Industrial Equipment Connection in Labs – RBC

ERTMS Integration, Validation and Certification Processes

Dipl.-Inform. Oliver Gantz
German Aerospace Center (DLR)

Deutsches Zentrum
für Luft- und Raumfahrt e.V.
in der Helmholtz-Gemeinschaft

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Need for common RBC Interoperability Tests
Potential Approaches

- RBCs must be tested for interoperability to speed up the rollout of ETCS Level 2
- A common core of the RBC for interoperability must be completely specified
- Behavior variations caused by differences of the national operational rules must be limited
- There must be a common test specification for interoperability
- **Common test interfaces would reduce effort for independent tests**

RBCs in RailSiTe® Laboratory today

- RailSiTe's modular architecture today allows the use of predefined Euroradio messages as well as dynamic RBCs
- RailSiTe is prepared to integrate industrial RBCs
- The integrated RBC software simulator is driven by proprietary interfaces developed by DLR:
  - Laboratory database for track topology
  - Common interlocking interface for BEST (Funkwerk) or generic interlocking simulator
  - ISDN interface for RBC ↔ RBC and EVC ↔ RBC communication
  - ISDN switch box hardware and/or radio network software simulator for phone call routing (also from/to public ISDN network)

RBC Test Interfaces

Suggestions for common Test Interfaces

- Adaptation of the RailSiTe's RBC interfaces for industrial RBCs is possible

- For exhaustive test campaigns a common test interface specification is needed to reduce the integration effort and to provide comparable results

- The interfaces are:
  - Track Data → RBC
  - Interlocking ↔ RBC
  - EVCs ↔ RBC
  - RBC ↔ RBC

RBC Test Interfaces
Track Topology Data

- RBC and laboratory must share the same track layout for testing
  These includes: tracks, switches, block sections, signals, eurobalises, euroloops, etc.

- Industrial RBCs have proprietary data sources for the track information or use predefined messages selected by given train routes

- Possible solutions for the track layout data interchange:
  - Development of data converter tools for each product/supplier
  - Usage of a standard file format for testing (e.g. railML)
  - Definition of a common standard track layout for testing

RBC Test Interfaces
Interlocking, EVCs, RBCs

- Interlocking
  - Changing train routes, switch positions, signal aspects
  - Change of train running numbers (both directions)
  - Track occupation state
  - Hardware: ISDN?
- EVCs
  - Euroradio messages
  - Hardware: ISDN S_{2M}, GSM-R
- RBCs
  - Subset-039 (FIS,Application Level)
  - Hardware: ISDN S_{2M}

Conclusion

- Industrial RBC integration into labs is difficult and expensive today
- Intensive RBC interoperability testing is needed
- Common testing interfaces for RBCs are required
- Common data format for test track layout is needed

Thank you for your attention!

Dipl.-Inform. Oliver Gantz
Institute of Transportation Systems
German Aerospace Center (DLR)