Fintraffic

NordicWay 3 Tampere pilot

C-ITS data from traffic lights

Olli Rossi 16.6.2023

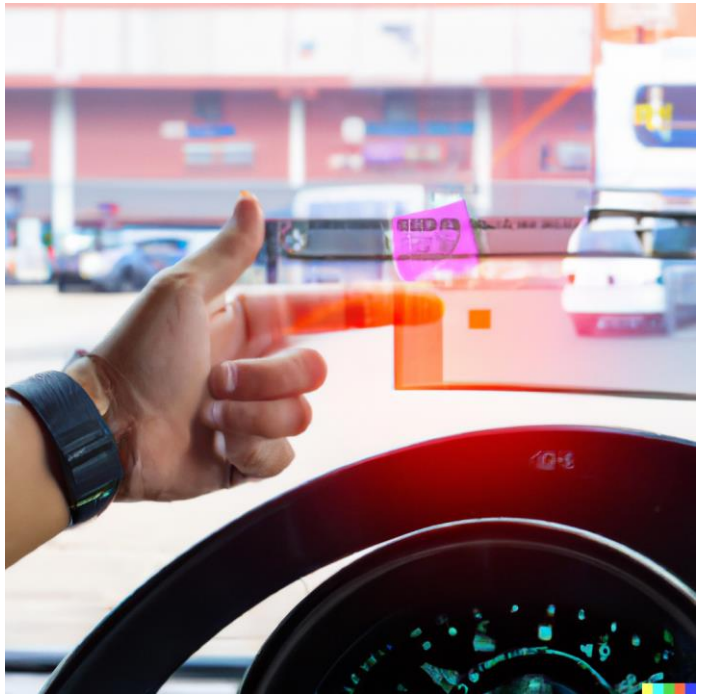
Nordic WAY 3

Co-financed by the Connecting Europe Facility of the European Union

Tampere pilot scope

- To increase understanding of the technical requirements when collecting and produce C-ITS data from traffic lights
  - Is the data interoperable?
  - Is the predicted data consistent?
  - technical requirements for traffic light C-ITS data?
- **Use case:**
  - Collecting data from multiple devices of different suppliers and different traffic light control principles into a centralized system.

  Schedule:
  - Technical part 6/2022 – 12/2022
  - Validation part: 1/2023 ->



Participants

- Fintraffic Road
- City of Tampere
- Nodeon Finland
- Swarco Finland
- Normivalaistus

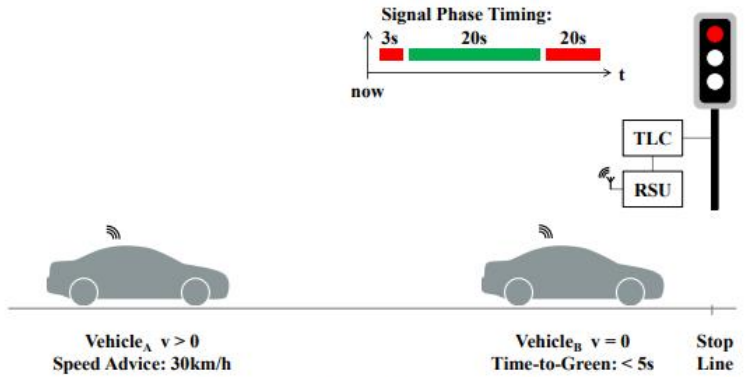
TAMPERE

LA SEMAFORICA
traffic solutions for a better life

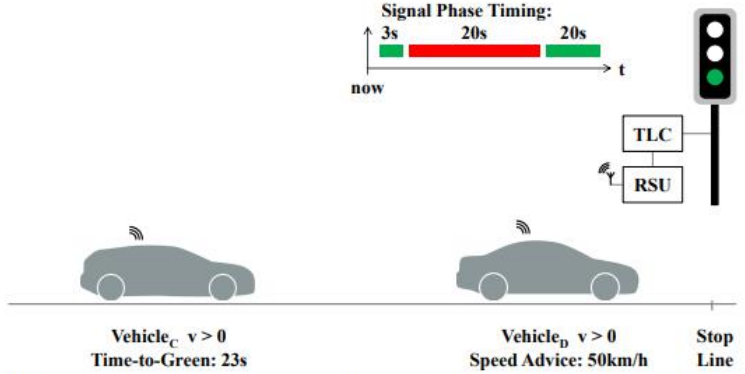
C-ITS use cases related to traffic lights

- Green Light Optimal Speed Advisory (GLOSA)
- Signal Phase and Timing Information
  - SPATem
  - MAPem

  Not in the pilot scope
- Imminent Signal Violation Warning;
- Traffic Light Prioritisation;
- Emergency Vehicle Priority.



(a) Scenario 1: Current phase of traffic light program is red



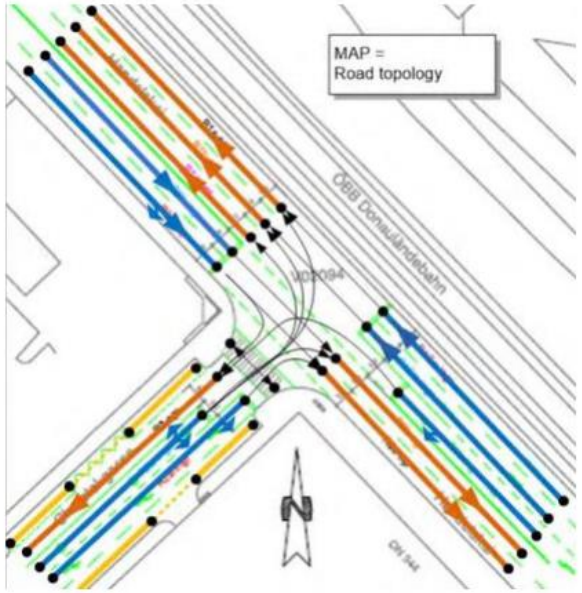
(b) Scenario 2: Current phase of traffic light program is green

Figure 2: Intersection approach scenarios

Source: Exploring GLOSA Systems in the Field: Technical Evaluation and Results
Stahlmanna, Möllera, Brauerb, Germanc, Eckhoffb
https://www.david-eckhoff.net/pdf/stahlmann2017exploring.pdf

GLOSA - Green Light Optimal Speed Advisory - messages

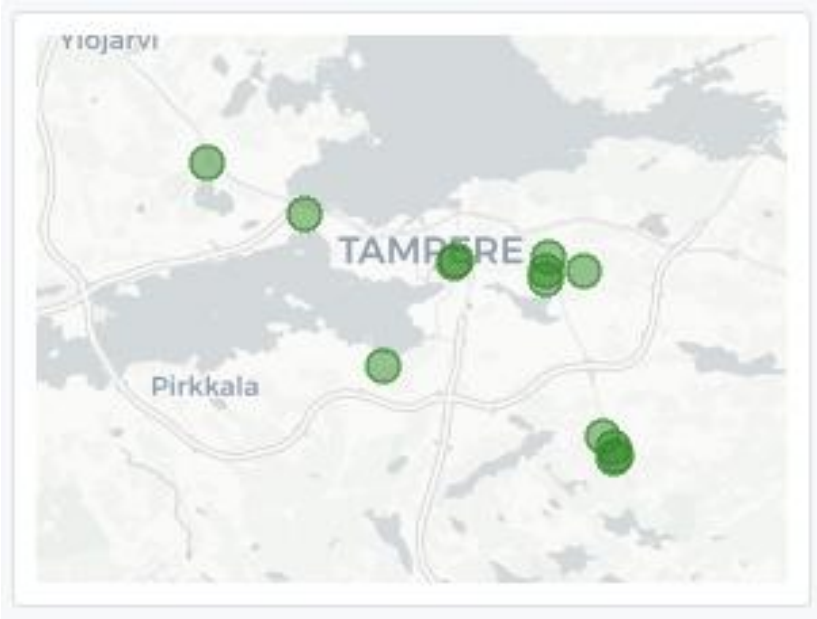
- SPATem (Signal Phase And Timing Extended Message)
  - Real-time status information of signal timing and operation of traffic lights, including upcoming events (predictions) in the timing
- MAPem (Map Extended Message, road and lane topology and traffic maneuver message)
  - Topology/geometry of intersections (lanes and allowed driving directions, stop line locations, pedestrian crossings, bicycle lanes, etc.).



Kuva 7I-5.1. Esimerkki liittymän topologian koodauksesta MAPEM-viestimuodolla (EU EIP A4.2 Workshop in Madrid, September 2016 / Andreas Schmid).

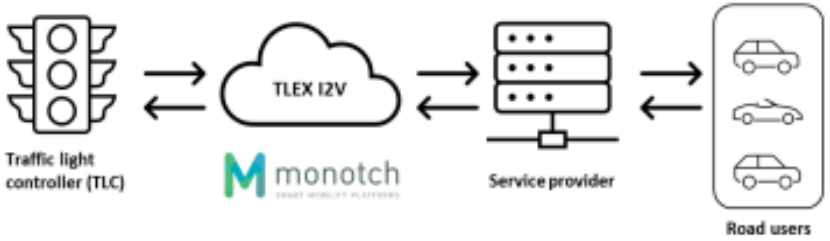
Traffic light intersections

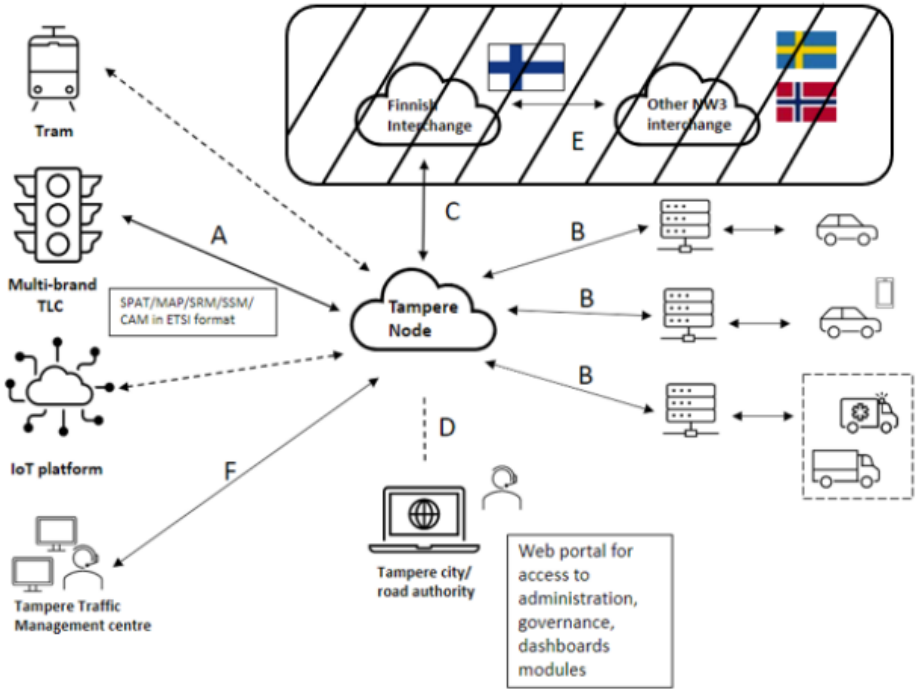
- TL Controllers (12 pcs) in Tampere region
  - Swarco Finland: EC-2, ITC-2
  - Normivalaistus: La Semaforica, Cartesio
- Control Method
  - Adaptive (Imflow)
  - Coordinated (Syvari)
  - Tarffic Actuated (Syvari)



How to transfer messages?

- The transmission of MAPEM and SPATEM message sets is specified in the document "European handbook for MAPEM and SPATEM creation" (version 1.0 / May 21, 2021) published by C-ROADS.
- The transmission of traffic light messages to the TLEX cloud service was implemented using the TLEX-FI interface (known as UDAP-FI in the Netherlands).





Lessons learned

- You need to increase the amount of hardware/computing power in the field.
- Configuration (at least in the early stages) is labor-intensive.
- The devices (and compatibility) were not as ready as initially anticipated.
  - There were challenges with the stability of the controllers' basic operations.
- Now we have a better understanding of what needs to be considered when writing C-ITS requirements.
  - Suppliers understand better the demands of the customers.
- The overall picture is still unclear (regulation and roles are incomplete, revision of the ITS directive).

Lessons learned

- Processes are needed to maintain MAPem and SPATem data in a changing world.
- As the number of users grows, there is a need for dialogue between stakeholders (more stakeholders than traditional traffic lights operations).
- To ensure data reliability and availability, the following are needed:
  - **Monitoring**: Continuous monitoring of data to ensure its accuracy, integrity, and proper functioning.
  - **Control:** Implementation of control mechanisms to regulate data access, storage, and usage, ensuring security and adherence to established protocols.
  - **Oversight:** Regular oversight and audits to assess the overall data management practices, compliance with regulations, and identification of any potential issues or risks.

Next steps

- Validation and comparison of C-ITS message data
  - Especially from a traffic engineering perspective
- More potential pilots on end devices/applications, enabling data for other pilots
- Possible system extensions
- Testing interoperability with other systems and the national access point
- Initiate a technical dialogue among stakeholders regarding Traffic light C-ITS
- Develop a technical requirements specification for traffic lights regarding C-ITS services.
  - Designing a technical architecture for traffic lights

Kohta liikenne puhuu Suomessakin

Source: Nodeon
https://www.itewiki.fi/p/kohta-liikenne-puhuu-suomessakin

(b) Operation mode 2: Time-to-Green (TTG)

Figure 3: Instrument cluster display of GLOSA

Source: Exploring GLOSA Systems in the Field: Technical Evaluation and Results
Stahlmanna, Möllera, Brauerb, Germanc, Eckhoffb
https://www.david-eckhoff.net/pdf/stahlmann2017exploring.pdf

In future.. The NordicWay3 is ending..

We need to decide how we will manage and share C-ITS data in the future

At a strategic level, we have a couple options:

A. Do it ourselves, manage and distribute the data and the service internally.

B. Partner with a third-party who will handle it on our behalf.

- In this option, we require transparency and the need to know and understand how the data is shared and managed, along with the underlying principles.

Thank You!

Olli Rossi | olli.rossi@fintraffic.fi | +358 50 475 9307

Nordic WAY 3

Co-financed by the Connecting Europe Facility of the European Union