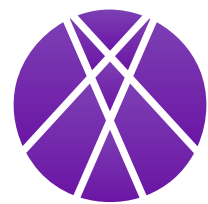


ANNUAL REPORT 2020



EULYNX

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FOREWORD

*by Paul Hendriks,
Chairman of the
EULYNX Steering Committee*



The year 2020 was an important year for the EULYNX consortium. The EULYNX specifications have reached a high maturity level. With the completion and publication of Baseline set 3, a stable set of specifications has been obtained, providing the basis for infrastructure managers to start concrete product development together with the European suppliers. The cooperation of the EULYNX consortium with the European suppliers has been strengthened and is fruitful. Several consortium members have started new projects and taken initiatives to work to tangible results and implementation of EULYNX.

The collaboration between EULYNX and ERTMS Users Group on RCA has also entered the next phase. The European Commission supports the initiatives to further harmonise the European Rail System. With the establishment of the System Pillar, the European Commission focuses on the harmonisation of CCS+ within the European Rail Joint Undertaking, thereby accelerating the ambitions of the Green Deal and the development of Smart and Sustainable mobility in Europe. EULYNX is one of the important building blocks that contributes to this harmonisation. In addition, EULYNX has taken the initiative to further intensify the cooperation with ERTMS Users Group.

Over the past year, the EULYNX team developed a migration roadmap in collaboration with RCA. This roadmap also pays attention to the legacy issues. Each infrastructure manager has an own starting point for migration with specific issues, and will work towards the same harmonised modular architecture. The migration strategy facilitates the required migration steps.

The results of 2020 give confidence for the future. We expect 2021 to be an important year, as major steps will be taken in further collaboration with various stakeholders and organizations.

INTRODUCTION

EULYNX continues to focus on standardised technical interfaces for signalling systems, leading to lower life cycle costs, more commercial off the shelf products and increased availability of the infrastructure for the member infrastructure managers.

The past year was dedicated to completing the Baseline set 3, and incorporating feedback from the signalling industry through collaboration with UNIFE. The development of EULYNX Baseline 3 specifications has been completed, with Releases 5 and 6 marking the completion of the baseline set.

The development work shifts toward Baseline set 4. The upcoming baseline will focus on improvements, as well as some outstanding features that were not included in Baseline set 3. Baseline set 4 will be started with publication of Release 1, planned for December 2021.

PROGRESS AND STATUS

✂ *Architecture*

EULYNX Reference Architecture defines the complete EULYNX system, describing the overall architecture, cross-cutting architectural concepts and all generic functions of the system. The development of Baseline 4 will include an update to maintenance functionality and will support object controllers for multiple field elements.

✂ *Interfaces*

Each functional interface SCI is developed by a dedicated cluster, specifying the Requirement specifications and Interface specifications for that interface. For all field element subsystems, also the diagnostics interfaces SDI and maintenance interfaces SMI are specified.

The development of Baseline 4 brings full harmonisation to interfaces with field elements, therefore the dedicated IM codes will no longer be applied in specifications for these interfaces. In addition, Baseline 4 will introduce functional packages, which will identify functionality according to product capabilities.

✂ *Data Preparation*

Data Preparation cluster is preparing an exchange data format for exchanging signalling engineering data between IMs and market parties. Modelling work progresses according to schedule, and is planned to be complete in December 2021. The data preparation UML model provides the basis for XML schema of the exchange format. References to topology rely on the RailTopoModel. The data preparation model is regularly updated on the EULYNX website as a public snapshot: <https://www.eulynx.eu/index.php/dataprep>

The IMs involved in data preparation are planning a deployment roadmap, which will trigger pilot projects and toolchain developments.



⌘ Assurance

EULYNX delivers assured specifications that can be accepted by all member organisations and their corresponding National Safety Authorities. To facilitate this cross border approach, the assurance process is following the principles of CSM, tailored to the scope of delivering assured specifications rather than assured products. EULYNX assurance demonstrates that hazards and threats within the scope of the EULYNX work have been identified and that suitable mitigations are in place.

⌘ Certification

EULYNX Certification will provide a formal confirmation that a product demonstrates required compliance to EULYNX specifications. The certification process is focusing on open testing procedures and establishing a network of testing facilities, both independent or supplier based test facilities. The certification process is being prepared in close cooperation with the signalling industry. The work on the test catalogue has been completed, and a test case database is now in preparation.

⌘ Modelling and Testing

Modelling and Testing cluster provides the system engineering process and modelling methodology for development of EULYNX model-based specifications. The modelling methodology will also form the basis for RCA development work as a recognised system engineering approach in the CCS sector.

⌘ Security

Security cluster defines a security architecture for EULYNX and provides best practice guides for a complete security of the railway systems. Significant progress has been made over the past year, with results leading to a cross-sector Security Concept shared between EULYNX, RCA and OCORA. The EULYNX Security concept has been revised, and work continues on security requirements. Security cluster also support the security strategy for RCA.

⌘ Migration

Migration cluster analyses and proposes migration strategies for EULYNX and RCA. The cluster analyses how the system architectures of different infrastructure managers will evolve, starting at the legacy situation and following the whole period of migration towards the RCA target system architecture, taking into account both train systems and rail infrastructure.

REFERENCE CCS ARCHITECTURE (RCA)

The IMs organised in EULYNX and ERTMS Users Group (EUG) agree on a common goal to guide the developments in the CCS sector towards life cycle cost reduction, improved capacity and increased deployment speed.

RCA defines standardised, evolvable interfaces for all major components of the future railway CCS, and brings in new technology and technological progress from other sectors to railway CCS. Interfaces to trackside assets, as specified by EULYNX, remain also in the RCA target architecture.

The development of RCA is progressing, and in the past year a further release RCA Baseline set 0 Release 1 has been published.

As a foundation of future CCS systems, EULYNX will also be considered as part of the future EU Railway System Architecture and in the focus of the proposed System Pillar of the future Europe's Rail JU program that is expected to start operation by end of 2021.

FORMAL COOPERATION WITH UNIFE

EULYNX works closely with the signalling industry in a formal cooperation. Cooperation has been set through UNIFE as the representative organisation of the European rail supply industry. The UNIFE CCS Platform group is responsible for cooperation with EULYNX.

The cooperation is fully operational, UNIFE CCS Platform members are active in the EULYNX change control board. With valuable feedback and recommendations, UNIFE contributed to improving the Baseline 3 specifications, and proposed improvements which will be further developed as part of Baseline 4.

Specific working groups have been set up between EULYNX and UNIFE experts and cover dedicated topics, contributing to Baseline 4 development.

FINANCIAL REPORT

For the financial year 2020, available budget for EULYNX Consortium activities has been set at 1.064.000 EUR. Annual contribution fees of 13 EULYNX members amounted 750.000 EUR, according to the following fee apportionment: category small size network at 36.585 EUR, category medium size network at 54.878 EUR and category large size network at 73.171 EUR.

Principal outgoings were the costs of the management and technical coordination as well as technical support to central EULYNX clusters. Financial year 2020 closed within approx. 92% of the planned budget with the amount of 977.080 EUR. This results in underspending of approx. 86.920 EUR are shifted to the financial year 2021.

In 2021, work will be focused on Baseline set 4, security concept, data preparation and certification process. The proposed core budget 2021 for EULYNX consortium activities amounts to 1.033.750 EUR.



MEMBER ACTIVITIES

DB Netz AG

There are several newly contracted implementation projects in 2020 based on EULYNX Baseline 3: starting operation in 2023 high-speed project Zwiesel (Pintsch), in 2024 high-speed project Gera-Weischlitz (Hitachi) and high-speed project Lichtenfels-Coburg (Alstom) and in 2025 Digitaler Knoten Stuttgart (Thales).

In addition, high-speed line Wendlingen-Ulm is currently planned to be contracted for implementation projects in 2021 based on EULYNX Baseline 3. Start of operation is foreseen for 2023.

Starting in 2020 and continuing in 2021, DB Netz organised the demonstration of EULYNX interfaces with a demonstrator during the Digital Rail Summer School in the Digital Rail Test Field (Annaberg). In 2021, DB Netz together with Thales, Bombardier and Movares will present further work on the demonstrator of EULYNX interfaces and migration to RCA during the events in Berlin (Railway Forum) and Rome (SmartRail Europe).

DB Netz AG continued to make significant contributions to the formal specification and verification of EULYNX specifications, helping to bring formal methods and modelling expertise closer to the railway sector.

As a permanent activity, DB Netz together with further EULYNX partners in Shift2Rail continued in feeding EULYNX deliverables into the projects of the EU Shift2Rail research program. A dedicated process has been set up in the LinX4Rail project to support an efficient integration of EULYNX requirements into Shift2Rail.

SNCF Reseau

Starting in 2020, the next generation of interlockings “Argos” is continuously developing through an innovative partnership with 3 different suppliers selected for a 10-year deployment contract.



The innovative partnership process revealed to be of very high value given that it really unleashed creativity from the teams of both parties (SNCF Réseau and its suppliers) and focused on the global efficiency and the achievement of the economical target. It has been decided that Argos interlockings from all the suppliers shall be able to support EULYNX SCI interfaces when required. As a first application of this principle, in 2021 new axle counter systems will be tendered with the EULYNX SCI-TDS specification to guarantee the interoperability with Argos interlockings. These new axle counter systems will progressively replace existing track circuits wherever possible.

SNCF Réseau engineers are currently working on a R&I project involving new trackworker safety systems capable to retrieve from the interlockings all the necessary information to manage the trackworker protection. The EULYNX SCI-CC interface, already including the SNCF requirements, is seen as a possible solution to manage the interoperability with Argos interlockings.

✂ ProRail

EULYNX is currently an important part of the overall signalling migration strategy within the CCS domain towards Radio Based Signalling ERTMS Level 2 in the Netherlands. It will help to realize the goals, in combination with the ERTMS Game Changers, of a common European strategy, set up together with European colleague IMs in the RCA context. From this point of view, also the ProRail ICT organization became closely connected, this department is responsible for the non-safe TMS systems.

In 2020 the ProRail contribution to the definition of EULYNX Baseline 3 has in parallel lead to the inclusion of EULYNX into the national signalling requirements. First, with this approach, legacy systems such as points and level crossings can migrate to a situation with EULYNX. In the same approach the legacy power system for signalling is converted to an industry standard. Locations prepared for ERTMS can then be equipped with systems for Radio Based signalling for ERTMS trains. Second, from a certain release ERTMS system are also prepared for EULYNX, which are developed in a separated ERTMS program with a planned roll out in 7 national corridors in the second half of this decennium.

ProRail

In concrete terms, the first method is applied in the realization of the PHS Amsterdam project, where capacity increase is the main goal. The new signalling system of Amsterdam is prepared to implement ERTMS due to standardization of interfaces between the central interlocking system and the line side object controllers. The project provides for a changed infrastructure layout with unbundling of transport corridors. The signaling part of the project comprises 1200 elements (signals, points, etc.) and extends over a geographical distance of 10 km.

A tender for development of EULYNX is discussed with market parties and technically prepared to cover EULYNX object controllers for the field elements and the adaptation of EULYNX on legacy interlocking systems.

Since 2018, ProRail and DB have been collaborating on a 4-year project in which national systems with EULYNX specifications are formally specified. This brings automated testing within reach. This project shows how young engineers and scientists can apply modern specification methods in the field of signalling. ProRail demonstrates that the policy pursued at European level can be applied in practice. The Netherlands actively contribute to activities that will be set up in the European approach according to the System Pillar. The ProRail architecture is in line with the higher objectives in accordance with the European railway strategy.

Infrabel

The goal of Infrabel for the next years is to introduce EULYNX standards in new contracts. The main specifications that Infrabel intends to use in tenders are level crossings and axle counters.

Currently there is an ongoing discussion within the workgroups for Infrabel vision 2040, where the EULYNX requirements are planned to be used.

INFRABEL



✂ *Trafikverket*

For Trafikverket, EULYNX is an important and necessary step towards more flexible and cost effective solutions. In the coming procurement, the requirements, specified in the Functional Product FP6.0.0, will to a large extent be based on EULYNX supported functionality.

As FP6.0.0 is scheduled to be ready by December 2022, the work of defining its content has been started, and will accordingly continue to be the main focus during the complete year of 2022 and onwards.

✂ *Österreichische Bundesbahnen (ÖBB)*

As a new EULYNX member, ÖBB has been participating in EULYNX Reference Architecture and the IT Security Cluster since spring 2020.

For the procurement of interlockings and field elements, ÖBB will increasingly require the implementation of interfaces according to the EULYNX specifications in the future, whereby the overall architecture will be strongly aligned with RCA.

EULYNX will play an important role in ÖBB strategy for the system development plan - for main line and for regional line technology and will contribute to achieving the corporate goals.

✂ *Rete Ferroviaria Italiana (RFI)*

As for 2020, RFI resources that are involved in EULYNX Data Preparation, were active in the „Signaling“ domain of IFC Rail for RFI, also holding leadership of the domain itself.

RFI is interested in the evolution of the safety protocol with respect to national Standard Vital Protocol (based on subset 098 - RBC-RBC interface) used by RFI for interfacing between interlockings. A migration strategy is investigated that considers a way to manage existing protocols in the transition period.



Swiss Federal Railways (SBB)

In early 2020, SBB published a Request for Information called „Program ETCS interlocking“. It gathered information about potential suppliers, existing products (e.g. Object Controllers) and time to market of future products. The OC questions were based on a published Smartrail 4.0 OC concept which was oriented on EULYNX and RCA. Specific questions concerned advantages and disadvantages of multi-OC platforms in addition to EULYNX BL3’s single OCs.

Due to the positive feedback, SBB strengthened its effort in 2020 to promote the multi-OC platform concept for EULYNX BL4. Furthermore, it prepared BL4 contributions on operation states, configuration handling, security and harmonization.

For SBB tenders, EULYNX BL4 and higher is relevant. SBB is currently preparing to implement the European Rail Traffic Management System strategy of the Swiss Federal Office of Transport (FOT) released in April 2021.

Mid May 2021, SBB has published a new Request for Information called „Implementation of FOT ERTMS strategy for signalling installations“. In this context, signalling installations comprise interlocking systems (signalling logic systems and control units for external components; EULYNX BL4 compatible object controllers in the future), radio block centres (RBCs) and their overall integration as well as connection and embedding in the overall environment, including rail process control technology and scheduling.

The purpose of this RfI is to obtain information on potential suppliers and existing products or solutions in the signalling systems and security areas that could fulfil the ERTMS strategy approved by the FOT and the EULYNX standard, the potential for upgrading lineside signalling systems to cab signalling, preparing for the industrialised rollout of a high-performance cab signalling system and enhancing the (cyber-)security levels of signalling systems. The results of the hearings will be considered in upcoming tenders.



✂ *Network Rail*

EULYNX is becoming a more and more important part of Network Rail's overall signalling migration strategy and is a key part of Target190plus programme of works.



As part of Target190plus Network Rail is developing its EULYNX Migration strategy to support implementation of EULYNX interfaces and align with:

- › Future-CCS Strategy
- › Reference CCS Architecture and,
- › ETCS Long-Term Deployment Plan

Against this strategy the Target190plus Generic Interface and Boundaries project will work with industry partners to develop EULYNX migration plans specifically for train detection, points and level crossings in the first instance, with the aim that standardised products become available for March 2024.

✂ *Société Nationale des Chemins de Fer Luxembourgeois (CFL)*

An important milestone in 2020 was the successful integration of the centralized LEU interface into the SCI-RBC interface specification, allowing a performant system design with ETCS Level 1 functionality. ETCS Level 1 remains the automatic train protection and signalling system of choice on Luxembourg's network.

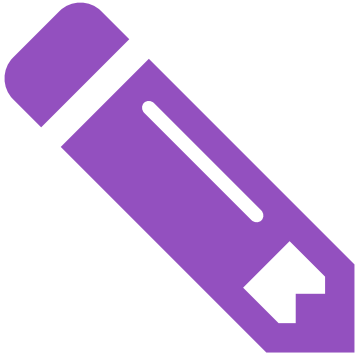


On the basis of the published Baseline 3 specification set, CFL is currently updating the tender documents for EULYNX compliant signalling systems. A major signalling renewal project is planned in Bettembourg, which contains the largest marshalling yard on Luxembourg's railway network as well as an important passenger line towards France. The tender is planned to be published in 2022.

✂ *Slovenian Railways (SZ)*

Slovenian railways are in the process of modernising the railway network. It is anticipated that the EULYNX specifications will become a part of the tender documentation as the renovation of the infrastructure in Slovenia is underway. A pilot EULYNX project is planned with the modernisation of the section Zidani Most – Laze. After the pilot project, EULYNX roll out will continue an all further signalling projects.





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