

Response to Pre-Consultation Document PC12/03

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Submitted by:

Professor Martin Cave, Imperial College Business School, London

Jarleth M. Burke, London School of Economics

On behalf of:

Digicel Bermuda

A. Structure and Outline

1. This assessment is submitted by Professor Martin E. Cave and Jarleth M. Burke on behalf of Digicel Bermuda in relation to the Pre-Consultation Market Review Process undertaken on behalf of the Ministry. In particular, it focuses on Part A of the Market Review on Market Definition and Part B on Significant Market Power ('SMP') in so far as they concern the mobile sector. For ease of reference, we refer to both pre-consultation documents throughout as the 'Initial Review'. This assessment is a joint legal and economic analysis and covers:
 - Findings, Methodology and Forward Looking Analysis
 - Markets, Joint Dominance and the Communications Act
 - The Relevant Markets and Mobile
 - SMP analysis in the Retail Mobile Market
 - SMP analysis for other Mobile Related Markets
 - The Proposed Remedies, Feasibility and Priorities
2. The economic elements of this report are principally the work of Professor Martin Cave of the Imperial College Business School. Legal elements and legal input in to the economic assessment are principally the work of Mr. Jarleth M. Burke of the London School of Economics. Brief biographies for each are attached at Annex I. Observations of fact concerning Bermuda throughout are based on information supplied by Digicel Bermuda. No claim of confidentiality is being made in respect of this document.
3. In the mobile sector, the principal finding of the Initial Review is that the current mobile operators, Digicel and BDC, enjoy a position of joint SMP in a broadly defined retail market. While we do not contest this provisional market definition (based on the available evidence), it is clear that the conditions necessary to demonstrate either single or joint SMP in that market are not fulfilled. Just to pick two relevant considerations, there is no demonstration of excess profitability using valid economic techniques, and far from raising concerns about potential entry, the Initial Review instead provides more than ample evidence that it is feasible, realistic and likely to occur in sufficient time to have a meaningful impact during the four years of the review period. Those two failings alone invalidate the provisional conclusion on joint market power in the retail mobile market. Separately, there is an obvious omission in the failure to apply any of the economic criteria that are relevant to the assessment of tacit co-ordination so as to underpin a finding of joint SMP.
4. Apart from the lack of demonstrated SMP in the retail mobile market, there are fundamental problems of definition and appraisal in relation to what are said to be markets in the origination of international calls on mobile networks, origination and MVNO access, as well as for termination on mobile networks. It is more than doubtful that these markets exist in the manner contended for, and this raises serious questions about the associated SMP findings, however tentative they may be. In our view, many of the difficulties concerning these three markets stem from the direct importation of candidate markets from the EU without sufficient consideration being given in particular to how retail markets in Bermuda differ from those in the EU. Relevant points of divergence include the receiving party pays ('RPP') regime, the lack of charging for interconnection services, and the peculiarities of international calling services.

5. The analysis provided within the Initial Review as to possible remedies is almost non-existent, in particular as to the proportionality of the various interventions, and ultimately, those remedies are driven by the SMP assessments, which are flawed. Thus, the introduction of unspecified MVNO access is presented as a panacea for both the retail market as well as for what is said to be the wholesale market for MVNO access. No real consideration is given to the administrative feasibility or cost of such measures even though evidence for verifiable demand or of requests for MVNO access being unreasonably denied are not provided in the Initial Review.
6. Finally, the remedies that are suggested in relation to the hypothesised markets for origination (for international) and termination on mobile networks given their unusual formulation (effectively prohibition on new charges) give reason to doubt the robustness of the underlying SMP findings and in particular of the associated market definitions.

B. Findings, Methodology and Forward Looking Analysis

Candidate Markets

7. The Initial Review presents a market power analysis for four markets as follows:
- *a national market for the supply of retail mobile services, including voice and data;*
 - *a national market for the supply of wholesale access and local call origination on mobile networks;*
 - *a national market for the supply of wholesale origination of international calls on mobile networks; and,*
 - *markets for the supply of call termination on each individual mobile network*

The conclusion of the analysis is that the following operators hold significant market power (SMP):

- (a) *a national market for the supply of retail mobile services, including voice and data: Digicel and BDC jointly hold SMP;*
 - (b) *a national market for the supply of wholesale access and local call origination on mobile networks: Digicel and BDC jointly hold SMP*
 - (c) *a national market for the supply of wholesale origination of international calls on mobile networks: Digicel and BDC jointly hold SMP;¹*
 - (d) *markets for the supply of call termination on each individual mobile network: each of Digicel and BDC holds SMP in respect of its own network.*
8. The conclusions (tentative or otherwise) with respect to markets (b) and (c) are said to flow from the conclusion in market (a), while the reasoning with respect to market (d) is different. Accordingly, if the conclusion with respect to (a) is found to be unsound then the conclusions with respect to (b) and (c) fall too.

The Bermudian legal framework and its implementation

9. §2 of the Electronic Communication Act 2011 ('EC Act 2011') defines SMP as:

'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.'

Apart from the final clause ('which may provide...'), the statutory language appears to be taken from the renowned interpretation of dominance contained in the 1978 judgment of the European Court of Justice in *United Brands*. The EC Act 2011 also 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),*

¹ This is only 'tentatively' concluded.

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.” (page 203, para. 64.)

10. The authors of the Initial Review have included as Appendix G of their report: ‘*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.*’ (page 207, para. 396).
11. Appendix G has two sections. The first discusses market concentration measures, particularly as used in merger cases by competition authorities in Australia, New Zealand and the United States. It is not clear how these are to be read across to market analysis outside the context of appraisal of the competitive effects of a merger, since it is important to make a distinction between a firm which, by virtue of the industry and skill with which it faces its customers, acquires a large market share and a firm which simply ‘buys’ market share. Also, there is scarcely a mobile market in the world (including those markets which are widely held to be competitive), which records quantitative values, with respect, for example to the HHI index,² lying within the range which would lead a competition authority reviewing a merger not to undertake further analysis. In any case this aspect of the discussion plays no subsequent part in the analysis of Bermudan mobile markets, which only cites market shares of the two operators identified.
12. The second section, entitled ‘tacit co-ordination and effects on competition’ outlines the familiar conditions for tacit co-ordination to be feasible. These appear to be derived from European jurisprudence as summarised in a 2005 Working paper from the European Regulators’ Group.³ This provides a reasonable basis for an analysis, but, as is generally recognised, it is crucial to conduct a careful and thorough analysis of joint dominance because of the difficulty of discriminating between the outcomes in markets exhibiting joint dominance and those that are effectively competitive. Thus markets characterised by joint dominance and markets characterised by effective competition may both exhibit parallelism in prices. Moreover, a misdiagnosis by the regulator of joint dominance in a competitive market may trigger interventions that interfere with the competitive process in ways that distort competition and injure consumers. Any analysis must be alive to this difficulty and collect evidence thoroughly while appraising it carefully.

The Requirement for Current and Forward Looking Analysis

13. An important point, repeated in several places in the Initial Review, is that the market review process is dynamic, and that more specifically, it incorporates an important forward-looking dimension. This is stated to be a requirement of the legislation and it is an important consideration given how fast moving the communication sector tends to be. The pace of innovation make future predictions difficult, and it needs to be borne in mind that the move to future technologies must get underway well before they are capable of commercialisation.

² See Initial Review pp. 204-5, paras 66-71.

³ European Regulator’s Group (September 2005) Revised ERG Working Paper 1 on the SMP concept for the new regulatory framework, para. 29. There have been developments in European jurisprudence since 2005, notably in the judgment in *Impala*.

14. The Review Notice grapples with the issue of what the future time horizon should be and quite sensibly considers that it should be a period of four years since that is the period between successive market reviews as provided for by law. Bermuda law is somewhat unusual in that it specifies the period between reviews, which suggests a careful balancing of the need for appropriate regulation, a consideration of the pace of technological progress, and the desirability of regulatory certainty for operators including those contemplating significant investment. It is clear that within the next four years, some very big changes in the structure of the communications sector are inevitable. The Initial Review makes reference to several of them, although it is not entirely clear whether the collective impact of these factors is fully reflected in the current analysis. Among the most important changes are the following:
- A spectrum review process
 - The introduction of a new system of licensing
 - The requirement for carrier pre-selection pending the introduction of number portability
 - The introduction of full number portability
 - The likely bundling of a range of telecommunications services
15. All of these developments are likely to have a significant impact on the mobile sector, which is increasingly just a component of a very diverse communications market where there are a variety of inter-changeable technologies. Given what is indicated above about the four-year term of the proposed review, one would have expected to see a careful working through of the implications of likely changes within that period of time. Inexplicably, having made the very cogent argument that four years is the relevant timescale, a much shorter temporal perspective appears to be at work when it comes to considering the impact of some of these changes. Where a particular development is likely to occur within two years, there are a further two years during which its implication will play out, and in some cases the market will start to be affected even ahead of the formal implementation of proposed changes.
16. We are aware that in the context of merger reviews (and in some other situations), the future horizon, say as to the potential for competitive entry, is sometimes limited, with a period of 1-2 years sometimes being used by competition agencies when assessing the effects of a merger. Quite apart from the special statutory reason (correctly inferred in the Initial Review) for taking (at minimum) a four year time horizon when engaging in forward looking analysis, the position relating to merger control can be distinguished for several reasons, not least being the typically one-off nature of concentrative transactions where a competition agency might only have a single opportunity within a decade to intervene in a given sector. This is to be contrasted with the position under the EC Act 2011 with four year reviews and provision for certain regulatory obligations independent of the output of SMP analyses. In considering the retail mobile services market, we will pay special attention to how a four-year time horizon is considered to be affected by developments that are set to occur in the next two years.

C. Markets, Joint Dominance and the Electronic Communications Act

17. A significant feature of the EC Act 2011 is that it does not specify by its terms what markets must be assessed for SMP. In that way, there is a difference with the first and second iterations of EU regulation where by legislative diktat certain markets were said to exist by law with regulators in turn under an obligation (albeit based on their own timetable) to make SMP assessments. Over time though, the EU system has evolved towards a system where regulators have more flexibility in terms of the identification of possible markets.

Status of the Initial Review

18. We note that in places the Initial Review is presented as a notice in accordance with section 22(1)(a) of the EC Act 2011. The term 'Notice' is used in the header of the second page of the document, which also advises the reader that:

" 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. "

Separately, we note the following statement:

" 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. "

Below, we set out some reasons for doubting that the substantive requirements of section 22(1)(a) have been complied with, but there is a prior formal objection that can be raised to the status of the Initial Review as follows. The Initial Review was commissioned by the Ministry and not by the Regulatory Authority ('RA'). We are told that it comprises the opinions of the outside advisers of the Ministry. Separately, we are told that the Initial Review incorporates the tentative views of the RA applying the criteria set out in section 22(2). It is not clear how the Initial Review could be all of those things.

19. Furthermore, it is not clear to what extent the Initial Review has been (or could be) adopted by the RA since it and not the Ministry must address itself to the task to be undertaken under section 22(1) of the Act. It is highly undesirable that there be any doubt as to the precise status of the Initial Review. Even if it is ultimately made clear that this Initial Review is not notice in accordance with section 22(1)(a), then it is hard to imagine that the RA can attend to that obligation unaffected by these voluminous commentaries. Although the desire for expedition is understood, that should not be at the price of risking possible pre-judgment. Separately, this pre-consultation creates the potential for gaming by players who may seek to adapt their conduct (albeit temporarily) so as to strategically influence the SMP exercise.

Relevant Markets

20. The SMP system in Bermuda is also based on the concept of a 'relevant market' although it is subject to a very particular definition also influenced by EU law. Section 2 of the EC Act 2011 defines 'a relevant market' as:
- ' the market for products or services that consumers perceive as substitutable or interchangeable based on the characteristics of the products or services their pricing or intended use.'*
21. Although Part A of the Initial Review is very much concerned with defining relevant markets, it is not entirely clear that this exercise has been undertaken with special reference to the definition of a 'relevant market' contained in the EC Act 2011. Read as a whole, Part A seems to be focused more on satisfying the requirements of section 22(2), which might be fairly described as some type of 'quick look' SMP analysis, with a more elaborate version of that exercise to be subject to the requirements of a section 23 exercise. While section 22(2) refers to retail and wholesale markets identified with reference to the specified criterion, the retail markets in question are referred to as those mentioned in section 22(1), which are stated to be 'relevant product and geographic markets'. In summary, our view is that the exercise of identifying relevant markets has been conflated with the abbreviated SMP analysis contained in section 22(2).
22. A second observation relates to the implications of the definition of 'relevant market' for the distinction made in the Initial Review between implicit and explicit markets, which might also be described as the difference between 'real' and 'notional' markets. For example, it could be argued (say with reference to the claimed market for origination and wholesale MMVNO access) that each of the mobile operators provides call origination to itself. If that is true though, then they notionally provide themselves with every conceivable form of wholesale access, something of an impossibility given that many of the different form of access are over-lapping.
23. Given the definition of 'relevant market' there is good reason to consider that the EC Act 2011 is concerned with real and not notional markets since it speaks to consumer perceptions of what is there. In saying that, we do not contest the ultimate ability of the RA to identify wholesale markets, but we do question its ability to hypothesise markets that currently do not have a real world existence, or at the very least, the non-existence of which may not be attributed to abusive or restrictive behaviour by existing operators. This concern has significant implications for the Initial Review's assessment of the wholesale segment in mobile.

Joint SMP

24. Section 22(3) of the EC Act 2011 makes provision for the possible finding of joint SMP. Although section 22(3) specifies a number of criteria that appear to be particular to such an assessment, the Initial Review appears to combine them with an analysis of the characteristics applying to single firm SMP. While that is an understandable approach to take (leaving aside the robustness of the conclusions ultimately reached), it does not fully suffice for the purpose of demonstrating joint SMP given its description as 'a market structure that is likely to give rise to tacit coordination'. The RA is therefore empowered to bring relevant consideration to bear on assessing whether the market structure might give rise to what is more usually referred to as 'tacit collusion'.

25. The Initial Review does not engage in any detail with the issue of tacit co-ordination. That is the case even though Section G of the Part B of the Initial Review sets out fairly widely acknowledged criteria for the establishment of this phenomenon. Similar criteria have been identified by regulators especially in Europe derived from the case law of the European Courts on joint dominance. Those were effectively summarised in 2004 by ComReg in Ireland as follows:

“ A. The degree of market concentration: whether a small number of undertakings account for a large share of the relevant market without any single undertaking being in an individual dominant position.

B. The incentive and ability to co-ordinate: whether the undertakings concerned have an incentive to align their conduct in the market in particular, in such a way as to maximise their joint profits by restricting production with a view to increasing prices. Where such an incentive exists, the following basic conditions must be fulfilled for coordination to be sustainable over time

C. the coordinating firms must have the means of monitoring, sufficiently quickly and precisely, whether the terms of coordination are being adhered to by other members of the alleged dominant oligopoly;

D. there must be an incentive not to depart from the common policy on the market, of which the notion of retaliation in respect of conduct deviating from the common policy is an integral part.

E. Actual and/or potential market constraints: whether, in any event, the foreseeable actions of outsiders, such as actual and potential competitors, as well as customers, would not be able to jeopardise the results expected from the implicit coordination seen to be taking place.’

An assessment of the existence of joint or collective dominance will need to take into account the overall impact of all these factors, rather than being confined to the analysis of any single indicator of collective dominance.”⁴

26. As will be set out in detail below, there is no assessment provided as to the case for tacit collusion existing between the mobile operators in Bermuda. No evidence or even suggestion is made as to what Digicel and BDC might be colluding on, either explicitly or implicitly. If it was the latter, then there is no indication or suggestion as to how that co-ordination is monitored or co-ordinated, including by means of an appropriate retaliation mechanism. In the absence of any particulars on these matters, the joint SMP claim is not substantiated.

⁴ ComReg 04/05 Wholesale Mobile Access and Call Origination, pp. 32-33. It should be noted that the ultimate outcome in that case was challenged in Ireland with ComReg agreeing to the annulment of its decision by consent.

D. The Relevant markets and Mobile

27. The Market Review suggests the existence of four distinct markets in the mobile sector. We propose to make some brief comments on each. While it is the case that methodologically, the exercises of market definition and SMP assessment are distinct exercises, as alluded to in the Initial Review, at least in economic terms, they are fungible to a degree given their joint purpose is the determination of whether operators are in a position to effectively prevent further competition, innovation or choice in a manner that prejudices consumers.
28. Separately, the demand for wholesale inputs is derived from demand for retail services, and the degree of substitution between wholesale inputs reflects the degree of substitution among retail inputs. Thus if fixed and mobile international calls at retail are in the same market, the relevant wholesale inputs are also likely to be in the same market.⁵ The following comments on the relevant markets should be seen in the light of those two observations and are inextricably linked to the overall assessment of SMP included in Sections E and F.

(a) A national market for the supply of retail mobile services, including voice and data

29. Unlike several of the other markets that proposed, there is at least some indication that this has a real-world existence grounded in the current organisation of the market, even though the relationship with fixed communications is constantly evolving. The European Commission has proposed broadly defined retail markets in several merger control cases. We do however acknowledge that the Initial Review gives extended consideration to the issues of substitutability between fixed and mobile communications as things stand in Bermuda, an exercise undertaken with comprehensiveness not apparent in all facets of the Initial Review. That said a more forward-looking analysis would be preferable, especially considering that there is likely to be a significant ramping up of competition on the fixed side in the light of the planned introduction of ICOLs. Given the available evidence, we do not fundamentally take issue with the assertion that this exists as a distinct market in Bermuda, but note that the Initial Review correctly acknowledges the existence of competitive constraints in terms of the relative pricing of fixed and mobile services.

(b) A national market for the supply of wholesale access and local call origination on mobile networks

30. These services are sometimes called that for 'mobile access and call origination.' Both terms reflect a range of possible services often availed of by Mobile Virtual Network Operators (MVNOs). Thus MVNOs can be 'skinny,' 'thin' and 'thick,' with the contribution made by the access seeker increasing through the progression.⁶ MVNO operators might

⁵ This does not prevent the wholesale market being wider on a supply substitution basis, if it also contains inputs into quite different services.

⁶ See <http://analystation.blogspot.co.uk/2010/07/mvnos-explained.html>

install their own switch, perhaps even some transmission facilities, or they may just be a sales and marketing operation with every technical aspect of service delivery including billing being outsourced. The nature of the MVNO model to be deployed in a particular country, and in particular, the degree of demand for it and the associated issue of regulatory intervention are fraught with difficulties. An important consideration is the continued incentives to invest for existing network operators who might be expected to contemplate MVNO type arrangements to the extent that they could boost aggregate market demand.

31. In the Bermudian context, the Initial Review notes that:

'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.' Page 239, para. 532.

One would expect to see evidence of supply and demand for a service before it could meaningfully be analysed as a distinct 'market'. At the very least, one would expect to see evidence of pent-up but unfulfilled demand, or some other manifestation of an access requirement. By contrast there is no evidence or specifics of any kind of MVNO access even being requested in Bermuda. That problem is not overcome solely by reliance on the distinction tendered in the Initial Review between implicit and explicit markets because no act of self-provision within an entity can be regarded as provision through means of a market, or for that matter, of demand underpinning a putative market. This concern is particular to the specific requirements of the EC Act 2011. The upshot is that the alleged market for origination and MVNO access does not exist, or at the very least, has not been shown to be frustrated by any unjustifiable act or omission on the part of the current mobile operators.

(c) a national market for the supply of wholesale origination of international calls on mobile network

32. At present, mobile operators are prevented from directly operating international facilities and providing international services under their mobile licenses. In the past, they have confined themselves to passing their international traffic for termination to the legacy international gateway operators. That said, the arrangements between the mobile operators and the legacy international carriers have not operated on the basis of a paid interconnection regime but rather on the basis of mobile customers signing up directly to one or other of those legacy international carriers so as to be able to make and receive international calls.
33. There is no origination service formally purchased from the mobile operators by these international carriers and no origination payments levied by the mobile carriers on the legacy international carriers.
34. In respect of MVNO access, we have noted that there is no evidence of any requests for those kinds of services being denied. By contrast, while origination is provided as a service by the mobile networks for international calls, conceptually, this is most rationally classified as the provision of a service to their end customers, albeit provided using the interconnection facilities put in place between carriers.

(d) markets for the supply of call termination on each individual mobile network

35. While the reasoning leading to the conclusion of markets for mobile termination applies to regimes in which the calling party pays (CPP) – that is to say to regimes in which the calling party’s operator pays the receiving party’s operator for termination - our understanding of Bermudan market is that the calling party’s operator hands the call over to the receiving party’s operator without remunerating the latter for terminating the call. This regime, known as receiving party pays or RPP, has the effect of causing the costs of a call to be shared between the two operators, which then seek to recover their shares of those costs from their respective clients.⁷ Again, we appear to be talking about a service for which no monetary transactions exist. While the Initial Review claims that the service is already provided, that is only in the technical realm. Mobile call termination is provided by means of interconnection but it does not exist as a wholesale service in economic terms because again it is a facility provided to end customers. Operators do not transact for it *qua* service, nor do they make underlying or side payments for it to each other.
36. The position in relation to both origination on mobile networks of international calls and of termination generally illustrates the dangers inherent in direct importation of a regulatory regime from overseas. Unsurprisingly, given the way that the EC Act 2011 is drafted, EU practice has had a significant influence on the way that the Initial Review is constructed. This however entails inherent dangers when one realises that the EU approach to market definition particularly at the wholesale level is grounded in retail markets that are organised in quite a different way in Europe compared to Bermuda. These difficulties are perhaps a demonstration of the shortcomings of the Initial Review in terms of identifying relevant markets strictly in accordance with the requirements of section 2 of the EC Act 2011.

⁷ See for example, S.C. Littlechild, ‘Mobile termination charges: calling Party Pays versus Receiving Party Pays’, *Telecommunications Policy*, Volume 30, Issue 5, 2006 and R. Dewenter and J. Kruse ‘Calling Party Pays or Receiving Party Pays?’ *The diffusion of mobile telephony with endogenous regulation*, *Information Economics and Policy*, Volume 23, Issue 1, March 2011, p. 107.

E. SMP analysis in the Retail Mobile Market

37. The section concerns the finding that Digicel and BDC (CellOne) jointly have SMP in the retail mobile services market. It is important to mention that nearly all of the analysis in the Initial Review reads as a consideration of whether each of the mobile operators have SMP, there being no evidence or even suggestion of them jointly coordinating anything whether by way or explicit or tacit collusion. In a previous section we have dealt with what needs to generally demonstrated, both as a matter of best practice and under our reading of the EC Act 2011. It is as if the Initial Review assumes that both operators are individually SMP holders and that this suffices in order to demonstrate joint dominance simply because they operate in the same market. That is contrary to the requirements of the EC Act 2011 and is at odds with the reputable international practice sensibly adopted but not applied in the Initial Review.

Market Shares

38. In this section of the Initial Review, there is reference to the market shares of both operators being approximately even, which of itself tells us very little about the underlying state of competition in the market. In particular, it reveals nothing about how vigorous competition is between the mobile operators. Incidentally, there is reference (later in the analysis) to both Digicel and CellOne running free promotions around the Cup Match, which is sensibly treated as not being anti-competitive, and which if anything is typical of operators competing quite keenly. That apart, there is almost no empirical assessment about how competition plays out in the market, how market share is won or lost through new products and promotions, and no assessment of the extent to which evenly matched operators (in terms of customer numbers) mean that neither enjoys an insuperable network effect.
39. Part B of the Initial Review includes a discussions about the extent to which there is control over infrastructure that is not easily duplicated, which for some unknown reason is conflated with what should be a separate discussion, namely the potential for increased demand for mobile services. In that regard, to focus on population growth is to miss the greater part of the story, which should be about the potential for further penetration among the existing population, even if growth is stagnant. Penetration levels well in excess of 100% are not unusual internationally and the RA will ultimately need to direct itself to the potential for further growth. This is key to the previous analysis of market share, since if there continues to be potential for growth (including the uptake of new services), then there is every possibility of continuing effective rivalry.

MVNO Access Requests

40. It is noteworthy that is in discussing the potential for the release of further spectrum, the Initial Review makes reference to a two year time horizon, which should be set against the back-drop of a four year review period. Moreover, the Initial Review refers to the fact that neither BDC nor Digicel provides wholesale mobile services, which we take as meaning that neither provide any form of MVNO access. We have been advised that Digicel has not ever been presented with a request for MVNO access.
41. The position in relation to requests for MVNO access and the weight that seems to be attached to it in the Market Review is very unsatisfactory and has very serious implications for the tentative suggestion of mandated MVNO access referenced later. The Initial Review effectively admits that the position concerning those requests. The initial submissions of respondents are said not to deal with this issue clearly since that is

a matter for proper inquiry not public consultation. For the moment though, the only safe inference to draw is that there is no evidence of any requests for wholesale MVNO access having been made, never mind unreasonably refused. Furthermore, the admission that MVNOs might enter the market is not vitiated (as seemingly implied by para. 533) by the possibility that margin squeeze and discrimination issues might subsequently arise.

Technological Advantages

42. In relation to technological advantages, while we agree with the general observations that are made, and subject to the release of capacity to accommodate another carrier, we do not consider that it has been demonstrated (or even suggested) that Digicel has any special or enduring technological advantages. In fact, we are advised that the spectrum allocation that Digicel uses places it at significant disadvantage compared with BDC because of the higher frequencies. As a result, Digicel must operate more cell sites and propagate more signal to ensure both indoor and offshore coverage, both of which are critical requirements in Bermuda. Separately, we agree that in terms of access to capital, Digicel enjoys no special advantage.

Bundling

43. The issue of bundling of service is dealt with in part in the discussion of economies of scale and scope, with particular attention paid to the prospect that BDC is best positioned to put together a combined offering, and that in turn this might not be replicable by others. This assessment of BDC's potential is a direct result of its participation in a diversified communications group, even if all of all of the group companies are not under common outright control. This though is to be contrasted with the position for Digicel. In respect of the potential for competitive disadvantage, the market Review Notice states that this 'could potentially be addressed by Digicel teaming up with other fixed network suppliers'. This though is the difference between likelihood (for BDC) and mere conjecture (for Digicel) since no reason whatsoever is given for assuming that Digicel will team up with third party suppliers.
44. Separately, it is not clear to what extent this factor is really a demonstration of SMP, since the construction of the bundles as opposed to the phenomenon of bundling is key to determining replicability and in turn the potential for competitive disadvantage. At its highest, the evidence under this heading might be a reason for suggesting SMP on the part of CellOne, although that is by no means a reliable inference. Bundling is in many instances welfare enhancing and its potential deployment should not be used to create the opposite presumption in SMP analysis. In any event, the commercial potential for bundling needs to be investigated in much greater detail.

Potential Entry

45. On the issue of barriers to entry and expansion, much is made of the spectrum audit process and the legal provision that a current holder of spectrum may retain spectrum for 18 months after its IOL is issued. Even if one was to assume that enough spectrum did not presently exist to facilitate further entry, the review process could be concluded and spectrum reassigned within 24 months. There is no reason why the RA could not begin that spectrum review process immediately since it would benefit from carrying out an initial audit (say in the next six months) before revisiting the issue 12 months later and then making a decision on reassignment. The RA could with an initial audit signal the probable availability of spectrum, which would no doubt be of considerable interest to the two firms already identified in the Market Review as possible entrants in the mobile market, being North Rock and Wow.

46. The Market Review's observations in relation to North Rock are very telling, although the necessary inferences are not drawn from what is presented. First, we are told that it currently provides fixed voice and data services using wireless. The fact that it does so means that what is previously presented as a possible barrier to entry, namely economies of scale and scope, might be overcome by having combined fixed and mobile services. Second, we are told that North Rock 'has sufficient spectrum to provide mobile phone service', which makes the prominent position given to the spectrum review seem misplaced in terms of the conclusions on SMP.⁸ Third, we are told that North Rock's existing infrastructure may provide a sufficiency of towers and poles to allow it to launch a mobile service. Fourth, consideration must be given to the earlier acknowledgment that no operator has privileged access to capital, and the unstated but implicit acknowledgment that neither of the existing mobile operators have an insuperable technical advantage. Fifth, and although this is subsequently downplayed, mobile number portability may be introduced in Bermuda.
47. Taken in its totality, it would appear that entry is timely, likely and credible, if only on the part of North Rock, although the Market Review notes that WOW might be in a similar position. Despite all of this, the Market Review seeks to minimise the significance of that finding by concluding that entry into the Bermuda mobile market in the next two years is 'likely to be limited to either of these two firms'. Of itself this conclusion alone makes the finding in relation to SMP in the retail mobile market largely untenable. The fact that there are two credible potential entrants and that they could overcome the perceived stumbling block that is the spectrum review means that even taking account of the two-year time horizon, the current market structure in Bermuda is far from stable.
48. Equally dubious are the claims that are made in relation to number portability, which is referred to as being one year away. In particular reliance is placed on the length of time that it will take for consumers to learn that they can take their numbers with them between networks. In this context, the broad functions of the RA, under its constituting legislation and the EC Act 2011, would surely permit it to undertake a public information campaign. Furthermore, there must also be the possibility of licence amendments should unnecessary obstacles be placed in the way of consumers, although they can and are headed-off in many jurisdictions by codes of practice put in place between operators and communicated to the public.
49. Number portability is an example of a remedy that arises independently of the Market Review, which is significantly discounted in the current process. That does not sit well with the imposition of remedies (separately discussed) where the availability of alternatives should figure as part of the assessment of necessity and proportionality. There is also significant antipathy or lack of faith in the general operation of market processes in para. 551, including apocryphal musings about bad consumer experiences possibly paralysing the market. A significant point of reassurance in Bermuda is that the two potential entrants to the mobile sector identified by the RA are both established local operators. North Rock is comparable in its operations to Digicel and with a presence going back to 1999 is clearly an accomplished ISP. The conclusion that switching would only be likely if the entrant has an established reputation as a provider of mobile services is surely raising the bar too high, and there is of course the possibility of an outside mobile operator taking a stake in North Rock or Wow.

⁸ We understand that separately there are good reasons to press ahead with the review given concerns about possible spectrum hoarding as well as competitive disadvantage in terms of the nature of spectrum allocated to particular operators.

Market Performance and Earnings

50. The Market Review acknowledges that it is very difficult to assess the extent to which observable prices might be different from some notional view of competitive prices. Despite this, the market Review proposes to rely on data provided as to Digicel's profitability (and in particular EBIDTA margins) for the conclusion that it is earning excessive returns. There is no consideration given to whether those profits might be mainly driven by superior efficiency or innovation.
51. This conclusion also suffers from two other serious defects. The first is that even if one could safely assume that there were excessive profits (rather than normal rents due to superior efficiency), then before one could use that as a basis for inferring that there was SMP, it would be necessary to establish that those excess profits were solely derived from the market in question. Although a very substantial part of Digicel's revenue comes from retail mobile services, not all of it does, and as such, no reliable inference may be drawn from company wide accounting data.
52. The second point of difficulty concerns the fact all that Digicel was requested to supply was some summary accounting information. An economic finding of excess profitability requires a demonstration that the return on capital employed (ROCE) consistently exceeds the cost of capital. The cost of capital in turn requires a careful consideration of the financing of the firm, including its optimisation of the debt/equity split. There is no evidence that any of this analysis has been undertaken, leaving aside the fact that the data request did not extend to covering the kinds of data that would be necessary to assess the ROCE.
53. Furthermore, profitability measures need to be approached with extreme caution in sectors where, as is the case for mobile, there are continuous network upgrades and less frequent but even more significant, changes in spectrum and the underlying mobile standard. Outside of utility sectors with undifferentiated output and little technical innovation, profitability measures are not a reliable indicator of anything, except perhaps comparative performance that might well be attributable to efficiency as opposed to the extraction of supernormal profits.
54. Before a case of joint dominance could be sustained, it would normally be necessary to show that all jointly dominant firms were enjoying excess profits (significantly above their cost of capital) for several years.⁹ The acknowledgment later in the Initial Review that customers in Bermuda are generally satisfied with providers does not sit too easily with the claims as to excess profitability.

Market Outcomes

55. The analysis provided in relation to advertising far from making the case for SMP undermines it, since a market with little competition would not be expected to see as much promotional activity as one exhibiting vigorous rivalry. We are told that in Bermuda, firms spend between 2 and 3% of their turnover on advertising when the comparable figure for the US is 4%. All else being equal the greater spend in the United States is unsurprising given the size of its telecommunication market and the sheer variety of media outlets which allow for greater targeting of particular customers.

⁹ For BDC, the Initial Review indicates, at para. 557, that profitability for 2011 does not appear to be excessive. Leaving aside the difficulty that this is not based on an economic measure of profitability, such a short time span makes the analysis almost meaningless.

56. In relation to churn, we are told that the rate in Bermuda is comparable to that in the United States, where there is said to be a high level of competition. That said, number portability is widely available in the United States, so as things stands, the degree of competitive rivalry between Digicel and BDC should not be underestimated. A further point on churn is to consider the identity of churners, since the same people repeatedly churning might not indicate significant rivalry, but if that is not the case then significant parts of an operator's customer base are up for grabs every year. That phenomenon should intensify with the introduction of number portability.

Pricing

57. The paragraphs on price comparisons are troubling. Price is a measure of what has to be paid to buy a single unit of a commodity or service. Expenditure per consumer measures the number of units which consumers buy multiplied by the amount that they buy. If two groups of consumers buy exactly the same numbers of units, their relative expenditures will bear exactly the same relationship to one another as do the relative prices. The corollary is that if quantities purchased vary across the two groups, differences in average expenditure will reflect both differences in prices and differences in quantities purchased.
58. ARPU (average revenue per subscriber) is a measure of expenditure not of price. The Initial Review, under the heading of 'pricing' is therefore 'passing off' evidence of expenditure as evidence of pricing, when it is quite clear that subscribers in countries as different as Bermuda, India and the US are likely to buy different bundles of mobile services. The Initial Review recognises this, but it does not appear to accept that this completely undermines the values of ARPU comparisons as a proxy for price comparisons that might reveal the level of competition in particular country at least in relative terms.
59. Exactly the same point applies to the movement of ARPU over time in a single country. A change in ARPU would only mirror a change in prices if the basket of services consumed were the same in both periods. In a dynamic market like mobile communications where new services and devices appear regularly, customers change their consumption patterns for example as smart phones are more widely used and data services multiply. There is no consideration given to where Bermuda is at in terms of the uptake of particular services or indeed of any idiosyncratic variation in service preference explained by local social or cultural preferences.
60. The alternative employed in the document is to compare the prices of two packages offered by Digicel in Bermuda with two packages offered in Guernsey, one in the BVI and one in Cayman. Two comparisons are made – one for entry-level packages and one for top tier plans. The small samples are a problem, but the conclusion is that Bermudian rates may be above comparator rates for entry-level packages but below them for top tier rates. We are told nothing about the most popular plans in the market, what customers typically purchase and how that might compare with elsewhere.
61. The evidence on price performance is either fatally flawed or at best inconclusive. Together with the other evidence, it does not support the conclusion that 'firms are exercising market power,' as claimed in the Initial Review at page 251, para. 576(f) The conclusion on SMP contained in para. 576 bears little resemblance to the detail of much of the previous analysis even making allowance for the loss in nuance through summation. The splitting of the market in relatively equal shares tells us very little, except perhaps that Bermuda has keenly matched mobile rivals with neither in the ascendancy. The observation on the spectrum review is completely misleading given the separate findings about the possibility of competitive entry. The implicit claim that the

market is only capable of supporting two operators is unsubstantiated. Separately, the lack of wholesale access has not been attributed to verifiable demand or for that matter to an unreasonable (or indeed any) refusal to facilitate an MVNO. Switching costs are grossly overstated, and the evidence of firms exercising market power amounts to nothing more than the barest of accounting and financial analysis. Overall, the conclusion on SMP, however tentative, does not withstand scrutiny. Evidence of the extent to which arguments are stretched beyond any credibility is apparent within the conclusion at para. 579, where the significance of the likely availability of number portability for three of the four years of the review is summarily dismissed.

Joint SMP

62. The analysis has omitted any consideration of two of the three standard criteria listed in Annex G for establishing whether a market is susceptible to tacit co-ordination (transparency and ability to punish deviations); it has only considered freedom from external competition; it has not indicated the form and transparency of the tacit collusion alleged to be practiced, nor does it specify a 'focal point' around which the parties can gather to achieve their aims; and, it has found none of the indicators of tacit collusion noted in Annex G. As a result, it fails to find significant support for a finding of joint SMP on an *a priori* basis, and has failed to follow its own self-imposed methodology for doing so.
63. The requirements that must be satisfied to sustain a finding of tacit collusion are set out in a document prepared for the Irish communications regulator – the Commission for Communications Regulation.¹⁰ They include a full analysis of rivalry in prices, the collection of reliable data on the ROCE, appropriate international price comparisons, and a full investigation of whether firms have tacitly colluded to restrict the supply of wholesale mobile services to MVNOs. No such analysis has been set out in the Market Review and on that basis the conclusion that both mobile operators jointly hold SMP is entirely unsupported.

¹⁰ Commission for Communications Regulation, *Market Analysis: Wholesale Mobile Access and Call Origination*, (04/118a), December 2004. These are appendices for the document referred to in footnote 4.

F. SMP analysis for other Mobile Related Markets

64. Adopting this starting point, we now examine the findings of SMP in relation to the other mobile markets in which are identified in the Document as follows:

1. *a national market for the supply of wholesale access and local call origination on mobile networks: Digicel and BDC jointly hold SMP*
2. *a national market for the supply of wholesale origination of international calls on mobile networks: Digicel and BDC jointly hold SMP;¹¹*
3. *markets for the supply of call termination on each individual mobile network: each of Digicel and BDC holds SMP in respect of its own network*

65. In doing so, it is important to bear in mind the assertion that is made concerning markets 1 and 2, namely that the claims as to SMP being made in relation to them is driven by the SMP finding in relation to the retail market for mobile services. Given the largely unsubstantiated nature of the findings in relation to joint SMP in national market for the retail supply of the bundle of mobile voice and data services, those findings are presumptively suspect. With further analysis based on their specifics, the case for each disappears entirely.

(1) A national market for the supply of wholesale access and local call origination on mobile networks

66. The discussion of SMP in the above market consists solely of the following paragraph:

“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.

67. An aspect of the Initial Review’s earlier findings worth revisiting concerns the potential for entry within two years, as to which we are told that there is not one but two firms potentially waiting in the wings. It is important to emphasise that even if those firms did not enter the retail mobile sphere, they are clearly in a position to assist a third party MVNO provider to enter the retail market. In particular this is confirmed by the analysis of North Rock’s underlying capability. As a result, there are potential suppliers of MVNO type access going beyond the existing mobile suppliers, assuming that there was demand for such a requirement.

68. Joint SMP is found in a market in which there has been no transaction, with respect to which there is no evidence of any actual potential customer for the service, and in which, consequently there is no evidence of any joint or collective refusal to supply. That is separate and apart from the lack of evidence (there not even being any such suggestion) of overt or even tacit collusion by the current mobile operators to withhold such access

¹¹ This is only ‘tentatively’ concluded.

were it to be requested. Proof of tacit collusion would entail the demonstration of effective monitoring and the operation of a retaliation mechanism, which is also missing. In summary the case for joint SMP in this market is entirely unproven.

(2) a national market for the supply of wholesale origination of international calls on mobile network;

69. The treatment of wholesale origination of international calls is subject to some confusion. On p.90, para. 285, it is stated that: "*International calls from mobiles are in the same market as international calls from fixed lines due to supply-side substitution.*" The reference to supply-side substitution is somewhat obscure. Then it is said fourteen paragraphs later, at paras. 299-300,:

"(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 markets."

70. In the section on SMP in mobile we are told that:

"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."

While this conclusion is, as with many others in the Initial Review, referred to as tentative, it is in fact untenable. That is in large measure because of the weakness of the finding in relation to SMP in the retail mobile market, but it is also flawed because of its discordance with the underlying structure of telecommunication provision in Bermuda, and which is set out above in the description of the relevant market. There is no origination service purchased (effectively or otherwise) from the mobile operators by the international carriers and no origination payments levied by the mobile carriers on the legacy international carriers. Instead the cost of origination is effectively borne by the conveying operator, thereby calling the origination centric analysis into doubt. The costs of origination are in turn recovered through the charges that mobile operators levy, which are constrained by the overall competitiveness of the retail market in which they operate.

71. The result of all of this is that the cost of call origination for international is ultimately borne by the originating party, who therefore has an incentive to choose operators (mobile and international in combination) giving the best aggregate deal. In these circumstances, it is clear that the single operator market definition is mistaken, with the consequence that the subsequent analysis of market power is unsound.
72. While we will separately address the issue of remedies, the Initial Review's treatment of remedies in relation to this market is telling. In essence, it is that the mobile operators not be allowed to change the current zero charging system unless they make a case that

they are not recovering their costs through the current retail charges. That amounts to saying that nothing should change, or in other words, a non-remedy for a non-market.

(3) markets for the supply of call termination on each individual mobile network

73. The Document makes the following observation on p. 153:

“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 are 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.”

This feeds into the following conclusion with respect to SMP:

“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.”

74. While the reasoning leading to the conclusion of single operator markets for mobile termination applies to regimes in which CPP operates – that is to say to regimes in which the calling party’s operator pays the receiving party’s operator for termination. Our understanding of Bermudian market is that the calling party’s operator hands the call over to the receiving party’s operator without remunerating the latter for terminating the call. Instead, in keeping with the RPP regime, the receiving party’s network operator charges its customer to receive that call.
75. The consequence of this system is that the cost of call termination is ultimately borne by the receiving party, who therefore has an incentive to choose an operator offering the best overall tariff, covering both outgoing and incoming calls. This means that the competitive conditions relating to outgoing calls (namely the retail mobile market) are essentially replicated for call termination. In these circumstances, it is clear that the single operator market definition is mistaken, with the consequence that the subsequent analysis of market power over call termination on mobile is fatally flawed.

G. The Proposed Remedies, Feasibility and Priorities

76. In this section, we consider the case for the remedies proposed for each market, bearing in mind the frailty of the underlying market definition and SMP analysis for each. There is though a separate standard against which the imposition of remedies must be judged, namely the requirements of the EC Act 2011 in relation to necessity and proportionality. For each, it is essential to ask whether a case for intervention is made out and in turn, whether the remedy proposed is the least intrusive intervention in the market considering the available alternatives.

MVNO access as the Remedy for the Retail and Wholesale Access Markets

77. The principal remedy proposed for the mobile arena is the introduction of compulsory MVNO access, although the nature of the requirement and in particular the applicable cost standard is not discussed, except for a reference to two of the possibilities, namely, a cost-based standard and a retail minus approach. It is unclear to what extent this issue might be left to commercial negotiation, there being no evidence that this has not worked in practice. What we will term 'mandated MVNO access' is proposed as a remedy both for the joint SMP findings in what is said to be the wholesale or MVNO access market, and more generally for the broadly defined retail market.
78. Focusing only on the retail market, it would be important first to consider the existing scope for further competitive activity, even if it had been demonstrated (as it has not been) that there is some type of stasis at present. Entry has been discussed above, and characterised as likely. The potential for increased rivalry through the foreseeable introduction of both number portability and carrier pre-selection (on international) are important medium term developments. We are told that pre-selection on international is to be introduced pending the adoption of portability.
79. The possible introduction of MVNO access for mobile is by contrast quite a leap into the unknown. It is interesting in this context to consider the position in relation to local loop unbundling on the fixed side and how this is dismissed as not being feasible considering the administrative cost of its implementation. This sounds like some kind of intuitive cost benefit analysis, although one would expect to see a fuller explanation for it by the RA at a later stage. Mandated MVNO access is a very costly intervention, both for operators subject to the obligation as well as in terms of regulatory costs to establish and supervise its operation. While unbundling the local loop generates a unique set of challenges, it is at least confined to the provision of access to a single product, namely copper with provision for access to related facilities for operators wishing to avail of the product. By contrast, MVNO access covers a myriad of potential offerings, ranging potentially from requests for RF access only through to turnkey access with only an overlay of customer support and a separate brand. The range of permutations can generate very significant administrative costs if all the major types of access request must be supported.
80. It will only partly mitigate any such burden for operators if forms of access are not mandated in advance since they may well need to be able to develop highly adaptable costing models to cope with all eventualities, quiet apart from potential difficulties as to user interfaces and interoperability. Although the case for imposing mandated MVNO access has not been established, even if it were, there are very good reasons to leave it to commercial negotiations with retail minus as a perfectly legitimate basis for engaging in and concluding such negotiations.

Origination of international calls on Mobile Networks

81. In effect, we are told that the introduction of a positive origination fee will not be tolerated. That said we are not aware of any proposals to do so in the market. As previously alluded to, to say that the introduction of a charge seemingly not on the agenda for operators is not likely to be countenanced stretches the concept of a remedy to the very limit. We do not oppose it in principle but instead suggest that it reveals an artificial or erroneous underlying SMP analysis.
82. Similarly, it is not obvious or explained how the introduction of carrier pre-selection might impact on origination, although it is likely that it will bring further additional competitive pressures to bear on the pricing of international calls.

Call Termination on Individual Mobile Networks

83. We are told that the policy for these calls is the same as for call termination. In other words, the policy would appear to be that the introduction of a specific charge for this service is not likely to be countenanced by the RA. Again, we are not aware of any proposals or agitation for the introduction of a mobile termination charge. As with the cost of origination, the effective cost is included in what the Documents refer to as the 'per minute' bucket, and as such, its pricing is subject to the same competitive pressures as the retail market generally. We have previously explained how the case for either single or joint SMP in the retail market is not established. Again, this remedy is innocuous and it is also unnecessary.

Annex I

Biographies

Prof. Martin E. Cave, OBE, is one of the UK's foremost electronic communications economists. He is currently a Visiting Professor at Imperial College Business School, London. Previously he was a professor at Warwick Business School and BP Centennial Professor at the London School of Economics. In the past, he has advised the European Commission, Ofcom and numerous telecommunications regulators and operators. Prof. Cave was instrumental in creating the new UK framework for the liberalisation and trading of spectrum. He also chaired an expert panel advising the United Kingdom's Secretary of State for Transport on the future of airport regulation. Separately, Prof. Cave is a leading specialist in the economics of water regulation.

Jarleth M. Burke is a researcher in law at the London School of Economics where he focuses on market failure. He was previously a partner with the international firm Jones Day specialising in telecommunications and competition law. He was also the Head of Legal Affairs at the Commission for Aviation Regulation in Ireland and prior to that, General Counsel of Esat Telecom. He was educated at University College Dublin, the University of London and the University of Chicago.