Future IT-architecture on-board vehicles

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The situation

- IT-systems on-board vehicles perform essential functions for Ruter
  - Fare Collection
  - Passenger Information
  - Automatic Passenger Counting (APC)
  - Automatic Signal Prioritisation (ASP)

- The systems are designed and developed «years ago» and does not meet current expectations in regards to modularity, interoperability and way of communicating with other systems
The situation

- There are additional systems on-board that perform important functions for the operators e.g. Fleet Management (FMS)
- Certain functions are needed for both system categories
  - Information display for the driver
  - Geo-positioning system
  - Communications solution
In summary

IT-systems on-board vehicles are «individual» systems (silos)

The installations are complex, static and expensive (both in regards to installation and operation)

The responsibility for the systems are spilt between the operator and Ruter
Future solution

- Use standards (where relevant)
- Ruter is an active contributor and participate nationally
  - SNK175
  - CEN/TC 278
  - ISO/TC 204
  - SVV
  - Håndbok xxx
- ..and internationally
  - ITxPT
  - Executive Board
  - Various WGs

1 Formal standardization bodies
   1.1 World standardization bodies
      1.1.1 ISO TC204 WG8 (WORLD)
      1.1.2 IEC TC9 WG43 and WG46 (WORLD)
   1.2 Europe standardization bodies
      1.2.1 CEN TC278 WG3 : ITS / Public Road Transport (EUROPE)
         1.2.1.1 WG3-SG1 : On Board Data Bus Transmission (EN13149)
         1.2.1.2 WG3-SG4 : Reference Data Model (TRANSMODEL)
         1.2.1.3 WG3-SG7 : Standard Interface for Real-Time Information (SIRI)
         1.2.1.4 WG3-SG9 : Network and Timetable Exchange (NeTEx)
      1.2.2 CENELEC TC9X WG15 (EUROPE)
   1.3 National standardization bodies

2 National bodies working on core specifications
   2.1 VDV - Association of German Transport Companies (GERMANY)
   2.2 RTIG (UNITED KINGDOM)
www.itxpt.org

Ruter#
Future solution

• ITxPT builds upon
  - EBSF Project (European Bus System of the Future)
  - 3iBS Project (Intelligent, Innovative, Integrated Bus System)

• The purpose of ITxPTs
  - Support the implementation of standards and to provide an arena for sharing experiences within «plug & play» IT-solutions on-board vehicles
  - Contribute in the development of EN 13149-7/8/9 through thight collaboration with CEN/CENELEC (TC 278 and relevant WGs)
3 Formal Standards

3.1 Onboard data communication
   3.1.1 IP-based standards
      3.1.1.1 EN13149
         3.1.1.1.1 Part 7: Network and System Architecture
         3.1.1.1.2 Part 8: Physical Layer for IP-communication
         3.1.1.1.3 Part 9: Services Specifications
   3.1.2 CAN-based standards
      3.1.2.1 ISO11898
         3.1.2.1.1 SAEJ1939: high-speed CAN
         3.1.2.1.2 Bus-FMS group

3.2 Back Office data communication
   3.2.1 SIRI - Service Interface for Real-time Information relating to public transport operations - CEN/TS 15531
   3.2.2 NeTEx - Network and Timetable Exchange - CEN/TS 16614
   3.2.3 TRANSMODEL

4 National Core Specifications
   4.1 VDV 301: IBIS-IP
      4.1.1 Part 1: System Architecture
      4.1.2 Part 2: Interface Specification
   4.2 RTIG T030: Digital Air Interface Protocol
Future solution

- Vehicle-specific networks are not IP-based
  - CAN = Controller Area Network (bus)
  - TCN = Train Communications Network (tram)

«BUS-FMS interface» and «FMStoIP gateway» will ensure that the vehicle-specific systems can connect to the new IP-network thus allowing resource-sharing
In summary

• Ruter wish to adopt existing standards as quick as practically possible such that they will be implemented in the vehicles commencing operation towards the end of this decade.

• Ruter will continue the development of its systems such that:
  - IT-systems on-board will be generic, stand alone and independent of Ruter’s business logic – which will be implemented in the backend platform.
  - Relevant information is shared with other on-board systems via the on-board IP-network.
  - Communication between the vehicle and the backend platform is in real-time and «always on».
We have the mobile coverage
Future solution

- Ruter have recently entered into parallel frame-agreements for the provision of
  - APC systems for some 400 buses to be installed during 1H 2017
  - VCG for the same buses that will connect the buses on-line to Ruters backend platform as well as providing continuous geo-location
  - Ruter have developed a new backend platform that are capable of receiving the data from these buses
Future solution

- In 2016, Ruter launched a project that evaluates alternatives for the next generation (NextGen) IT-systems
  - Fare collection
    - Fully automated (BIBO) Fare Collection System based on beacons and app’s
  - Passenger Information
    - Route information for on-board displays and announcements dynamically provided to the vehicle from the backend platform based on the actual position of the vehicle
QUESTIONS

• Ruter wish prepare new vehicles for its NextGen systems by adopting existing standards for IT-architecture on-board
• Ruter wish for the operator to take full responsibility for the vehicle – incl the on-board IT-equipment itself
  - Ruter would only specify functional requirements

• Are you able to support the new standards in time for 2019 operation?
• Are you willing to accept full responsibility for the vehicles?
• What are the pros & cons?
• What would you require from Ruter?
Please provide your feedback by February the 24th

Ruter will then invite you to separate meetings to elaborate and discuss

Send your response to

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