includes ducts, towers, and poles? Are

there are other facilities that should be included in this market?

Consultation question 15: Do you agree with the conclusion that there is a market for the supply of wireless network facilities that includes tower and mast access? Are there other services that you consider lie in this market?

Consultation question 16: Do you agree that the relevant retail market for the supply of subscription TV services to deliver broadcast content to end users includes subscription services provided via different means and is not disaggregated according to content?

Consultation question 17: Do you agree that the relevant wholesale market for the supply of subscription TV services to deliver broadcast content to end users includes subscription services provided via different means and is not disaggregated according to content?

Appendix B Company abbreviations and current license class

Table 24: Company Abbreviations and current license class

Company Abbreviation	Company Name	Current license/service
ANB	Atlantic Network (Bermuda) Limited (Parent: TBI)	Class A (international long distance service and transit. Also can offer ISP services to business customers only)
BBC	Bermuda Broadcasting Company Limited	Broadcast radio and TV services. ZBM Radio 95, 105, 89 and ZFB Radio ZBM Channel 7 TV and Channel 9 TV. The largest broadcasting company in the country.
BCV	Bermuda CableVision Limited (Keytech owns 40% of BCV but has little control of the company)	Class B (subscription TV and cable modem service)[299]
BDB	Bermuda Digital Broadband Limited (Parent: BDC[300])	(Can, but does not presently, provide Internet access and wireless Cable TV services)
BDC	Bermuda Digital Communications Limited CellONE[301]) BDC and M3 have merged and BDC is now part of the Keytech group of companies with Keytech controlling 42% of BDC.	Class B (mobile carrier)
Belco	Bermuda Electric Light	Not a licensee, but can provide dark

[299] Strictly speaking, BCV is not a Class B carrier but is listed as such here because: (1) as a supplier of subscription television, that is, programming for a fee, it is not a broadcaster, but a provider of electronic communications services (s2(1) EC Act); (2) under Sec. 9(1) of the *Telecommunications Act of 1986* (TA86), BCV and telecommunications firms are classified as "carriers" eligible for "public telecommunications licenses; and (3) BCV's licence designates it as a carrier's carrier eligible to provide broadband Internet access to residential and commercial customers. However, BCV does not have a full Type B license, not being authorized to provide voice services and not having received any spectrum.

[300] See, for example, "CellularOne buys out Hardell", http://www.royalgazette.com/rg/Article/article.jsp?sectionId=65&articleId=7d7161230030047 and http://www.royalgazette.com/rg/Article/article.jsp?sectionId=65&articleId=7d7199330030024.

[301] Cellular One is a coalition of wireless carriers that, to carry the Cellular One name, agree to adhere to certain guidelines via a licensing program in order to maintain consistent quality of service in all markets in which the Cellular One Brand is operating (http://www.cellularone.com/Main/AboutCellularOne.asp).

Company Abbreviation	Company Name	Current license/service
	Company (Parent: Ascendant Group Limited[302])	fibre
BLDC	Bermuda Land Development Company Limited	Class B (can provide wireline or wireless voice services, along with paging, data services and leased line services to tenants on property owned by BLDC)
BRT	Brasil Telecom Subsea Cable Systems (Bermuda) Limited	Class A (international transit only)
BTC	Bermuda Telephone Company Limited (Parent: KTL)	Class B (traditional fixed wireline service)
CCL	Cable Company Limited (Also known as CableCo. Parent is KTL)	Class A (international long distance service and transit. Also can offer ISP services to business customers only)
LBM	Link Bermuda--Bought out Cable & Wireless in Bermuda (Parent is the Bragg Group in Canada. Bragg Communications Inc. of Canada is a sister company)	Class A (international long distance service and transit. Also can offer ISP services to business customers only)
DBC	Defonte's Broadcasting Company Limited	Broadcast radio and TV services. VSB Radio 106 AM 1430 and 1460 and VSB TV 10
DCB	Telecommunications (Bermuda & West Indies) Limited (d.b.a. Digicel) (Parent is Digicel Group Limited)	Class B (mobile carrier)*
ECL	Electronic Communications Limited (Parent is Mantissa Holdings Group)	Class C (Next generation radio systems provider. Paging solutions, GPS fleet management, taxi radios)
FKB	FKB Transact Limited (the merged Fort Knox and Transact), this company	Class C (ISP)

[302] Ascendant Group Limited is the holding company for Bermuda Electric Light Company (BELCO), Bermuda Gas & Utility Company Limited and PureNERGY Renewables, Ltd.

Company Abbreviation	Company Name	Current license/service
	has been bought out by DCB and is now part of the Digicel group.	
GNC	Globe Net Communications Limited (Parent: TBI)	Class A (international long distance service and transit. Also can offer ISP services to business customers only)
ICL	Inter-Island Communication Limited	Class 1 broadcasting (radio station) license. Operates HOTT 107.5 FM and Magic 102.7 FM
KTL	KeyTech Limited	Holding company for BTC, M3, LCL, and CCL
LCL	Logic Communications Limited (Parent: KTL)	Class C (ISP and international long distance service provider)
LTT	LTT Broadcasting Limited	Class 1 broadcasting (radio station) license. Operates KJAZ 98.1 FM
NRC	North Rock Communications Limited	Class B (fixed wireless, WiMAX) and Class C (ISP) also provides international long distance service
QCL	Quantum Communications Limited (60% owned by ATG,[303] and 40% owned by Cable & Wireless PLC)	Class B
TNL	Telecommunications Networks Limited, (Also known as Telecom Bermuda, Parent: East End Group Limited)[304]	Class C (paging services, GPS tracking, two-way radio systems, and business WiFi solutions)
TBI	TeleBermuda International Limited	Class A (international long distance service and transit. Also can offer ISP services to business customers only)
WOW	World on Wireless Limited	Subscription radio service license.

[303] A joint venture between Ignition Bermuda Limited, Telecom Bermuda and Phoenix Trust.

[304] In 2007, East End Group Limited amalgamated Telecommunications Networks Limited (Parent company of Telecom Bermuda) and East End Asphalt Limited. See, http://www.eeabermuda.com/index.php?option=com_content&task=view&id=76&Itemid=1.

Notes: Class A licensees can carry international traffic, and provide commercial (non-residential) Internet services; Class B licensees can carry domestic traffic; Class C licensees can provide other electronic communications services, notably Internet services, and can provide VoIP services, but must pay the international termination charge to deliver calls to PSTN lines in Bermuda.

* Mobile companies can provide Internet services that are common internationally, such as Blackberry email, websurfing on smartphones, and Internet access for portable web-savvy devices such as laptops, for example, via a data card).

Appendix C Candidate Markets

1 INTRODUCTION AND LEGISLATIVE CONTEXT

1. Part 4 of the Electronic Communications Act (ECA) provides the legislative framework for the market review process to be followed in the determination of *ex ante* regulatory remedies required to address significant market power (SMP) in the supply of electronic communications services and subscription audiovisual programming content.

2. The first step in the market review process is for the Regulatory Authority (RA) to: "issue a notice that identifies any relevant product and geographic market which in its view appears to be susceptible to the imposition of ex ante remedies, based on a forward-looking assessment."[305]

3. Section 22(2) specifies that the identified markets can include retail and wholesale markets and must satisfy all of the following criteria and any other criteria that the RA considers pertinent:

A the relevant market is characterised by high and non-transitory barriers to entry;

B taking into account actual and expected market circumstances during the period under review, the relevant market either—is not likely to be affected by technological changes or other developments that would render it effectively competitive, or is likely to cease to be effectively competitive; and

C the application of ex post competition rules alone would not be sufficient to promote or preserve effective competition in the relevant market.

4. Once the list of markets is published, the RA is then required to conduct a consultation to review the identified markets with the aim of:

A evaluating whether these relevant markets are, or continue to be, correctly defined based on an economic assessment of supply and demand;

B analysing whether a communications provider, individually or with others, in fact possesses, or continues to hold, significant market power in one or more of these relevant markets based on the applicable facts and circumstances; and

C deciding which obligations, if any, should be imposed in respect of each relevant market characterised by significant market power in

[305] ECA, section 22(1).

order to promote or preserve effective competition, in accordance with section 24.[306]

5. The purpose of the current notice is to publish the RA's findings on which markets are susceptible to *ex ante* regulation in accordance with section 22(1) of the ECA. The identification of a market in this notice does not represent a finding that SMP necessarily exists in that market, but simply that it is a candidate market and requires further analysis through the market review process.

2 IDENTIFYING THE RELEVANT MARKETS - INTERPRETATION OF CRITERIA

2.1 Relevant services and market definition

6. There are a number of electronic communications services provided over fixed, wireless and Pay TV networks in Bermuda. Many of these services are explicitly provided to retail or wholesale customers. There are also some wholesale services that are implicitly provided by a vertically integrated firm to its retail arm. For example, although there is currently no explicit national provision of wholesale broadband services to third parties, each of the firms that currently compete in the provision of retail broadband access services effectively self-supplies the wholesale network broadband access service that is an input into retail service provision. There may be demand for the supply of wholesale services to external wholesale customers, however, without a regulatory obligation to provide access the vertically integrated may have little incentive to provide wholesale access if there is a lack of competitive pressure from other wholesale substitutes.

7. The approach taken in this notice is to consider both explicit and implicit markets when identifying which retail and wholesale markets are susceptible to *ex ante* regulation. The identification of wholesale markets that that do not explicitly exist is important in order to facilitate the development of effective competition in downstream markets.

8. The specific definitions of the markets identified in this notice are preliminary only. These preliminary definitions are based on the observation and experience of the RA, drawing on its knowledge of the electronic communications sector in Bermuda as well as international precedents. The ensuing market review process required under section 23(4) of the ECA involves a detailed assessment of the market boundaries through considering the demand and supply characteristics.

2.2 Interpretation of criteria

(a) High and non-transitory barriers to entry

9. The first criterion set out in section 22(2) of the ECA is that: "the relevant market is characterised by high and non-transitory barriers to entry." Barriers to

[306] ECA, section 23(4).

entry include legal, regulatory, economic, and technical barriers to a firm's ability to viably enter, expand and compete effectively in a market. In the context of electronic communications a key economic barrier can be the high level of sunk costs involved in deploying an electronic communications network. Sunk costs that those that are incurred upon entry and cannot be recouped if the firm exits the market.

(b) Expected market developments

10. The second criterion in section 22(2) of the ECA relates to whether there are likely to be technological changes or other developments that would alter a conclusion as to whether or not the market is likely to be effectively competitive. The ECA specifies that the relevant timeframe for considering technological changes and developments is over the period of the review. That period is 4 years, given that reviews must be carried out at least every four years according to section 23(6)(a).

11. An impending change that the RA considers important to take into account is the licensing change. The introduction of the Integrated Communications Operating License (ICOL) will reduces barriers to entry to some markets, and allow for further bundling and the attainment of economies of scope. However, it could potentially also allow leveraging of market power across service markets.

12. A second change that the RA anticipates is the introduction of number portability. This will lessen barriers to entry and expansion in the provision of fixed and mobile services

13. A third factor that the RA considers important is that there is ongoing technological innovation and change in respect of: (1) substitution and convergence between fixed and mobile services; and (2) the potential deployment of further fibre networks to provide ultrafast broadband.

(c) *Ex post* competition rules

14. The third criterion contained in section 22(2) is that "the application of ex post competition rules alone would not be sufficient to promote or preserve effective competition in the relevant market."

15. The Regulatory Authority Act has established a framework for the application of *ex post* competition rules. In generally *ex post* rules are not sufficient where a form of wholesale access (including interconnection) is required in order to promote effective competition in downstream markets.

16. Moreover, by the very nature of being *ex post* the rules are enforced after an event. Therefore where the extent of market power in a market is such it is likely that consumers will be harmed in the absence of *ex ante* regulation or that there will be irreversible damage to competition, *ex post* intervention will likely not be sufficient to promote or preserve competition.

(d) Further criterion

17. The imposition of regulatory remedies is aimed at achieving benefits in the form of enhanced competition and market outcomes. However, any regulatory remedy will generally also impose costs. In a small jurisdiction such as Bermuda, the administrative and systems costs of implementing a remedy are likely to have a significantly higher impact on the cost-benefit analysis than in other larger jurisdictions. This is because the fixed costs of implementing and administering regulatory remedies need to be recouped from a much smaller pool of customers than is the case in countries with large population bases.

18. A full assessment of the costs and benefits of regulating a particular market is outside the scope of the current notice. However, the RA does consider it appropriate to have regard to the whether the small size of Bermuda is likely to mean that the costs of imposing regulatory remedies are likely to outweigh the benefits when determining which markets are susceptible to *ex ante* regulation. This is particularly the case in respect of defining a new wholesale market.

3 LIST OF CANDIDATE MARKETS

19. Having assessed the criteria in section 22(2) of the ECA and the additional criterion identified above, the RA has determined the following candidate markets:

Box 2: Markets susceptible to *ex ante* regulation

Retail markets

1. Retail fixed narrowband access lines and local calls for all of Bermuda other than Southside for (a) business customers; and (b) non-business customers
2. Retail broadband services provided at fixed locations in all areas other than Southside
3. Retail mobile services
4. Retail leased line services in all areas other than Southside
5. Retail subscription TV services

Wholesale markets

6. Call origination on fixed networks in all areas other than Southside
7. Call termination on individual fixed networks
8. Wholesale narrowband access lines and local calls in all areas other than Southside
9. Wholesale broadband access on fixed networks in all areas other than Southside
10. Wholesale MVNO access on mobile networks
11. Origination of international calls on mobile networks
12. Call termination on individual mobile networks
13. Wholesale provision of terminating segments of leased lines in all areas other than Southside
14. Wholesale supply of access to local network infrastructure
15. Wholesale subscription TV services to deliver broadcast content to end users

20. A detailed analysis of market definition having regard to the principles of demand and supply side substitutability, the SSNIP test and cluster markets will be carried out as part of the market review process, pursuant to the issuing of this notice. The candidate markets identified in the current notice provide a starting point for that detailed market definition study. The detailed market definition to be carried out in the market review process may result in the above markets being further disaggregated by customer groups or geographic areas or service.

4 SUMMARY EXPLANATION OF VIEWS ON MARKETS SUSCEPTIBLE TO EX ANTE REGULATION

21. This section provides a summary discussion of the reasons for identification of the markets listed in Box 1, in accordance with section 22(4) of the EC Act.

4.2 Fixed access and calling

22. The fixed access and calling services identified as being susceptible to ex ante regulation are:

- Retail fixed narrowband access and local calls
- Call origination on fixed networks
- Call termination on fixed networks
- Wholesale narrowband access and local calls

(a) Barriers to entry in fixed access and calling markets

23. Currently the provision of any and all four services listed above requires the deployment of a fixed access network in all areas other than Southside.[307] This involves building a link between customers and the exchange as well as acquiring exchange space. Substantial barriers are associated with deployment of fixed access networks. Physical cabling is one means of providing this link, but requires sinking substantial costs, that is, making investments that have no alternative use or scrap value. Sunk investments are a fundamental barrier to entry. The costs of trenching, ducting, pole deployment (or any pole rentals), stringing overhead line, and a substantial proportion of the cable itself (its cost plus recovery costs less scrap value) are all substantial and sunk.

24. Spectrum over some part of the required access link is another means of providing a fixed access network, but deployment of fixed wireless solutions faces substantial barriers to entry, including: the high sunk costs of tower erection and equipment, and rental of the same; zoning difficulties in erecting towers, or gaining collocation space on existing towers for transceivers, and regulatory barriers to obtaining suitable spectrum. More specifically, in Bermuda fixed wireless services are offered but have not been widely taken up.

[307] Availability of wholesale access in Southside from BLDC as will be discussed below in the context of geographic markets means that competitors are able to provide fixed access and call services in the Southside area without the barriers to entry associated with deploying an access network.

(b) Technological change and developments

25. Looking forward, the entry barriers just listed are likely to remain in place with only a few regulatory exceptions. That is, there are no foreseeable technological changes that substantially reduce the sunk costs of deploying physical access lines, or towers. A change in regulation could ease the barriers to tower and transceiver deployment, and to access to spectrum. However, such changes would not eliminate, and may only moderately reduce, these barriers. For example, it is unlikely that zoning restrictions would be substantially reduced. Similarly, if more spectrum were made available, but at a financial cost (such as auction fees) that were not recoverable on exit (for example, by sale), then spectrum would continue to represent a substantial barrier to entry because of the costs that must be sunk to obtain it.

26. The impending license changes will likely mean that the cable network provider is able to enter into the supply of fixed access lines and calling. However, the 40% ownership of the cable network by the copper network owner (via KeyTech) may well mean that cable telephony will not lead to effective competition for these services.

(c) Geographic markets

27. In the Southside area, access network infrastructure is owned by BLDC, which leases access to duct spare, copper pairs, fibre pairs, cross-connects and collocation. As a result competitors are able to provide fixed access and call services in the Southside area without the barriers to entry associated with deploying an access network. Therefore the RA considers that that the relevant geographic market that is susceptible to *ex ante* regulation excludes Southside.

28. It may well be the case that there are additional separate geographic markets for fixed access and calling services within Bermuda, for example, with central business district having the greatest concentration of customer demand and therefore attracting stronger competition through network deployment. However, as this requires further analysis of the economics of service provision between geographic area the RA do not express a firm view and will instead examine this matter as part of the market definition analysis required as part of the market review.

(d) Retail fixed access and local calling

(i) Market definition

29. Fixed access lines and local calls are jointly provided to end consumers as a bundle in Bermuda. This reflects efficiencies on the demand and supply sides of joint purchase and supply, respectively. Therefore the RA is of the preliminary view that access and local calling are in a single market.

30. The RA considers it likely that there are separate business and residential markets. It is quite possible that there could be differing levels of intensity of

competition between the provision of services to these two separate groups given differences on the demand and supply-side between the two.

31. In terms of the technology, the RA acknowledges that a degree of mobile substitution has occurred such that mobile services likely do place at least some competitive constraint on fixed services. However, the RA holds the preliminary view that fixed and mobile services are not sufficiently substitutable that they would lie in the same market.

32. The relevant retail markets to consider therefore are: Retail narrowband access lines and local calls for (a) business customers; and (b) non-business customers

(ii) Entry barriers and technological change

33. Given the current absence of a nationally available wholesale service that can be used to provide retail and local calling, the sustained barriers to entry discussed in 0 apply. An additional barrier to entry is the current lack of local number portability however it is anticipated that it will be introduced in the near future.

(iii) Ex post competition rules

34. In the RA's preliminary assessment, the substantial entry barriers make entry and even market expansion by existing carriers difficult, and may well grant some existing fixed suppliers SMP (perhaps jointly). This raises the possibility that without remedies in these markets, competition may be unlikely to develop even if SMP is not used to effect anticompetitive ends. That is, the application of competition rules may prevent anticompetitive behaviour, but is unlikely to enable competition that the application of remedies might make possible. Consequently, the RA considers that SMP analysis for the purposes of identifying such remedies should be carried out for the markets that contain retail fixed access lines and local call services.

(iv) Costs and benefits of regulation in a small jurisdiction

35. Retail access and local calling has already been subject to regulated pricing and as such there are not significant set-up costs for retail regulation.

(e) Wholesale market for origination on fixed networks

36. The RA considers that there is a relevant market for the supply of call origination. It is possible that there are distinct geographic markets, however for the purposes of this notice a national market is adopted.

(i) Entry barriers

37. To supply wholesale origination on a fixed network, a firm must first deploy a fixed network and will face the same substantial entry barriers discussed above in 0.

(ii) Technological change and developments

38. As per the discussion in section d, there is little likelihood of technological progress or other developments eliminating entry barriers over the next three years

(iii) Ex post competition rules

39. Markets for call origination services rarely arise in the absence of regulation. In Bermuda, there is an active market for (wholesale) international call origination that is created by regulation. It is implausible that ex post application of competition rules would allow for competition to develop given the preceding barriers.

(iv) Costs and benefits of regulation in a small jurisdiction

40. The call termination service is already in place in Bermuda and therefore set-up costs of supplying the services have already been incurred. Little ongoing fixed costs would be required to supply and regulate the service.

(f) Wholesale market for termination on fixed networks

41. The RA considers there to be a relevant market for call termination on individual fixed networks. The definition of a separate termination market for each network is consistent with the approach taken in the EU and reflects that each supplier of termination has a monopoly over termination on that network. The RA considers that the extent of SMP in the termination market of an individual network will be uniform across all areas covered by that network and therefore the geographic aspect of the termination markets will be determined by the coverage of each network.

(i) Entry barriers

42. Given the above market definition in which each network constitutes its own market, entry is not possible. Therefore each fixed network will essentially have monopoly power over termination on its own network.

(ii) Technological change and developments

43. This aforementioned position of monopoly power will not change over the next 4 years.

(iii) Ex post rules

44. Ex post rules alone are not sufficient to address the issue of access to a bottleneck facility such as termination.

Costs and benefits of regulation in a small jurisdiction

45. The call termination service is already in place in Bermuda and therefore set-up costs of supplying the services have already been incurred. Little ongoing fixed costs would be required to supply and regulate the service.

(g) Wholesale access and local calls

46. Neither wholesale access nor wholesale local calls are currently provided to third parties. Given that retail access and local calls are bundled and appear to lie in a single market, this implies that wholesale access and local calls are also likely to lie in a single market. A wholesale local call product would not be attractive to wholesale customers because those customers would not be able to compete in the retail market. This is because retail customers would already be receiving a bundle of calls when they purchase retail access.

(i) Entry barriers

47. The entry barriers are substantial, and are the same as those discussed above in section d.

(ii) Technological change and developments

48. As discussed in section d. it is unlikely that technological change or other developments would increase the competitiveness in this market.

(iii) Ex post rules

49. Ex post rules would not be sufficient to ensure that wholesale access and local calls are provided on reasonable price and non-price terms.

(iv) Costs and benefits of regulation in a small jurisdiction

50. Resale of access lines and local calls would require some billing system changes but it is not obvious that this would be sufficient for the costs to outweigh the benefits.

4.3 Fixed broadband access

(a) Retail broadband access

(i) Market definition

51. Underlying cost conditions, as recognized by international regulatory developments, suggest that fixed broadband Internet access and Internet services are efficiently supplied as a bundle and will be so supplied in Bermuda under the ICOL. Accordingly, the RA concludes on a forward-looking basis that retail broadband Internet access and Internet services belong in a single bundled broadband services market.

52. The RA considers it likely that there are separate business and residential markets. It is quite possible that there could be differing levels of intensity of

competition between the provision of services to these two separate groups given differences on the demand and supply-side between the two.

53. For the same reasons discussed in the context of fixed access and calling, the RA considers that the relevant market excludes Southside. It may well be the case that there are additional separate geographic markets within Bermuda, for example, but the RA will examine this matter in more detail in market review process. Therefore, for the purposes of the current notice, the geographic delineation of this market is assumed to be national, excluding Southside.

54. The RA does not consider that mobile broadband is a good substitute for fixed broadband given difference in speed and cost and therefore defines the market as that for retail broadband services provided at fixed locations.

(ii) Entry barriers

55. The issues relevant to whether fixed broadband access is a candidate market for *ex ante* regulatory remedies are very similar to those discussed in the context of the supply of retail fixed access and local calls, because both require access to a fixed network (outside of the Southside area). The supply of fixed broadband access incurs the same substantial sunk costs in supplying an access link to an end user that a provider of fixed voice services does, whether that link is provided via fixed wireline, cable or fixed wireless. Entry barriers would reduce if a wholesale broadband access service were introduced, however there is no such service currently available.

(iii) Technological change and developments

56. From a forward looking perspective, these barriers will still be relevant in four years as there are no foreseeable technological changes that substantially reduce the sunk costs of deploying physical access lines, or towers and acquiring spectrum. Nor is it likely that zoning restrictions will be substantially reduced in that timeframe.

(iv) Ex post competition rules

57. In the RA's preliminary assessment, the substantial entry barriers make entry and even market expansion by existing carriers difficult, and may well grant some existing fixed suppliers SMP (perhaps jointly). This raises the possibility that without remedies in these markets, competition may be unlikely to develop even if SMP is not used to effect anticompetitive ends. That is, the application of competition rules may prevent anticompetitive behaviour, but is unlikely to enable competition that the application of remedies might make possible. Consequently, the RA considers that SMP analysis for the purposes of identifying such remedies should be carried out for the markets that contain retail fixed access lines and local call services.

(v) Costs and benefits of regulation in a small jurisdiction

58. Retail broadband access services are already regulated in Bermuda and thus it does not seem that the costs of regulation would be prohibitive.

(b) Wholesale fixed broadband access

(i) Market definition

59. The RA considers that the wholesale fixed broadband access market does not include mobile broadband access for the same reasons discussed in section 4.3(a). A market definition which includes all areas of Bermuda aside from Southside is adopted, however it is possible that the market review process will find a separate market for areas that have heavy demand concentration as compared with other areas of Bermuda.

(ii) Entry barriers

60. As discussed above, the deployment of a fixed access broadband network involves substantial sunk costs regardless of whether the link to the customer is provided via fixed wireline, cable or fixed wireless.

(iii) Technological change and developments

61. It is expected that the entry barriers associated with broadband will remain.

(iv) Ex post competition rules

62. Ex post rules would not be sufficient to ensure that wholesale access and local calls are provided on reasonable price and non-price terms.

(v) Costs and benefits of regulation in a small jurisdiction

63. Because wholesale broadband is not currently provided in Bermuda, there would be set-up costs involved in terms of systems and billing costs as well as regulatory administrative costs. However it is not clear that these costs would be prohibitive.

4.4 Leased lines

(a) Retail leased lines

(i) Market definition

64. The RA finds that its preliminary view of the relevant market definition is the retail market for domestic leased line services, being symmetric data or voice links with a fixed amount of reserved capacity, which includes all technology types and capacity levels. A market that includes all areas other than Southside is assumed for the purposes of this Notice, however it is possible that a more detailed market definition assessment to be carried out under the market review process would find separate geographic markets.

(ii) Entry barriers

65. The key barrier to entry associated with the provision of retail leased lines is the need to provide an access link to the customer's premise – sometimes referred to as a "data tail" or a "terminating segment". In the absence of competitive wholesaling of terminating leased line segments, a retailer will need to invest in its own access network. In that case the key barriers to entry are similar to those discussed in section 4.2(a), with particular regard to the high sunk costs associated with entry. Whether retail revenue streams, particularly in areas with high concentrations of business customers, are sufficiently high so as to overcome these barriers to entry would need to be considered in the more detailed market review process.

(iii) Technological change and developments

66. The RA does not envisage any significant technological changes or other developments that would materially lessen the barriers to entry over the period of the review.

(iv) Ex post rules

67. Given the significant barriers to entry that are present in the absence of competitive or regulated wholesale products, it is unclear that ex post competition rules would suffice to ensure SMP is adequately addressed.

(v) Costs and benefits of regulation in a small jurisdiction

68. BTC's retail leased lines are already subject to regulatory oversight and therefore there is little anticipated upfront cost in continuing to regulate these services should the market review process find that a retail regulatory remedy is required.

(b) Wholesale terminating segments of leased lines

69. The relevant wholesale market relates to the terminating segments of leased lines, including all technologies and capacities. The RA considers that the relevant geographic market all includes all areas of Bermuda other than Southside.

(i) Entry barriers

70. Other than in Southside, provision of wholesale terminating segments of leased lines involves providing a connection to the end customer either by means of a fixed access network or a fixed wireless access network. The RA considers that there are high barriers to entry for the same reasons described above in respect of retail leased lines.

(ii) Technological change and developments

71. The RA considers that the barriers to entry to the wholesale terminating leased line segments market are durable, and does not anticipate that they will reduce significantly over the market review period.

(iii) Ex post rules

72. The RA considers it unlikely that ex post rules would be sufficient to ensure that wholesale terminating segments of leased lines are provided on reasonable price and non-price terms because they form a bottleneck service to the provision of retail leased lines.

(iv) Costs and benefits of regulation in a small jurisdiction

73. Currently wholesale terminating segments of leased lines are not subject to regulation. As a result there would be some set-up cost involved in service provision. However, it is not obvious that these costs would be so large as to negate the competitive benefits of the availability of these services on regulated terms.

4.5 Mobile services

(a) Wholesale MVNO access on mobile networks

(i) Market definition

74. Wholesale access on mobile networks – also referred to as Mobile Virtual Network Operator (MVNO) access – is not currently subject to regulation nor is it a service that is provided on commercial terms.

75. The RA considers that the relevant market would include wholesale access and the provision of voice, messaging and data services.

(ii) Barriers to entry

76. Supply of wholesale access services requires a firm to deploy its own mobile network infrastructure. There are a number of barriers to entry of network deployment, including: the high sunk costs of erecting towers and equipment, or rental of the same; zoning difficulties in erecting towers, or gaining collocation space on existing towers for transceivers, and a need to obtain spectrum.

77. In the RA's preliminary assessment, these substantial barriers make entry very difficult.

(iii) Technological change and developments

78. A change in regulation in the infrastructure market could ease the barriers to tower and transceiver deployment, and to access to spectrum. However, such changes would not eliminate, and may only moderately reduce, these barriers. For example, it is unlikely that zoning restrictions would be substantially reduced. Similarly, if more spectrum were made available, but at a financial cost (such as

auction fees) that were not recoverable on exit (for example, by sale), then spectrum would continue to represent a substantial barrier to entry because of the costs that must be sunk to obtain it.

(iv) Ex post rules

79. Application of *ex post* rules is unlikely to enable competition that the application of remedies might make possible.

(v) Costs and benefits of regulation in a small jurisdiction

80. While there would be some set-up costs involved in implementation of wholesale MVNO access on mobile networks, it is not clear that these would be so significant as to outweigh the benefits.

(b) Wholesale origination of international calls on mobile networks

(i) Market definition

81. Mobile networks currently essentially provide a service of originating calls to international destinations. This practice has arisen due to the existing licensing regime whereby international retail services cannot be supplied by access network providers.

(ii) Barriers to entry

82. There are substantial barriers to entry into the supply of wholesale origination services given that entry into this market requires deployment of a mobile network. Therefore the durable barriers to entry discussed above are equally as relevant to mobile origination as they are to mobile MVNO services.

(iii) Technological changes and developments

83. It not clear that call origination of international calls from mobiles would be offered by the mobile networks once the integrated licenses are in place if there were no regulatory obligation to do so. Even if the origination service were available, to the extent that there is SMP in this market this may well lead to origination charges that are excessive.

(iv) Ex post rules

84. As a result of the high barriers to entry which may result in joint dominance and the inability of ex post rules to adequately address the terms of which a wholesale service should be provided, the RA concludes that the market for the origination of international calls should be included in the Candidate Markets Notice.

(v) Costs and benefits of regulation in a small jurisdiction

85. As this service is currently already offered the set-up costs of supplying the services have already been incurred. Little ongoing fixed costs would be required to supply and regulate the service.

(a) Wholesale termination on mobile networks

86. The RA considers it appropriate to define separate markets for the termination of calls on individual mobile networks, for the same reasons as were discussed in section 4.2(f).

87. The RA concludes that the mobile network termination markets should be included in the Candidate Markets Notice for the same reasons given in relation to termination on fixed networks. That is:

- each network will essentially have monopoly power over termination on its own network;
- this position of monopoly power will not change over the next 4 years;
- competition rules alone is not sufficient to address the issue of access to a bottleneck facility such as call termination; and
- the service is already provided and implementation costs have therefore already been incurred.

4.6 Access to infrastructure facilities

88. There is a range of facilities that underpin the provision of electronic communications and Pay TV services to end users. The RA considers that there is a relevant market for the supply of access to fixed and mobile infrastructure facilities, including poles, ducts and towers.

(i) Entry barriers

89. There are substantial sunk costs and other legal barriers associated with obtaining land or other property access required to house network infrastructure facilities, as well as the physical construction and/or deployment of trenches, towers and poles.

(ii) Technological change and developments

90. It is not anticipated that there will be any technical changes or developments that will substantially lessen barriers to the deployment of infrastructure facilities.

(iii) Ex post rules

91. It is unlikely that ex post rules align will result in provision of access to infrastructure services on reasonable terms and conditions.

(iv) Costs and benefits of regulation in a small jurisdiction

92. Access to infrastructure facilities occurs commercially in many jurisdictions. It would not appear that the costs of providing access would be so substantial as to outweigh the benefits.

4.7 Pay TV

(a) Retail Subscription TV services

93. Retail Pay TV services are currently subject to regulation. Subscription television providers entertainment services for a fixed monthly fee.

94. The RA considers that the retail subscription TV service market as being susceptible to ex ante regulation.

(i) Entry barriers

95. Currently the provision of subscription television requires the deployment of a fixed access network. This involves building a link between customers and the supplier. Substantial barriers are associated with deployment of fixed access networks as discussed in Section 4.2(a).

(ii) Technological change and developments

96. Looking forward, as discussed in Section 4.2(b), the entry barriers are likely to remain in place with only a few regulatory exceptions.

(iii) Ex post rules

97. In the RA's preliminary assessment, the substantial entry barriers make entry and even market expansion by existing carriers difficult, and may well grant some existing fixed suppliers SMP. This raises the possibility that without remedies in these markets, competition may be unlikely to develop even if SMP is not used to effect anticompetitive ends. That is, the application of competition rules may prevent anticompetitive behaviour, but is unlikely to enable competition that the application of remedies might make possible. Consequently, the RA considers that SMP analysis for the purposes of identifying such remedies should be carried out for the subscription television market.

(iv) Costs and benefits of regulation in a small jurisdiction

98. Subscription television service has already been subject to regulated pricing and as such there are not significant set-up costs for retail regulation.

(b) Wholesale Subscription TV services to deliver broadcast content to end users

99. The RA considers that there is a relevant market for the wholesale supply of subscription TV services.

(i) Entry barriers

100. To supply wholesale subscription television service, a firm must first deploy a fixed network and will face the same substantial entry barriers discussed above in section 4.2(a).

(ii) Technological change and developments

101. As per the discussion in section 4.2(b), there is little likelihood of technological progress or other developments eliminating entry barriers over the next three years

(iii) Ex post competition rules

102. Application of *ex post* rules is unlikely to enable competition that the application of remedies might make possible.

(iv) Costs and benefits of regulation in a small jurisdiction

103. While there would be some set-up costs involved in implementation of wholesale subscription television service, it is not clear that these would be so significant

Appendix D Stakeholder Views

Due to their confidential nature these have been redacted

Appendix E SSNIP test to assess whether NRC's fixed wireless services are in the same market as BTC's fixed services

1. This appendix examines empirically the estimated financial impact on BTC of a SSNIP of 5% and of 10% on its residential standard plan. An approach was taken that would overestimate the profitability of a SSNIP because no allowance was made for low demand customers that might switch to, for example, BTC's residential Economy Line service. Table 25 shows the sensitivity of the analysis to assumptions made about the extent to which learning and LNP would increase switching, and the extent to which BTC avoids costs when it loses a customer. The results suggest that BTC could make small profits by increasing price by 5%, and larger profits by increasing price by 10%.

2. Table 25 begins with a 5% SSNIP and a per customer avoidable cost estimate of [CIC $--]. This value is BTC's estimate of the fully distributed cost of an access line, less shared costs (since shared costs would not be avoided in the face of customer churn), but includes avoided traffic related costs (see rows one and two). The [CIC $--] estimate likely overstates costs for several reasons: BTC produced these estimates to justify a proposed tariff increase, but failed to provide sufficient evidence to allow the RA to validate the estimate; a fully distributed cost approach, even excluding shared costs is likely to exaggerate avoided costs; and the avoided traffic related costs are likely exaggerated since only a small amount of traffic would be lost to BTC, and traffic costs are not linearly avoided. As the first row of Table 25 demonstrates, if customers' propensity to switch to NRC remains at current rates (so there is no learning effect or change due to the introduction of LNP), and BTC avoids [CIC $--] in costs for every customer lost to NRC, then RA estimates that a 5% SSNIP would increase BTC's net revenues by [CIC ----%]. The effects of learning and LNP would lead to more customer switching than presently observed. Row two assumes an increase of 10% in the take up rate for NRC's package. This increases the estimated number of BTC customers who may defect to NRC, lowering BTC's net revenue increase to [CIC ----%]

3. Under the LAC NTS avoided cost estimate of [CIC $--], a 5% SSNIP would also be somewhat profitable in all cases.

4. The effects of a 10% SSNIP are depicted in rows five to eight of Table 25. Under both avoided cost estimate assumptions (the LAC NTS and BTC's) and an assumed 10% increase in the take-up rate, the SSNIP would be successful, increasing BTC's net revenue between [CIC ----% and ----% (see Box 3 for the underlying calculations).

Table 25: BTC profitability scenarios for 5% and 10% SSNIPs on basic residential service against NRC's tariff [CIC]

SSNIP	Avoided Cost Scenarios	Per customer avoidable cost	Take Up Rate Assumptions	Percentage increase in revenues net of avoided costs
5%				
	BTC Cost Estimate*		Current take-up rate	
			10 percent increase	
	LAC NTS Cost Estimate†		Current take-up rate	
			10 percent increase	
10%	BTC Cost Estimate		Current take-up rate	
			10 percent increase	
	LAC NTS Cost Estimate		Current take-up rate	
			10 percent increase	

* BTC's residential access line fully distributed cost estimate, less shared costs, but including avoided traffic related costs. This represents an upper limit for per line avoidable costs (see main text below).

† LAC is an acronym for Local Access Charge. NTS refers non-traffic sensitive. Per access line non-traffic switching costs (*BTC Model Hyperlink Data- 04-05 cost of access line.xls* (LAC II 2005), Splits tab, cell H61 and I61. This workbook was used during the LAC II proceeding. This arguably represents a lower limit for costs, since it is possible some traffic-sensitive costs would be avoided even at the very small volumes lost to NRC.

Notes: Customer usage data is derived from inputs to BTC's COMPASS model, submitted by BTC in April 2009.

Box 3: Calculation of the SSNIP test presented in Table 25

Currently, only BTC and NRC provide residential standard telephony service. NRC has [CIC ---] standard telephony customers (most of NRC's customers also get broadband access with their voice service). Our analysis indicates that, under current rates, [CIC -----] of BTC's standard telephony only customers would be financially better off using NRC. The current ratio of NRC's customer share to those BTC standard telephony customers who would be financially

better off on NRC's network is [CIC ----% = ---/-----].

If BTC's prices were to rise 5% (to a monthly charge of $27.30 and overage call per hour charges of $0.21) then [CIC -----] of BTC's standard telephony only customers would be financially better off using NRC. Allowing some of these customers to switch to NRC so that the [CIC ----%] ratio is maintained is done as follows:

Let A = the number of customers currently on NRC's network—[CIC ---]

Let B = the number of customers on BTC's network that, given the imposition of a 5% SSNIP, would be financially better off on NRC's network—[CIC -----].

Let X = the number of customers who would be expected to leave BTC's network for NRC's network if a SSNIP of 5% were imposed holding the ratio of NRC's customers to BTC's customers who would be financially better off on NRC's network constant (at [CIC ----%].

To ensure that the ratio of the number of customers on NRC's network to the number of customers on BTC's network who would be financially better off on NRC's work is held constant at [CIC ----%] after X number of BTC customers migrate to NRC as a result of the 5% SSNIP requires that (A + X) / (B – X) = [CIC ----%]. Rearranging terms gives:

A + X = [CIC ----%] * (B – X);
A + X = [CIC ----%] * B – [CIC ----%] * X. Rearranging again gives;
[CIC ----%] * X + X = [CIC ----%] * B – A—which simplifies to:
[CIC -----]*X = [CIC ----%] * B – A. Plugging in the values for B and A gives;
[CIC -----]*X = .--- * ----- – ---;
[CIC -----]*X = --- – --- = 105;
X = 105 / 1.345 = 78 customers that could be expected to leave BTC's network for NRC's network in the event of a 5% SSNIP.

This implies [CIC ---- = --- + 78] customers on NRC's network after a 5% SSNIP and [CIC ----- = ----- – --] customers still on BTC's network after the SSNIP, even though they would be financially better off switching. The ratio of NRC to BTC customers would still be [CIC --- / ----- = ----%]. The take-up rate after the SSNIP would be [CIC 3.51% = -- /------].

Similarly, if BTC's prices were to rise 10% (to a monthly charge of $28.60 and overage call per hour charges of $0.22), then [CIC -----] of BTC's standard telephony only customers would be financially better off using NRC. Allowing some of these customers to switch to NRC so that the current take-up rates are maintained, after the 10% price rise, implies that [CIC ----- = .--- * ----- – ---, or (---- – ---) / ----- = X = 151] customers that could be expected to leave BTC's network for NRC's network in the event of a 10% SSNIP.

As a sensitivity test, the calculations just outlined are repeated allowing for 10% more switching to NRC (as might be engendered by local number portability and the ongoing development of NRC as a competitor).

5. Turning to business offerings, NRC provides a single line business service with unlimited local calling for $50 per month, BTC's standard single line business service is $32 per month, which includes 50 local calls. Overage calls charged at $0.20 per call/per hour. Thus, BTC's business customers would be better off so long as, beyond the first 50 calls, they do not make more than 90 local calls, so long as each call lasts less than an hour. Consequently, the difference between BTC's and NRC's plans again is that NRC seeks the custom of those that expect to make many calls, and/or those who are willing to pay an upfront "insurance" fee in return for a stable bill. However, the difference between BTC's and NRC's business tariffs is narrower than the difference in the residential market, and hence NRC's business tariffs are more competitive. Table 26 illustrates profitability scenarios for SSNIPs in BTC's business tariff by applying the same methodology and assumptions from the residential analysis.

Table 26: BTC profitability scenarios for 5% and 10% SSNIP on basic single line business service against NRC's tariff [CIC]

SSNIP	Avoided Cost Scenarios	Per customer avoidable cost	Take Up Rate Assumptions	Percentage increase in revenues net of avoided costs
5%				
	BTC Cost Estimate*		No Change	
			10 percent increase	
	LAC NTS Cost Estimate†		No Change	
			10 percent increase	
10%	BTC Cost Estimate		No Change	
			10 percent increase	
	LAC NTS Cost Estimate		No Change	
			10 percent increase	

Notes as per Table 25 above.

6. Table 26 demonstrates that both a 5% and 10% SSNIP on BTC's standard single line business service would be profitable under all of the avoided cost and take-up scenarios depicted..

Appendix F Price level differences between fixed and mobile telephony

The section first outlines, in section 1, different calling plan prices and features. It is immediately apparent that (1) mobile plans with unlimited calls are substantially more expensive than equivalent fixed plans (see section 1.1 below), while (2) users making less than 88 minutes of calls a month are financially better off with a prepaid mobile plan (section 1.2). Plans that suit users who make more than 88 calls, but who are also not best served by an unlimited package, are considered in section 1.3. That section finds that in almost all cases, mobile services are again substantially more expensive than fixed. All of these price comparisons are consistent with fixed and mobile services being in separate markets (section 2.1).

1 FIXED AND MOBILE CALLING PLANS

1. This section summarizes the fixed and mobile calling plans available in Bermuda as of June 2012. Table 27 depicts the currently available residential calling plans of BTC, NRC and the Yak. The BTC, NRC and Yak prices represent all fixed residential voice services (though, as noted in section 5.2, above, the RA does not consider the Yak to be part of the fixed voice market).

2. BTC's current fixed plans provide a number of free calls (not call minutes), overage is calculated on a per call/per hour basis, and customers are charged for originating calls only. For example, BTC's current Standard 50 service offers 50 free local calls per month, after which a fee of $0.20/call/hour, is levied. Thus, if 52 calls are made in the month, each of 2 minutes duration, then the customer's monthly bill would be $26.40 (= $26 + 2 * $0.20). Similarly, if 51 calls are made in the month, with 50 calls being less than an hour and the 51st call being an 1 hour and 59 minutes, then the bill would also be $26.40 (= $26 + 2 * $0.20). Additional charges must be incurred to obtain calling features (see notes to Table 27). (BTC's DSL 4.0 plan is included as an additional comparator.

Table 27: Fixed Previous and Current Residential Calling Plans and Rates

	Monthly Fee	Number of Plan Calls	Overage Rate per call/per hour
Standard 50 *	$26.00	50	$0.20
DSL 4.0 Unlimited**	$89.00	Unlimited	n/a
Standard 100*	$35.00	100	$0.20
Standard 150*	$45.00	150	$0.20
Standard 200*	$55.00	200	$0.20
Unlimited Local Calling*	$59.00	Unlimited	n/a
NRC†	$49.95	Unlimited	n/a
The Yak‡	$59.00	Unlimited	n/a

* For BTC only outbound calls and hours are counted. Additional features can be added for an additional tariff, for example, caller ID, $6; call waiting $3; call

forwarding $3; three way calling, $3; and voicemail $5. Discounts for multiple features are available. (http://www.btc.bm/Residential/CallingFeatures/Default.aspx sighted July 2012).
** This is BTC's basic plan for a voice and DSL bundle. Spending $10 more adds Call Waiting with Caller ID, Caller ID Deluxe, 3-Way Calling, Call Forwarding, Voice Mail (http://www.btc.bm/Residential/DSL/Pricing/bundleDSL/Default.aspx sighted July 2012.
† Voicemail, caller ID, call waiting, call forwarding and three-way calling can be added for $10 (Per handout from North Rock Communications, received on July 12, 2012).
‡ Includes voicemail, call forwarding, caller ID, three-way calling, and texting ($0.05 per outbound text, inbound texts free)— http://www.cellone.bm/plans/plans_yak.html sighted 24 July 2012.

3. Table 28 lists the post-paid plans of Bermuda's cellular operators. These post-pay mobile plans carry a fixed monthly fee, which provides for a fixed number of free on-net and off-net minutes. Minutes of use that exceed these amounts (called out-of-plan minutes or overage) are priced at an additional per minute rate. Unlike fixed service, customers are charged for both making and receiving calls, that is, respectively for both outbound and inbound minutes. The Government also imposes a monthly handset fee of $7.00 on each handset in use. This fee is collected by the carriers and passed on to the Government. CELLONE adds the fee to each customer's account. Digicel waives this fee for its customers.

Table 28: Current Individual Post-pay Mobile Plans and Rates*

Plan Descriptions	Monthly Fee	Free Anytime Minutes	Free on Network Minutes	Total Free Minutes	Handset Fee (per month)	Overage (per minute)
Digicel Gold**	$25.00	100	100	200	$7.00	$0.25
Digicel 300	$35.00	100	200	300	$7.00	$0.25
Digicel 900	$55.00	300	600	900	$7.00	$0.20
Digicel 1500	$75.00	500	1000	1500	$7.00	$0.15
Digicel 3000	$115.00	1000	2000	3000	$7.00	$0.10
Digicel Unlimited	$165.00	Unlimited	Unlimited	Unlimited	$7.00	n/a
CellONE 300‡	$37.00	100	200	300	$7.00	$0.25
CellONE 900	$57.00	300	600	900	$7.00	$0.20
CellONE 1500	$77.00	500	1000	1500	$7.00	$0.15
CellONE 3000	$117.00	1000	2000	3000	$7.00	$0.10
CellONE Unlimited	$137.00	Unlimited	Unlimited	Unlimited	$7.00	N / A

* Customers are charged for both calling and receiving calls, that is, respectively for both outbound and inbound minutes.

**The Digicel Gold plan is available only to customers over the age of 65. Digicel's plans include the following vertical features: voicemail, caller ID, call waiting, call Forwarding, call holding, and call forwarding. They also include free incoming text messages and free incoming local Digicel calls. The unlimited plan includes unlimited outgoing local SMS messages (unlimited local SMS messaging costs $5.00 per month when added on to another plan). The Government mandated monthly handset of $7.00 is also waived under Digicel's plans See http://www.digicelbermuda.com/en/postpaid viewed July 2012.
‡ CellularOne's plans include: voicemail, call display, call waiting, call forwarding, and three way calling. The unlimited plan includes unlimited outgoing local SMS messages (unlimited local SMS messaging costs $7.00 per month when added on to another plan). The Government mandated monthly handset of $7.00 is added to each customer's monthly bill. See http://www.cellone.bm/plans/plans_voice.html viewed July 2012.

4. Prepaid mobile plans are listed in Table 29. These plans can vary from simple basic talk plans to plans having a fixed, paid in advance, monthly fee.

Table 29: Current Individual Pre-pay Mobile Plans and Rates

Plan Descriptions	Peak Rate Per Minute*	Off-Peak Rate Per Minute*	Daily Charge	Handset Fee	Free Text Messages	In Network Calling
Digicel**	$0.35	$0.25	n/a	None	Incoming	Free Incoming
CELLONE Basic Talk†	$0.35	$0.20	n/a	$0.23 per day	100	n/a
CELLONE Daily Plan††	n/a	n/a	$2.50	In Price	Unlimited	Unlimited

* Peak times are 7am to 7pm (and off peak times are 7pm to 7am and weekends).
** Digicel's plan includes voicemail, caller ID, call waiting, and per 30 second billing. The monthly handset fee is waived. Incoming text messages are free, local outgoing are $0.10 per message, and international outgoing are $0.25 per message. Voicemail is free to receive and to retrieve. See http://www.digicelbermuda.com/en/prepaid/voice-rates viewed July 2012.
† CELLONE's Basic Talk plan charges $0.05 per outgoing local text message and $0.25 per outgoing international text message. All incoming text messages are free. Outgoing long distance calls are $0.75 per minute. See http://www.cellone.bm/plans/plans_prepaid.html viewed July 2012.
†† CELLONE's Daily Plan includes free voice mail. The $7.00 monthly handset fee is also included. International test message cost $0.25 to send, incoming are free. Outgoing long distance calls are $0.75 per minute. See http://www.cellone.bm/plans/plans_prepaid.html viewed July 2012.

1.1 Fixed unlimited plans are far cheaper than mobile unlimited plans

5. Fixed voice plans with unlimited local calling are considerably cheaper than any of the equivalent mobile plans, as Table 30 demonstrates. For example,

the highest fixed price listed, BTC's voice and DSL bundle, with equivalent calling features to those available on the mobile plans, costs $99 per month. That price would have to be raised by more than 30% to equal the lowest unlimited mobile rate available (BDC's $137). Similarly, BTC's $69 per month unlimited calling rate, $59 per month for the calling plan and $10 per month for the calling features of the mobile plans, would have to be raised by more than 90% to equal the BDC price.

Table 30: A comparison of Fixed and Mobile Unlimited Calling Plans

	Fixed Providers			
	BTC (with DSL)	BTC	YAK	NRC
Unlimited Local Calling Rates (Per Month)	$99	$69	$59	$59
	Mobile Providers			
	DCB	DCB Smartphone	BDC	
Unlimited Local Calling Rates (Per Month)	$165	$199	$137	

Notes: BTC's and NRC's rates are adjusted to include the same set of calling features as are available with the mobile packages. The Yak rates already include those calling features, NRC's rate includes 1Mbps broadband access, and BTC's voice with DSL rate includes 4Mbps of broadband access DCB's Smartphone plan includes unlimited local data, minutes, and test messages.

6. Despite these large price differences, approximately 3,000 individual voice plan mobile customers (about 6% of total subscribers) have chosen unlimited mobile calling plans, presumably because these mobile subscribers value mobility sufficiently highly to pay the premium. This indicates that, for subscribers that prefer unlimited packages, competitive suppliers of fixed service would be unlikely to constrain a mobile service monopolist (so, as previously concluded, fixed service is not in the same market as mobile services—see section 5.3(b) above). Such large price differences also suggest that a fixed monopolist may not be constrained by competitive mobile service providers, all the more so given that fixed services appear to have some advantages over mobile services (see section 5.3(c) above). Thus, this also suggests that mobile telephony is not in the same market as fixed telephony.

1.2 For low volume users, mobile prepaid plans are cheapest

7. This section initially presents evidence that, for low volume users, mobile services do not constrain the prices of fixed services, and hence are unlikely to be in the same market as fixed services. In particular, for low volume users, mobile services are significantly cheaper than fixed, yet large numbers of low volume users purchase the more expensive fixed service. This implies fixed services have some value that mobile services do not provide and hence are in a

different market to fixed services. The section then goes on to conduct a SSNIP test similar to those conducted above in section 5.2(b). This test reinforces the conclusion that mobile services, at least for low volume users, are not in the same market as fixed services.

8. On the basis of price alone, customers that expect to make less than 88[308] minutes worth of calls in any month are best off purchasing a prepaid mobile plan over a monthly mobile or landline plan. This constitutes a substantial proportion of BTC's customers: [CIC --% (----- customers)] of BTC's residential customers make less than [CIC --] minutes worth of calls each month.[309] Indeed, [CIC --% (approximately ----- customers)] of BTC's residential subscribers make less than [CIC --] minutes worth of calls each month, and hence would make material savings if they were to switch to a prepaid mobile service.

9. This raises the question as to why all these customers do not switch to cheaper mobile prepaid plans. Part of the likely answer is that the strengths of fixed service means that differences in price alone cannot induce switching from fixed to mobile service (switching costs may also play a role). That is, as discussed in section 5.3(c) above, customers may be willing to pay a premium for fixed service for several reasons. Moreover, many of these customers likely already have mobile phones, so are directly demonstrating that they view the two services ultimately as complements, preferring to have both, rather than seeing their choice as one or the other

10. Put in terms of a SSNIP, it seems unlikely that competitive mobile suppliers would prevent a hypothetical fixed line monopolist over low volume users from engaging in a SSNIP. This is because it appears many low volume users would demand a fixed line even when the fixed line price was substantially in excess of mobile prices. Consequently, this suggests, at least for low volume users, mobile services are not in the same market as fixed.

11. Performing an analysis similar to what was done in section 5.2(b), above, in examining NRC's VoWiMAX service, the RA examined the financial impact on BTC of a 5% and 10% SSNIP on its standard residential service. These results are presented Table 31.

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[308] Estimate derived by assuming that 51% (respectively 49%) of mobile calls are made at peak (off-peak)—see *Revision Of The Methodology For Constructing Telecommunication Price Baskets*, Working Party on Communication Infrastructures and Services Policy, Organisation for Economic Co-operation and Development, DSTI/ICCP/CISP(2009)14/FINAL, 18 March 2010, http://www.olis.oecd.org/olis/2009doc.nsf/LinkTo/NT00008FD6/$FILE/JT03280342.PDF.

[309] Customer usage data is from September 2008 and is derived from inputs to BTC's COMPASS model, submitted by BTC in April 2009.

Table 31: BTC profitability scenarios for 5% and 10% SSNIPs on basic residential service against a prepaid mobile service alternative [CIC

SSNIP	Avoided Cost Scenarios	Per customer avoidable cost	Take Up Rate Assumptions	Percentage increase in revenues net of avoided costs
5%				
	BTC Cost Estimate*		No Change	
			10 percent increase	
	LAC NTS Cost Estimate†		No Change	
			10 percent increase	
10%	BTC Cost Estimate*		No Change	
			10 percent increase	
	LAC NTS Cost Estimate†		No Change	
			10 percent increase	

CIC] Notes as per Table 25, above.

12. Table 31 suggests that a SSNIP for fixed services aimed at low volume users would be profitable, despite competition from very cheap mobile services. That is, at least for low volume users, prepaid mobile service and standard telephony service appear to be in separate markets.

13. In summary, customer behaviour, price and quality differences all suggest that fixed and mobile service are in different markets, at least as far as low demand customers are concerned.

1.3 Comparisons of the effective cost faced by end-users under fixed and mobile plans that do not offer unlimited calling and are aimed above low volume users

14. Even putting aside the very low volume users just discussed, a significant proportion of users would be better off on a plan that does not provide unlimited

minutes. Comparisons between the different fixed and mobile plans of Table 27, Table 28 and Table 29, above, that fit this category cannot be undertaken without taking into account that: (1) BTC's plans bill only outbound calls, which are charged on per call per hour basis, while the mobile plans bill on a per minute basis with both outbound and inbound minutes of use being charged, (2) additional payments are required to obtain calling features on BTC's plans (in contrast to the mobile plans which include a feature set in their monthly prices); (3) BTC's plans do not distinguish between on- and off-net calls (in contrast to the mobile plans); and (4) BTC's plans do not distinguish between peak and off-peak minutes, while some mobile plans do. Taking account of these differences requires making assumptions about calling patterns. A comparison of Digicel's lowest price, widely available, monthly plan, the Digicel 300 plan[310], with BTC's standard telephony plan will help illustrate this point (peak/off-peak prices, not relevant in the Digicel 300 plan, are accounted for as per footnote 308 above).

15. A subscriber to the Digicel 300 plan pays $35 per month for 300 minutes worth of free airtime each month (counting both calls made and calls received), 200 on network minutes and 100 anytime minutes (these can be either on or off network) as well as the feature package described in the notes to Table 28. To compare what this Digicel 300 subscriber would pay under BTC's plan, assume to start with that exactly 300 calling minutes are used for outbound calls only and that the average length of a call is 2 minutes with no call exceeding 59 minutes.[311] Further, assume the customer is willing to pay at least $10 per month for calling features. Under these assumptions this subscriber would be making 150 (= 300/2) calls each month. Under BTC's current Standard 150 telephony plan a subscriber making 150 calls each month would pay $45. To this must be added the $10 cost of obtaining from BTC the calling features included for free under the Digicel 300 plan. Thus, such a customer would have to pay BTC $55 (= $45 + $10) for a service equivalent to that obtained under the Digicel 300 plan. This is more than 57% higher than the Digicel 300 price.

16. If, instead, the customer placed no value on calling features, BTC's current Standard 150 telephony package, at $45, would be approximately 29% more expensive than the Digicel 300 plan.

17. Adjusting the assumption that all calling minutes are outbound only to reflect a 1 to 1 ratio of inbound to outbound calls, but still holding to the 300 total calling minutes per month, gives 150 outbound and 150 inbound minutes, or 75 outbound and 75 inbound calls assuming the 2 minute calling average. This calling profile under BTC's Standard 50 plan would cost $31 (the monthly rate of $26, which includes 50 free calls, plus $5 = 25 * $0.20 for the overage calls).

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[310] Digicel has a cheaper plan available, the Digicel Gold plan, but this plan is only available to those who are 65 years old, or older, and so was not relevant for this discussion.

[311] BTC bills on a per call per hour basis at a rate of $0.20. Thus one 2 minute long call is $0.20, while one 62 minute long call is $0.20 * 2 = $0.40. Making the assumption that all calls made do not exceed 59 minutes simplifies the calculations without altering the results of this section.

Inbound calls are not charged. A customer with this calling pattern, and no interest in calling features, would be better off using BTC's standard plan (making savings of $4 per month, or more than 16% of the BTC monthly price). If, however, the customer valued the calling features of the Digicel 300 at $10 or more per month, then the BTC plan (which would cost $41) becomes 17% more expensive than the Digicel 300 plan.

18. The preceding showed, among other things, that the cost of BTC's calling plan rises as the ratio of outbound to inbound calls increases. The cost of BTC's calling plan also varies depending on the assumed average calling time, falling as this is increased. For example, if average calling time were assumed to be 4 minutes instead of 2, the 300 minutes of outbound calling would drop from 150 calls to 75 (300/4 = 75). A customer with this calling pattern could then switch from BTC's Standard 150 plan, at $45 per month, to the Standard 100 plan for $35 per month.

19. The details of the underlying analysis used by the RA are set out below.

2 SSNIP TEST TO ASSESS WHETHER FIXED AND MOBILE SERVICES ARE IN THE SAME MARKET

20. The analysis is developed as follows. An overview of the analysis is provide first. The section following this compares fixed with mobile monthly bills using actual calling patterns from BTC data. An unrealistic robustness test designed to make mobile prices more attractive is also applied. The next section provides an even more unrealistic robustness test designed to make mobile plans more attractive. It compares the monthly bills on fixed and mobile plans of customers with calling patterns designed to optimise mobile plan usage. With minor exceptions (essentially all arising in the robustness tests), BTC's prices are sufficiently different from mobile prices to support the proposition that BTC's services are not in the same market as mobile services and *vice versa*.

2.1 Overview of approach and results

21. Using customer level data on calls made and minutes used per month,[312] the RA determined the average call duration and number of calls made by six BTC residential customer types (see Table 32 below).[313] The RA used this data to define six representative customers for use in the price comparisons. The first three are directly taken from the BTC data, being those non-DSL customers who make 50 calls or less each month, those non-DSL customers who make more

[312] The data from BTC covers nine months ending in September 2008, however, the RA only used the data for September 2008. Data from 2008 was used in the analysis as data for later dates at the level of detail required for the analysis was not available.

[313] Residential customers were considered as they are likely to be more price sensitive than business customers. Thus, if residential demand responsiveness does not place mobile services in the same market as fixed, then it is unlikely that business demand would place mobile services in the same market as fixed.

than 50 calls each month, and the average non-DSL voice only customer (see rows 1 to 3 of Table 32). Call these three representative customers the “realistic customers”. For robustness testing, three other representative customers were also created who would face lower monthly mobile bills than the realistic customers—call these the “robust customers”. This was done because a large price difference between fixed and mobile services, even when the underlying assumptions are designed to reduce that difference, would reinforce the conclusion that mobile services are not in the fixed market and *vice versa*. The average call duration of the robust customers was assumed to be that of the bundled DSL and voice customers (rows 4 to 6 of Table 32), but they were assumed to make the same number of calls per month as the realistic customers (rows 1 to 3 of Table 32). The effect is to minimise, within the bounds of the BTC customer data, a customer’s total minutes of use. Table 33 reports the robust customers’ assumed calling profile.

22. The monthly bills for both the realistic and robust customers under BTC’s plans are reported in Table 34 (they are the same for both customer types since it is number of calls that determine the final bill). The monthly bills of the realistic and robust customers under various mobile plans are respectively depicted in Table 35 and Table 36.

23. Taking the results from Table 34, Table 35, and Table 36, the RA was able to identify the fixed and mobile plans with the lowest monthly costs to the six representative customers under BTC’s prices (Table 38), under the various mobile plans for the realistic customers (Table 39) and, under the various mobile plans for the robust customers (Table 40). These tables show that in all cases, for customers that place no value on calling features, BTC’s current and proposed calling plans are cheaper than the cheapest mobile alternatives. Moreover, these results hold for all customers even when the $10 charge for calling features is added to BTC’s plans, the sole exception being the robust customer that makes fifty calls or less.

24. The RA then raised BTC’s current standard telephony plan prices by 5 and 10% and compared the lowest priced fixed and mobile plans. These results are depicted in Table 41 and Table 42.

25. These two tables show that there are substantial price differences between fixed and mobile services. With the exception of the first row of Table 42, these price differences remain even when a $10 charge is allowed to account for BTC’s price of calling features. This is good evidence that fixed services are not in the same market as mobile (since much more expensive mobile plans are being purchased despite the availability of cheaper fixed plans). Such price differences also suggest that mobile services are not in the same market as fixed services (since the fixed service prices could be raised by more than 10% and largely still be cheaper than mobile services).

26. To further test this conclusion, the RA compared BTC’s proposed standard telephony calling plans with the least cost comparable mobile calling plan, assuming (quite unrealistically) that for each mobile plan, the subscriber

used exactly as many airtime minutes as the plan allowed, thereby avoiding overage charges. Similarly, call durations based on mobile data are also adopted. These are even shorter than those assumed for the robustness test and reflect the high per minute charges of mobile plans, so again are biased in favour of lowering the total cost of the mobile plans. Both of these assumptions are quite unrealistic and lower the total cost of the mobile plan relative to the fixed, so provides a kind of extreme robustness test of whether present mobile prices would likely constrain present fixed prices. The results of this last robustness test are depicted in Table 43 and Table 44. As these tables demonstrate, even under these extreme assumptions the conclusions of the previous paragraph are reinforced: there are, with only one exception, material price differences between fixed and mobile services favouring fixed services so long as calling features are not accounted for.

27. The methodology employed by the RA in performing the analysis just discussed is now described in greater detail.

2.2 Comparing fixed and mobile plans using calling patterns derived from fixed users

28. Using data supplied by BTC, the RA estimated the average call duration and number of calls made by six aggregations of BTC's residential customers—see Table 32.

Table 32: Calls and call duration by BTC residential customers [CIC

BTC Residential Customers	Average call duration (minutes)	Average number of calls per month
Non-DSL customers making no more than 50 calls per month		
Non-DSL customers making more than 50 calls per month		
All non-DSL customers		
DSL customers making no more than 50 calls per month		
DSL customers making more than 50 calls per month		
All DSL customers		

CIC]

29. Non-DSL customers likely have longer hold times than DSL customers for at least two reasons. First, they are charged for calls beyond the first 50, so will prefer one long call to two or more short calls. Second, 8% of households access the Internet through dial-up plans,[314] and calls used for dial-up (which are unlikely

[314] the *Bermuda Omnibus Report* for December 2011, at page 15.

to be made by DSL customers) have considerably longer average call duration than voice calls.[315]

30. The natural data to use in comparing BTC's standard voice plan with mobile packages is the non-DSL data in the first three rows of Table 32. This, after all, represents the actual usage of customers who have chosen BTC's standard plan over all available voice plans. Moreover, those customers may have reasons other than price for preferring fixed service. In that case, the availability of a cheaper or similarly priced mobile plan may not be sufficient to cause switching and mere price comparisons understate the difference between the two plans. For example, dialup Internet subscribers would likely find the switch to mobile unattractive for two reasons: mobile calling quality would make dialup frustrating, and long held calls could rapidly become expensive (so it would not be appropriate to try to remove the effect of dialup calls from the customer profiles).

31. However, such customers, if forced to choose another plan, would alter their calling patterns so they were optimized for the new calling plan. In particular, on mobile plans that do not offer unlimited minutes (which is what this section is concerned with), one would expect customers to make more, but shorter calls (because overage minutes are costly). Consequently, as a means of robustness testing, the RA conducted additional analysis assuming the average number of calls from customers without DSL but, using the shorter call lengths of BTC's DSL customers (essentially adopting a calling profile that is likely to minimize the monthly cost of a mobile plan, while still being based on customers of BTC's fixed plans; section 2.3 below provides an even more radical robustness test). Table 33 reproduces the assumed calling patterns.

Table 33: Calls and call duration by robust customers [CIC

Residential Customer Types	Average call duration (minutes)	Average number of calls per month
Robust customer making no more than 50 calls per month		
Robust customer making more than 50 calls per month		
Average robust customer		

CIC]

32. Table 34 shows, for BTC's current standard voice plans, the total monthly payment given the calling patterns of the realistic customers depicted in rows 1 to 3 of Table 32 above (assuming no call exceeds 59 minutes) and of the robust customers of Table 33. (The monthly payment is the same in both cases as it is

[315] See, for example, Ron Hutchins and others, *Internet User Access via Dial-up Networks—Traffic Characterization and Statistics*, 2001, at page 317. Available at http://www.ieee-icnp.org/2001/papers/2001-33.pdf (Site last visited on August 10, 2010).

the number of calls that drives BTC's monthly subscriber payments and these are same between rows 1 to 3 of Table 32 and those in Table 33.

Table 34: Total monthly payment of identified realistic and robust customers for various BTC plans

	Non-DSL customers who make no more than 50 calls	Non DSL customers who make more than 50 calls	Average non-DSL customer
Standard 50	**$26.00**	$43.20	**$33.60**
Standard 100	$35.00	**$42.20**	$35.00
Standard 150	$45.00	$45.00	$45.00
Standard 200	$55.00	$55.00	$55.00
Unlimited Local Calling	$59.00	$59.00	$59.00

Note: **Bold text** indicates the cheapest monthly price for each identified customer type under BTC's current plans. All calls are assumed to be less than 59 minutes long.

The formula used to derive the payments of Table 34 is:

*Pr + max[0, (Ac - Pc)*OPr]*

Where:

Pr = the monthly fee;

Ac = the average number of fixed calls per month for a customer type;

Pc = the number of calls allowed per month under the calling plan;

OPr = the out-of-plan per call per hour rate; and

max(a, b) = the higher of *a* and *b*.

Table 35 shows, for post-paid mobile plans, the total monthly payment of the realistic customers.

Table 35: Total monthly payment of identified realistic customers for various mobile plans

	Realistic customers who make no more than 50 calls	Realistic customers who make more than 50 calls	Average realistic customer
Digicel Gold*	$55.58	$366.10	$251.51
Digicel 300	$45.16	$351.10	$236.51
Digicel 900	$55.00	$187.88	$96.21
Digicel 1500	$75.00	$102.38	$75.00
Digicel 3000	$115.00	$115.00	$115.00
Digicel Unlimited	$165.00	$165.00	$165.00
CellONE 300	$47.16	$353.10	$238.51
CellONE 900	$57.00	$189.88	$98.21
CellONE 1500	$77.00	$104.38	$77.00
CellONE 3000	$117.00	$117.00	$117.00
CellONE Unlimited	$137.00	$137.00	$137.00

Table 36 shows the total monthly payment for of the robust customers of Table 33.

Table 36: Total monthly payment of identified robust customers for various mobile plans

	Robust customers who make no more than 50 calls	Robust customers who make more than 50 calls	Average robust customer
Digicel Gold*	$25.00	$207.58	$125.84
Digicel 300	$35.00	$192.58	$110.84
Digicel 900	$55.00	$76.18	$55.00
Digicel 1500	$75.00	$75.00	$75.00
Digicel 3000	$115.00	$115.00	$115.00
Digicel Unlimited	$165.00	$165.00	$165.00
CellONE 300	$37.00	$194.58	$112.84
CellONE 900	$57.00	$78.18	$57.00
CellONE 1500	$77.00	$77.00	$77.00
CellONE 3000	$117.00	$117.00	$117.00
CellONE Unlimited	$137.00	$137.00	$137.00

33. The formula used to derive these prices is very similar to the one used in deriving the prices for Table 34. However, a few additional preliminary steps were required before that formula could be applied.

34. First, the fixed line data only counts originating calls. In contrast, mobile customers are charged airtime minutes for originating and receiving calls. To estimate total fixed calling MOU[316] (originating plus received call minutes) required determining the ratio of outbound to inbound fixed calls to be used. Using data submitted by the carriers these ratios were calculated and are depicted in Table 37. This table shows the ratio of outbound to inbound call minutes has been falling on BTC's network, but is approximately one-to-one on Digicel' network.

Table 37: Ratio of outbound to inbound call minutes [CIC]

Company	Year	Outbound/inbound minutes
BTC	2007	
	2008	
	2009	
Digicel	2007	
	2008	
	2009	

CIC]Source: BTC: Data for September 2008. Digicel: Submission of February 2010.

35. This data suggests that the ratio of outbound to inbound calls may be slightly less than one. As shown in section 5.3(e) above, the higher the ratio of outbound to inbound, the less attractive BTC's standard plan becomes relative to the mobile calling plans. So as to err on the side of understating the cost to an end-user of mobile plans, in what follows the RA assumes a 1 to 1 ratio for inbound to outbound calls.

36. Next, using this ratio the estimated number of originating minutes per customer type per month was calculated by multiplying each types average total calls (*Ac*) by average call duration (*Acd*). This product was then divided by the ratio of outbound to inbound calls (*Ror*), which, as noted in the preceding, is assumed to be 1, to give the estimated number of receiving minutes of use. These two estimates were then added together, resulting in the estimated total fixed calling MOU for each customer type. Algebraically:

(Ac)*(Acd) + (Ac)*(Acd)/(Ror),

Using the values for the average robust customer from Table 33, the calculation is that

[316] Minutes of use.

--*---- + --*----/1 = 301.68 + 301.68/1 = 603.35

minutes are originated and received per month by the average robust customer.

37. The third step requires taking the total fixed minutes just estimated and splitting these between on-net and off-net minutes This was done by first multiplying the total minutes by the ratio of on-net to total minutes (*Rot*) for mobile operators, which is 0.56, to get the average on-net minutes (per customer, per month).[317] The resulting on-net minute estimate was then subtracted from the total minutes to obtain the amount of off-net minutes (per customer, per month). For the average robust customer the calculations are:

38. 603.35 * *Rot* = 603.35*0.56 = 340.12, the amount of estimated on-net minutes, *Eon*, (per customer, per month). Then 603.35 – 340.12 = 263.23, the amount of estimated off-net minutes, *Eoff*, (per customer, per month).

39. To recapitulate, Table 33 shows that the average number of calls made by the average robust customer is [CIC --] calls per month and that the average duration of these calls is [CIC ---] minutes. Using the method described above, it was determined that 603.35 call minutes are made and received by this customer type in the course of month. This 603.35 total minutes per customer, per month is split between 340.12 mobile on-net minutes and 263.23 mobile off-net minutes.

40. Taking this approach enables the RA to calculate the monthly fees each of the representative fixed line customers would have to pay for any given mobile plan. This was done according to the following formula:

((IF(Eon ≥ Pon, (Eon - Pon),0) + IF(Eoff ≥ Poff, (Eoff - Poff),0))* OPr) + Pr

Where:

Eon = Estimated number of on-net minutes (per customer, per month)

Eoff = Estimated number of off-net minutes (per customer, per month)

Pon = Number of “free” in plan on-net minutes (per customer, per month)

Poff = Number of “free” in plan off-net minutes (per customer, per month)

Pr = The base per month retail rate of the calling plan

OPr = The out-of-plan per minutes rate

IF(a, b, c) = If a is true then do b, otherwise do c.

Continuing with the average robust customer, the cost of the M3 M100 Plan is:

((IF(340.12 ≥ 100, (340.12 - 100),0) + IF(263.23 ≥ 100, (263.23 - 100), 0))* $0.23) + $33

= [(240.12 + 163.23) * $0.23] + $33

= $125.77 per month.

[317] This value was calculated using data supplied by Bermuda’s mobile providers.

41. Table 38 depicts the least cost BTC plan for the six representative customers (remembering that the realistic and robust customers face the same monthly costs on BTC's plans).

Table 38: Least cost available fixed service plans by customer type for realistic and robust customers

Least cost Fixed Service Plan	Cost for customer who makes no more than 50 calls	Cost for customer who makes more than 50 calls	Cost for average customer
Standard 50	$26.00		$33.60
Standard 100		$42.20	

Table 39 shows the least cost mobile calling plan available to the realistic customers.

Table 39: Least cost available mobile service plans by customer type for realistic customers

Least Cost Mobile Plan	Cost for realistic customer who makes no more than 50 calls	Cost for realistic customer who makes more than 50 calls	Cost for average realistic customer
Digicel 300	$45.16		
Digicel 1500		$102.38	$75.00

Table 40 depicts the least cost mobile calling plan available to the robust customers.

Table 40: Least cost available mobile service plans by customer type for robust customers

Least Cost Mobile Plan	Cost for robust customer who makes no more than 50 calls	Cost for robust customer who makes more than 50 calls	Cost for average robust customer
Digicel 300	$35.00		
Digicel 1500		$75.00	
Digicel 900			$55.00

42. Comparing these three tables shows that in all cases, for customers that place no value on calling features, BTC's current Standard 50 and Standard 100 plans are substantially cheaper than the cheapest mobile alternatives (the monthly costs in Table 38 are lower than those in Table 39 and Table 40). If the

$10 charge for similar calling features to those available on the mobile plans is added to the price of BTC's plans, then the cost differences between the fixed and mobile plans narrows. However, BTC's plans remain cheaper for all customers except the robust customer making 50 calls or less.

43. In Table 41 and Table 42. BTC's fixed prices are subjected to a 5 and 10% increase and compared with the least cost mobile plans.

Table 41: Comparison of the least cost mobile plan to the least cost fixed plan by realistic customer

	Fixed	Fixed price increased by 5%	Fixed price increased by 10%	Mobile	Least Cost Comparable Mobile Plan
Cost for non-DSL customers who make no more than 50 calls	$26.00	$27.30	$28.60	$45.16	Digicel 300
Cost for non-DSL customers who make more than 50 calls	$42.20	$44.31	$46.42	$102.38	Digicel 1500
Cost for average non-DSL customer	$33.60	$35.28	$36.96	$75.00	Digicel 1500

Table 42: Comparison of the least cost mobile plan to the least cost fixed plan for robust customers

	Fixed	Fixed price increased by 5%	Fixed price increased by 10%	Mobile	Least Cost Comparable Mobile Plan
Cost for non-DSL customers who make no more than 50 calls	$26.00	$27.30	$28.60	$35.00	Digicel 300
Cost for non-DSL customers who make more than 50 calls	$42.20	$44.31	$46.42	$75.00	Digicel 1500
Cost for average non-DSL customer	$33.60	$35.28	$36.96	$55.00	Digicel 900

44. These two tables show that there are substantial price differences (typically well in excess of 10%) between fixed and mobile services. With the exception of the first row of Table 42, these price differences remain even when a $10 charge is allowed to account for BTC's price of calling features. This is good evidence that fixed services are not in the same market as mobile and *vice versa*.

2.3 Call profiles optimized to mobile usage: a robustness test

45. Since mobile minutes are billed on a per minute basis, mobile calls are likely shorter than on a fixed network. This might be thought to suggest that the preceding analysis should also be conducted using the typically shorter average call length on a mobile. That is not so, since customers who have chosen BTC's service clearly prefer it over, or in conjunction with, mobile service presumably in part exactly because it allows them to make longer calls. Despite this, the RA also conducted the price comparison analysis using OECD data on average mobile call lengths.[318] These ranged from a low of 0.9 minute for voice mail calls, to a high of 2.2 minutes on net. However, these numbers have been highly criticized for being unduly conservative. Again to reduce the cost of the mobile plans relative to BTC's current plans, the RA assumes an average call length equal to the median value of the OECD numbers, which was 1.85.

[318] *Revision Of The Methodology For Constructing Telecommunication Price Baskets*, Working Party on Communication Infrastructures and Services Policy, Organisation for Economic Co-operation and Development, DSTI/ICCP/CISP(2009)14/FINAL, 18 March 2010. Available from http://www.olis.oecd.org/olis/2009doc.nsf/LinkTo/NT00008FD6/$FILE/JT03280342.PDF

46. To illustrate the calculations undertaken, the Digicel 300 plan is best suited to a customer that makes, and/or receives, exactly 300 minutes of calls each month, with 200 of these being on network minutes and the other 100 being anytime minutes, which can be either on or off network. Thus, again to maximise the chance that the mobile plan is cheaper than BTC's previous and current offerings, a calling pattern that is perfectly optimized for the constraints of each mobile plan is considered. Relying on the OECD call duration assumption, and assuming a one-to-one relationship between out- and inbound calls and that the customer makes only 150 minutes of calls, this implies (rounding up) 82 (= 150/1.85) outbound calls. The most optimal BTC calling plan for this caller would be the Standard 50 plan at a cost of $32.40 (= $26 + 32 * $0.2) per month, which must be marked up approximately 8% to match Digicel's price. Adding the price of the equivalent Digicel vertical feature pack to the Standard 50 plan would raise the price to $42.40, which raises the cost of BTC's plan above that of Digicel's by approximately 17%

47. Performing similarly biased analysis on all other mobile pricing plans yields the comparisons depicted in Table 43.

Table 43: Comparison of Mobile Plans to BTC Current Plans

Mobile plans	Monthly Fee	Total Plan Minutes	BTC Monthly Rate	BTC Monthly Rate Plus Feature Pack	BTC Plan Names
Digicel Gold[319]	$25.00	200	$27.00	$37.00	Standard 50
Digicel 300	$35.00	300	$32.40	$42.40	Standard 50
Digicel 900	$55.00	900	$59.00	$69.00	Unlimited Local Calling
Digicel 1500	$75.00	1500	$59.00	$69.00	Unlimited Local Calling
Digicel 3000	$115.00	3000	$59.00	$69.00	Unlimited Local Calling
Digicel Unlimited	$165.00	Unlimited	$59.00	$69.00	Unlimited Local Calling
CellONE 300	$37.00	300	$32.40	$42.40	Standard 50
CellONE 900	$57.00	900	$59.00	$69.00	Unlimited Local Calling
CellONE 1500	$77.00	1500	$59.00	$69.00	Unlimited Local Calling
CellONE 3000	$117.00	3000	$59.00	$69.00	Unlimited Local Calling
CellONE Unlimited	$137.00	Unlimited	$59.00	$69.00	Unlimited Local Calling

	Indicates BTC plans that are less expensive than mobile by more than 10%.
	Indicates BTC plans that are less expensive than mobile by 10% or less.
	Indicates BTC plans that are more expensive than mobile by 10% or less.
	Indicates BTC plans that are more expensive than mobile by more than 10%.

48. Consider first customers that are indifferent to the calling features available on mobile services. For those customers, Table 43 indicates that for all but three cases (the orange cell's in the fourth column), customers with mobile calling patterns are able to obtain cheaper service under one of BTC's current voice only plans. For customers that value the calling features available under the comparable mobile plans, BTC's current plans are, for the most part, still cheaper than their equivalent mobile plans (the yellow and blue cells). In five instances BTC's plans become substantially more expensive (the pink cells) than mobile plans after increasing the price to account for calling features.

[319] The Digicel Gold plan is only available to those who are 65 years old, or older.

Table 44: Price differences between user optimized mobile plan and cheapest BTC plan for the same calling pattern

Mobile plans	Total Cost on BTC Current Plan	Total Cost on BTC Current Plan Plus Feature Pack
Digicel Gold*	7%	32%
Digicel 300	-8%	17%
Digicel 900	7%	20%
Digicel 1500	-27%	-9%
Digicel 3000	-95%	-67%
Digicel Unlimited	-180%	-139%
CellONE 300	-14%	13%
CellONE 900	3%	17%
CellONE 1500	-31%	-12%
CellONE 3000	-98%	-70%
CellONE Unlimited	-132%	-99%

Appendix G Guidelines for Market Assessment in the Electronic Communications Sector

1 INTRODUCTION

1. The material presented in this Appendix forms the guidelines the RA has followed, and will follow going forward, when conducting the periodic reviews of a relevant market or markets as called for under both the Electronic Communications Act ("EC Act") and the *Regulatory Authority Act* ("RA Act").

2. After summarising the relevant legislation (section 2), this Appendix describes the methodology relevant to:

a) Assessing the definitions of the markets that have been identified as being candidates for ex ante regulation (sections 3);

b) Examining whether any operator holds SMP in the defined markets (section 4).

2 ENABLING LEGISLATION

3. Authority and guidance for the market review process comes from Part IV of the *Electronic Communications Act* ("EC Act") and Section ("§") 59 of the *Regulatory Authority Act* ("RA Act").

4. § 20(1) of the EC Act grants the Regulator Authority (RA) the power to "…make administrative determinations that impose *ex ante* remedies on a communications provider in respect of its provision of electronic communications or the provision of subscription audiovisual programming content in a relevant market or markets if, individually or together with others, the communications provider has significant market power in that market.". § 20(2) of the EC Act states that: "In order to determine whether a communications provider has significant market power, the Authority shall conduct a review of a relevant market or markets in accordance with section 23 of this Act and section 59(2) of the Regulatory Authority Act 2011."

5. Section 22(2) of the EC Act instructs the RA to identify first those relevant markets in which *ex ante* remedies may be appropriate by applying the

… following criteria and any other criteria that the Authority deems to be pertinent—

(a) the relevant market is characterized by high and non-transitory barriers to entry;

(b) taking into account actual and expected market circumstances during the period under review, the relevant market either—

(i) is not likely to be affected by technological changes or other developments that would render it effectively competitive, or

(ii) is likely to cease to be effectively competitive; and

(c) the application of ex post competition rules alone would not be sufficient to promote or preserve effective competition in the relevant market.

6. Section 23(4) of the EC Act requires that the RA conducts a consultation that includes an assessment of the definition of the Candidate Markets as part of the market review process. In particular, section 23(4) states that:

The Authority shall conduct a public consultation to review those markets identified in accordance with section 22 that in its view are susceptible to ex ante regulation, if any, or pursuant to subsection (6), for the purposes of—

(a) evaluating whether these relevant markets are, or continue to be, correctly defined based on an economic assessment of supply and demand;

(b) analysing whether a communications provider, individually or with others, in fact possesses, or continues to hold, significant market power in one or more of these relevant markets based on the applicable facts and circumstances; and

(c) deciding which obligations, if any, should be imposed in respect of each relevant market characterised by significant market power in order to promote or preserve effective competition, in accordance with section 24.

7. Additionally, §23(6)(A) of the EC Act mandates that a subsequent review of a relevant market must be commenced by the RA "…within a period of not more than four years from the date of its completion of the previous review of the same relevant market in any case in which it has made a finding of significant market power."

[lead-in to next sections]

3 MARKET DEFINITION AND ANALYSIS—OVERVIEW

3.1 Overview

8. As a concept the phrase "relevant market" uses the term "market" in a different context from its normally understood reference to an area where a company's goods are sold, or to an industry or sector, such as the telecommunications market. From a regulatory standpoint a relevant market is a market concerning which either a participant, a consumer, or a regulatory authority has expressed doubts as to the fairness and/or competitive nature of its functioning. Defining the "relevant market" then becomes an exercise in identifying and defining the boundaries of competition between firms so as to analyse the prospects for competition in the market, the opportunities for particular firms to acquire and exercise market power within the market, and the

implications all of this has, or might have, for what form of regulatory intervention is most appropriate (if any) to maximise consumer welfare.

9. Defining the relevant market is best thought of as the first step in a series of interrelated exercises, none of which are entirely independent of each other, consisting of: 1) Defining the relevant market; 2) Determining which player, or players, may be said to have significant market power (SMP) in the defined market; 3) Identifying the causes of significant market power in those markets where it is found; and, 4) Determining the appropriate regulatory intervention(s), if such are required, so as to move the market towards one containing more competitive outcomes. Defining a market is thus not an end in itself but the beginning of a broader competition analysis identifying as it does the relevant area of competition; a necessity in performing an effective competition assessment of a particular market.

10. The main purpose of market definition is to systematically identify what competitive constraints, if any, may restrain a firm from behaving independently of effective competitive pressure in a particular market. Thus, the essential task in market definition is to define all the products on the demand side that buyers regard as reasonable substitutes for the product under investigation, and then to identify all the sellers who supply that product and/or substitute products, or who could potentially supply them within the time frame established for the analysis. This becomes the relevant market. Most importantly, however, it must be kept in mind that the market definition and analysis exercises discussed here are for the purposes of identifying particular detriments and public benefits. Any well conducted competition analysis ought properly have these factors as its focus.

11. This section of the document provides a discussion of the relevant theoretical and methodological considerations that are typically brought to bear in defining relevant markets and conducting the SMP analysis that both follows from and informs this definitional exercise. Section 3.2 provides a broad overview of the theory of market identification. Section 3.4 distinguishes the process of developing market definitions from the process of identifying firms with SMP in those markets.

3.2 The analytical framework for market identification

12. This section provides a brief outline of the key factors to be considered when identifying markets, and also discusses (a) how regulation can create markets that might not otherwise exist; and (b) more generally the interplay between retail and wholesale markets.

3.3 Market definitions are purposive

13. Markets can only be meaningfully identified in the context of a question to be answered. In the present context, that question is whether any communications provider, “individually or together with others” has SMP, that is, holds a position of economic strength in the relevant market and has “the power to behave to an appreciable extent independently of competitors, customers and

ultimately consumers, which may provide the basis for the imposition of *ex ante* remedies.[320]" Put slightly differently, the task at hand is to identify markets so as to assess the competitive constraints faced by communications providers for the purposes of determining regulatory remedies. Thus, an approach must be chosen that provides clarity about the market power issues that are likely to arise and how that market power can be best addressed.

14. It is true that market definition is a necessary pre-condition for undertaking analysis of whether there is SMP—one cannot identify entry barriers to a market or define market shares without knowing what is the market. However, in defining a market one must keep the purpose of the definition firmly in mind.[321]

15. The purposive nature of market definition analysis implies that the definitions arrived at for the purpose of assessing SMP and regulatory remedies are without prejudice to those used in the context of antitrust proceedings.

(a) Market dimensions and the SSNIP test

16. Markets are most commonly delineated along four dimensions:[322]

1. product or service, which captures the nature of the benefits the product delivers to customers (for example, are fixed line and mobile calls in the same or separate markets?);

2. geographic coverage (for example, are there regional markets in Bermuda or is there just one national market?);

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[320] §2 of EC Act, definition of significant market power.

[321] For an argument that if one can define markets and market concentration, one can directly conduct SMP analysis without defining a market or market concentration see Dennis Carlton, 2004, Using Economics to Improve Antitrust Policy, Columbia Business Law Review, 2004 (2), 283-334, in section III. For an example of directly applying SMP analysis without market definition in the context of merger analysis, see Whinston, M. D., 2006, *Lectures on Antitrust Economics*, Cambridge, MA, MIT Press, at pages 99-100). Similarly, market definition is only mentioned twice and only in passing in an entire book on the modern theory of identifying market power—see Perloff, J. M., L. S. Karp, et al., 2007, *Estimating Market Power and Strategies*, Cambridge, UK, Cambridge University Press (at page 22 and 23, relying on the Amazon.com electronic search). Despite this, we follow the more conventional approach of first undertaking a market definition, and then conducting the SMP analysis.

[322] A fifth dimension is time - ie, service today versus tomorrow. This is unlikely to be relevant for current purposes therefore we do not discuss this in detail. However a discussion of the temporal dimension of markets can be found in: Smith, R. L. and R. Trindade, 2004), It's time: The temporal dimension of competition analysis, *Competition and Consumer Law Journal*,12: 142-162; and *Mergers Acquisition Guidelines*, Commerce Commission of New Zealand (available at http://www.comcom.govt.nz/BusinessCompetition/MergersAcquisitions/MergersAcquisitionsGuidelines/Overview.aspx), at page 14.

3. functional layer (wholesale versus retail); and

4. customer group, which is often apparent from price discrimination[323] or other differences in supply between customer groups (for example, are large businesses in the same market as residential customers).

17. In determining market boundaries for each of these (and most commonly the service and geographic) dimensions, a SSNIP test is often applied.[324] The SSNIP test starts with a tentative and narrow market definition (for example, a market consisting of fixed voice calls only), and considers the ease with which other services (e.g., mobile) might be substituted for the services in the narrowly defined market. In particular, the test asks whether a hypothetical monopolist over the narrow market could profitably[325] maintain a small but significant (usually considered to be a price rise that lies between 5 and 10 percent[326]) non-transitory increase in price (SSNIP) above competitive levels. If it could not, then the market is too narrowly defined. For example, if it was found that the loss of custom due to substitution toward mobile calls, that is, demand-side substitution, would render a SSNIP by a hypothetical monopoly supplier of fixed calls unprofitable, then mobile calls would be in the same market as fixed calls. Thus, the initial narrowly defined market of fixed voice calls only was too narrow and should then be expanded to include mobile calls. (The reverse need not be true. That is, a hypothetical monopolist over mobile calling might profitably make a SSNIP above competitive prices because sufficient custom would not be lost to

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[323] The EU guidelines discuss customer markets at ¶46; see also Cave, Martin, Ulrich Stumpf, and Tommaso Valletti, *A Review of certain markets included in the Commission's Recommendation on Relevant Markets subject to ex ante Regulation*, July 2006, at ¶4.2.1. Also, *Market Analysis: Retail Fixed Calls Markets*, Consultation Paper, Commission for Communications Regulation—Ireland, Document No. 04/95, 01 September 2004, at ¶3.75. ¡ADD cite to new draft US merger guidelines.

[324] For a description see European Commission (EC), 2002, Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services (2002/C 165/03), http://ec.europa.eu/information_society/topics/telecoms/regulatory/new_rf/documents/l_10820020424en00330050.pdf, hereafter "EC Market Analysis Guidelines," at ¶¶40-41; the test is optional (¶43), is explicitly recognized as "but one example of methods used for defining the relevant market" at footnote 26, and is not mentioned in the description of demand-side substitution that runs from ¶¶44-50, until the last paragraph. For an example of the test see Ofcom, *Fixed Narrowband Retail Services Markets: Consultation on the identification of markets and determination of market power* (Ofcom, 2009, Fixed Narrowband), Publication Date 19 March 2009, http://www.ofcom.org.uk/consult/condocs/retail_markets/fnrsm_condoc.pdf, at ¶¶4.19, 4.41, 4.54, 4.64 and 4.78. Similar examples can be found in Ofcom, *Review of the fixed narrowband services wholesale markets: Consultation on the proposed markets, market power determinations and remedies*, 19 March 2009, at ¶¶5.61, 5.63 etc.

[325] EC Market Analysis Guidelines, at footnote 25.

[326] EC Market Analysis Guidelines, at ¶40.

competitive suppliers of fixed voice. Thus, the market that is used to assess SMP and remedies for "fixed" calls might include mobile calls, but not *vice versa*.[327])

18. Similarly, in the EU, the potential for entry into the hypothesized narrow market by existing suppliers of a different service, a process called supply-side substitution is also considered.[328] Thus, a good or service is considered to be in the same market as another if existing firms could render a SSNIP by the hypothetical monopolist unprofitable by reasonably quickly (usually thought to mean in less than 12 months[329]) supplying the same output provided by the hypothetical monopolist without incurring substantial costs or risk. Thus, if a supplier of international calling card services could readily expand its operations to supply domestic fixed calls making a SSNIP on domestic fixed calls unprofitable, then international calling would, on the grounds of supply-side substitution, fall into the same market as domestic fixed telephony.[330]

19. Supply-side substitution between two services must occur swiftly for it to result in the services constituting a single market is addressed explicitly by the EC. In particular, the EC explains that:

> *The difference between potential competition and supply-side substitution lies in the fact that supply-side substitution responds promptly to a price increase whereas potential entrants may need more time before starting to supply the market. Supply side substitution involves no additional significant costs whereas potential entry occurs at a significant sunk cost.*[331]

and:

> *supply-side substitutability indicates whether suppliers other than those offering the product or services in question would switch in the immediate to short term their line of production or offer the relevant products or services without incurring significant additional costs.*[332]

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[327] See, for example, Jonathan Baker, 2006, Market definition: An analytical overview, http://ssrn.com/abstract=854025, page 32.

[328] EC Market Analysis Guidelines, at ¶¶38-39.

[329] Malcolm B. Coate and Jeffry Fischer, 2008, A Practical Guide to the Hypothetical Monopolist Test for Market Definition, *Journal of Competition Law and Economics*, 4 (4), pages 1031-1063

[330] Taking account of supply-side substitution creates some theoretical difficulties in the market definition process—see Jonathan Baker, 2007, Market definition: An analytical overview, *Antitrust Law Journal* 74 (1) pages 129-174; but *cf* Coate and Fischer, *ibid.*

[331] EC Market Analysis Guidelines, para 38.

[332] EC Market Analysis Guidelines, para 39.

20. As the foregoing discussion illustrates, market definition analysis is an iterative process which begins by postulating a candidate market for each product of a firm. The analysis then proceeds by determining whether a hypothetical monopolist controlling the group of products in that candidate market would be able to impose a price increase of between five and ten percent assuming the terms of sale of all other products remained constant. If the price increase would likely cause buyers to switch their purchases to other products in sufficient quantity to render the price increase unprofitable, the postulated candidate market is not the relevant market, and the next-best substitute is added to the candidate market. The analysis is then repeated on this expanded market until a point is reached at which a hypothetical monopolist could impose and sustain the price increase for at least one product of in the candidate market. In performing this analysis it is important to keep in mind that a market can incorporate firms that supply different services.

21. In addition to the product, or service, specific iterative process just described, market definition must take into account the possibility that a firm may offer more than a single service to consumers or supply more than one customer group or geographic area. This may indicate the presence of a cluster market. If, for example, a hypothetical monopolist over the supply of a group of services would not be constrained by competition from independent suppliers of the individual services, then the services belong to a cluster market. That is, there is a cluster if a hypothetical monopolist, say firm ABC, which jointly supplies services A, B, and C has some distinct advantage over the independent supply of service A by firm A, service B by firm B, and service C from firm C.

22. Cluster markets can arise for both supply and demand-side reasons. On the supply side, there may be economies of scope in production. For example, important economies of scope may exist between supply of residential and business long distance services. By serving both groups of customers, a carrier can use the same switches and transmission equipment to meet the needs of business customers during the day and the residential market at night and on the weekends. If these economies of scope exist, a residential or business only supplier would likely not be viable when faced with competition from a firm that supplies both residential and business customers. As a result, a hypothetical monopolist to both groups could raise prices for both customer classes above competitive levels without attracting competition from firms seeking to serve only one class of customer.

23. There may also be economies of scope in consumption. For example, consumers may face lower costs or greater benefits when they buy a bundle from a single supplier. These might arise due to a single bill and access point for enquiries for local and long distance calls and may be viewed as sufficiently attractive to consumers to threaten the viability of separate supply. A hypothetical monopoly supplier of the bundle could raise its prices above competitive levels unconstrained by competition.

(b) Weaknesses of the SSNIP test and the need for commercial reality tests

24. Care must be taken in applying the SSNIP test when starting from existing prices, since these may differ from competitive prices either due to regulation or the existence of monopoly power.[333] For example, if existing prices are set by a firm with SMP, then a further small price increase might result in substitution toward other services that may be seen as inferior to the services provided by the firm with SMP. This is because the profit-maximising firm is fully exercising its SMP position by pricing as high as it possibly can without inducing substitution away from it. Applying a SSNIP test in this case would result in a more broadly defined market than would be obtained if the SSNIP had been applied using more competitive prices. It could also result in the SMP analysis falsely concluding that the firm with SMP faces effective competitive constraints (the so-called "cellophane fallacy"[334]).

25. Moreover, the SSNIP test does not allow appropriate market definitions in many instances, largely because it fails to consider the commercial reality of aggregation of provision and/or consumption.[335] For example, a telephone line to Person A's house is not a close substitute for a telephone line to house five blocks away: a SSNIP by Person A's supplier as a hypothetical monopolist would not lead Person A to switch to using a phone five blocks away, and it would not likely be profitable for a competitive firm operating five blocks away to build a line to Person A's phone. Yet, commercial reality, because of the large fixed costs of network rollout and customer acquisition that must be shared over many subscribers, dictates that when a firm chooses to supply residential fixed telephony it does so over areas considerably larger than a neighbourhood. Thus, geographical markets for fixed telephony are generally much broader than a

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[333] EC Market Analysis Guidelines, at ¶42.

[334] EC Market Analysis Guidelines, in endnote 31. For a detailed explanation of the fallacy see Lawrence White, 1999, Wanted: A market definition paradigm for monopolization, New York University Center for Law and Business, Working Paper #CLB-99-002, http://ssrn.com/abstract=1293083. A reverse cellophane fallacy can also arise when regulation forces prices below efficient cost-recovering levels—see Deborah Aron and David Burnstein, 2010, Regulatory Policy and the Reverse Cellophane Fallacy, *Journal of Competition Law and Economics*, forthcoming (but see http://ssrn.com/abstract=1171292). The EC Market Analysis Guidelines also explicitly acknowledge this problem (at ¶42 and footnote 30).

[335] For regulatory examples, see Ofcom, 2009, Fixed Narrowband ¶¶4.3-4.6; Australian Competition and Consumer Commission (ACCC), Local services review: Final decision, July 2006, at page 29, and EC, Commission Recommendation: On Relevant Product and Service Markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services, at page 31; on US case law, see M.H. Morse, 2003, Product market definition in the pharmaceutical industry, *Antitrust Law Journal* vol. 71 (2) pp. 633-676, footnotes 84, 88 and 93, and Eastman Kodak Company v. Image Technical Services. Inc., 504 U.S. 451. 112 S.Ct. 2072. 2083. 119 L.Ed.2d 265 (1992) at 2090; and for an academic perspective, see Rhonda Smith and Jill Walker, 1997, The role of commercial reality versus substitution in market definition, *Competition and Consumer Law Journal*, Vol. 5 (1) August, pp. 1-21.

SSNIP test might suggest. This perhaps explains the long-established EU position on geographic markets:[336]

> *The relevant geographic market comprises the area in which the undertakings concerned are involved in the supply of relevant products or services, in which the conditions of competition are sufficiently homogeneous and which can be distinguished from neighbouring geographic areas because, in particular, conditions of competition are appreciably different in those areas.*
>
> *Factors relevant to the assessment of the relevant geographic market include the nature and characteristics of the products or services concerned, the existence of entry barriers, consumer preferences, appreciable differences of the undertakings' market shares between neighbouring geographic areas or substantial price differences.*

26. The SSNIP test faces similar problems in the context of product differentiation.[337]

27. The presence of bundling also requires careful consideration. For example, in many locations it may be that there are separate markets for retail broadband access and retail subscription television, but it may also be possible that there is a market, or a market is developing, for the retail bundling of broadband access plus subscription television. Indeed, there may also be (a perhaps prospective) market for retail voice, broadband and subscription television bundled together (the so-called "triple-play"). In considering bundles, SSNIP tests must be used cautiously. For instance, while it is unlikely that a SSNIP test on broadband access service would result in a finding that subscription television is a close substitute for that service, but it may be incorrect to draw the inference that there is no market for the bundle.

28. Finding a market for a bundle does not rule out separate markets for components of the bundle. For example, there is a separate market for tires, even though, in the market for cars, tires are bundled with the rest of the car. Yet, one must also consider the possibility that bundled supply has replaced or is likely to replace unbundled supply. This is another question not readily answered

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[336] This definition goes back to at least 1989: EC, 1994, Form Co Relating to the Notification of a Concentration Pursuant to Regulation (EEC) No 4064/89, http://ec.europa.eu/competition/mergers/legislation/co_en.html, §6.II; and is currently applied in e-comms: EC Market Analysis Guidelines, at ¶¶55-56, though the approach calls for application of demand and supply substitution tests to determine the *limits* of a geographic market (at ¶57).

[337] As recognized in the EC Market Analysis Guidelines, at footnote 28. A detailed discussion of these issues can be found in Jonathan Baker, 1997, Product differentiation through space and time: some antitrust policy issues, *The Antitrust Bulletin*, 42 (1) pp. 177-196.

by a SSNIP test, but rather must be determined by considering commercial reality, in particular whether on-going unbundled supply is viable.[338]

29. Similarly, it may be the case that while certain kinds of services are either supplied separately, or in a bundle, no competitive supplier would choose to supply some, and not all, of those services. For example, it may be that in some circumstances a supplier of broadband would, as a matter of commercial necessity, also provide voice. It also may be that it is uneconomic for certain services to be provided by separate suppliers when consumed by the same customer (thus one does not bring one's soap when going to a carwash).[339] In all these cases, no commercial enterprise could viably operate unless it supplied all the services in question, and thus efficient provision means that the identified services likely fall into a single market—called a cluster market.[340]

(c) Market definitions must be forward-looking and are subject to change

30. Market boundaries, as the preceding discussion should make clear, are not static, but may alter with circumstances, including changes in:

- demand, that is, willingness-to-buy, whether due to changes in tastes or income;
- technology, and business strategies by firms in the market (including a shift to or away from bundling), or those outside it;
- access to resources;
- regulations or laws;
- intellectual property right restrictions (and expirations);
- macroeconomic factors, e.g., exchange rates, interest rates, credit availability and similar.[341]

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[338] Jonathan Baker, 2006, Market definition: An analytical overview, http://ssrn.com/abstract=854025, page 40.

[339] Ian Ayres, 1985, Note: Rationalizing Cluster Markets, 95 *Yale Law Journal* 109, pages 119-125.

[340] See, for example, Henry Ergas, 1997, Cluster Markets: What they are and how to test for them, http://www.greenwhiskers.com.au/papers_reports/papers-ergas-cluster.PDF; Oftel 2001, Effective competition review: mobile, 26 September, Annex 1, ¶A1.29; and *United States v. Philadelphia National Bank*, (1963) 374 U.S. 321, at 357; ACCC, 2008, Merger Guidelines, http://www.accc.gov.au/content/item.phtml?itemId=809866&nodeId=7cfe08f3df2fe6090df7b6239c47d063&fn=Merger%20guidelines%202008.pdf, ¶4.44.

[341] See, for example, *Methodologies for market definition and market analysis*, Final Report; Study for ICP-ANACOM, wik Consult and Squire Sanders, 23 July 2003 at page 18. Available at http://www.anacom.pt/streaming/WIK.pdf?contentId=128770&field=ATTACHED_FILE

31. Dramatic changes in most of the preceding areas characterise e-comm markets, so market definition and analysis of power must be forward-looking and frequently reviewed.[342] As discussed previously, a change in licensing regime is a particularly relevant factor when considering forward-looking market.

3.4 Market definition and determining SMP

32. Market definition should not be confused with determining whether any firm has market power, a question that is answered after markets are delineated. Thus the SSNIP test assumes a monopolist over a narrow candidate market, and considers whether consumers would switch to competitively supplied substitutes outside of the candidate market or whether assumed competitive suppliers outside of the candidate market could readily enter the candidate market. While thinking about hypothetical monopolists and outside competition helps define the market, the facts, of course, may be different. In actuality, there may be more than one firm operating in the candidate market (rather than there being a hypothetical monopolist), and there may not be competitive supply outside of the candidate market (for example, outside substitutes could, in reality, be controlled by a monopolist). It is these actualities of competition in the identified and nearby markets that SMP analysis considers as these determine the economic power of the suppliers in the market.

33. Further, a finding that a given service is in a particular market does not mean that services outside of the market are irrelevant in considering the question of market power as they may still provide some competitive constraint on suppliers in the market under consideration. For example, an Ofcom consultation into the workings of the retail fixed narrowband access markets found mobile access and calls to be in a separate market from that of fixed narrowband access and calls, even though evidence indicates increasing substitution between fixed and mobile services in the UK. That is, Ofcom found that a hypothetical fixed call monopolist could profitably engage in a SSNIP above competitive prices despite some substitution toward mobile service. However, in its SMP analysis, Ofcom recognised the increasing competitive constraint on fixed services due to the observed increase in mobile call substitutability.[343] Thus, the Ofcom market definition implies that a fixed call monopolist (if there was one) would have SMP even if the mobile market was highly competitive, but this does not mean actual providers of fixed calls in today's UK have SMP.[344] For example, a certain degree of competition in the fixed line market coupled with additional pressure from mobile providers might mean that no fixed line supplier has SMP, though that result might be reversed without the mobile competition.

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[342] Section 23(6) of the EC Act mandates a review of each relevant product and geographic market at least every four years.

[343] Ofcom, 2009, Fixed Narrowband, at ¶4.4.

[344] As is consistent with EU practice, see EC Market Analysis Guidelines, footnote 24.

34. A consequence of the preceding is that a narrow market definition does not determine whether a firm has SMP. This is because a narrow market definition does not prevent us from taking into account the impacts of any competitive constraints from beyond the defined market. For this reason the RA considers it pragmatic to accept a narrow market definition if the evidence of product or service substitutability makes it difficult to conclusively define market boundaries. The alternative is to spend an inordinate amount of time attempting a precise definition. However, this is unnecessary as the ensuing SMP analysis must take into account the effect of any competitive constraints from services outside of a defined market on the behaviour of a firm, or firms, operating within that market.[345]

4 DETERMINATION OF SIGNIFICANT MARKET POWER (SMP)

4.1 Unilateral market power

35. This section deals with a firm's "unilateral" or "single-firm" market power. The market power indicators set out in the EC Act primarily relate to market structure. The way that the RA proposes to interpret each of those indicators is discussed in sections 4.1(a) to 4.1(k). Other useful information about the extent of a firm's market power can be gathered by examining market performance and conduct – these measures are discussed in section 4.1(l). Section 4.1(m) provides some remarks on the RA's approach to drawing a conclusion on whether there are firms with unilateral market power.

(a) Market share levels and volatility

36. Market share levels and trends provide information on a firm's overall past success in acquiring and/or retaining custom. While a firm's success as reflected in its market share will be determined by a range of factors, one determinant is the height of barriers to entry and expansion. Where an incumbent firm operates in a market that has substantial barriers to entry and expansion, it will likely have a high and stable market share. Thus, where a firm is observed to have a high market share that is not trending down significantly over time, this outcome is consistent with the conclusion that the firm is free of strong competitive constraint – ie, that it has SMP. Clearly, a high level of market share on its own will not conclusively prove the existence of SMP, and to draw a strong conclusion requires a broader analysis of indicators describing the structural features of the market (and potentially also of market performance and conduct measures). However, market share does provide a readily available and quantifiable indicator which is widely utilised by regulators internationally as a component of SMP analysis.

37. The RA does not consider it necessary to form a view as to what level of market share a firm must have for it to be considered to hold SMP, and concurs with the view expressed by the ERG that "there is no clear-cut relation between a

[345] Ofcom, 2009, Fixed Narrowband, at ¶4.6, has taken a similar pragmatic approach in avoiding replicating previous market definitions for the purpose of SMP analysis.

certain market share and the existence of dominance". (ERG, p. 4). However the RA will have regard to the position taken in the EU which is that single firm dominance is generally considered to arise when market share is above 40%, and that market shares in excess of 50% are generally considered as strong evidence of SMP.[346] We are mindful that Bermuda has a small population and therefore its market may have fewer suppliers, and hence higher market shares, than EU States. This implies that there may need to be a higher tolerance of market share before intervention than in larger countries.

38. Market shares may be calculated with reference to sales volumes, subscriber numbers, sales values or capacity. Where available, a range of market share estimates should be used as a means of shedding light on market structure and the presence of market power. As a result, measures of market share that reflect aspects of the capability of the relevant firms to compete are most relevant. Similarly, data sources containing anomalies or large error ranges should be avoided. Even these criteria, however, will not in general either isolate a unique measure of market share or rank measures of market share. Instead, it is often the case that different measures provide complementary pieces of evidence. For example, market share data based on capacity is valuable because it indicates firm's ability to expand output and hence compete. Similarly, market share data that is linked to firm profitability is valuable when it is an indicator of firm viability, again something that is important to a firm's ability to compete.

39. Because market reviews must be forward-looking, SMP identification must examine whether there are changes (regulatory, legal or technological) which have the potential to either increase or reduce the degree of competitive pressure placed on existing market participants. Where changes are expected, historic market shares could either over or under state the future extent of competitive pressure in a given market, reinforcing the need to consider them as part of a broader SMP analysis rather than using them as a bright-line test as to whether an operator does or does not hold SMP. In the current market review process, an upcoming change that has the potential to fundamentally alter the existing market structures is the introduction of the ICOL. The introduction of the ICOL has the potential to intensify competitive pressure by removing a regulatory barrier to entry to many markets. However, by enabling firms to bundle services, the ICOL introduction could give rise to a situation where a firm engages in anticompetitive bundling which enables the leveraging of SMP from one market into another. In that case, markets in which no player currently has a high market share could alter substantially (if left unregulated). In that case, low existing

[346] European Commission (2002), *Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services*, para 75.

market shares cannot be taken to imply that a firm will not in the foreseeable future have SMP.[347]

(b) Overall size of the communications provider

40. The overall size of the provider can provide advantages in the form of economies of scale (see section 4.1(g)) and easier access to capital (see section 4.1(c)). Other potential benefits of being large relative to other market participants include: strong purchasing power; and having a wide distribution network and strong brand/marketing presence.

41. Advantages in relation to purchasing could arise when a firm that is large relative to other market participants has strong purchasing power which allows it to acquire inputs at a price that is significantly lower than the prices available to its rivals. For this to be a significant and sustained advantage depends on whether volume discounts of this type are available, whether other market participants can also achieve purchasing power through links with multinational parent companies, and how quickly entrants can achieve the same discounts.

42. In some markets it is conceivable that a well developed distribution network can be costly and time consuming to replicate. Whether this is a factor that can contribute to a firm's market power depends on whether there are lower cost alternatives rather than through the use of physical offices to distribute services (eg, through initially relying on websites and telephone services for signing up customers).

43. A potential advantage of large size is having deeper pockets for marketing campaigns. However, this advantage is not necessarily significant enough to affect the contestability of the market. For example, entrants that have multinational parent companies can draw on international branding can counter this, and smaller firms could use innovative low-cost marketing approaches.

44. More generally, large size can have its drawbacks as well as advantages. Smaller players may be able to overcome the advantages that larger players have by being more nimble – for example, being able to respond to customer demands and competitive pressures quicker.

(c) The existence of economies of scale or scope

45. Economies of scale occur where unit costs fall as volumes increase. Economies of scope occur where unit costs are reduced as the product range supplied by a firm increases. Therefore in high fixed cost industries economies of scale and scope can provide a significant advantage to large firms. If economies of scale are high, the number of firms that can operate profitably in the market at minimum efficient scale will be small. In the case of a natural monopoly, it is efficient for a single firm to serve the market. If a firm can enter profitably on a

[347] This is a key reason why the RA has chosen not to adopt a market share filtering approach foreshadowed in an earlier discussion paper on dominance.

small scale, then this would suggest that economies of scale are not so great – that is, the cost asymmetry associated with sub-optimal plant utilisation is insignificant or not so great – as to prohibit effective market entry.

46. If economies of scope are very high, it may only be possible for firms to profitably operate by providing a set of products for which these costs are jointly incurred. If a firm can enter profitably by supplying only a subset rather than the full set of products, then this would suggest that economies of scope are not so great – that is, the cost asymmetry associated with providing the subset rather than the full set is not so significant – as to prohibit effective market entry.

(d) The communications provider's control of infrastructure not easily duplicated

47. Where there are key barriers to entry such as high sunk costs, large economies of scale and/or legal and regulatory barriers, it may not be possible for entrants to viably duplicate the infrastructure necessary for supply in a given market. If this is the case and substitutable alternatives are not available, then the underlying infrastructure represents a natural monopoly or bottleneck facility.

48. In determining whether this is in fact the case, a forward-looking approach, taking into account likely changes in technology and demand must be taken to determine whether advantages are likely to be sustained.

(e) The communications provider's technological advantages or superiority

49. If a firm has access to technology that is significantly superior to that of its rivals, this can bestow on it a significant advantage. This can be determinative of the extent to which entrants can compete head-on. Technological advantage held by the incumbent may, for example, relegate competitors that use alternative technologies to that of a competitive fringe. To examine whether this is the case, the RA considers it relevant to examine market outcomes to date (including how successful the alternate technologies have been in challenging the incumbent's technology, taking into account how the path of new technology adoption may trend over time. While many technologies may start off with slow take-up, once there is a critical mass, improved reputation/reliability etc then the ability of the alternate provider may substantially increase. The RA may also want to consider technological evolution, how the functionality of the service compares, international evidence, and views presented by the operators.

(f) The degree of countervailing buyer power

50. In markets where there are large buyers that are individually significant (for example, by being strategically important, or simply having a very large expenditure), or where large customers have options for self-supply, those customers can exercise countervailing buyer power thus reducing a firm's ability to act free of constraint in that market.

(g) The communications provider's ability to access capital and financial markets relative to that of its competitors

51. Entrants may face a cost asymmetry if the rate at which they borrow is higher than incumbents. This may be due to the perceived higher risk (of failure) by lenders. Alternatively, entrants may face the same or even more favourable lending terms than incumbents due to links with large and established parent companies or through government links. One possible measure is to examine the credit ratings of the firms concerned to determine if access to capital provides a substantial advantage to one or more market participants.

52. Government rules limiting foreign ownership may also be a barrier-to-entry if funds are more expensive domestically than internationally.

(h) Diversification of products or services (including bundles)

53. In general, diversification of products or services can be efficient and provides substantial benefits to consumers. However, where a firm is able to bundle a range of services that cannot be replicated by its competitors then there is a potential for this practice to enable a firm to extend or "leverage" its power from one market to other. In particular, this can occur where a firm supplies non-contestable services as part of a bundle with contestable services. As mentioned above, this criterion will become increasingly relevant with the introduction of the ICOL.

(i) Advantages of vertical integration

54. Advantages accruing from vertical integration have over recent years been a significant concern internationally among regulators. A primary concern is that where a vertically integrated firm competes in downstream markets it may have incentives to engage in discriminatory conduct. This can occur in respect of price terms, in which case vertical discrimination can result in an anti-competitive price squeeze. Alternatively, it may discriminate on non-price terms – for example, by providing a superior product to its downstream arm, through delays in providing services to third parties, and more generally favouring its downstream arm.

(j) The presence of de jure or de facto barriers to market entry or expansion

55. Broadly speaking, barriers to entry or expansion are any factor that reduces the contestability of a market. They can include: legal barriers, regulatory barriers, economic barriers and technical barriers. Legal and regulatory barriers could include, though are not limited to, ownership restrictions and the need to acquire licenses.

56. Economic barriers can be identified as those that create cost asymmetries between incumbent firms and potential entrants. One key economic barrier to entry is high sunk costs. Sunk costs are costs that once incurred cannot be recovered. Sunk costs make entry risky, and hence, less likely to begin with. While sunk costs are often high in telecommunications markets, the relevant question is whether the sunk costs are sufficiently high as to effectively prevent entry. Where there are large sunk fixed costs but entry has occurred, firms often have incentives to compete strongly.

57. A second important economic barrier to entry relates to brand loyalty, or more generally customer inertia. This is often considered to provide a significant source of market power, particularly in markets in which there is significant product differentiation. Customer inertia can be examined through examining market outcomes, such as market share changes and churn. If churn is high, then this suggests brand loyalty is not a source of SMP.

58. A third key barrier to entry is the nature and extent of any switching costs. Customers may incur an explicit financial cost in switching suppliers, or face other inconveniences that give rise to costs, such as needing to change their phone number or e-mail address. In practice, these costs are difficult to quantify. Hence, as with the issue of brand loyalty, one indicator of the materiality of switching costs, and the ability of customers to manage these, is to consider the extent of actual switching. This is reflected in customer churn and to some extent in market share trends. Long term contracts can potentially hinder entrants from gaining the scale they need to be viable by affecting customers' ability to switch. This is especially so if, for example, an incumbent were to systematically switch a significant proportion of the customer base to long-term contracts around the time of entry. If, instead, term contracts do not have a long length, or are such that a significant number of customers' contracts are up for renewal at any one time then term-contracts need not be a barrier to entry, and could even facilitate entry by providing certainty to the entrant in terms of revenue flows (especially where it incurs a high cost of connecting a customer).

(k) Evidence of previous anti-competitive behaviour

59. It is important to consider examples of anti-competitive conduct where these have occurred. This indicates whether competition laws are sufficient to deter anticompetitive activity or whether regulatory intervention is required. Given the absence of general competition law in Bermuda there is little in the way of proved cases of anti-competitive conduct.

(l) Other measures

60. The list of SMP criteria set out in the EC Act relate primarily to the underlying market structure. Information on firms' conduct and on market performance can also inform the market review process.

61. With regard to conduct, one indicator specified by the EC Act is whether there is evidence of previous anti-competitive conduct. However, additional information that can shed light on the extent to which a firm faces competitive constraint, is observation on the extent of competitive rivalry between firms. This would include, for example, examining how vigorously a firm responds to its rivals' pricing initiatives. Examination of price differentials between firms can also help illuminate the degree to which a firm's pricing is constrained by competitive forces.

62. Other measures that focus on market outcomes (also referred to as market performance) include, though are not limited to:

- **Price trends**: in a competitive market it is expected that efficiency gains over time would result in price reductions that reflect cost-savings; in a market that is becoming increasingly competitive one would generally also expect a downward trend in prices
- **International price comparisons**: can provide valuable information on the competitiveness of the local market as compared with other countries. There are limitations and considerations (eg, need to take into account that small scale in Bermuda may lead to higher costs, also high cost of living in Bermuda also elevates cost of service provision). To some extent these factors can be accounted for – eg, by considering comparable countries and using PPP adjustments (where PPP measures are available) – but there must be an element of care taken in interpretation of results.
- **Churn**: churn is the percentage of the customer base that switches away from a firm in a given period, and can provide a more complete picture than market share. For example, market share could be stable even if churn is high. Data necessary to examine churn rates is not always available and are also some issues with the interpretation of churn – on the one hand high churn indicates low barriers to switching, but on the other hand high churn could also imply high customer dissatisfaction.

(m) Drawing conclusions on extent of unilateral market power

63. The RA takes the approach of examining a broad range of indicates so as to obtain as complete a picture as possible of the constraints on firms' behaviour in each market. Not all measures will be appropriate to all markets, and it makes sense to focus on those measures that are most relevant to each market rather than necessarily carrying out a comprehensive analysis of all measures when some are clearly not relevant (consistent with legislation).

4.2 Joint dominance

64. EC Act 23(3) requires that in examining whether two or more firms jointly hold SMP:

"the Authority shall consider, among other relevant factors, whether—

(a) the market is concentrated;

(b) each provider has a relatively high and stable market share;

(c) significant and enduring barriers to entry exist; and

(d) there are reasonable grounds for concluding that these factors, in combination with those set forth in subsection (2), give rise to a market structure that is likely to give rise to tacit coordination and thereby prevent, restrict or distort competition in the provision of products or services in the relevant market."

65. The RA's approach to examining market shares and trends has been discussed above (section 4.1(a)) as have barriers to entry (see 4.1(j)). Therefore, the discussion that follows focuses on market concentration measures and assessing the likelihood of tacit coordinating limiting competition.

(a) Market concentration measures

66. Market concentration can be measured in a range of ways including by examining:

- the number of firms in the market;
- market shares;
- the Herfindahl-Hirschman index (HHI) index of market concentration; and
- concentration ratios.

67. The HHI is calculated by summing the squares of the market shares, with the output of the measure ranging up to 10000 (ie, which occurs in the case of a monopoly). An HHI of 5000 is equivalent to that of a duopoly where shares are split equally, while an HHI of approximately 3300 is equivalent to the HHI that would occur in a triopoly where all three firms have equal market shares. A context in which market concentration measures such as the HHI are used extensively internationally is in the analysis of mergers. Therefore merger guidelines used by international competition authorities are a helpful reference point for the interpretation of concentration measures.

68. The US Department of Justice and Federal Trade Commission in the Horizontal Merger Guidelines state that in their experience they generally classify markets into three types based on concentration:

- Unconcentrated Markets: HHI below 1500
- Moderately Concentrated Markets: HHI between 1500 and 2500
- Highly Concentrated Markets: HHI above 2500.[348]

69. In the EU, the European Commission considers it unlikely that there would be horizontal competition concerns in a market where the post-merger HHI is less than 1000. For markets that have a post-merger HHI in excess of 1000 the Commission is more likely to identify horizontal competition concerns where the merger significantly increases the HHI. In particular, the Commission states that it is unlikely to identify competition concerns: (a) if the postmerger HHI is between 1000 and 2000 and the merger increases HHI by less than 250; and (b) if the post-merger HHI in excess of 2000 and the merger increases the HHI by

[348] U.S. Department of Justice and the Federal Trade Commission (August 19, 2010), Horizontal Merger Guidelines, p. 18.

less than 150.[349] However, it does note that there are some special circumstances. The Commission notes that: "In markets with cross-shareholdings or joint ventures the Commission may use a modified HHI, which takes into account such share-holdings."[350]

70. In Australia, the ACCC states that when assessing mergers it may have regard to a range of concentration measures including concentration ratios and the HHI. It generally considers that it is less likely that horizontal competition concerns will arise when:

- the post-merger HHI is:
- less than 2000, or
- greater than 2000 with a delta less than 100[351].

71. In New Zealand, the Commerce Commission makes use of the 3-firm concentration ratio to set a safe harbours rule for mergers which is used to screen out those mergers that are unlikely to raise competition concerns. It uses as a threshold of 70% (that is, the sum of three largest market shares must be less than 70%) as long as the merged firm has a combined market share of less than 40%.[352,353]

(b) Tacit coordination and effects on competition

72. Tacit coordination between firms in a concentrated market occurs when there is an implicit agreement between firms to restrict competition. This behaviour does not involve an explicit agreement but rather can result from firms determining their commercial strategies by using expectations about how rivals will respond. Over time, in a market where there are ongoing barriers to entry and a lack of countervailing buyer power, firms repeatedly observe how their rivals react to price changes and other commercial activity. This can effectively allow the firms to reach an implicit understanding to limit the degree to which they compete. Means of coordination other than through price include coordination on output levels, or, especially where there is product differentiation, dividing the market between the firms which can occur by partitioning the market by customer segment or geographic area.

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[349] European Commission (2004), "Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings", *Official Journal of the European Union*, para 19-21.

[350] Ibid, footnote 25

[351] Australian Competition and Consumer Commission (November 2008), *Merger Guidelines*, p. 37.

[352] Where the combined firms have a market share of less than 20% then the Commission takes the view that the acquisition is unlikely to substantially lessen competition even if the three-firm ratio is in excess of 70%.

[353] New Zealand Commerce Commission, Mergers and Acquisitions Guidelines, p. 25.

73. In order for tacit coordination to occur, it must be the case that firms can observe the actions of other firms. High transparency of information on pricing and other aspects of commercial activities is conducive to coordination. This is necessary both for firms to observe patterns of competitive responses in order to develop a coordinated approach but is also necessary so that each firm can monitor whether rivals are adhering to the implicit agreement.

74. A second condition for tacit coordination is that there must be a means for retaliation if one firm deviates from the implicit agreement. This could simply occur through the initiation of a price war.

75. As noted above, an important further condition for tacit coordination is high barriers to entry and a lack of countervailing buyer power. If entry is possible, or if there is a fringe player that is able to compete aggressively (sometimes referred to as a "maverick firm") then competition from entrants or the maverick firm could disrupt coordinated activities.

76. Additional factors which can affect the likelihood of tacit coordination occurring include the following:

- Structural links between firms: Structural links such as cross-ownership can facilitate coordinated behaviour by reducing the gains from deviating from an implicit agreement. Joint ventures can also increase the ability for retaliation.354
- Maturity of market: In a mature market, entry which is disruptive to coordinate activity is less likely.
- Product differentiation: The effect of product differentiation is somewhat ambiguous. Product differentiation can make tacit collusion less likely because the product variation makes it hard for suppliers to agree on the profit maximizing price. On the other hand, the product variation reduces the level of competition because the products are not direct substitutes.
- Elasticity of demand: where demand is inelastic, firms have a greater incentive to increase price to obtain higher profits.
- Market growth: As the ERG highlights, the effects of the rate of market growth are ambiguous. While firms may be more likely to deviate from an implicit coordination agreement where demand growth is strong, future gains from coordination increase where demand is growing strongly.355
- Excess capacity: As explained by the ERG:

  > *Absence of excess capacity would tend to make it easier to maintain an anti-competitive agreement, as providers would*

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354 Patrick Rey (August 2002), *Collective dominance and the telecommunications industry* p. 12.

355 European Regulator's Group (September 2005) *Revised ERG Working paper 1 on the SMP concept for the new regulatory framework,* para 29.

not have an incentive to deviate from an agreement by using their excess capacity to produce at a lower price, and in so doing make more profit overall.[356]

[356] *Ibid*, para 35

IMPLEMENTATION OF ELECTRONIC COMMUNICATIONS ACT 2011
ADVISORS' PRELIMINARY RECOMMENDATIONS

Pre-Consultation:

Market Review Process (Part B) -- Significant Market Power

Pre-Consultation Document

Reference: PC12/03-B

Date: 10th October 2012

Closing Date: 21st November 2012

NOTICE

PURPOSE OF PRE-CONSULTATION PROCESS AND DOCUMENTS

This pre-consultation document has been prepared by a team of legal, regulatory and economic advisors retained by the Government of Bermuda to assist in implementing the provisions of the Electronic Communications Act 2011 ("ECA").

The purpose of this pre-consultation is to provide industry participants and the general public with an opportunity to comment on the advisors' preliminary recommendations and, where possible, to focus on key issues so that the Regulatory Authority can conduct a more efficient and productive consultation process when it begins operations in January 2013. All references to "consultation" in this document should be construed as "pre-consultation," that is, as the preliminary draft of a future consultation document. The responses to this pre-consultation will be important inputs in the preparation of the consultation document, on which the Regulatory Authority will request and consider comments, prior to issuing a preliminary decision, order and general determination proposing to designate operators as having significant market power in one or more relevant electronic communications markets.

For the avoidance of doubt, the analysis, conclusions and proposals contained in this pre-consultation document are preliminary in nature and have been developed by the Government's advisors. Notwithstanding any references to the "Regulatory Authority" in this pre-consultation document, the preliminary analysis, conclusions and proposals set forth herein do not in any way bind the Regulatory Authority, the Government or its advisors.

FILING INSTRUCTIONS

Responses to this pre-consultation document should be submitted in MS Word or Adobe Acrobat format by email to reform@gov.bm no later than 6:00 PM on 21 November 2012. All comments should be clearly marked "Response to Pre-Consultation Document PC12/03: Comments on Market Review Process." Commenting parties submitting information that is confidential in nature should refer to Part A, Paragraph 14 of the pre-consultation document.

Table of Contents

1 SMP – INTRODUCTION

396. §2 of the EC Act defines SMP to be:

> *a position of economic strength in the relevant market or markets that affords an undertaking, either individually or jointly with others, the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers, which may provide the basis for the imposition of ex ante remedies.*

396 §23(2) and §23(3) of the EC Act set out criteria that the RA may have regard to when assessing whether SMP exists in a given market. Appendix G provides a discussion of those criteria and how the RA interprets them, as well as other indicators that the RA considers can aid in the identification of SMP. The appendix discusses both: (1) criteria related to unilateral market power (also sometimes referred to as single-firm dominance); and (2) the additional criteria used to determine whether there is collective (or joint) market power.

397 The following sections apply the SMP criteria to each of the following sets of markets:

(a) Fixed narrowband access and voice services (section 2) – including the retail and wholesale markets for access and local calls, and the wholesale markets for call and termination on fixed networks;

(a) Broadband services (section 3) – covering retail and wholesale services;

(b) Mobile services (section 4) – including retail mobile services, wholesale MVNO access, wholesale call origination for international calls, and wholesale call termination on mobile networks;

(c) Leased line services (section 5) – retail low-speed leased lines, retail high-speed leased lines, wholesale terminating segments of low speed leased lines, and wholesale terminating segments of high-speed leased lines;

(d) Infrastructure services (section 6) – for facilities used to construct fixed and wireless access networks; and

(e) Subscription TV services (section 7) – including the retail and wholesale markets.

2 SMP – FIXED NARROWBAND ACCESS AND VOICE

398 The market definition analysis carried out in Part A Section 6 found the relevant markets for fixed narrowband access and voice services to be:

(a) three retail markets for access and local calls;

(b) two geographic markets for wholesale fixed narrowband access and local calls.

(c) two geographic markets for the origination of international calls on fixed lines; and

(d) markets for the termination of calls on individual fixed networks.

399 This section examines for each of these markets whether there is one or more firms that holds SMP. It first considers in Section 2.2 the retail access and local call markets and tentatively finds that BTC holds SMP in each market. Section 2.3 examines the wholesale access and local call markets and concludes that BTC likely holds SMP in each market. Section 2.4 examines the wholesale markets for the origination of international calls and comes to the preliminary conclusion that BTC holds SMP in the relevant markets. Section 2.5 finds that each fixed network operators likely holds SMP for termination of calls on its network.

2.2 Retail access and local calls

400 This section examines the following markets for retail access and local calls:

(a) A market for the supply of retail fixed access lines and local calls to residential customers, covering all areas of Bermuda excluding Southside;

(b) A market for the supply of retail fixed access lines and local calls to business customers in Central Hamilton; and

(c) A market for the supply of retail fixed access lines and local calls to business customers outside of Central Hamilton and Southside.

401 As was discussed in Part A, Section 5.2, the RA is of the view that the fixed access and local call markets include other fixed network technologies, such as cable and fixed wireless, but does not include mobile technologies.

(a) Suppliers and market shares

i) Residential access line shares

402 In the residential customer market, BTC currently faces competition from NRC, which provides VOIP access via its WiMax network. NRC's share of access line subscribers has to date been very small. The resulting market shares of BTC and NRC are contained in Figure 1. BTC's subscriber share of 97% lies well above any market share threshold used internationally for identifying significant market power. The height of BTC's access line share and the fact that it is only very slowly declining at a rate of around 1 percentage point per annum indicates that BTC is likely to have SMP in the retail provision of access lines and local calls to residential customers, although examination of other factors is necessary especially to take a forward look

as to whether there are future changes that are likely to alter BTC's position and the competitive pressures it faces.

Table 1: Residential market share as a percentage of total fixed residential access lines (2006-2011) [CIC

	2006	2007	2008	2009	2010	2011
BTC						
North Rock						

CIC] Source: Confidential data provided by carriers to the RA:

403 Parenthetically we note that while we have excluded mobile wireless from the residential fixed access line market, the addition of mobile wireless service would have little impact on our conclusion. At one time, the United States Federal Commission included wireless only households in the same market as households that subscribe to fixed wireline services.[1] The wireless subscribers used in the U.S. calculation were served by mobile, not fixed, wireless service.[2] These are households which are said to have "cut-the-cord."

404 We are unaware of any survey that has asked Bermudians if they are a wireless only household. The *Bermuda Omnibus* does ask households if they have wireline service. The following table reports the percentage of respondents that report that they have a landline at home.

Table 2: Survey results regarding percentage of respondents that have a landline connection

Date	Percentage of Respondents that Have Landline Phone at home
September 2009	94%
December 2009	96%
March 2010	95%
June 2010	95%
December 2010	95%
March 2011	97%
December 2011	94%

Source: *Bermuda Omnibus*

405 The values that appear in the table are the percentage of respondents who report that they have wireline service at home. In December 2011, the most recent time period for the survey, six percent of the households report that they do not have wireline service at home. This six per cent, in turn, is composed of two groups. First,

[1] United States Court of Appeals, Tenth Circuit, Qwest Corporation v. Federal Communications Commission, August 6, 2012, slip op., P.7. In this case, the Court accepted that it was not improper for the FCC to exclude wireless only households from the fixed wireline market.

[2] Center for Disease Studies, "Wireless Substitution," December 21, 2011, p.1, http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201112.pdf, p.1.

there are households with wireless service. Secondly there are households without any telephone service. Hence the available Omnibus data suggests that a *de minimis* percentage of households in Bermuda have chosen to cut-the-cord, that is, when at home, to rely exclusively on wireless service.

Figure 1: Residential market share as a percentage of total occupied dwellings [CIC

CIC] Source: Confidential data provided by carriers to the RA

406 Other data suggests that the extent of cord cutting could be significantly higher than suggested by the *Omnibus* survey results. As depicted in **Error! Reference source not found.**, above, confidential data provided by BTC suggests that the company supplied wireline phone service to no more than [CIC --%] of households as of March 31, 2012. As **Error! Reference source not found.** also illustrates, North Rock provides fixed access services to no more than another [CIC -%] of Bermudan households.[3] As we pointed out in the prior paragraph, of the remaining [CIC --%] of households, we do not know the split between wireless only and no telephone service households.

407 In any case, the data suggests that a significant percentage of households obtain service from BTC, even after taking into account homes that have "cut-the-cord," and therefore we will proceed to undertake a more in-depth analysis of the residential access and calling market.

ii) Business access line shares

408 There are three suppliers of access lines and local calls to business customers: BTC, NRC and QCL. As described above, NRC supplies customers using its fixed wireless network. QCL supplies customers using its fibre optic network which is primarily in Central Hamilton. The RA understands that NRC's network coverage is weakest in Central Hamilton due to the signal loss caused by brick buildings. Therefore, currently, in Central Hamilton there are essentially only two suppliers that business customers would use for fixed access and local calls: BTC and QCL. Outside of Hamilton (excluding Southside), there are also only two suppliers: BTC and NRC.

409 Market share statistics are not available on a geographically disaggregated basis. Looking at a national level, as is illustrated in Figure 2, below, at the present time BTC's share of business access lines is [CIC --%] with QCL having a [CIC -%] share of subscribers and NRC having, approximately, a [CIC -%] share of subscribers. BTC's very high market share, and the fact that it has reduced very little over time, indicate that it likely has SMP in the supply of fixed access lines and local calls to business customers. Given that QCL's network primarily serves Central

[3] A customer may have more than one line and therefore the ratio of households with BTC service may be lower than the value calculated above. Quantum is not operating in the residential market. Quantum response to Market nalysis data request, July 13, 2012, worksheet "Fixed Access and Broadband," line 1//.

Hamilton, QCL's market share in that area may be in excess of [CIC -%] (perhaps significantly) but to what extent is unknown because it is not known how many business lines exist outside Central Hamilton.

Figure 2: Business market share as a percentage of total fixed access lines [CIC CIC] Source: Confidential data submissions of the parties.

iii) Other measures of market share

410 The above discussion has focussed on suppliers' shares of access lines. The RA considers that the prevalence of bundles of access lines and local calls plus other services, such as broadband, complicates analysis of revenues because it becomes necessary to split bundle revenues using an allocation methodology. This process has the potential to distort market shares that are calculated on the basis of revenues. The RA therefore considers it more appropriate to rely on access line shares than revenue shares.

411 The RA has examined local calling volume data that it has collected from the parties, and has estimated BTC to have a share of approximately [CIC --%] of total outbound local calls from fixed lines, with NRC having a share of [CIC -%] and QCL having [CIC -%].[4] The data set is not disaggregated by residential and business customers. That BTC's share of domestic call minutes is approximately [CIC --%] strengthens the RA's view that BTC is likely to have SMP in the access and local call markets.

(b) Control over infrastructure not easily duplicated

412 In entering a retail access and local call market, an entrant must either purchase wholesale services from existing network providers or build its own customer access network. In the latter case, an entrant may either build a network from scratch or obtain access to some existing facilities, such as ducts, poles or towers, and utilise those when deploying its accompanying infrastructure.

413 Various submissions by the parties made during the course the RA's market investigation (especially those data request responses submitted by the parties in 2009 and 2010) highlighted that access to existing facilities or wholesale services was not at that time available for entrants (outside of Southside). The RA understands that this situation has not changed – that is, that there are no commercial arrangements

[4] This was calculated using data provided by BTC, QCL and NRC on the number originating calls and call minutes that terminated on a domestic fixed or mobile network. The number of on-net domestic calls for QCL (ie, calls that both originate and terminate on the QCL network) was unavailable. Therefore, the RA estimated QCL's on-net traffic by assuming that QCL's ratio of on-net to off-net call minutes is the same as that for NRC. The RA applied this assumption by calculating the NRC's ratio of on-net to off-net call minutes, and multiplying that ratio by QCL's number of off-net call minutes to estimate QCL's on-net minutes.

for access to existing fixed access networks in the form of wholesale services or access to specific facilities (such as poles, towers, and ducts) aside from: (1) the sharing of some poles, ducts, and towers; and (2) the provision of duct space, access to copper pairs, access to fiber, cross connect facilities, and co-location space by BLDC in the area of Southside. Therefore, as things stand, unless it can commercially negotiate an agreement with existing network owners, an entrant to the Bermudan markets (outside of Southside) needs to largely deploy its own access network.

414 In doing so, the entrant faces a number of substantial obstacles. Laying a fixed copper or fibre access network in the absence of access to existing ducts and/or poles involves carrying out trenching which is costly and involves obtaining permission to dig up driveways, roads and pavements. A number of parties commented on this point in the various data request responses that have been submitted during these proceedings.[5]

415 An alternative is to deploy a fixed wireless network which is the approach taken by NRC. New entry and expansion of fixed wireless access networks is limited by access to spectrum and towers. Limited access to existing towers combined with a moratorium on new tower construction is a significant obstacle to further development of fixed wireless networks. Furthermore, the existing fixed wireless provider has not captured a significant share of the market. A small market share drives up unit costs.

416 In the RA's view, given the substantial difficulties and high sunk cost associated with deploying either a fixed network or a fixed wireless network, there are high barriers to duplicating network infrastructure. No commercial wholesaling has occurred to date outside of Southside and it is unclear that the networks would have the incentive to engage in wholesaling in future. The contrast between the availability of access to copper in Southside and the lack of a similar wholesale arrangement elsewhere may well be due to BTC's interest in retaining retail customers.

417 The RA notes that BTC's network is not the only fixed access network in Bermuda. BCV has deployed a network that could, with the introduction of the ICOL and investment on the part of BCV, be used to supply voice connections. The RA also notes that BCV has previously expressed the view that all structures are economically duplicable, and that alternative views reflect a lack of knowledge of networks, risk and customer demand.[6] The RA considers that a strong knowledge of these factors may allow an entrant to enter in some customer segments or niches (for example – the entry of QCL in the area of Hamilton where there is a high concentration of business customers). Clearly BCV has developed its own nation-wide network. Furthermore, LinkBermuda has announced its intention to extend QCL's fibre network to throughout

[5] For example, the responses of QCL, NRC and ECL to the RA's qualitative data request of May 2009 referred to many of the obstacles touched upon in this paragraph.

[6] Response of June 16, 2012 by BCV to the *Class A, B, C Carriers Qualitative Questions* data request issued by the RA in May 2009.

the country.[7] The lack of wholesaling activity outside of Southside does imply that BTC's control of the access infrastructure affords it a position of power in the retail access and local call markets, particularly outside of Central Hamilton. While entry into the residential retail access markets may occur by BCV, and by LinkBermuda, it is unclear: (a) if there is a significant likelihood this will happen in the near future, especially absent local number portability; and (b) whether wholesaling would result from what could effectively be a duopoly (i.e., BTC and BCV) with a fringe player (NRC), in which there exists cross-ownership between the two duopolists (BTC and BCV).

418 The above discussion has focussed on duplication of the customer access network needed to provide access and local calling services. In addition to the customer access network, an entrant must also obtain access to domestic transmission (for example, to link up its local exchanges/aggregation points) and carry out retailing functions. It appears that there is a significant amount of competition in the provision of domestic transmission services. In addition, it does not appear to the RA that there is significant non-duplicable retailing infrastructure that would confer to BTC (or any other access supplier) a position of SMP.

(c) Technological advantages

419 The three technologies currently being used to supply access lines are: copper (BTC), fixed wireless (NRC) and fibre (QCL). Potential entry could occur via BCV's cable network, or some other medium, such as fiber-to-the-home.

420 It is possible that fixed wireless networks have some technological disadvantage as compared with fixed copper, cable or fibre networks. To date the success of the NRC WiMax network in competing with fixed technologies in the retail fixed access and local call markets has been fairly limited. It is, however, difficult to attribute this to solely to technological differences because it is likely that the need for customers to change their phone number when switching access provider has substantially constrained the ability of NRC to make significant inroads into BTC's market share. As was examined in detail in Part A, section 5.2 the functionality of the voice service offered over NRC's WiMax network is similar to that provided over fixed networks. However, fixed wireless technologies such as WiMax are susceptible to attenuation from physical obstacles as well as interference from other wireless devices, which affects availability, reliability and consistency of service to at least some extent. Previous submissions to the RA generally expressed the view that fixed wireless services are unlikely to supplant the position of fixed networks.[8]

421 The RA considers that fixed networks likely do have a technological advantage over fixed wireless networks. It also considers that customer perceptions

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[7] See, Marina Mello, "LinkBermuda aims to take Bermuda's internet service to a higher level", *The Royal Gazette*, 26 September 2012. Available at http://www.royalgazette.com/article/20120927/BUSINESS/709269905, viewed 27 September 2012.

[8] This view was expressed by both NRC and QCL in their June 2009 submissions in response to the *Class A, B, C Carriers Qualitative Questions* data request issued by the RA in May 2009.

of alternative technologies (such as fixed wireless) can also be a hindrance to take-up, and at least slow the rate of take-up. That is, with fixed networks being the norm for home and business connections, customers will be hesitant to switch to an unproven technology that does not have the trusted and lengthy reputation of fixed wireline networks.

(d) Access to capital

422 The construction of an electronic communications network requires a significant amount of capital. Along with other businesses in Bermuda, telecommunications companies are subject the 60/40 Bermudian ownership rule. There are however several exceptions within the telecommunications industry where the Minister of Finance, after consultation with the Minister responsible for telecommunications, has granted exemptions to individual companies. The exempted companies contended that they needed access to international financing in order to build and grow their businesses.

423 We anticipate that the Government will continue to exhibit flexibility in this area, as illustrated by the recent steps taken by the Government to ease the granting of 60/40 exemptions,[9] and therefore we do not anticipate access to capital as being a barrier-to-entry.

(e) Vertical relationships

424 All three existing suppliers of retail fixed access and local calls are vertically integrated – that is, they all use their own network rather than a wholesale service purchased from a third party to provide retail access services. As will be discussed in more detail below, introduction of ICOL will likely mean that there is an increased interest from entrants in obtaining wholesale access services to enter into the supply of retail access lines, in particular so that providers of other services (such as international calling) can bundle their services with fixed access lines.

425 As mentioned in section 2.2, wholesale services (whether in the form of resale or access to facilities such as ducts) are not currently available except in Southside. As also mentioned above, the differing approach of BTC and BLDC in this respect could also reflect the commercial importance to BTC in retaining retail customers rather than eroding its retail revenues by allowing entrants to compete using a BTC wholesale service. It is not clear from parties' submissions to what extent entrants have actively sought to engage with BTC to attempt to commercially negotiate terms of access. Therefore, it is unclear whether BTC has actually refused to supply wholesale services/facilities access or alternatively offered terms of supply that were deemed unreasonable by its competitors.

426 Looking to the future, if a wholesale service were made available (whether by regulatory mandate or through commercial negotiation), vertical concerns that may arise relating to SMP in the retail market include margin squeeze issues and discrimination on non-price terms.

[9] http://www.royalgazette.com/article/20120917/BUSINESS03/799999957.

(f) Economies of scale & scope and bundling

i) Economies of scale

427 Minimum efficient scale can create a barrier to entry where there are large fixed costs. A company operating at a small scale will have high unit costs relative to a supplier who serves a large share of the market. In the provision of access and local calls there are:

(a) Very significant fixed costs associated with building an access network; and

(b) Fixed costs associated with retailing – such as marketing/branding.

428 It seems likely to the RA that economies of scale are a factor that does constrain entry in Bermuda, particularly facilities-based entry. In a country that has approximately 40,000 residential and business access lines, it is to be expected that the number of viable players in the market will be limited, particularly with respect to network deployment.

ii) Economies of scope

429 There are clear economies of scope associated with the supply of access lines/local calls and other electronic communications services. For example, it is unlikely that a firm would enter the retail market for the sole purpose of supplying access lines and local calls. Instead, access services and local calls are likely to be provided in conjunction with another core service (such as broadband, leased lines or television content). The extent to which economies of scope can currently be achieved is somewhat limited under the existing licensing regime. However, in future under the ICOL increased efficiencies will be achievable by firms expanding their service range or by increased integration between licensees that share common ownership. For example, (1) BCV may choose to supply voice access and potentially also international calls, which would allow it to spread its customer acquisition costs, connection costs and common network costs across a larger range of services; and (2) KeyTech may integrate operations of some or all of its fully-owned subsidiaries to achieve cost savings.

430 Economies of scope, themselves, are not problematic and can provide important cost savings which can, in the right competitive setting, be passed on to consumers in the form of reduced prices. Therefore, the important question in respect of SMP is not simply whether economies of scope exist, but whether some players are likely to achieve such great economies of scope that it strengthens their market power.

431 All participants in the access and local markets have at least some ability to jointly provide a range of services. It may well be that the KeyTech group is in the best position to achieve economies of scope. However it is possible that collaboration or mergers could occur between other carriers. The RA considers that economies of scope, while they will be more achievable by some suppliers than others, are not

likely a key limiter of competition. In the next section we turn to a related issue, the ability to bundle.

iii) Bundling

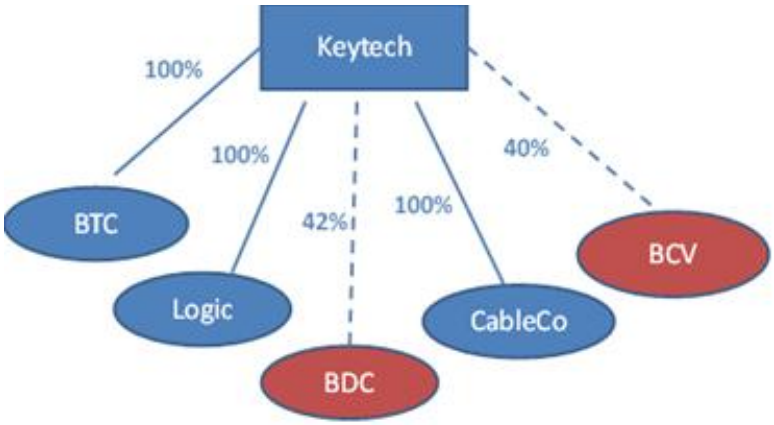
432 Bundles of access, local calls and other services that offer customers a cheaper price than if there were to purchase the services separately already occurs to a degree. For example, a customer wishing to purchase unlimited local calling, DSL 4 Mbps access, and a suite of calling features[10] would pay $118 per month to BTC or $94.90 per month to NRC if purchasing all these items separately. Alternatively, a customer could purchase these items as a bundle which would reduce the BTC price by 16% (to $99 per month) and the NRC price by 5% (to $89.95 per month). Bundling has the potential to provide benefits to customers in the form of added convenience (i.e., of not having to shop for individual products) and by passing on the cost savings of jointly supplying services. However, as is discussed in Appendix G, bundling can be a means through which firms are able to leverage a position of market power from one market to another, or more generally, offer a bundle that cannot be contested by other players.

433 A number of past submissions directly raised the issue of the Keytech group's ability to offer wide service bundles once the ICOL is implemented. BTC, Logic, and CableCo are wholly owned subsidiaries of Keytech (see **Error! Reference source not found.**).[11] Keytech also holds a substantial, but not a majority, number of CellOne and BCV shares Therefore, once the ICOL is in place Keytech may choose to either integrate some or all of these subsidiaries, or at least increase the level of coordination between them, allowing the provision of bundles that include access and local calls, long-distance calls, broadband access and ISP service, mobile services and potentially also Pay TV.

[10] The calling feature suite includes: call waiting with caller ID, caller ID deluxe, call forwarding, three-way calling, and voice mail.

[11] Data concerning Keytech's subsidiaries appearing in **Error! Reference source not found.** are taken from *Unlocking a World of Connections—Annual Report 2012*, Keytech, Ltd. Data concerning CellONE is drawn from page 6 of that report, while data for BCV is take from page 43.

Figure 3: Keytech Group



434 Two types of concerns regarding bundling of access lines and local calls with other services can be identified:

(a) The concern that competition in the access and local call market would be lessened as a result of BTC being the only player that can bundle services such as mobiles with access lines. This could potentially be addressed by access line suppliers teaming up with the competing mobile networks to offer packages.

(b) The concern that SMP in the access and local call markets could be leveraged into other markets such as broadband, long-distance or mobile services. Given BTC's very high and sustained market share in the access and local call markets this is potentially a more significant issue. This is an issue that is especially relevant to the RA's choice of regulatory remedies.

(g) Barriers to entry and expansion

435 Many of the key barriers to entry have already been discussed above – in particular, barriers to entry associated with investing in network infrastructure are explained in II.A.2. Further important barriers include switching costs and customer inertia.

i) Switching costs

436 Switching costs include the cost of purchasing new equipment and of installation: each of the three networks that provide access lines do so using different technologies (copper, cable and WiMax) and when a customer (whether residential or business) opts to switch supplier new customer premise equipment (CPE) is required. This is often subsidised by the supplier – for example, NRC has chosen to fully subsidise the cost of the CPE so that the customer faces no connection or CPE charge. Even with a free connection and CPE the customer still faces the inconvenience of installation – such as having to be home when technician arrives – as well as the unsightliness of external equipment such as antennae and internal equipment/extra sockets and wiring. Customers switching to cable or WiMax also

need to incur the cost of purchasing a back-up power supply in order to have access to service in the event of a power outage.

437 A further set of switching costs relates to the need to change phone number when switching access line provider. These costs include: the inconvenience and administrative expense associated with having to let contacts know of changed number; potential for missing important calls (results in lost business for business customers and inconvenience for residential customers); cost for businesses of changing signage, office stationery, websites and so on. As highlighted by QCL, some business customers also must incur the costs of specialist PBX vendors to re-engineering office switches and make configuration changes for SIP/TDM interfaces. Although number portability which allows customers to retain their number when switching access provider will be introduced, it is likely still one year away and even once it is in place it takes time for customers to understand that they will then be able to keep their number – that is there can be a substantial lag in take up of number portability.

438 These switching costs reduce a customer's willingness to switch suppliers.

ii) Customer inertia

439 In addition to the explicit costs associated with switching, an additional barrier to entry and expansion that entrants have to overcome is a general reluctance to switch. This might be because of the hassle of changing supplier (for example, the need to fill in paperwork and change existing payment arrangements), the time required to select a supplier (for example, comparing suppliers and their prices) and understanding different technologies. In addition, perceptions rather than actual facts can be an important determinant of customer's supplier selection – customers are more likely to hear horror stories about alternative service providers and technologies than the more mundane stories about good service. Therefore, there can be a general reluctance to switch to new technology, especially where it is unproven. The high market share of BTC observed in section 2.2 is consistent with high customer inertia.

440 As highlighted by QCL, term contracts are another factor that can hinder switching. In its July 2009 submission QCL states "Customers have been prohibited from switching to services provided by Quantum as a result of long term contracts which they may have engaged with other parties." As explained in Part A, Appendix G the mere existence of long term contracts does not necessarily form a significant barrier to entry as long as there are sufficient customers that are out of contract at any one time that entrants can contest in order to achieve economies of scale.

iii) Regulatory and legal barriers

441 A legal barrier that has already been mentioned is the restriction on ownership. In particular, at present telecommunications providers in Bermuda can have no more than 40% foreign ownership unless an exemption is granted. This may make it difficult for large multinational carriers to enter the Bermudan markets, and limits the amount of capital available to other firms wishing to enter. Overall though, as stated in II.A.4 , we anticipate that the Government will continue to exhibit flexibility

in this area and therefore we do not the ownership restriction to seriously impede the competitive process.

442 As discussed in Part A, section 4.1 the licensees of one Class are currently unable to provide services that fall outside the class. The introduction of the ICOL means that this restriction will eventually disappear.

443 Firms not already providing electronic communications services will not be able to obtain an ICOL for a period of at least one year. The Act states that no earlier than one year of the date of commencement can the Minister direct the Authority to investigate the merits of issuing additional ICOLs. The Authority's recommendation will be passed onto the Minister for final resolution.[12] This section of the law, while a barrier-to-entry, is not likely to be a major impediment to the competitive process because of the substantial number of firms that will receive ICOLs.

444 Moratoriums on tower construction and works are also significant legal barriers to entry and expansion as discussed in section 1)(b).

(h) Other structural factors

i) Countervailing buyer power

445 There is little scope for mass market customers (that is, residential and small business customers) to have countervailing buyer power. Some large business/government customers could potentially exercise countervailing buyer power because: (1) their large expenditure means that they are individually important to telecommunications providers; and (2) some may be able to use leased lines to carry traffic between sites over a private network as an alternative to purchasing access lines. However, the number of customers that do have countervailing power is small and is unlikely to have a significant effect on the broader business customer market.

ii) Potential entry

446 BCV will be a potential entrant into the fixed access line and local call markets once it obtains an ICOL. BCV could use its existing cable network infrastructure although some investment would be required. That BCV is 40%[13] owned by Keytech which also wholly owns BTC, potentially limits BCV's incentives to enter and compete aggressively with BTC. However, the RA notes that Keytech is not BCV's major shareholder. Therefore, the extent to which BCV places a strong competitive constraint on BTC is unknown though it is likely that, in any case, many customers will be reluctant to switch until number portability is in place.

447 If an entrant attempts to build a wireless network, it will face the constraint of the tower moratorium, and would also require spectrum. If an entrant builds a wireline

[12] Electronic Communications Act 2011, Sec. 75.

[13] See page 43 of Keytech's *Annual Report 2012*.

network, it would need to obtain access to the existing poles and conduit, or install its own infrastructure, and negotiate the deployment of drops into the homes of its future customers. These obstacles are formidable, but not impenetrable barriers. LinkBermuda has announced that it intends to build a fibre optic network throughout the Island in the coming 18 to 24 months.[14]

iii) Competition from other technologies

448 BTC expresses a strong view in its submission of June 12, 2009 that access to local voice services is highly competitive given competition between fixed wireless providers (North Rock, CellularOne's The Yak), mobile wireless providers (M3 Wireless, CellularOne, and Digicel) and fixed line providers. As was discussed above in Part A, section 5.3, the RA considers that while there is some competitive constraint from mobile services, fixed services offer additional benefits and for a wide range of customer calling profiles are significantly cheaper than mobile services.

449 BTC also points out that there is additional competition for calling from Skype and Vonage. The extent to which these services place a competitive constraint on access and local calls depends on the customer having access to a broadband connection, a device that enables use of the Skype or Vonage service (for example, a computer with Skype installed, certain types of TVs and mobile phones, or a VOIP phone adapter). The RA considers that at this point in time services such as Skype and Vonage do not provide a substantial competitive constraint on BTC in the fixed access and local call market. For example, a household cannot obtain from Vonage a local telephone number.

(i) Market outcomes and conduct

450 One market outcome measure that can provide information on the extent to which a firm is competitively constrained in its behaviour is the price differential between the firm and its rivals. Table 3 contains BTC's residential access line and local call price offerings which range from the Residential Basic plan that provides an access line and 50 local calls for $26 per month up to the Unlimited plan that provides customers with an access line and unlimited local calls for $59 per month. NRC does not offer a standalone product for access and local calls, but instead provides customers with a bundle of broadband, an access line and local calls. NRC's offer is priced at $49.95 for the package that includes 1Mbps broadband access and $79.95 for the package that includes 4Mbps broadband access. It seems clear that NRC's pricing is not having a significant constraining effect on BTC's prices, given that BTC has chosen to set its price for its Unlimited package at a price which is 15% high than NRC's unlimited calling package, even though NRC's package also includes a 1Mbps broadband connection.

[14] http://www.royalgazette.com/article/20120927/BUSINESS/709269905

Table 3: Comparison of BTC and NRC charges for customer purchasing an access line but no broadband

Residential package	BTC monthly fee	NRC Monthly Fee
Residential Basic (Access line + 50 calls)	$26.00	
Residential 100 (Access line + 100 calls)	$35.00	
Residential 150 (Access line + 150 calls)	$45.00	
Residential (Access line + 200 calls)	$55.00	
Unlimited (Access line + unlimited calls)	$59.00	$49.95

Notes: (1) BTC charges 20c per call for all local calls that are in excess of the free call allowance.

451 In order to carry out a like-for-like comparison of BTC's and NRC's pricing, Table 4 calculates the price differential between the prices of bundles that include access, local calls, broadband access and, in some cases, vertical services. This shows that BTC's pricing is in the range of 9% to 36% in excess of NRC's. Although this comparison relates to a bundle that includes broadband, and so is affected by the competitiveness of the broadband market, it does indicate that BTC is not strongly constrained by NRC in the residential market for access and local call services.

Table 4: Comparison of BTC and NRC charges for customer purchasing a bundle of an access line, unlimited local calling and broadband

BTC Bandwidth (Downstream/ Upstream)	BTC monthly fee	BTC Vertical services included	NRC monthly fee	NRC bandwidth	NRC vertical services	Price differential =(BTC-NRC)/BTC
1Mbps/1 Mbps	$78.00	None	$49.95	1Mbps	None	36.0%
4Mbps/1 Mbps	$89.00	None	$79.95	4 Mbps	None	10.2%
4Mbps/1 Mbps	$99.00	Call Waiting with Caller ID, Caller ID Deluxe, 3-Way Calling, Call Forwarding, Voice Mail	$89.95	4 Mbps	Deluxe line caller display, voicemail, 3-way calling, call waiting, call forward	9.1%
6 Mbps/1 Mbps	$109.00		No comparable plan available			
6 Mbps/1 Mbps	$119.00	Call Waiting with Caller ID, Caller ID Deluxe, 3-Way Calling, Call Forwarding, Voice Mail				

452 For business customers, BTC charges $32 for a basic access line, which includes 50 local calls. In comparison, Quantum charges $56.50 per month for an access line with unlimited local calls.

(j) Conclusions on SMP in retail access and local call markets

453 The above analysis has found:

(a) extremely high market shares reflect a number of key barriers to entry including substantial difficulties in replicating infrastructure;

(b) a lack of access to wholesale services or facilities;

(c) technological advantages of fixed networks over fixed wireless; and

(d) high switching costs and customer inertia.

454 This is the case for all of the retail fixed access and local markets that were included in the initial Candidate Market List, although the ability to replicate infrastructure appears to be somewhat higher in Hamilton. Looking forward over the period of the current market review it is expected that customer switching costs will fall to some extent with the introduction of local number portability. Furthermore, BCV and/or LinkBermuda will likely enter this market. A further expected change is that the new licensing regime means that BTC/Keytech could offer bundles that other licensees could not match.

455 In the light of the above findings and the underlying detailed analysis conducted, the RA tentatively finds that BTC holds SMP in the retail access and local markets. To the extent that market reviews of the relevant wholesale markets find SMP exists and leads to wholesale regulation, the RA consider that retail SMP is likely to continue to exist for at least part (and perhaps all) of the period covered by the review. This is because LNP will not be operational for at least a year, and even then it will take time for customers to be aware or to complete existing contracts with BTC. In addition, it also takes time to overcome general customer inertia. The market in Central Hamilton seems increasingly competitive and it may be that a lower level of regulatory intervention is required in that market.

2.3 Wholesale access and local calls

456 The market definition analysis found two geographic markets for wholesale fixed narrowband access and local calls: one for Central Hamilton and one for other areas of Bermuda. A number of the reasons discussed above in the context of retail access and local calls imply that BTC likely holds SMP in both geographic markets for wholesale access and local calls. In particular:

(a) There are very high barriers to entry, including high sunk costs of deploying a customer access network;

(b) Technological advantages of fixed networks over fixed wireless mean that fixed wireless services do not appear to effectively competitively constrain the provision of fixed services; and

(c) Vertical integration of networks means that there is little incentive to supply wholesale services to third parties in the absence of regulatory intervention.

2.4 Wholesale origination of international calls on fixed lines

457 The market definition analysis finds two geographic markets for the origination of international calls on fixed lines. The service of wholesale origination is currently provided under regulatory mandate. Provision of this service requires access to a customer access network. Therefore, the same considerations apply as in respect of the wholesale narrowband access and local calls. As a result, the RA tentatively finds that BTC holds SMP in the market for wholesale origination of international calls on fixed lines, in both geographic markets.

2.5 Wholesale termination on individual fixed networks

458 The market definition analysis concluded that there are likely separate markets for the termination of calls on individual fixed networks. As explained in the Candidate Markets Notice (para 36):

> *The definition of a separate termination market for each network is consistent with the approach taken in the EU and reflects that each supplier of termination has a monopoly over termination on that network. The RA considers that the extent of SMP in the termination market of an individual network will be uniform across all areas covered by that network and therefore the geographic aspect of the termination markets will be determined by the coverage of each network.*

459 The RA therefore tentatively concludes that, by definition, each supplier has SMP in the market for termination of calls on its fixed network.

3 SMP – BROADBAND SERVICES

460 The market definition analysis identified three retail broadband markets and two wholesale broadband markets. Section 3.1 examines whether any operator has SMP in the retail broadband markets and Section 3.2 turns to the analysis of SMP in the wholesale broadband markets.

3.1 Retail broadband SMP analysis

461 This section examines the following markets for fixed broadband:

(a) A national market for the supply of retail broadband services to residential customers, excluding Southside;

(b) A market for the supply of retail broadband services to business customers in Central Hamilton; and

(c) A market for the supply of retail broadband services to business customers outside of Central Hamilton and Southside.

462 As was discussed in Part A, Section 5.2, the RA is of the view that the fixed broadband markets include other fixed network technologies such as cable, fibre and fixed wireless but do not include mobile technologies. It was also concluded that the relevant market includes the bundle of broadband access and ISP services.

(a) Suppliers and market shares

i) Residential market

463 There are currently three suppliers of fixed broadband access to residential customers in Bermuda, with each supplier using a different technology. BTC supplies ADSL over its copper network and currently provides a maximum speed of 10 Mbps. BCV supplies broadband access of up to 8 Mbps over its fibre network.[15] NRC supplies connections with 4 Mbps bandwidth over its fixed wireless network.[16]

464 As Table 5 illustrates, the market shares of the two largest suppliers has been converging over time. BTC's market share of subscribers has declined steadily over the past several years and now stands at [CIC --%] of all fixed broadband access lines. As is also illustrated in Table 5, BCV's market share has been steadily increasing over the years to the point where it now stands at [CIC --%] of all fixed broadband access lines. NRC's market share has remained fairly static, in the range of [CIC ---%].[17]

Table 5: Share of residential fixed broadband subscribers, 2007 to 2011 [CIC

Company	2007	2008	2009	2010	2011
BTC					
BCV					
NRC					

CIC] Source: Confidential data provided by carriers to the RA.

465 The above analysis focuses on the subscriber share of broadband access lines. Currently broadband access is provided separately from Internet access and services, except in the case of NorthRock which provides the bundle of services over its wireless network. As discussed above, the RA considers that the relevant market includes both broadband access lines and the provision of Internet access and services and that in future consumers will increasingly choose to purchase these

[15] It should be noted that BCV has been granted authority to roll out 15 and 25 Mbps access services.

[16] The maximum speeds mentioned here are those reported on the BTC, BCV, and NRC websites as viewed on September 19, 2012. These speeds have also been reported in the various data responses the parties have submitted to the RA during the course of its investigations.

[17] As of 2011 approximately 71% of households subscribed to broadband access services provided by either BTC, BCV, or NRC.

services as a bundle. In the absence of a wholesale broadband service it seems likely that market shares of Internet access and services will approximately converge to the market shares of broadband access. Therefore, it is the RA's view that the share of broadband access lines is more relevant to the current analysis than shares of Internet service provision.

466 An issue to consider in interpreting the subscriber shares presented in Table 5 is that BTC and BCV have common ownership: KeyTech fully owns BTC and holds 40% of outstanding shares in CableVision Holdings, Ltd. the holding company of which BCV is a part. BTC and BCV appear to be run independently with separate management structures. Keytech does not have management control of BCV. Even so, the shared ownership has implications for the incentives for the two firms to compete vigorously.

ii) Business markets

467 There are currently three suppliers of fixed broadband access to business customers in Bermuda and three different styles of technology are used to provide this service. BTC provides broadband access to its business customers throughout the country via ADSL over its copper network, currently providing access at a maximum speed of 10 Mbps. Within Central Hamilton BTC can also provide broadband access to business customers via Ethernet (at various speeds starting at 10Mbps) over the fiber network it has built, and is continuing to expand, within the city. Quantum also supplies broadband access to business customers using ethernet technology (at various speeds up to 10 Gbps) over its fiber network, however service is largely confined to Central Hamilton and Southside areas. The third provider of broadband internet access services to businesses is NRC, which supplies access at up to 4 Mbps bandwidth to SOHO clients and up to 100 Mbps to corporate clients over its fixed wireless network, which covers approximately 80% of the country. [18]

468 Broadband market shares are not as easy to identify as residential market shares. To begin with, it is not possible at this time to separate market share data on a geographic basis. Thus it is not possible to ascertain broadband market shares within the Hamilton and non-Hamilton geographic markets. Furthermore, both BTC and QCL are providing broadband services, largely within Hamilton, via their respective ethernet networks however, they are not able to provide a count of the number of circuits being utilized by their clients specifically for broadband internet services. For these reasons it cannot be said with specificity what the business broadband market share is nor where it is and the RA has chosen not to engage in a fruitless attempt to estimate those shares here. Market share for leased lines is reported in section 5 below and the conclusions the RA reaches concerning SMP for leased lines is equally applicable to the business market for broadband access services. Furthermore, broadband access and services as delivered over leased line is qualitatively different from broadband access and services delivered over non-

[18] The speeds mentioned here are those reported on the BTC, BCV, and NRC websites as viewed on September 19, 2012. These speeds have also been reported in the various data responses the parties have submitted to the RA during the course of its investigations.

leased lines, which is it is considered separately. For example, broadband access and services delivered over leased lines is a managed service involving high level QoS agreements, something not done for mass-market broadband access and services.

(b) Control over infrastructure not easily duplicated

469 There are three key sets of activities involved in providing the bundle of retail broadband and Internet services:

(a) Retailing functions;

(b) Provision of Internet access and services; and

(c) Network activities associated with the provision and maintenance of a broadband access connection.

470 In the RA's view there are no significant issues regarding infrastructure that is not easily duplicated with regard to retailing functions.

471 Entry into the supply of Internet services has relatively low barriers to entry. The key infrastructure required is international cable capacity. However, with 6 suppliers of cable capacity (3 networks plus 3 carriers with long-term access agreements) there does not appear to be any significant issue with regard to infrastructure that cannot be easily duplicated.

472 Where concerns associated with control over infrastructure are likely to be highest are in relation to the provision of broadband access lines. In the absence of a wholesale broadband service (whether by commercial agreement or by regulatory mandate), entry into the retail broadband access market requires the entrant to build its own broadband network. It could do so either by building a fixed network or a fixed wireless network. As was discussed in section 1)(b) there are significant obstacles to duplication of existing broadband networks. Nevertheless, we take note of LinkBermuda's plan to build a fibre network throughout the Island.

473 Within Hamilton, Quantum is providing Ethernet service that can be used to access the Internet.[19] Quantum's network does not reach all buildings in Hamilton. Nevertheless, Quantum is an important broadband supplier in the city.

(c) Technological advantages

474 Four different technologies are currently being used to supply broadband services in Bermuda:

(a) DSL technology over BTC's copper network throughout the country and ethernet over BTC's fiber network in Central Hamilton;

[19] http://www.quantum.bm/index.php/page/isp-connections

(b) cable modem services using DOCSIS 3.0 over BCV's cable network, which runs through all areas of the country, except for a portion of the city of Hamilton;

(c) Ethernet over Quantum's fiber optic network in city of Hamilton; and

(d) wireless broadband over NRC's WiMax network, which covers approximately 80% of the country.

475 All networks have options to upgrade in future to significantly faster speeds – for example, VDSL2 is being used internationally and could potentially provide download speeds of 100Mbps or more (although actual speeds currently provided by international operators using VDSL2 are generally significantly less than this); DOCSIS 3.0 provides the potential for cable networks to provide symmetric speeds of up to 100Mbps; Ethernet can also run at 100Mbps; and WiMax upgrades based on the IEEE 802.16m specification approved in 2011 will result in download speeds ranging between 110 Mbps and 1 Gbps depending on network configuration and user mobility.[20]

476 While the advantages and disadvantages of each technology could be debated at length, what is important is whether there is any advantage that is so great that it confers significant market power to one or more of the parties. It seems to the RA based on the technological capabilities of each service, outcomes in the Bermudan market and international experience that at this point, DSL, Ethernet, and cable are well-placed to compete vigorously with each other. Although WiMax technology has the potential to compete strongly with fixed technologies in the broadband markets in future, it is a relatively new technology and experience in Bermuda and internationally has shown that so far fixed technologies are dominant in broadband markets. How WiMax will fare in future is uncertain and depends on a number of issues including: international take-up (which affects equipment costs faced by Bermudan WiMax operators and their customers); customer preferences and inertia, access to towers and spectrum needed to upgrade to higher speeds and whether Bermudan WiMax operators are able to achieve the economies of scale necessary to justify the increased investment needed to upgrade.

(d) Access to capital

477 The issues regarding access to capital in the broadband markets are very similar to those in the fixed access and local markets as discussed in section 1)(d). In summary, we do not anticipate access to capital as being a barrier-to-entry.

(e) Vertical relationships

478 Currently the supply of broadband access and Internet access is carried out by separate providers. Access network owners provide the retail customer with

[20] See, for example, "WiMAX and the IEEE 802.16m Air Interface Standard", available at http://www.wimaxforum.org/sites/wimaxforum.org/files/document_library/wimax_802.16m.pdf viewed September 2012.

broadband access while ISPs provide retail customers with Internet access and services. The exception is NRC which provides the bundle of wireless broadband access and Internet service.

479 To date there has been no wholesale supply of services – that is, broadband access network owners have not supplied a wholesale broadband access service to ISPs or any other retailer. Once the ICOL is in place demand for such wholesale services may increase as access network owners increasingly move to bundled supply of broadband access and Internet access and in response ISPs seek to be in a position where they too can retail the bundle of broadband access and ISP access. It is unclear whether the access networks would have the incentives to provide a wholesale service on a commercial basis.[21]

(f) Economies of scale & scope and bundling

i) Economies of scale

480 The small size of Bermuda constrains the number of broadband access networks, given the very significant fixed costs associated with both fixed and fixed wireless networks. Not only does this affect entry but as mentioned above, it also affects the ability of small players to make the on going investments need to keep up with broadband market developments.

481 Economies of scale are also potentially important for provision of Internet access and services. As will be explained in more detail below, Bermudan broadband prices are very high when compared internationally and the ISP charge is a significant driver of this. This may reflect that small companies have high costs. Therefore even in the presence of a wholesale broadband access product, whether made available on a purely commercial basis or by regulatory mandate, there may still be consolidation of ISPs.

ii) Economies of scope

482 All four existing broadband access providers offer customers more than one service: BTC supplies voice access and local calling services; BCV supplies Pay TV; NRC supplies voice access and local calling services, Internet services, traditional international long distance calling services and international VOIP calls; and QCL supplies voice access and local calling services, managed interconnection services to international carriers, and point-to-point data services to its business customers.

483 Supply of multiple services allows carriers to share customer acquisition and marketing costs across several services and ultimately offer lower prices to customers. The extent to which economies of scope creates market power depends on: (a) whether some carriers are able to supply a greater range of services than

[21] The RA notes that it does not presume that a wholesale broadband service is necessarily required. The conclusion on whether there should be a regulatory mandate to provide the service would be considered subsequently in the regulatory remedies analysis if SMP is found to be held by one or more carriers in the relevant market.

others; and (b) whether that ability materially affects the ability of competition to constrain the carriers that are able to achieve economies of scope. In the case at hand, it is unclear that the economies of scope available are so high as to confer SMP to any operator.

iii) Bundling

484 The relevant market has been defined as that for the bundle of broadband access and Internet services because it seems likely, based on international evidence, that once the ICOL has been introduced that bundled services will dominate the market. It seems highly possible that ISPs supplying only Internet access and services will have difficulty in competing effectively with the integrated carriers who will supply the bundle of broadband access, Internet access and other services.

485 Moreover, as discussed in section 1)(f) the ability of the KeyTech group, in particular, to offer bundles that contain a broad range of services (including mobile services) that cannot be matched potentially limits the extent of competitive pressure on the two largest broadband access providers, BTC and BCV.

(g) Barriers to entry and expansion

i) Switching costs

486 Due to all existing suppliers using different technologies, a cost faced by consumers when they switch broadband access supplier is that they must purchase a new modem. Suppliers can subsidise this either fully or partially to reduce the upfront outlay required by the customer.

487 Changing email address may be a small restraint on switching suppliers as many people use an address (such as hotmail or gmail) that is not linked to their Internet provider anyway.

488 To the extent that customers prefer to purchase broadband access and voice access from the same supplier, then the need to change phone number is an additional barrier to switching.

ii) Customer inertia

489 The RA would expect that there is at least some level of customer inertia which would disadvantage NRC. Firstly, it may well be more convenient for a customer to stay with its existing supplier to avoid inconvenience of switching and in this respect BCV has an advantage over NRC when competing with BTC because many customers already purchase Pay TV from BCV. Secondly, customers may be averse to the uncertainty of switching to new, less proven, technology such as wireless.

iii) Legal and regulatory barriers

490 As previously discussed, the moratorium on towers hinders entry using wireless technology. Entry using fixed technology is impeded by rules that limit opening up streets. Further, the expense of automobile traffic control can be significant.

491 Currently the licensing regime prevents broadband suppliers such as BTC and BCV from supplying Internet access and services in addition to the broadband access they currently supply. Once the ICOLs are introduced these carriers will be able to supply the bundle of retail broadband access and Internet access and services.

(h) Other structural factors

i) Countervailing buyer power

492 There is likely to be little countervailing buyer power in mass market for broadband services, though large businesses may have some alternatives including the use of other data services.

ii) Potential entry

493 Facilities based wireless entry will likely be constrained given the moratoriums on towers (which substantially hinder the deployment of a further fixed wireless network) and on works (which make it challenging to build further fixed networks without access to existing facilities such as ducts or poles.

iii) Competition from other technologies

494 Mobile technologies continue to improve with LTE, for example, having theoretical speeds of up to 100 Mbps. However as was discussed in Part A, section 7.3, there continues to be a substantial price differential between mobile and fixed technologies. This implies that while mobile broadband may place increasing constraint on fixed broadband, at the current time and in the near future, this constraint is not sufficient to effectively constrain the behaviour of fixed broadband access providers.

(i) Market outcomes and conduct

495 This section examines market performance and conduct outcomes to consider whether the activity that has taken place in the Bermudan broadband markets is indicative of a market with strong competitive forces.

i) Broadband take-up

496 The first indicator that the RA has examined is broadband penetration. Bermuda performs extremely well on this measure, having the second highest broadband penetration in the world at approximately 62 connections per 100 inhabitants, according to data collected by the ITU (see Table 6).

Table 6: Broadband penetration, 2010 – top 20 countries

		Fixed broadband subscriptions per 100 inhabitants
1	Liechtenstein	63.83
2	Bermuda	61.75
3	British Virgin Islands	46.53
4	Monaco	38.98
5	Falkland (Malvinas) Is.	38.91
6	Netherlands	38.10
7	Switzerland	37.99
8	Denmark	37.70
9	Korea (Rep.)	35.68
10	Gibraltar	35.68
11	Norway	35.30
12	France	33.92
13	Cayman Islands	33.53
14	Iceland	33.43
15	Faroe Islands	33.40
16	Luxembourg	33.18
17	Sweden	31.85
18	Germany	31.70
19	Belgium	31.49
20	United Kingdom	30.84

Source: ITU ICT (available at: http://www.itu.int/ITU-D/ict/statistics/material/excel/Fixed%20broadband%202000-2011.xls)

ii) Bandwidth

497 Using data gathered and compiled by *Net Index*[22] the RA compared the maximum download and upload speeds as measured for Bermuda with those measured for a select group of comparator countries. International comparisons can provide useful information as to whether Bermudan broadband suppliers are keeping pace with the rest of the world. Of course, local conditions can have a significant impact on market outcomes and so in conducting the international comparisons of both bandwidth and price, the RA has considered both broad international trends in developed countries and has also focussed on a set of countries that are could be considered most comparable with Bermuda taking account of features of demand and supply.

498 The RA determined a first set of comparable countries by identifying island nations that had similar income, population and population density levels to Bermuda. The income variable used was GDP per capita (PPP USD) and was considered

[22] *Net Index* is a site run by Ookla. The site Index presented at the site is derived from millions of test results from Speedtest.net. See http://www.netindex.com/about/ viewed September 2012.

relevant as it is likely linked to demand – higher income countries will tend to have strong demand for broadband and will generally demand higher quality products. Population was considered relevant because it impacts on the extent to which broadband suppliers can achieve economies of scale. Population density was also included because of its link with costs – in general, high population density will lead to lower per unit costs for fixed network.

499 As compared with all other countries included in the comparative country statistical tables available at *Indexmundi*[23], Bermuda has:

(a) the 4th highest GDP per capita (PPP USD);

(b) the 36th smallest population; and

(c) the 11th highest population density.

500 Given this, the RA selected island nations that lay in the highest quartile for GDP per capita; the lowest quartile for population and the highest quartile for population density. The RA also identified countries in the Caribbean region that are most similar to Bermuda using these same variables. The countries selected by this method are depicted below in Table 7.

Table 7: Comparable Countries

Country	GDP - per capita (PPP) (US$)	2010 population	2010 population density
Bermuda	$69,900	68,679	1,272
Jersey	$57,000	94,161	812
Guernsey	$44,600	65,068	834
Cayman Islands	$43,800	51,384	195
Bahrain	$40,300	1,214,705	1,598
British Virgin Islands	$38,500	25,383	168
Bahamas	$28,700	313,312	23

Source: http://www.indexmundi.com

501 The RA collected information concerning the maximum download and upload speeds measured in the countries depicted in Table 7 and these are depicted below in Table 8.

[23] See http://www.indexmundi.com

Table 8: Comparative average download and upload speeds (Kbps)--2012[24]

Country	Avg Download Speed (Kbps)	Avg Upload Speed (Kbps)	Download Rank	Upload Rank
Jersey	10,550.86	3,992.63	43	39
Guernsey	6,906.61	708.10	61	152
Bermuda	4,322.92	2,471.36	91	63
Bahamas	3,676.01	1,685.21	100	83
Bahrain	3,640.37	1,211.96	101	112
Cayman Islands	3,476.51	1,056.63	109	127
British Virgin Is.	2,415.44	931.73	135	138

502 The speeds depicted in the above table are derived from test results of download and upload speeds experienced by broadband customers in the countries depicted. Thus, the speeds depicted here are not necessarily a reflection of the broadband speeds that may be available and/or achievable on a particular countries broadband network. For example, in Bermuda data submitted to the RA by the parties indicates that the vast majority of customers currently subscribe to plans having download speeds of 4 Mbps even though, as of September 2012, plans having download speeds up to 10 Mbps were available.

503 As Table 8 demonstrates Bermuda ranks 3rd among the comparator countries in terms of measured download speed and 2nd in terms of measured upload speed. Measured against the entire list of 181 countries, Bermuda ranks 91st in terms of measured download speeds and 63rd in terms of measured upload speeds. Concerning these latter rankings it is worth recalling that the vast majority of customers have chosen plans whose maximum download speed is 4 Mbps. However, it is also the case that broadband access and ISP service plans offering 10 Mbps download speeds were only made available in Bermuda in the summer of 2011 and so options for higher speed plans were limited until relatively recently.

504 As mentioned earlier (at paragraph 500) Bermuda is one of the wealthier nations in the world ranking 4th highest in terms of GDP per capita (PPP US$). So, to gain a somewhat different perspective on Bermuda's comparative international standing vis-à-vis measured download speeds, the RA compared Bermuda's

[24] Data is taken from the indexes available at http://www.netindex.com/download/ the full data set is available from http://www.netindex.com/source-data/ viewed September 2012. Download speeds are "[b]ased on millions of recent test results from Speedtest.net, this index compares and ranks consumer download speeds around the globe. The value is the rolling mean throughput in Mbps over the past 30 days where the mean distance between the client and the server is less than 300 miles." Upload speeds are calculated in a similar fashion. The download and upload country ranks are based on a total country count of 181. Thus Bermuda ranks 91st out of 181 countries for measured download speeds.

measured download speeds for the years 2012 and 2008 with those of the top 20, 50 and 100 wealthiest countries as measured by GDP per capita (PPP US$). The results are presented in the following table.

Table 9: Average download speeds (Kbps) : 2012 and 2008[25]

	2012	2008
Bermuda	4,323	1,732
Top 20 wealthiest countries	13,528	4,970
Top 50 wealthiest countries	13,937	5,342
Top 100 wealthiest countries	11,094	4,034

505 As this table illustrates, broadband speeds in Bermuda significantly lag international developments. While to some extent, speeds in Bermuda are constrained by a need for data to be transmitted internationally, this situation is not unique to Bermuda and the RA understands there is currently substantial excess capacity on the International cables that land in Bermuda.

iii) International price comparison

506 The RA has also carried out a set of broadband price comparisons between Bermuda and the comparator countries depicted in Table 7 for the delivery of broadband service with 4 Mbps download speeds.[26] These comparisons are depicted in Table 10, below. Also included in the table are the average price per download Mbps for the world as a whole and for the 50 wealthiest nations in the world.

[25] The data presented in this table is derived from data taken from the indexes available at http://www.netindex.com/download/ the full data set is available from http://www.netindex.com/source-data/ viewed September 2012. And from GDP data available at http://www.indexmundi.com.

[26] This speed was chosen because it is the overwhelming majority of Bermuda's broadband subscribers subscribe to plans offering 4 Mbps as the maximum potential download speed.

Table 10: Comparative per Mbps prices for 4 Mbps broadband service (current US$)[27]

Country	Monthly Per Mbps price (Download)
Cayman Is.	$38.11
Bermuda	$33.74
British Virgin Is.	$27.25
Bahrain	$23.19
World avg.	$9.47
Bahamas	$9.28
Jersey	$7.50
50 wealthiest countries	$5.58
Guernsey	$2.45

507 As the table above demonstrates, broadband service in Bermuda is extremely expensive when compared to world average prices and to the prices available in 50 wealthiest countries in the word. Even considered from a regional perspective, Bermuda's broadband prices seem high. As was mentioned in the market definition analysis, a major factor driving broadband is the fact that, in Bermuda, broadband access and Internet services must, as a matter of law, be provided under separate licenses (typically held by separate companies). This enforced separation of services that are typically provided by one company as a bundled service option is undoubtedly a contributing factor to the high broadband service prices observed in Bermuda. This supposition is supported the by high percentage of total fixed broadband price attributable to ISP charges in Bermuda, as depicted in **Error! Reference source not found.**, below.

Table 11: Percentage of total fixed broadband service price attributable to ISP charges

Broadband Access and ISP Speeds	BTC	BCV	NRC
1 Mbps	57%	50%	42%
2 Mbps	67%	71%	63%
4 Mbps	70%	72%	72%

[27] Country price data is drawn from the websites of the various broadband service providers operating in those countries. The world average price and the average price for the 50 wealthiest countries were taken from the *Household Value Index* from **Net Index** available at http://www.netindex.com/value/, viewed September 2012.

508 The RA tentatively concluded in the broadband section of the *Market Analysis and Definition* report that once the ICOL becomes available, the separation of Internet services from broadband access services will disappear as providers will choose to bundle these two services together to mass market customers. The RA believes the likely result of this bundling will be a drop in broadband service prices.

iv) Conduct

509 Each of the service providers has mirrored each other in terms of network upgrades and service pricing over the years.

(j) Remarks on SMP based on above analysis

510 The above analysis indicates that there are likely significant barriers and that there is some degree of customer inertia (driven by the reluctance to change to a new technology and the reluctance of customers to switch away from their existing supplier) which hinders the ability of a wireless network such as NRC to effectively constrain the two fixed networks, BTC and BCV. LinkBermuda's plan to extend its fibre network outside of Hamilton, if realized, will add an important element of rivalry.

511 Market outcomes, and in particular international comparisons, are not indicative of an effectively competitive market.

512 Given this and the convergence of market shares between BTC and BCV, there appears to be potential for these two networks to hold collective SMP. This possibility is now considered.

(k) Collective SMP

i) Market shares and concentration

513 As discussed above the residential market shares of BTC and BCV have been converging over time and are currently at the point where BTC holds [CIC --%] and BCV holds [CIC --%], with NRC having the remaining [CIC -%]. Effectively the resultant market structure is that of a duopoly with a small fringe player, where there is cross-ownership between the duopolists.

ii) Ability and incentive to tacitly coordinate

514 As discussed above in section 1)(g) there are high and enduring barriers to entry and expansion which facilitate the ability to tacitly coordinate. Although BTC and BCV are managed independently, that there is shared ownership between the two by KeyTech implies that they have less incentive to compete vigorously than would otherwise be the case.

515 NRC does not appear to be a disruptive, or maverick, player, perhaps because of its use of wireless technology which may not be so widely accepted by customers.

(l) Conclusions on SMP in retail broadband markets

516 The RA tentatively draws the conclusion that BTC and BCV hold collective SMP in the retail broadband markets.

3.2 Wholesale broadband markets

517 The market definition analysis found two geographic markets for wholesale broadband access: one for Central Hamilton and one for other areas of Bermuda. The discussion above in the context of retail broadband similarly implies that BTC and BCV hold collective SMP in both geographic markets for wholesale broadband access. In particular:

(a) There are very high barriers to entry, including high sunk costs of deploying a customer access network;

(b) Technological advantages of fixed networks over fixed wireless mean that fixed wireless services do not appear to effectively competitively constrain the provision of fixed services; and

(c) Vertical integration of networks means that there is little incentive to supply wholesale services to third parties.

4 SMP – MOBILE SERVICES

518 The Candidate Markets Notice includes the following mobile markets:

(a) a national market for the supply of retail mobile services, including voice and data;

(b) a national market for the supply of wholesale access and local call origination on mobile networks;

(c) a national market for the supply of wholesale origination of international calls on mobile networks; and

(d) markets for the supply of call termination on each individual mobile network.

519 The following sections conduct an SMP assessment on each of these in turn.

4.2 Retail Mobile Service

520 This section examines whether there is one or more firms that holds SMP in the retail mobile services market and finds that BDC (dba CellOne) and Digicel jointly hold SMP. Sections 4.3 and 4.4 apply an SMP analysis to the wholesale MVNO and international mobile call origination markets, respectively, and conclude that BDC and Digicel jointly hold SMP in both. Finally, section 4.5 finds that BDC and Digicel both have single-firm dominance in the network-specific markets for mobile termination.

(a) Suppliers and market shares

i) Mobile Market shares

521 Today the retail cellular market is essentially evenly split between Digicel and BDC, when measured by the number of lines. Historically there has been a significant amount of fluctuation in the market share of the providers. We have calculated market share data from the industry's response to our questionnaire. Prior to spring 2011 there were three wireless suppliers in Bermuda: M3, BDC, and Digcel. In May 2011 BDC and M3 merged. Post-merger, BDC and Digicel now split the market almost evenly between them; Digicel having a market share of [CIC --%] and BDC a market share of [CIC --%]. Overall the data indicates a small, but perceptible, shift in market share values in the past three years.

Figure 4: Percentage share of total mobile subscribers [**CIC CIC]**Source: Confidential data supplied by the parties.

(b) Control over infrastructure not easily duplicated

522 A fixed wireline entrant into the mobile market would have to place its transmitters and receivers on poles, towers, and buildings, as well as acquire spectrum.[28] The cost of placing the equipment requires the firm to incur substantial fixed costs, some of which are sunk.[29] As noted by one Industry analyst, world-wide there has been a "tremendous amount of M&A activity over the past decade," and the "driving force behind the M&A activity is the desire to expand subscriber base and resultantly enjoy improved economies of scale."[30] Stated differently, in order to not be at a significant cost disadvantage, an entrant will have to capture a large share of the market. Market share would have to be achieved by convincing a significant number of existing customers to switch suppliers. Whereas so many people already have wireless service, there are limited opportunities to sign-up individuals who do not already have service. Furthermore the country's population is fairly stable and therefore population growth will not generate many potential customers for an entrant.[31]

523 As explained in section 1)(g) below, there is no opportunity in the coming two years for an entrant to obtain spectrum, and there may be limited opportunity to place equipment for a new network on the existing structures. Therefore *de novo* entry is unlikely to occur within the next two years.

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[28] The entrant may have to buy the spectrum through an auction. See, ECA §36(2)(e) and 40(2).

[29] The per cent of wireless network investments that are sunk is likely less than in the wireline market because the resale value of the wireless equipment is likely higher than for cables. In both the wireline and wireless worlds, an entrant will also incur sunk costs setting up operations and advertising its presence.

[30] IBISWorld, "Wireless Telecommunications Carriers in the US,"" BIS Report 51332, December 2011, pp. 23-24. The larger subscriber base allows a firm to spread its fixed costs over a larger number of subscribers.

[31]http://www.google.com/publicdata/explore?ds=d5bncppjof8f9_&met_y=sp_pop_totl&idim=country:BMU&dl=en&hl=en&q=bermuda+population

524 Neither, at this time, is entry aided by the existence of a wholesale market. Neither BDC nor Digicel provide wholesale mobile services.[32]

525 It does not appear that there is significant non-duplicable retailing infrastructure that would confer to Digicel and BDC a position of SMP. Rather, as described below, market power is derived from the operator's upstream operations.

(c) Technological advantages

526 The mobile industry is characterized here, as elsewhere in the world, with rapid adoption of new technologies. Both carriers have regularly upgraded their networks in order to provide new and improved services.

527 Both carriers indicate that they serve the entire Island.

528 Both carriers have been allocated a significant amount of spectrum. Their current operations should not be constrained by a scarcity of assigned spectrum.

(d) Access to Capital

529 The construction of an electronic communications network requires a significant amount of capital. Along with other businesses in Bermuda, telecommunications companies are subject the 60/40 Bermudian ownership rule.

530 We anticipate that the Government will continue to exhibit flexibility in this area and therefore we do not anticipate access to capital as being a barrier-to-expansion or entry.

(e) Vertical relationships

531 Both existing suppliers of mobile services are vertically integrated – that is, they both use their own network rather than a wholesale service purchased from a third party. The introduction of the ICOL will likely mean that there is an increased interest from entrants in obtaining wholesale mobile services to enter into the supply of retail mobile services, in particular so that providers of other services (such as fixed services) can bundle their services with mobile services.

532 Wholesale services (whether in the form of resale or access to facilities such as tower space) are not currently available. It is not clear from parties' submissions to what extent entrants have actively sought to engage with Digicel and BDC to attempt to commercially negotiate wholesale service. Therefore, it is unclear whether the mobile carriers have actually refused to supply wholesale services/facilities access or alternatively offered terms of supply that were deemed unreasonable by its competitors.

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[32] Historically Bermuda has had a policy that discouraged the entry of pure resellers, that is firms that do not own their own facilities. The Government has not prohibited the provision of wholesale services. For example, Brasil telecom holds a wholesale-only license. Southside is a second example of the Government permitting the provision of wholesale services.

533 Looking to the future, if a wholesale service were made available (whether by regulatory mandate or through commercial negotiation), vertical concerns that may arise relating to SMP in the retail market include margin squeeze issues and discrimination on non-price terms.

(f) Economies of scale & scope and bundling

i) Economies of scale

534 Minimum efficient scale can create a barrier to entry where there are large fixed costs. A company operating at a small scale will have high unit costs relative to a supplier who serves a large share of the market. It seems likely that economies of scale is a factor that does constrain entry in Bermuda, particularly facilities-based entry. As discussed in section 1)(b), there are substantial fixed costs associated with constructing a mobile network and this appears to make it difficult for the market to support, even in a large market like the United States, a large number of suppliers.

ii) Economies of scope

535 There are clear economies of scope associated with the supply of voice and data mobile services. The same bandwidth, transmitters, and receivers may be used to provide both voice and data mobile services.[33]

536 Further economies of scope may be achievable by bundling mobile with fixed services. Bundling is likely to reduce churn and billing costs. Furthermore, traffic can be offloaded from the wireless to the wireline network.

537 Economies of scope, themselves, are not problematic and can provide important cost savings which can, in the right competitive setting, be passed on to consumers in the form of reduced prices. Therefore, the important question in respect of SMP is not simply whether economies of scope exist, but whether some players are likely to achieve such great economies of scope that it strengthens their market power.

538 It may well be that the KeyTech group is in the best position to achieve economies of scope. However it is possible that collaboration or mergers could occur between other carriers. The RA considers that economies of scope, while they will be more achievable by some suppliers than others, are not likely a key limiter of competition. We note, for example, that in the United States some firms, like Verizon, provide fixed and mobile services, while some fixed cable companies do not offer mobile service, and finally, some wireless companies, like T-Mobile, are not providers of fixed services. In the next section we turn to a related issue, the ability to bundle.

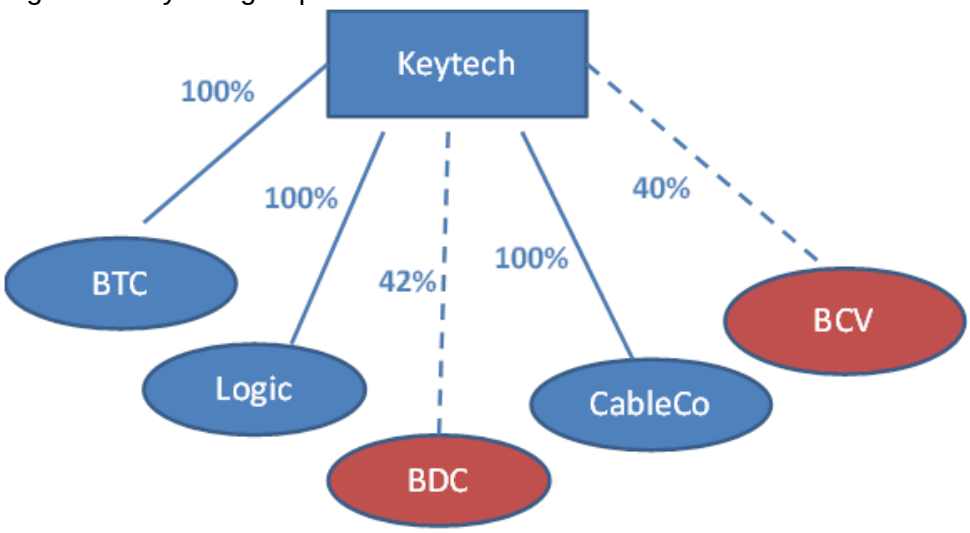
iii) Bundling

[33] Some smartphones cannot provide voice and data concurrently using 4G LTE technology. According to Apple, "It is not yet possible to do simultaneous voice and data on networks that use CDMA for voice and LTE for data in a single radio design." "Why the iPhone 5 on Verizon and Sprint Won't Juggle Calls and Data," New York Times, September 13, 2012, http://bits.blogs.nytimes.com/2012/09/13/iphone-5-calls-data/

539 Bundling of two or more services, which offer customers a cheaper price than if they were to purchase the services separately already occurs to a degree. Bundling has the potential to provide benefits to customers in the form of added convenience (i.e., of not having to shop for individual products) and by passing on the cost savings of jointly supplied services. However, as was discussed in section 1)(f), bundling can be a means through which firms are able to leverage a position of market power from one market to another, or more generally, offer a bundle that cannot be contested by other players.

540 A number of submissions made by operators in response to the *Class A, B, C Carriers Qualitative Questions* data request issued by the RA in May 2009.directly raised the issue of the Keytech group's ability to offer service bundles once the ICOL is implemented. BTC, Logic, and CableCo are wholly owned subsidiaries of Keytech. Keytech holds a substantial, but not a majority, number of CellOne and BCV shares. Therefore, once the ICOL is in place, Keytech may choose to either integrate some or all of these subsidiaries, or at least increase the level of coordination between them, allowing the provision of bundles that include access and local calls, long-distance calls, broadband access and ISP service and mobile services.

Figure 5: Keytech group[34]



541 Two types of concerns regarding bundling of mobile with other services can be identified:

(a) The concern that competition in the mobile market would be lessened as a result of BDC being the player in the best position to bundle fixed with mobile service. This could potentially be addressed by Digicel teaming up with other fixed network suppliers.

[34] This diagram is derived from material gleaned from *Unlocking a World of Connections—Annual Report 2012*, Keytech Ltd. Data concerning CellONE is drawn from page 6 of that report, while data for BCV is take from page 43

(b) The concern that SMP in the mobile market could be leveraged into other markets.

(g) Barriers to entry and expansion

i) Regulatory, Legal, and Infrastructure Barriers

542 The Ministry of Energy, Telecommunications and E-Commerce (METEC) issued a Spectrum Consultation document to industry on June 1, 2009. [35] This document opened the dialog on a wide range of spectrum related issues in order to determine which issues, if any, could be addressed by METEC in the near term, and to develop a record and provide recommendations for the Regulatory Authority to consider prospectively when implementing Bermuda's spectrum policy.[36]

543 Responses to the Spectrum Consultation indicated that the lack of space available for wireless equipment on support structures was a major impediment to the roll out of new services by existing carriers and a likely insurmountable entry barrier for additional carriers wishing to enter the wireless marketplace. Respondents cited both a lack of structure sharing, particularly on privately owned towers, and the Government's moratorium on the construction of new towers as the reason why demand exceeded supply for structure space.[37] The moratorium was established in 2001 in response to the public's concerns over radio frequency emission safety and the Government's desire to protect the Island's "limited and congested open spaces. "[38]

544 Entry into the mobile market is also hampered by the spectrum audit process. §73(c) and §78 of the ECA states that a current holder of spectrum may retain the spectrum for 18 months after its ICOL is issued. At that time, the RA may renew the spectrum license, or modify the spectrum license "if the licence holder fails to demonstrate a reasonable need for some or all of the spectrum assigned to it, and the Authority concludes that such measures are necessary to ensure the efficient use of spectrum."[39]

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[35] See Spectrum Consultation Document. 1 June 2009.

[36] See Spectrum Consultation Document at ¶14.

[37] See, for example, Telecom's and M3's response to question 46.

Towers do not need to be used in order to build a network. Smaller supporting structures, referred to as masts or poles, can provide support for the transmitters and receivers. The poles are not as tall as towers and therefore their broadcasting range is comparatively shorter. Consequently more poles than towers are needed in order to build a network and this result in higher costs.

[38] Ministerial Statement to The House Of Assembly by the Hon. Renee Webb, JP MP; dated July 20, 2001. Also, see, Establishment of a Regulatory Structure to Support Competition in Public Telecommunications Services in Bermuda, May 10, 1996.

[39] ECA §78(b).

545 A spectrum audit will be conducted approximately nine months after the first ICOLs are issued. Only after the audit is completed, and the Authority has completed its ECA §78 investigation, will the Authority be in a position to finalize the procedures that will be used to assign spectrum. The assignment, which could be done in a number of ways,[40] will not be completed for a number of months after the §78 investigation is completed. Hence we do not foresee an assignment of new spectrum for a period of two years or more following the issuance of the ICOLs. Once new spectrum is assigned, the carrier will have to engineer and build out its network, and as suggested above, the carrier may run into the barrier of a scarcity of space for its transmission equipment.

546 Entry into the market may be possible, however, by existing firms possessing both spectrum and access to existing towers and/or poles, subject to any constraints established through the §73(2)(c) transition spectrum licensing process. For example, North Rock, which currently provides voice and broadband services over its fixed wireless network, has sufficient spectrum to provide mobile phone service. Furthermore, its existing fixed wireless voice and broadband broadcasting network may provide a sufficiency of towers, and/or poles, to support the additional equipment required to launch a mobile phone service. Thus, entry of a firm such as North Rock into the mobile market may be possible within the next two years.

547 In summary, regulatory barriers, and infrastructure barriers will effectively block entry into the retail mobile market for most firms for a significant period of time. However, entry possibilities do exist for those firms, such as North Rock, that may already possesses appropriate spectrum and access to towers and/or poles either through ownership or pre-existing access arrangements. The RA believes that there may only be one other firm, WOW, that might be in a similar position to that of North Rock (available existing spectrum holdings and access to towers and/or poles). Thus, any entry into Bermuda's mobile market within the next two years would likely be limited to either of these two firms.

ii) Switching costs

548 Switching costs may include the cost of purchasing new handsets in some cases. For example, approximately [CIC --%] of BDC's customer base are using handsets tied to the company's legacy CDMA network. Customers owning these handsets and desiring to switch to Digicel would have to purchase new ones as Digicel does not support the CDMA platform. However, for other types of handsets, both BDC and Digicel state all of their GSM/sim devices are unlocked, meaning that customers having these devices can keep their handsets when switching providers, needing only to purchase a new SIM card from their new provider.

549 A further set of switching costs relates to the need to change phone number when switching mobile providers. These costs include the inconvenience and administrative expense associated with having to let contacts know of changed number, and the potential for missing important calls (results in lost business for

[40] ECA §36(2)(e).

business customers, inconvenience for residential customers). Although number portability which allows customers to retain their number when switching access provider will be introduced, it is likely still one year away and even once it is in place it takes time for customers to understand that they will then be able to keep their number – that is there can be a substantial lag in take up of number portability.

550 These switching costs reduce a customer's willingness to switch suppliers.

iii) Customer inertia

551 In addition to the explicit costs associated with switching, an additional barrier to entry and expansion that entrants have to overcome is a general reluctance to switch. This might be because of the hassle of changing supplier (for example, the need to fill in paperwork and change existing payment arrangements), the time required to select a supplier (for example, comparing suppliers and their prices) and understanding different technologies. In addition, perceptions rather than actual facts can be an important determinant of customer's supplier selection – customers are more likely to hear horror stories about alternative service providers and technologies than the more mundane stories about good service. Therefore, there can be a general reluctance to switch to a new supplier, especially where it is unproven.

552 We do not think that customer inertia significantly hinders competition in the mobile market, though it is possible that business customers in particular would have a general reluctance to switch to a new entrant until the entrant had established a reputation as a reliable supplier of mobile services.

(h) Other structural factors

i) Countervailing buyer power

553 There is little scope for mass market customers (that is, residential and small business customers) to have countervailing buyer power. Some large business/government customers could potentially exercise countervailing buyer power because: their large expenditure means that they are individually important to telecommunications providers. However, the number of customers that do have countervailing power is small and is unlikely to have a significant effect on the broader market.

(i) Market Performance

i) Earnings

554 One measure of market performance is the relationship between cost and price. In a competitive market, and one in which firms incur no fixed costs, entry reduces prices to the point where the price of a product is equal to the marginal cost of production and there is no incentive for firms to enter or exit the market. An indicia of a firm having market power is where it is observed that a firm is charging a price that exceeds the cost of a production.

555 Data on the marginal cost and fixed cost of providing mobile telephone service is not readily available. Therefore we are unable to observe the degree to which prices depart from the levels that would emerge in a competitive market. Nevertheless, Digicel's financial statements suggest that in aggregate, that is when both its voice and data services are taken into account, the firm does earn an excessive return, as would be expected if it had market power.[41]

556 Parenthetically we note that Digicel is owned by a multi-national company. Such a firm must allocate costs between operating companies to a greater degree than BDC. Therefore Digicel's financial statements are impacted by the allocations made by the parent company.

557 The return earned by BDC is clouded due to recent merger activity. BDC completed its merger with M3 during its last fiscal year. While BDC's calculated rate-of-return is not supra-competitive, the return may not be typical because of the merger activity.[42] BDC's financial statement suggests that in aggregate, that is when both its voice and data services are taken into account, and when the analysis is limited to one-year, the firm did not earn excessive returns in 2011.[43]

558 There is other material in the BDC statement that suggests that this static analysis understates the return-on-investment. On the asset side of its ledger, BDC records [CIC ----------l.] [44]

559 In summary, the data from the Digicel and BDC financial statements suggest that the firms market power is being exercised in the provision of mobile voice and data services, and the firms do not foresee this changing.

(j) Market outcomes and conduct

i) Advertising

560 Advertising is used by economists to gauge the conduct of firms in a market. Advertising can be deemed as pro-competitive, or as a barrier-to-entry, depending on how it used. Advertising can be a barrier-to-entry, for example, when it raises the cost of entry and diverts consumers' attention away from a new, competitive product.

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[41] Wireless Holdings (Bermuda) Ltd., Consolidated Financial Statements 31 March 2012 and 2011.

[42] Bermuda Digital Communications' Consolidated Financial Statements, December 31, 2011 and 2010, pp. 2 and 3. See note four of the 2011 report for BDC's discussion of how the merger affected its financials. Earlier returns are of little interest because they do not reflect the intended efficiencies associated with the merger.

[43] There are a number of one-off adjustments in BDC's financial statements that we do not address.

[44] Bermuda Digital Communications' Consolidated Financial Statements, December 31, 2011 and 2010, pp. 2, 8-9, 13-15.

On the other hand, advertising can increase the degree of rivalry where it is used to provide information to consumers.[45]

561 In recent years, in Bermuda, advertising by the wireless industry should not be characterized as a barrier-to-entry because the licensing policy of the government has prohibited entry. Therefore there would be no need to spend money to deter entry.

562 In the United States wireless market, firms spend about four percent of revenue on advertising.[46] In Bermuda firms have been spending between 2 and 3% of revenue on advertising and promotion.

ii) Churn

563 Advertising in Bermuda is often directed as trying to attract new customers. The frequency to which customers leave their existing carrier is measured by churn. A high churn rate indicates that customers are not "sticky," that is they are willing to move from one supplier to another.

564 A market could have stable market shares, thus suggesting a lack of competition, when in fact the churn rate would suggest a different view. Suppose that year after year, the market was evenly divided by two firms. This would appear to suggest a cozy duopoly because firms are not trying to attract their rival's customers. But if customers are regularly moving between two firms, an activity that would be reflected in the churn rate, a high-level of customer attrition would be supportive of the proposition that the market is competitive.

565 In the United States, according to IBISWorld, "Most [wireless] players experience an average monthly churn rate of roughly 1.5% to 3.5%. This indicates this industry has a high level of competition."[47]

566 In Bermuda providers report churn rates comparable to those reported above for the United States.

567 Data published by the Bermuda Omnibus is suggestive that the churn rate is not due to customers being dissatisfied with their current providers. The survey data shows that over the past six years only about ten percent of the customers say they are dissatisfied with the service.[48] Or stated differently, about 90% of the respondents indicated that they were either completely or mostly satisfied with their wireless carrier.

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[45] Don Waldman and Elizabeth Jensen, Industrial Organisation: Theory and Practice (2001), pp. 7, 386..

[46] IBISWorld, "Wireless Telecommunications Carriers in the US,"" BIS Report 51332, December 2011, p. 20.

[47] *Id.*

[48] Bermuda Omnibus, June 2012, p. 16.

568 In the United States, a survey by ACSI, scales consumers' response so that they fall in the range of 1 to 100. The scaled level of satisfaction for the U.S. cellular industry is 70%.[49] While the data from the U.S. and Bermuda cannot be directly compared because of the different methodologies employed, the data is suggestive that the cell industry in Bermuda is providing satisfactory service when benchmarked against U.S. suppliers.

iii) Pricing

569 Here we turn to a comparison of mobile prices with prices abroad. These comparisons are not straight forward because many factors merit consideration when comparing different price plans. For example, one approach is to hold constant, across jurisdictions, factors such as the minutes-of-use, number of calls, number of text messages, and amount of traffic within network and off-peak. Within network and off-peak calls are typically "free," but this may not be the case.

570 Rather than make a number of assumptions regarding what constitutes an appropriate basket of products, a more straight-forward approach is to compare the revenues per minute and subscriber. Unfortunately, the RA had difficulty obtaining proper data concerning minutes of use from one of the parties and so was unable to perform a comparative analysis on revenues per MOU. However, the RA was able to obtain sufficient data to perform a comparative analysis of the average revenue per unit/subscriber (ARPU) received by Digicel and BDC. The results of this analysis are depicted in Table 12, below.

Table 12: Average revenue per unit--total subscribers [CIC

	2009	2010	2011
Digicel			
BDC			

CIC] Source: Confidential data submission of 31 July 2012

571 Additional information is obtained by comparing Bermuda's subscriber ARPU to those observed in other countries, this is done below in Figure 6[50], Table 13,and Table 14. The values depicted here measure what subscribers spent per month for voice and data services from mobile service providers. What we see when we look at this data is that Bermuda's ARPU is high when compared to what is observed in other, arguably more competitive, jurisdictions.[51] Furthermore, ARPU in Bermuda

[49] American Customer Satisfaction List, May 2012, http://www.theacsi.org/index.php?option=com_content&view=article&id=281:press-release-may-2012&catid=13&Itemid=357; and http://www.theacsi.org/index.php?option=com_content&view=article&id=48&Itemid=122.

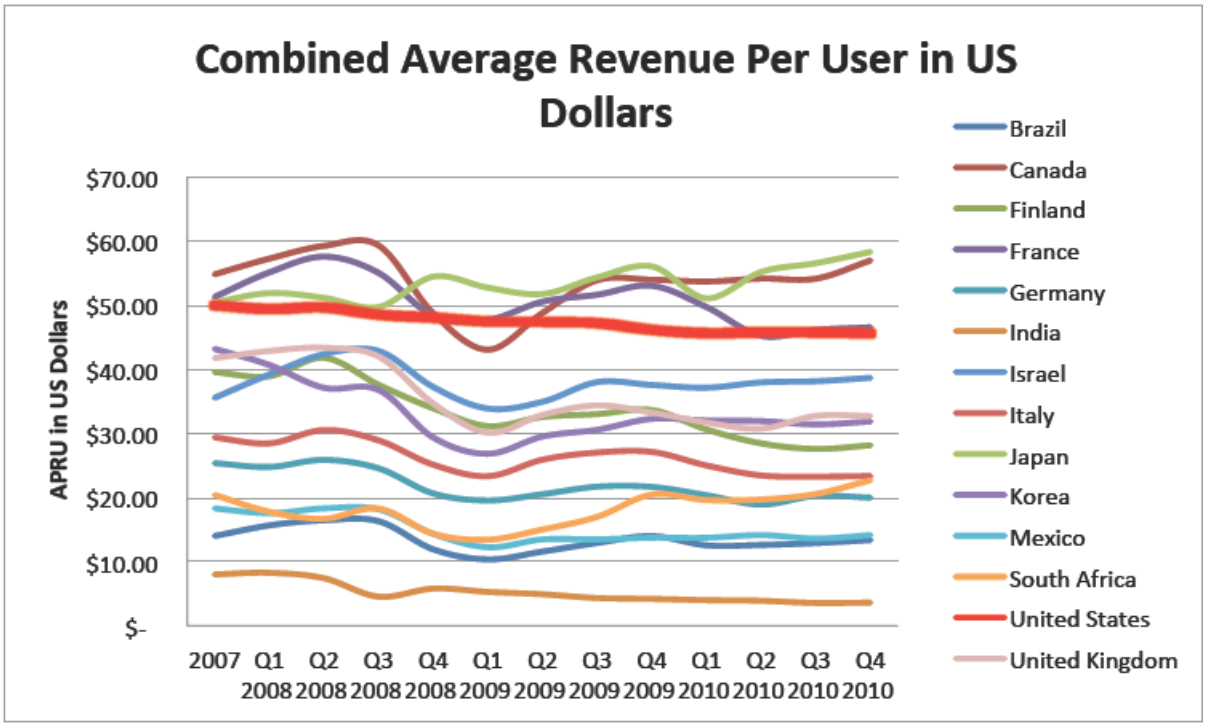
[50] Source for Figure 6 is "What's it worth to you?" at page 8.

[51] Part of the increase in 2011 is attributable to the $2 monthly increase in the handset fee that occurred on April 1, 2011. Government Fees Amendment Regulations 2011, BR 14 / 2011.

appears to be increasing, while the observed pattern in Figure 6 is one of decreasing, or flat, ARPU, with a few exceptions. This pattern holds true even when more recent data from the US is considered, as is depicted in Figure 7[52], below.

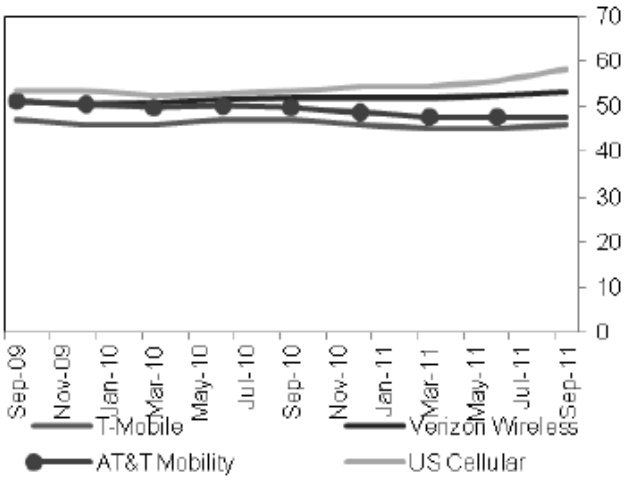
572 The comparisons made between Bermuda and these other countries are suggestive, but hardly determinative, of the degree to which the market in Bermuda is competitive relative to other nations. All of the other countries depicted have larger populations, as well as land mass, and may be able to offer lower prices due to the lower unit costs that derive from economies of scale. Furthermore, the mix of products sold may be different. Nevertheless we do think the data is instructive insofar as it shows a slight upward trend in ARPU in Bermuda, while that ratio is declining or is flat in many of the countries depicted.

Figure 6: ARPU selected countries



[52] Source for Figure 7 is "United States Telecommunications Report, Q1 2012", *Business Monitor International, Ltd.*, at page 30. Report is available at www.businessmonitor.com.

Figure 7: US operators blended ARPU (2009-2011)



573 A comparison of Bermuda's mobile rates with those of other island nations, presented in Table 13 and Table 14 below, is instructive for demonstrating how those rates compare with mobile rates in other in other small jurisdictions. As can be seen from the data presented in Table 13, Bermuda's basic entry level post-paid plan of 300 minutes and 100 text messages is more expensive (when considered from an capacity price standpoint) than most of the other plans appearing in the table. What is more the other plans offer more minutes of use and more text messages than are available with the Bermuda plans. The one exception to this is the Digicel Cayman Island plan, which is more expensive that what is available in Bermuda. However, it needs to be noted that the minutes of use associated with the Cayman Island plan are Digicel World minutes—meaning they can be used to call not only any phone on any network in the Caymans, but also most any country in the world as well.

Table 13: Comparative entry rate plans--various countries[53]

Country	Plan	Monthly Rate	Local Anytime Minutes	Local Digicel Minutes	Total Minutes	Included Text Messages	Included Data	capacity price
Guernsey	Basic 400	$38.37			400	400	10MB	$0.10
British Virgin Islands	Digicel Select 325	$41.00			325	150		$0.13
Guernsey	Smart 400	$53.13			400	400/unlimited[54]	Unlimited	$0.13
Bermuda	Digicel 300	$51.80	100	200	300	100		$0.17
Bermuda	CellONE 300	$54.76	100	200	300	100		$0.18
Cayman	Digicel World 350	$85.06			350	90		$0.24

574 The situation changes somewhat when a comparison of the top tier plans available in each country is made, as can be seen by looking at Table 14, below. As this table demonstrates, the capacity price for Bermuda's top tier mobile plans offer more minutes that all the other plans and have capacity prices that are cheaper or comparable to what is available under the other plans. And, for the most part, the Bermuda plans offer more text messages. The Guernsey plans, however, do offer data packages (an unlimited one in the case of Guernsey's highest tiered plan) for the same capacity price as the Bermuda plans. And again, the Digicel Cayman Island plan minutes are Digicel World minutes, which makes comparison with plans offering strictly local/national minutes difficult.

575 What the comparison depicted in these two tables suggests is:

(a) For customers wanting entry level mobile plans, Bermuda is more expensive relative to what is observed in other countries of comparable size. This possibility is underscored by the fact that for consumers in the other countries depicted in the tables, even cheaper post-pay plans (with, of course, lower amounts of minutes and messages) are available then can be obtained in Bermuda; and,

(b) For top tier mobile plan customers Bermuda is, by and large, less expensive relative to what is observed in other countries of comparable size.

[53] Data drawn from the rate plans of various providers webpages. Prices were converted to US Dollars using a PPP index available from http://www.indexmundi.com/g/r.aspx?t=0&v=67&l=en

[54] Unlimited texting under this plan is only available for contracts of greater than 12 months duration.

Table 14: Comparative top tier rate plans--various countries

Country	Plan	Monthly Rate	Local Anytime Minutes	Local Digicel Minutes	Total Minutes	Included Text Messages	Included Data	Capacity price
Guernsey	Basic 2000	$112.16			2000	2000/unlimited[55]	10MB	$0.06
Guernsey	Smart 2000	$126.92			2000	2000/unlimited[56]	Unlimited	$0.06
Bermuda	Digicel 3000	$170.20	1000	2000	3000	1000		$0.06
Bermuda	CellONE 3000	$173.16	1000	2000	3000	1000		$0.06
British Virgin Islands	Digicel Select 675	$82.00			675	200		$0.12
Cayman	Digicel World 995	$215.49			995	170		$0.22

(k) Conclusions on SMP in retail mobile market

576 The above analysis has found:

(a) Two firms, with relatively equal shares, serving the entire mobile market;

(b) Entry impeded for at least two years as the RA investigates how existing spectrum allocations are being used and establishes a tower management policy;

(c) Significant fixed and sunk costs associated with constructing a mobile network, which limits the number of potential suppliers;

(d) A lack of access to wholesale services or facilities;

(e) Non-trivial switching costs; and

(f) Evidence that firms are exercising market power.

577 Looking forward over the period of the current market review it is expected that customer switching costs will fall to some extent with the introduction of local number portability. A further expected change is that the new licensing regime means that BDC/Keytech could offer bundles that other licensees may find hard to match. Most importantly, for a considerable period of time, entry will be challenging because of the Authority's need to conduct a spectrum audit before issuing new spectrum, and because of congestion on the existing towers.

[55] *Id.*

[56] *Id.*

578 In the light of the above findings and the underlying detailed analysis conducted, we find that Digicel and BDC jointly hold SMP in the mobile voice and data markets and that wholesale market analyses are required. We conclude that there are "reasonable grounds for concluding…[that the] market structure… is likely to give rise to tacit coordination and thereby prevent, restrict, or distort competition in the provision of products or services in the relevant market." ECA §23(3).

579 To the extent that market reviews of the relevant wholesale markets find SMP exists and leads to wholesale regulation, the RA considers that retail SMP is likely to endure for at least part (and perhaps all) of the period covered by the review. This is because LNP will not be operational for at least a year, and even then it will take time for customers to be aware or to complete existing contracts. In addition, it also takes time to overcome general customer inertia.

(l) Evidence of previous anti-competitive behaviour

580 The Authority takes note of Digicel's announcement to provide free WiFi service during the 2012 Cup Match. Digicel announced on August 1, 2012 that it would offer "free Wi-Fi to anyone attending the game as a gesture of both celebration and goodwill." The announcement followed, by two weeks, TBI's announcement that TBI would be providing WiFI service at the event for a fee. TBI had announced on July 17, 2012 that it would provide service at Cup Match for $5 for 24 hours of service.

581 The provision of free service might be deemed as an anti-competitive act because the zero revenue would not cover the incremental cost of providing coverage. We take no position on this issue at this time because we also understand that the provision of free service could be seen as "a gesture of both celebration and goodwill" or a loss-leading promotion. Furthermore, the incremental cost of establishing a billing system for Cup Match may have exceeded the anticipated revenue, or there maybe another pro-competitive reason for the provision of free service.

4.3 Wholesale access and local call origination on mobile networks

582 Currently all supply of wholesale mobile access and local call origination on mobile networks is provided internally within a vertically integrated firm. That is, there is no external supply of a MVNO product to access seekers. The barriers to entry to the wholesale access and local call origination market for mobile networks and market structure are essentially the same as for retail mobile services. Therefore, for the same reasons discussed above in section 4.2 the RA concludes that BDC and Digicel jointly hold SMP.

4.4 Wholesale origination of international calls on mobile networks

583 The market definition analysis concluded that there is a national market for the supply of wholesale origination of international calls on mobile networks. The barriers to entry to the wholesale international call origination market for mobile networks and

market structure are essentially the same as for retail mobile services. Therefore, for the same reasons discussed above in section 4.2 the RA tentatively concludes that BDC and Digicel jointly hold SMP in the market for wholesale origination of international calls on mobile networks.

4.5 Wholesale call termination on mobile networks

584 The Candidate Markets List identifies the markets for the supply of call termination on each individual mobile network. Each network is considered to have a separate market for its own network and has a monopoly over termination on its own networks.

585 The RA is of the view that because each network has a monopoly over termination on its network, each of BDC and Digicel will likely hold SMP in the mobile termination markets.

5 SMP – LEASED LINE SERVICES

586 The market definition analysis came to the tentative conclusion that the relevant retail leased line markets are defined as follows:

(a) A market for the retail supply of low-speed retail leased lines in Central Hamilton.

(b) A market for the retail supply of low-speed retail leased lines outside of Central Hamilton.

(c) A market for the retail supply of high-speed retail leased lines in Central Hamilton.

(d) A market for the retail supply of high-speed retail leased lines outside of Central Hamilton.

587 In Part A, section 8.1.1 the RA found the following data services are likely part of the retail leased line markets in Bermuda:

(a) Sub rate access of up to 64 kbps;

(b) Fractional T1 services;

(c) Voice and Data T1 services;

(d) DS-3 services;

(e) Frame Relay services;

(f) Ethernet SMDS services; and,

(a) Gigabit Ethernet services.

588 And in Part A, section 8.1.2 the RA tentatively concluded that that there are two service markets for the supply of retail leased lines, regardless of the underlying technology used to provide the service. The two service markets are: (1) low-speed leased lines – that is, leased lines that provide a capacity of less than 1 Mbps; and (2) high-speed leased lines – that is, leased lines with a capacity of 1 Mbps or more. These service markets are further disaggregated into two geographic markets being services that are provided (1) inside Central Hamilton; and (2) elsewhere in Bermuda.

589 This section examines whether there are one or more firms that holds SMP in retail leased line markets listed above. The RA reaches the preliminary conclusion that BTC holds SMP for the supply of low-speed retail leased lines both outside and within Central Hamilton. In respect of the high-speed retail leased line markets, the RA tentatively concludes that no company, either jointly or by itself, possesses SMP for the supply of high-speed retail leased lines within, Central Hamilton, but BTC does have SMP for the supply outside Central Hamilton.

590 In Section 5.3 we apply an SMP analysis to the wholesale leased lines markets and conclude that BTC holds SMP for the wholesale terminating segments of high-speed leased lines outside Central Hamilton and for the wholesale terminating segments of low-speed leased lines in all areas of Bermuda.

5.2 Suppliers and market shares

(a) Low-speed retail leased line services

591 Low-speed retail leased lines services consist of leased lines with a capacity of less than l Mbps. In Bermuda these services are currently provided using the following technologies:

(a) Sub rate access of up to 64 kbps;

(b) Fractional T1 services; and,

(c) Frame Relay services (CIR) at speeds < 1 Mbps.

592 At the present time there are four firms supplying these services in Bermuda. These are:

1. BTC;
2. Quantum;
3. North Rock; and,
4. Telecommunications Networks Limited (TNL).

593 Quantum provides Ethernet based retail leased line services almost exclusively within Central Hamilton, with service out to CWC Teleport in Devonshire and another service at Southside in St. David's. BTC and North Rock provide service throughout the country. TNL provides only a few low-speed circuits for security and monitoring purposes in the City of Hamilton. The following table depicts the number of low-speed retail leased line circuits provided by each of these firms.[57]

Table 15: Number of low-speed leased line circuits provided to customers (<1 Mbps) [**CIC**

	2011	**2010**	**2009**
BTC			
QCL			
NRC			
TNL			
Total			

CIC] Source: Confidential data submission of 31 July 2012.

[57] The RA's analysis relied on circuit counts because customer count data was unavailable for some parties.

594 As illustrated by Table 15 BTC currently serves over **[CIC --%]** of the Bermudan low-speed retail leased line market in terms of number of circuits provided to end-users.

(b) High-speed retail leased line services

595 The same four companies provide high-speed leased line services. Here we see that once again BTC has the largest share of the market, and its market share has been fairly stable.

Table 16: Number of high-speed leased line circuits provided to customers (>=1 Mbps) [**CIC**

	2011	2010	2009
BTC			
QCL			
NRC			
TNL			
Total			

CIC] Source: Confidential data submission of 31 July 2012.

(c) Control over infrastructure not easily duplicated

596 There are two key sets of activities involved in providing leased line services:

(a) Retailing functions; and

(b) Network activities associated with the provision and maintenance of private line services.

597 It is the RA's tentative view that there are no significant non-duplicable retailing infrastructure that would confer to a position of SMP.

598 Where concerns associated with control over infrastructure are likely to be highest are in relation to the supply of access lines for the provisioning of leased-line services. In the absence of a wholesale leased-line service (whether by commercial agreement or by regulatory mandate), entry into the retail leased line market requires the entrant to build its own network utilizing copper, fiber or fixed wireless technologies. As was discussed earlier (in sections 1)(b) and 1)(b)) there are substantial difficulties and high, sunk costs associated with entry via the duplication of existing networks whether they be fixed wireline or wireless, which constitute a significant barrier to entry. In Hamilton where there is a high concentration of business customers and thus revenues, there is a highly likelihood that the barriers to entry associated with high sunk costs can be overcome, particularly in respect of high-revenue services.

599 While a number of carriers currently supply leased-line services to other carriers, these are provided on a retail, not wholesale basis at the present time. It is unclear whether current network operators will have the incentive to provide

wholesale access to leased-lines on terms that would favour entry into the retail leased line market by another provider absent regulatory intervention.

600 However, in addition to the four current leased line providers there is BCV, which has deployed a network that could, with the introduction of the ICOL and investment on the part of BCV, be used to supply the point-to-point connections necessary for the provisioning of leased line services. Except for a small portion of the City of Hamilton, BCV's network is ubiquitous throughout the country. The RA considers the likelihood of BCV's entry into the leased line market, especially the high-speed portion of it, to be non-trivial.

601 In addition, LinkBermuda, whose network is currently concentrated in Hamilton, has announced its plan to expand the geographic scope of its network in the coming eighteen to twenty-four months.

602 It is clear that there has been duplication of BTC's fixed infrastructure at least in Central Hamilton. Outside of Hamilton entry has been primarily via wireless networks (NRC and TNL). The wireless operators have not captured a large share of the market.

(d) Technological advantages

603 BTC's network, with its extensive deployment of copper cables, is the one most suited for the provisioning of sub 1 Mbps data services. Copper loops have been deployed, around the world, for over a hundred years, to provide voice, and slow-speed data services. More recently constructed networks were designed to provide higher-speed data services. For example, Quantum's network is based on ethernet MAN[58] technology, which was specifically designed to provide high bandwidth services in increments of 1 mbps; providing services at speeds lower than this is not efficient from either an engineering or economic perspective.

604 BTC's recent construction efforts in Hamilton appear to reflect the firm's view that a network upgrade was necessary in order to provide high-speed data services.[59]

605 North Rock and TNL, use wireless technology to compete in the high-speed leased line market.

606 DOCSIS 3.0 provides the potential for cable networks to provide symmetric speeds of up to 100Mbps. Hence Cablevision is a potential entrant in the high-speed data market.

607 Hence we tentatively conclude that BTC has a technological advantage in providing low-speed leased line services, while no firm has a technological advantage in the provision of high-speed services.

[58] Metropolitan Area Network.

[59] http://www.royalgazette.com/article/20120522/BUSINESS03/705229967

(e) Access to capital

608 The issues regarding access to capital in the leased line markets are very similar to those in the fixed access and local markets as discussed in section 1)(d). We do not anticipate access to capital as being a barrier-to-entry.

(f) Vertical relationships

609 Currently the supply of international and domestic leased line providers is carried out by separate providers. Access network owners provide the retail customer with leased line access and transport to the A carrier, while the A carrier provides off-island transport.

610 To date there has been no vertical supply of services – that is, leased line access network owners have not supplied international connectivity. A dominant firm in the access market could exclude an equally efficient supplier of international connectivity by bundling international and domestic leased line service.

611 It is unclear whether the access networks would have the incentives to provide a wholesale service on a commercial basis.

(g) Economies of scale & scope and bundling

612 The markets for leased lines are based on the same telecommunications networks as the markets dealt with concerning the delivery of broadband services discussed in section 3. With respect to economies of scale and scope, the Board is of the tentative view that the same characteristics and findings apply as outlined in section 1)(f).

i) Bundling

613 As explained in section 1)(f), concerns have been expressed by a number of parties about the ability of the KeyTech group, in particular, to offer bundles that contain a broad range of services that cannot be matched.

614 We tentatively conclude that bundling has the potential to increase BTC's market power.

(h) Barriers to entry and expansion

615 Switching costs and customer inertia may make the market sticky. For example, end-users may be reluctant to switch suppliers due to a concern that a switch in suppliers will be disruptive to the end-users operations. A business may be reluctant to switch leased line suppliers for its security system fearing that it may lead to a period of time of no service. Therefore a potential entrant may face significant challenges attracting new customers.

616 Overall we do not feel that BTC's market power in the low-speed data market is significantly enhanced by switching costs and customer inertia.

617 We also tentatively find that there are no legal or regulatory barriers that will impede competition.

(i) Other structural factors

i) Countervailing buyer power

618 Low speed data connections are often obtained by households for alarm services, or by businesses for frame relay services. We tentatively conclude that the subscribers of low speed data services do not have significant countervailing buying power. It is difficult for them to self-provision the links and there are few, if any, competitive alternatives.

619 Customers of high-speed data services are more likely to have communications experts that can negotiate favourable prices.

ii) Potential entry

620 The low speed data market is a declining market. That is, the number of circuits has been declining in the past few years. In light of the significant fixed and sunk costs associated with entry, we do not expect to see significant entry into this market in the near future.

621 One notable potential exception is Cablevision. It is possible that they will use their network to offer low speed data services. At this point in time we are unaware of such plans and therefore conclude that the likelihood of entry into the low speed market is limited.

622 Customers pay a higher price for high-speed data services and therefore there is a greater likelihood of entry into this market than the low-speed market.

(j) Market conduct

623 This section examines market conduct. In terms of pricing, BTC and QCL have similar prices. For half circuits, BTC's rates are generally higher than QCL's prices. The pattern is reversed for full circuits. NRC's rates are the highest for half circuit rates and the lowest, or the middle rate, for full circuits.

i) Pricing

Table 17: Comparative half circuit rates--Bermuda companies [**CIC**

Half Circuit Rates	**BTC**	**QCL**	**NRC**
T1			
DS-3			
OC-3			
1Mbps Ethernet			
10Mbps Ethernet			
100Mbps Fast Ethernet			
Gigabit Ethernet			
10 Gigabit Ethernet			

CIC] Source: Confidential data submission of July – September 2012.

Table 18: Comparative full circuit rates--Bermuda companies [**CIC**

Full Circuit Rates	**BTC**	**QCL**	**NRC**
T1			
DS-3			
OC-3			
1Mbps Ethernet			
10Mbps Ethernet			
100Mbps Fast Ethernet			
Gigabit Ethernet			
10 Gigabit Ethernet			

CIC] Source: Confidential data submission of July – September 2012.

(k) Conclusions on SMP based on above analysis

624 We tentatively conclude that BTC has SMP in the low-speed data markets in all geographic areas. The firm controls the overwhelming share of this slowly shrinking market.

625 In the high-speed data market, BTC controls a significant share of the market.[60] Nevertheless we tentatively conclude that it does not have significant market power in the Hamilton area. This is because the high concentration of revenues associated with high-speed services in this area likely reduces the barriers to entry associated with sunk costs. The RA considers it likely that outside Central Hamilton, BTC holds SMP in the retail supply of high-speed leased lines. This may change if BCV or LinkBermuda compete with BTC outside Central Hamilton.

5.3 Wholesale leased lines

626 Section [9] found the following wholesale markets for the supply of data tails (wholesale terminating segments of leased lines):

(a) A market for the wholesale supply of low speed data tails in Central Hamilton

(b) A market for the wholesale supply of low speed data tails outside of Central Hamilton

(c) A market for the wholesale supply of high speed data tails in Central Hamilton

[60] As previously noted, the market share data is problematic because the carriers are unable to distinguish broadband from leased line customers.

(d) A market for the wholesale supply of low speed data tails outside of Central Hamilton

627 The considerations as to whether SMP is held in these wholesale markets are similar to the factors examined in the analysis of the retail leased lines. The RA tentatively concludes that BTC holds SMP in the wholesale market for low-speed data tails in all areas of Bermuda on the basis that there are high sunk costs associated with the deployment of an access network need to supply data tails.

628 For high-speed data tails in areas of high concentration of customers (such as in Hamilton), it is more likely that the barriers to entry associated with high fixed (and sunk costs) can be overcome. Therefore, the RA tentatively concludes that in Hamilton no network holds SMP, but that outside Hamilton where the economics of network deployment differ, BTC does hold SMP.

6 SMP - INFRASTRUCTURE ACCESS

629 The market definition analysis identified two markets for infrastructure access:

(a) A market for the wholesale supply of access to facilities used to construct fixed local access networks; and

(b) A market for the supply of access to facilities used to construct wireless radio access networks.

630 The first of these markets includes poles and ducts. Belco owns all, or almost all, poles on the Island. It also owns a substantial number of ducts. It is not the exclusive owner of ducts.

631 Belco rents pole space to electronic communication companies. Companies can place their cables on poles within a two foot space set aside by Belco. Belco avers that the two foot space can become, or is congested, but that it tries to accommodate the needs of the communication companies.

632 The charge for using the poles has been established by the Energy Commission. Belco represents that the formula used to set the rates was based on a methodology established by the United States Federal Energy Regulatory Commission.

633 Belco shares some duct space with QCL. Belco was formally a partial owner of QCL.

634 Belco represents that it has little space available in its ducts.

635 The Energy Commission has not established a price for duct sharing.

636 We tentatively conclude that owners of duct and poles have significant market power due to the difficult in replicating these facilities. The Governments, both City and National, strive to restrict the number of road disruptions associated with

installing either ducts or poles. Therefore entry is impeded. Furthermore, the investment requires a substantial amount of risky, sunk costs.

637 With regard to the market for the supply of access to facilities used to construct wireless networks, while a number of towers are owned by the government and government agencies, some towers and masts are owned by the vertically integrated mobile operators. It is the latter case where SMP is most likely held because of the lack of incentives for a vertically integrated mobile network to provide an entrant with access to a key input. The RA tentatively concludes that Northrock, BDC and Digicel have SMP due to the high legal, regulatory and economic barriers to entry.

7 SMP – SUBSCRIPTION TELEVISION

638 The initial Candidate Market List set out in Part A, section 1 includes subscription television service:

639 This section examines whether there is one or more firms that holds SMP in this market. It first considers in Section 7.1 the retail subscription television market and finds that BCV holds SMP. Section 7.2**.** applies an SMP analysis to the wholesale subscription television market and concludes that BCV holds SMP in that market.

7.1 Retail Subscription Television

(a) Suppliers and market shares

i) Subscription Television shares

640 In the subscription television market, BCV faces competition from WOW's wireless services, as well as satellite and free over-the-air, only-local broadcasts. According to the *Bermuda Omnibus* reports, over the past seven years, a declining portion of households have obtained their television programing via satellite or free over-the-air broadcasts. Customers instead are increasingly obtaining their television programing from the subscription services provided by WOW and BCV.[61]

641 Table 19 reports the percentage of households that obtain their television programing from BCV or WOW.

Table 19: Percentage of households receiving TV service by carrier
[**CIC**

	2011	2010	2009	2008	2007
BCV					
WOW					

CIC] Source: Confidential data provided by the parties

[61] *Bermuda Omnibus*, September 2011, p. 18.

642 BCV's subscriber share of [CIC --%] lies well above any market share threshold used internationally for market power analysis. The height of BTC's access line share and the fact that it is increasing over time, indicates that BCV is likely to have significant market power in the provision of subscription television services, although examination of other factors is necessary especially to take a forward look as to whether there are future changes that are likely to alter BCV's position and the competitive pressures it faces.

(b) Control over infrastructure not easily duplicated

643 In section 1)(b) we discussed the difficulty of constructing a fixed access network that would be used to provide residential voice service. Much of the analysis provided in that section applies equally to the construction of a subscription television network. An entrant would have to incur substantial fixed and sunk costs in order to establish its delivery system. A fixed wireline entrant would have to place its facilities in conduit, on poles, or buried in the ground. A wireless supplier would have to obtain scarce spots on towers and masts. Regardless if the entrant used wireline or wireless technology, it would have to deploy set-top boxes at customer's residences and might also incur significant expenses wiring the household for the new service. For example, according to one news report, it costs approximately $800 to install a fiber drop and rewire a home so that the fiber can be used to provide subscription television and other electronic communications service.[62] These expenditures involve a significant amount of sunk costs and this makes entry risky.

644 Neither, at this time, is entry aided by the existence of a wholesale market. To the best of our knowledge, neither WOW nor BCV provide wholesale subscription television services.[63]

645 The RA notes that BCV's network is not the only fixed access network in Bermuda. BTC has deployed a network that could, with the introduction of the ICOL and investment on the part of BTC, be used to supply subscription television services.

646 At times, BTC has expressed to the Department its interest in upgrading its network in order to provide subscription television services. The network upgrade will be costly, and involve significant sunk costs. Neither is the upgrade likely it be done quickly. Furthermore, it is our understanding that entry by BTC into BCV's market is significantly more challenging than BCV entering the voice market. BTC would have to convert its narrowband to a broadband network, while BCV would unlikely need to make any substantial investments in its physical plant. Rather BCV would have to figure out how to run voice services on its existing network.

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[62] http://www.youtube.com/watch?v=3g5hl-LMuAQ. Google charges a connection fee of $300 to its fiber network in Kansas City in order to cover a portion of the cost of connecting the home to the fiber infrastructure. (See, http://gigaom.com/2012/07/26/google-fiber-heres-what-you-need-to-know/

[63] Historically Bermuda has had a policy that discouraged the entry of pure resellers, that is firms that do not own their own facilities. The Government has not prohibited the provision of wholesale services. For example, Brasil telecom holds a wholesale-only license. Southside is a second example of the Government permitting the provision of wholesale services.

647 LinkBermuda has announced its intention to build a fibre network throughout the country in the coming eighteen to twenty-four months. This is another formable, potential entrant to the subscription television market.

648 There is no strong basis for believing that further ubiquitous entry will occur in the next year. Given this, and the lack of wholesaling activity outside of Southside, BCV's control of the access infrastructure affords it a position of power in the subscription television market. While entry into the subscription television market by BTC and LinkBermuda may occur, it is unclear: (a) how quickly a fixed network rival to BCV will emerge; and (b) whether wholesaling would result from what could effectively be a duopoly (i.e., BTC and BCV) with a small player (WOW), in which there exists cross-ownership between the two duopolists (BTC and BCV).

649 The above discussion has focussed on duplication of the customer access network needed to provide subscription television services. In addition to the customer access network, an entrant must obtain access to programming and carry out retailing functions. As was discussed in Part A, section 11.1 in the context of market definition, it appears that there is a significant amount of competition in the supply of content obtained abroad. Furthermore, the Government has historically discouraged contracts that provided exclusive access to content.[64] While the RA takes no position on exclusive contracts at this time, we are mindful that such a commercial agreement may be deemed an action to exclude and thereby violate §85 and/or §86 of the Regulatory Authority Act of 2011.

650 In addition, it does not appear that there is significant non-duplicable retailing infrastructure that would confer to BCV (or any other subscription television supplier) a position of SMP.

(c) Technological advantages

651 Hybrid fiber-coaxial (BCV) and wireless (WOW) technologies are currently used to provide subscription television services in Bermuda.

652 Wireless subscription television service has some advantages and disadvantages relative to cable service. WOW recommends that a subscriber install an antenna on the outside of their house in order to pick-up a strong signal. The

[64] See, for example, Hiram Edwards to Terry Roberson, June 12, 2008, REF: RA 206/18. Furthermore, also in 2008, ruling in a dispute between WOW and BCV concerning BCV's exclusive distribution arrangement with Setanta (a wholesale provider of high value sports channels), the Commission found for WOW; handing down a decision which stated, in part, that exclusivity arrangements for the distribution of high value, high demand content within in Bermuda was not in the best interest of Bermuda's consumers. On appeal, the Minister found "…that the Commission fully understood the issues, applied a sensible approach, properly investigated the claim and collected enough evidence to make an informed decision." However, the Minister went on to refer the matter back to the Commission instructing it to "…investigate and report on the impact of exclusive agreements on the market as a whole." The Minister's decision further stated: "While the Commission is undertaking their enquiry the status quo shall remain." See Ministerial Decision in *Appeal against Decision of the Commission dated 12 June 2008 (Setanta)*, 15 October 2008, Ref No. TC 203/02/18/08.

trade-off for this inconvenience is that no cabling needs to be installed from the street to the home. With both the wireless and wireline connections, coaxial cable has to be installed inside the house in order to carry the signals to the set-top boxes.

653 WOW service is not available everywhere on the Island. The Company states on its web site that "there are 'shadow areas' in valleys, at the base of steep hills, or behind large buildings where the WOW signal will not be strong enough for reliable reception. In most cases, this problem can be corrected."[65]

654 The existing WOW network does not offer as many channels as BCV. For example, WOW's Showtime package includes two channels, while BCV's Showtime package includes ten channels. The smaller number of channels on WOW's network is not due to any technological limitation. Rather the firm appears to be marketing smaller packages in exchange for lower prices for the bundle.

655 Neither does the WOW network provide two-way transmission. Therefore it cannot effectively be used to provide two-way access to the Internet[66] or voice services.

656 Overall the RA considers that BCV's fixed network likely has a technological advantage over WOW's fixed wireless networks.

657 Potential entry could occur via a fiber-cable network, a fiber-to-the-home network, or by a wireless supplier. The evidence from the United States does not indicate that the hybrid fiber-coaxial cable network has any significant advantage or disadvantage relative to a fiber-to-the-home network. Both networks can deliver enormous capacity and high-speed data connections.

658 The hybrid fiber-coaxial network does have a distinct advantage over the fiber-copper network because the quality of the signals on the latter network diminish significantly as the distance between the network electronics in the serving pedestal and customer location increases.[67] Therefore BTC will need to make significant capital investments before it can provide ubiquitous subscription television service. The investments would be directed at reducing the length of the connection that runs on copper.

659 In summary, fiber-to-the-home is the strongest technological competitor to BCV's HFC network. While fiber-to-the-home is a technically appealing technology, some industry analysts say that the evidence to date suggests that it is unprofitable to deploy this network configuration.[68]

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[65] http://www.wow.bm/Pages/FAQs.htm

[66] A different network could be used for upstream transmissions but such an arrangement is inefficient.

[67] http://www.uverseguide.com/how-does-att-u-verse-pair-bonding-work/

[68] "Is Verizon's Bet on FiOS Paying Off?" Business Week, March 17, 2011, http://www.businessweek.com/magazine/content/11_13/b4221046109606.htm.

660 Potential entry could also come from a wireless supplier. CellOne holds a significant amount of spectrum and some of this could be used to provide television services. To date, CellOne has not used its allocated spectrum for this purpose, nor are we aware of plans for this to be done in the near future. A second wireless supplier may not be able to serve the entire Island, for, as with WOW, its signals may be weak in some localities due to natural and man-made obstacles.

(d) Access to Capital

661 The construction of an electronic communications network requires a significant amount of capital. Along with other businesses in Bermuda, telecommunications companies are subject the 60/40 Bermudian ownership rule.

662 We anticipate that the Government will continue to exhibit flexibility in this area and therefore we do not anticipate access to capital as being a barrier-to-expansion or entry.

(e) Vertical relationships

663 Both existing suppliers of subscription television services are vertically integrated – that is, they all use their own network rather than a wholesale service purchased from a third party to provide retail subscription television services. The introduction of ICOL will likely mean that there is an increased interest from entrants in obtaining wholesale subscription television services to enter into the supply of retail subscription television services, in particular so that providers of other services (such as voice services) can bundle their services with subscription television service. [69]

664 As mentioned in section 1)(b), wholesale services (whether in the form of resale or access to facilities such as ducts) are not currently available. It is not clear from parties' submissions to what extent entrants have actively sought to engage with BCV to attempt to commercially negotiate wholesale service. Therefore, it is unclear whether BCV has actually refused to supply wholesale services/facilities access or alternatively offered terms of supply that were deemed unreasonable by its competitors.

665 Looking to the future, if a wholesale service were made available (whether by regulatory mandate or through commercial negotiation), vertical concerns that may arise relating to SMP in the retail market include margin squeeze issues and discrimination on non-price terms.

(f) Economies of scale & scope and bundling

i) Economies of scale

666 Minimum efficient scale can create a barrier to entry where there are large fixed costs. A company operating at a small scale will have high unit costs relative to

[69] In the United States for example, some of the major telephone companies, such as Verizon and CenturyLink, bundle satellite TV service with their voice and Internet products.
http://www22.verizon.com/home/bundles/standard and , http://www.centurylink.com/home/bundles/

a supplier who serves a large share of the market. In the provision of subscription television service there are:

(a) Very significant fixed costs associated with building a subscription television network; and

(b) Fixed costs associated with retailing – such as marketing/branding.

667 It seems likely to the RA that economies of scale is factor that does constrain entry in Bermuda, particularly facilities-based entry. In a country that has approximately 26,000 homes, it is to be expected that the number of viable players in the market will be limited, particularly with respect to network deployment.

ii) Economies of scope

668 There are clear economies of scope associated with the supply of subscription television service along with other electronic communications services. The provision of television service over a wireline connection requires a significant amount of bandwidth. The incremental cost of installing additional capacity that can be used for broadband or voice products is likely small.

669 The extent to which economies of scope can currently be achieved is somewhat limited under the existing licensing regime. However, in future under the ICOL increased efficiencies will be achievable by firms expanding their service range or by increased integration between licensees that share common ownership. For example, (1) BCV may choose to supply voice access and potentially also international calls, which would allow it to spread its customer acquisition costs, connection costs and common network costs across a larger range of services; and (2) KeyTech may integrate operations of some or all of its fully-owned subsidiaries to achieve cost savings.

670 Economies of scope, themselves, are not problematic and can provide important cost savings which can, in the right competitive setting, be passed on to consumers in the form of reduced prices. Therefore, the important question in respect of SMP is not simply whether economies of scope exist, but whether some players are likely to achieve such great economies of scope that it strengthens their market power.

671 We tentatively conclude that WOW is not in as good position as BCV to obtain economies of scope because its network is more of a one-way, rather than a two-way network. On a one-way network, programing and data are transmitted downstream, but the customer cannot use the same pathway to transmit data from the household back to the head-end of the network. Consequently WOW is not in a good position to offer voice or data services. Therefore we do not expect WOW to achieve the same economies of scope, in the foreseeable future, as BCV.

672 All participants in the access and local markets have at least some ability to jointly provide a range of services. It may well be that the KeyTech group is in the best position to achieve economies of scope. However it is possible that collaboration

or mergers could occur between other carriers. The RA considers that economies of scope, while they will be more achievable by some suppliers than others, are not likely a key limiter of competition. In the next section we turn to a related issue, the ability to bundle.

iii) Bundling

673 Bundling of services that offer customers a cheaper price than if there were to purchase the services separately already occurs to a degree (see the discussion at page 216 for an example of the bundling discounts available in Bermuda). Bundling has the potential to provide benefits to customers in the form of added convenience (ie, of not having to shop for individual products) and by passing on the cost savings of jointly supplying services. However, as was discussed in Part A, Appendix G, bundling can be a means through which firms are able to leverage a position of market power from one market to another, or more generally, offer a bundle that cannot be contested by other players.

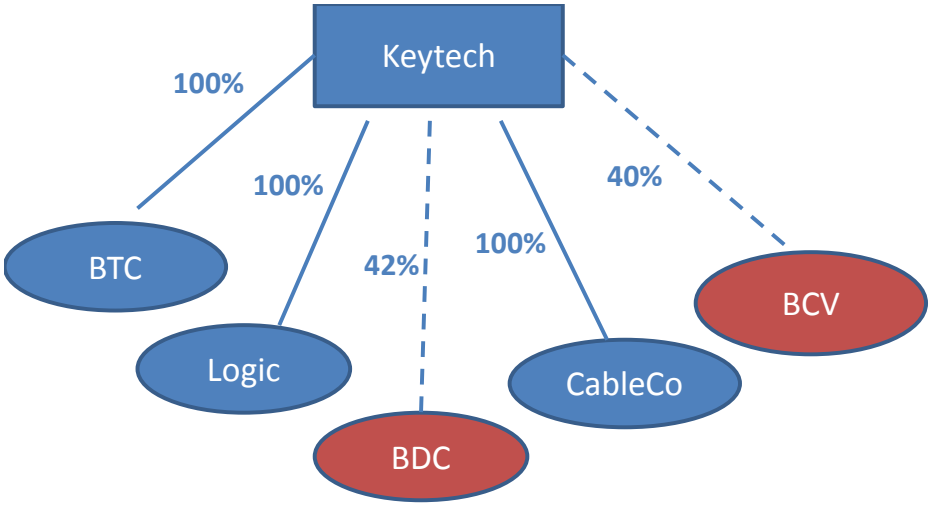
674 A number of submissions directly raised the issue of the Keytech group's ability to offer wide service bundles once the ICOL is implemented. BTC, Logic, and CableCo are wholly owned subsidiaries of Keytech. Keytech holds a substantial, but not a majority, number of CellOne and BCV shares (see Figure 8). Therefore, once the ICOL is in place Keytech may choose to either integrate some or all of these subsidiaries, or at least increase the level of coordination between them, allowing the provision of bundles that include access and local calls, long-distance calls, broadband access and ISP service and mobile services.

675 Two types of concerns regarding bundling of access lines and local calls with other services can be identified:

(a) The concern that competition in the subscription television market would be lessened as a result of BVC being the only player that can bundle services such as broadband with subscription television service. This could potentially be addressed by access line providers teaming up with the competing broadband networks to offer packages.

(b) The concern that SMP in the subscription television market could be leveraged into other markets such as broadband, long-distance or mobile services. Given BCV's very high and sustained market share in the subscription television market this is potentially a more significant issue. This is an issue that is especially relevant to the RA's choice of regulatory remedies.

Figure 8: Keytech group



(g) Barriers to entry and expansion

676 Many of the key barriers to entry have already been discussed above – in particular, barriers to entry associated with investing in network infrastructure are explained in VII.A.2. Further barriers include switching costs and customer inertia.

i) Switching costs

677 Switching costs include the cost of purchasing new equipment and installation: the two networks that provide subscription television service do so using different technologies. When a customer opts to switch supplier new customer premise equipment (CPE) is required. The cost of the CPE set-top box is recovered through an explicit monthly fee, while other installation costs, such as the external antenna on the WOW system, or the network terminating unit on BCV's network, are recovered as part of the monthly service fee for the different television channels. Even with free connection and CPE the customer still faces the inconvenience of installation – such as having to be home when technician arrives etc – as well as the unsightliness of external equipment such as antennae and internal equipment/extra sockets and wiring.

678 These switching costs reduce a customer's willingness to switch suppliers.

ii) Customer inertia

679 In addition to the explicit costs associated with switching, an additional barrier to entry and expansion that entrants have to overcome is a general reluctance to switch. This might be because of the hassle of changing supplier (for example, the need to fill in paperwork and change existing payment arrangements), the time required to select a supplier (for example, comparing suppliers and their prices) and understanding different technologies. In addition, perceptions rather than actual facts can be an important determinant of customer's supplier selection – customers are

more likely to hear horror stories about alternative service providers and technologies than the more mundane stories about good service. Therefore, there can be a general reluctance to switch to new technology, especially where it is unproven.

iii) Regulatory and legal barriers

680 As discussed in Part A, section 4.1 the licensees of one Class are currently unable to obtain a license of another Class but the introduction of the ICOL means that this restriction will disappear. These line-of-business restrictions will end when the existing license holders, which are identified on Schedule One of the ECA, are issued ICOLs.

681 Firms not already providing electronic communications will not be able to obtain an ICOL for a period of not less than one year: The Act states that no earlier than one year of the date of commencement can the Minister direct the Authority to investigate the merits of issuing additional ICOLs. The Authority's recommendation will be passed onto the Minister for final resolution.[70] This section of the law, while a barrier-to-entry, is not likely to be a major impediment to the competitive process because of the substantial number of firms that will receive ICOLs.

682 Moratoriums on tower construction and limits on the digging up of roads are also significant barriers to entry and expansion as discussed in section 1)(b).

(h) Other structural factors

i) Countervailing buyer power

683 There is little scope for mass market customers (that is, residential and small business customers) to have countervailing buyer power. Therefore it is unlikely that countervailing buyer power will have a significant effect on the subscription television market.

ii) Potential entry

684 BTC will be a potential entrant into the subscription television market once it obtains an ICOL. BTC could use its existing cable network infrastructure, although considerable investment would be required. That BCV is 32% owned by Keytech which also wholly owns BTC, potentially limits BTC's incentives to enter and compete aggressively with BCV. However, the RA notes that Keytech is not BCV's major shareholder. Therefore, the extent to which BTC places a strong competitive constraint on BCV is unknown.

685 One or more of the other ICOL holders may choose to build their own network. If the entrant attempts to build a wireless network, it will face the constraint of the tower moratorium, and would also, perhaps, need spectrum. If the entrant builds a wireline network, it would need to obtain access to the existing poles and conduit, or install its own infrastructure, and negotiate the deployment of drops into the homes of

[70] Electronic Communications Act 2011, Sec. 75.

its future customers. These obstacles are formable and therefore, looking forward, we do not expect there to be the rapid entry of a ubiquitous facility based provider into the subscription television.

iii) Competition from other technologies

686 As was discussed above in Part A, section 11.1, the RA considers that while there may be some competitive constraint from over-the-top programming and mobile-TV, the available evidence suggests that to date these products are not diminishing households interest in watching broadcasts over a subscription television network.

(i) Market outcomes and conduct

687 One market outcome measure that can provide information on the extent to which a firm is competitively constrained in its behaviour is the price differential between the firm and its rivals.

688 BCV offers subscribers a choice of four programming tiers, each upper tier containing the channels of the tier(s) below it in addition to the upper tier's new ones, these are depicted in Table 20 below. All of BCV's video programming tiers also come bundled with a wide variety of music channels, a feature that WOW does not offer.

Table 20: BCV Subscription Options[71]

Tier Levels	Economy	Deluxe	Super	Variety
Price	$30.00	$47.50	$57.50	$75.50
No. of Channels	21	49	66	121
Price Per Channel	$1.43	$0.97	$0.87	$0.62

689 In addition to these subscription tiers BCV offers the following premium content options as add-ons to any of the programming tiers listed above.

[71] Prices and channel counts taken from BCV's website at http://www.cablevision.bm/index.php/support189/rates-and-fees and http://www.cablevision.bm/index.php/digital-cable310/digital-channels/ viewed July 2012. Prices listed are per month.

Table 21: BCV Premium Content Add-on Options[72]

Tier Levels	HBO	Cinemax	Showtime	Starz	Maxpak (Sports)	HDTV Tier
Price	$14.00	$13.00	$13.00	$12.00	$22.00	$12.00
No. of Channels	8	6	10	5	2	32
Price Per Channel	$1.75	$2.17	$1.30	$2.40	$11.00	$0.38

690 In contrast to BCV, WOW only offers subscribers a choice of two programming tiers, which are depicted in Table 22 below.

Table 22: WOW Subscription Options[73]

Tier Levels	Basic	Classic
Price	$40.00	$68.00
No. of Channels	43	93
Price Per Channel	$0.93	$0.73

691 Like BCV, WOW also offers various premium content options to subscribers that may be added to any of the programming tiers subscribed to, these are depicted in Table 23 below.

Table 23: WOW Premium Content Add-on Options[74]

Tier Levels	HBO	Showtime	TMC	Cinemax	MaxPak (Sports)
Price	$14.00	$11.00	$11.00	$13.00	$22.00
No. of Channels	7	2	2	6	2
Price Per Channel	$2.00	$5.50	$5.50	$2.17	$11.00

692 As these tables illustrate, the prices for each firm's subscription-TV offerings are very close to one another. WOW's Basic 43 channel tier is $7.50 less than BCV's Deluxe 49 channel tier. WOW's Classic 93 channel tier is also $7.50 less than BCV's

[72] *ibid*. Prices listed are price per month.

[73] Prices and channel counts taken from WOW's *Channel Programing and Product Information* brochure submitted to the RA on July 31, 2012. Prices listed are per month.

[74] *Id*. WOW also has a high definition package available containing 5 HD channels, but no pricing was available for this package and so it was not included in the table.

121 channel Variety tier.[75] Furthermore, the two firms carry many of the same channels. For example, BCV's Deluxe option contains 27 channels that are also available to subscribers of WOW's Basic option (and vice versa),[76] thus over half of the channels offered under each of these subscription options are the same.[77] Arguably, this closeness in price and high degree of similarity in channel offerings are indicative of the close degree of rivalry between the two firms for customers in terms of price and the provision of content.

(j) Market Performance

693 One measure of market performance is the relationship between cost and price. In a competitive market, and one in which firms incur no fixed costs, entry reduces prices to the point where the price of a product is equal to the marginal cost of production and there is no incentive for firms to enter or exit the market. A indici of a firm having market power is where it is observed that a firm is charging a price that exceeds the cost of a production.

694 Data on the marginal cost and fixed cost of providing subscription television service is not available. Therefore we are unable to observe the degree to which prices depart from the levels that would emerge in a competitive market. Nevertheless, BCV's 2010 financial statement suggests that in aggregate, that is when both its broadband and subscription television services are taken into account, the firm has market power and is charging prices that allow it to earn supra-competitive returns. WOW Is not earning supra-competitive returns.

695 BCV's return on historical investment suggests that BCV has market power. This analysis does not tell us if the market power is in one or both of its retail markets—subscription television and broadband

(k) Conclusions on SMP in subscription television markets

696 The above analysis indicates that there are likely significant barriers and that there is some degree of customer inertia (driven by the reluctance to change to a new technology and the reluctance of customers to switch away from their existing supplier) which hinders the ability of a wireless network such as WOW to effectively constrain BCV. LinkBermuda's plan to extend its fibre network outside of Hamilton, if

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[75] On the basis of absolute price, WOW's offerings are cheaper than comparable BCV offerings, but more expensive when considered from a per channel perspective.

[76] This analysis was performed by comparing the channels offered under BCV's Deluxe tier (which also contains Economy tier channels) obtained from BCV's website at http://www.omniexchange.net/cv_development/digital_channel_lineup.php and with the channels offered in WOW's Basic tier as listed in a programming sheet submitted to the RA on July 31, 2012.

[77] Of all the channels offered by BCV and WOW 89 of those are offered by both network operators. Stated another way, approximately 85 percent of WOW's channels are also available from BCV and approximately 56 percent of BCV's channels are available from WOW.

realized, will add an important element of rivalry. The RA tentatively draws the conclusion that BCV holds SMP in the retail subscription television market. .

7.2 Wholesale Subscription Television

697 As discussed in detail above in the context of the retail SMP analysis, the deployment of a subscription television network involves high sunk costs associated with connecting customers, whether using a fixed network or a wireless network, and in deploying set-top boxes. As discussed above, the RA considers that fixed networks have a technological advantage over wireless networks. Given these considerations, the RA draws the tentative conclusion that BCV is likely to hold SMP in the wholesale market for subscription television.

Appendix A List of Possible Remedies

The following table contains a list of remedies that might be proposed if the logic and data in this pre-consultation document remains largely unchanged.

Service	Definition of candidate markets	Possible Remedies
1. Retail fixed narrowband access lines and local calls	• **A national market for the supply of retail fixed narrowband access lines and local calls to residential customers** • **A market for the supply of retail fixed narrowband access lines and local calls to business customers in the City of Hamilton** • **A market for the supply of retail fixed narrowband access lines and local calls to business customers outside of the City of Hamilton**	• **Residential prices could not increase more than 7% per annum (i.e., the $26 rate could increase to $26 *1.07 = 27. 82 in 2013; in 2014 it could increase to 26*1.07*1.07=$29.77) absent an affirmative showing by BTC that its prices are below cost.** • **Same rule for business customers outside of Hamilton.** • **No retail remedies for business market in Hamilton.** • **§85(5) of the RAA prohibits price squeezes and predation. Remind parties of this prohibition but not proscribe specific methodologies on price squeezes/predation until these topics are explored in a consultation.**
2. Retail broadband access	• **A national market for the supply of retail fixed broadband access and Internet services to residential customers** • **A market for the supply of retail fixed broadband access and Internet services to business customers in the City of Hamilton** • **A market for the supply of retail fixed broadband access and Internet to business customers outside of the City of Hamilton**	• **Price per Mb/s cannot increase (unless an affirmative showing that prices are below cost).** • **No price restrictions on new products (including the bundling of access with ISP service) other than price squeeze/predation restriction.** • **Must offer retail access at the existing speeds, as well as whatever new speeds are introduced for bundled access and ISP service.**
3. Retail mobile services	• **A national market for the supply of retail mobile services, including voice and data.**	• **Addressed through wholesale remedies.** • **More active monitoring (i.e., collection of data).**
4. Retail leased lines	• **A market for the retail supply of low-speed retail leased lines in the**	• **The price of low speed-retail leased lines cannot**

	City of Hamilton • **A market for the retail supply of low-speed retail leased lines outside of the City of Hamilton** • **A market for the retail supply of high-speed retail leased lines in the City of Hamilton** • **A market for the retail supply of high-speed retail leased lines outside of the City of Hamilton**	**increase more than 7%, per annum, absent an affirmative showing by BTC that its price is below cost.** • **No remedies for high-speed data in Central Hamilton** • **The price of high speed-retail leased lines outside of Central Hamilton cannot increase more than 7%, per annum, absent an affirmative showing by BTC that its price is below cost.** • **In order to avoid exclusion from the international market, for any international product, domestic retail access must also be made available.**
5. Retail subscription TV services	• **A national market for the supply of retail subscription TV services**	• **Addressed through wholesale remedies.**
6. Call origination on fixed networks	• **A wholesale market for the origination of calls on fixed networks in the City of Hamilton** • **A wholesale market for the origination of calls on fixed networks in areas other than the City of Hamilton**	• **International calls. Price ceiling is the charge established by the LAC (local access charge) proceeding, unless subsequently revised by the TC or Board.** • **No need to address domestic calls given bundling of local calls and access.** • **Preselection of international carriers. Section 73(8)(a) of the ECA requires carrier pre-selection for international calls for all ICOL holders (that participate in the numbering plan) until the advent of number portability.**
7. Call termination on fixed networks	• **Markets for the supply of call termination on each individual fixed network**	• **Maintenance of current policy. Bill and keep domestic calls; $0.03 termination rate for international calls (until revised by the TC or Board).**

8. Wholesale fixed narrowband access and local calls	• **A wholesale market for the supply of fixed narrowband access and local calls in the City of Hamilton** • **A wholesale market for the supply of fixed narrowband access and local calls in areas other than the City of Hamilton**	• **None**
9. Wholesale broadband access	• **A wholesale market for the supply of fixed broadband access in the City of Hamilton** • **A wholesale market for the supply of fixed broadband access in areas other than the City of Hamilton**	• **retail minus for both access, and access + ISP**
10. Wholesale MVNO access on mobile networks	• **A national market for the supply of wholesale access and local call origination on mobile networks**	• **MVNO access agreements, on just and reasonable cost based terms; must be made easily available to those who seek them.** • **Or retail minus**
11. Origination of international calls on mobile networks	• **A national market for the supply of wholesale origination of international calls on mobile networks**	• **Current policy zero rate on the grounds that the cost is recovered in the per minute bucket fee. Maintain policy of zero rate unless carriers make an affirmative showing that the rate is below cost.** • **Preselection of international carriers. Section 73(8)(a) of the ECA requires carrier pre-selection for international calls for all ICOL holders (that participate in the numbering plan) until the advent of number portability.**
12. Call termination on individual mobile networks	• **Markets for the supply of call termination on each individual mobile network**	• **Same policy as mobile call origination.**
13. Wholesale provision of terminating segments of leased lines	• **A market for the wholesale supply of low speed data tails in the City of Hamilton** • **A market for the wholesale supply of low speed data tails outside of the City of Hamilton** • **A market for the wholesale supply of high speed data tails in the City**	• **Retail minus for low speed data tails.** • **Retail minus for high-speed data tails outside Central Hamilton**

	of Hamilton • **A market for the wholesale supply of low speed data tails outside of the City of Hamilton**	
14. Supply of access to infrastructure facilities	• **A market for the wholesale supply of access to facilities used to construct fixed local access networks** • **A market for the supply of access to facilities used to construct wireless radio access networks.**	• **Non-discriminatory access (including a price squeeze test).**
15. Wholesale subscription TV services to deliver broadcast content to end users	• **A wholesale market for the supply of subscription TV to deliver broadcast content to end users**	• **Retail minus avoided costs**

Additional Notes: Accounting separation between retail and wholesale is required wherever retail minus, and, perhaps, where cost based rates, are established.

A Reference Interconnection Order is also needed where a carrier is required to provide wholesale services.