EULYNX

ANNUAL REPORT 2023

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FOREWORD

Reflecting on the year 2023, it was the year about growth for EULYNX. The consortium was strengthened by two new members from the Czech Republic and Croatia – Sprava Zeleznic and HZ-Infrastruktura. The growth and strengthening of the close collaboration with EU-Rail System Pillar resulted in the first delivery of concrete System Pillar specifications: the common documentation publication EULYNX Baseline Set 4 Release 2. The collaboration with EU-Rail brings part of the EULYNX development under the technical authority of the System Pillar.

The collaboration with UNISIG has resulted in a common agenda for the future. The focus of suppliers is on the development of concrete EULYNX products. More and more suppliers are adopting the EULYNX standard.

EULYNX initiatives are also growing, with the most notable addition being the preparation of the EULYNX Academy. The EULYNX Academy aims at both the general audience and experts with a variety of introductory, basic and deep dive modules.

Our journey continues, driven by partnerships such as EU-Rail, and our commitment is reflected in new activities such as the EULYNX Academy. We are positioned for the future, proud to provide a sustainable contribution to a robust and viable European rail system.

Paul Hendriks,
Chairman of the EULYNX Steering Committee

As the development work on specifications nears completion, the EULYNX Consortium is shifting its focus towards deployment and dissemination. Over the past year, significant activities have been initiated to support EULYNX deployment. A dedicated deployment team has been formed to address the needs of infrastructure managers and accelerate the preparation of EULYNX tenders. This team is actively engaged in providing technical support, integrating national specifications, and planning the migration steps.

EULYNX is also advancing in compliance testing and development support, working to establish a reference test bench and a comprehensive test catalogue. These efforts focus on the compatibility and interoperability of various manufacturers' solutions, facilitating a seamless integration to signalling solutions.

One of the most exciting initiatives is the preparation for the EULYNX Academy, which aims to meet the growing demand for knowledge dissemination. The Academy will offer regular online and onsite courses, with dedicated sessions tailored for specific teams or organisations.

Looking ahead, the future of railway signalling will see more standardisation, and EULYNX is excited to be a part of this important journey. Current deployments and upcoming plans demonstrate how these standardisation efforts are coming to life. By working together and innovating, EULYNX is dedicated to helping the rail sector move towards a standardised, modular, and efficient system.

Mirko Blazic,
EULYNX Technical Lead

INTRODUCTION

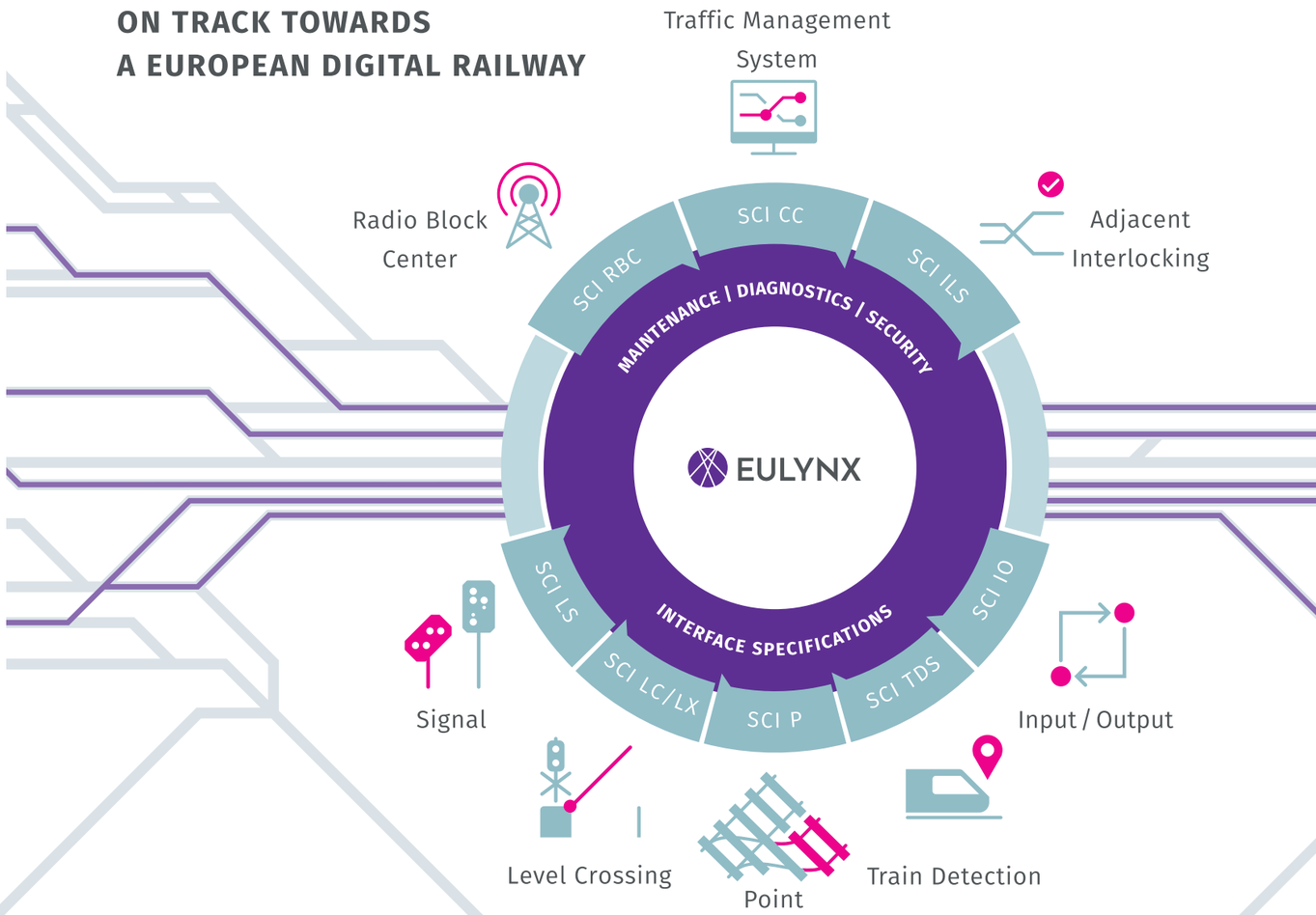
The focus of recent activities is on maturity of the current Baseline Set 4. A major milestone in 2023 was the first publication of Baseline set 4 under the umbrella of EU-Rail System Pillar. Baseline set 4 Release 2 has been prepared in close alignment between EU-Rail and EULYNX, under the authority of EU-Rail System Pillar, bringing a part of the EULYNX development under technical authority of the System Pillar. All specifications related to trackside assets and transversal functions apply for both the current EULYNX architecture and the future System Pillar target architecture, and were therefore published as a single set of specifications under a common publication by EULYNX and EU-Rail System Pillar, delivering in total 24 specification documents.

In addition to the common documentation release, EULYNX published also additional specifications and supporting documents for the current EULYNX architecture, which are integrated in the EULYNX part of Baseline Set 4 Release 2, delivering additional 30 documents.

Ongoing investments of the infrastructure managers with multiple running and planned projects, together with corresponding industry developments, all require a stable and future-proof basis for procurements and developments. The joint publication by EU-Rail System Pillar and EULYNX provides the stable basis for current investments related to the EULYNX architecture and ensures both migration and compliance to the future System Pillar target architecture.

The efficient development phase and successful sector wide approval of this first publication under the umbrella of the EU-Rail System Pillar demonstrate the role of the System Pillar as the “generic system integrator” and the architect of the future European Union’s railway system, successfully collaborating with sector initiatives, such as EULYNX, to bring all rail sector representatives under a single coordination body.

As with previous EULYNX releases, also the release encompassed not only formal specifications but also supporting artifacts, contributing to a comprehensive user experience. A full model export has been made available, facilitating simpler visualisation of the modelled requirements, and enabling users to reapply the model in model-based environments. Additionally, executable simulators, developed by EULYNX for internal verification and validation of requirements, have also been delivered, allowing users to simulate subsystem and interface behaviour.



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 working group is also active in the Trackside Assets domain of the System Pillar, and is responsible for all architectural and generic issues related to the field element subsystems. The architecture and the generic functions are already very stable, therefore the updates planned for the next release focused on the maturity of diagnostic and maintenance functionality.

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, maintenance interfaces SMI and security interfaces SSI are specified. The SMI and SSI interfaces are fully generic and applicable across all field element subsystems.

Baseline set 4 provides harmonised specifications for EULYNX field element subsystem and interface specifications. The country specific IM (infrastructure manager) codes are no longer applied in specifications for these interfaces. In addition, Baseline 4 includes functional packages, which are used to delimit the required scope of the functionality of a product, either in the context of tenders for specific implementation projects or in the context of generic product development, testing and/or certification.

Data Preparation

Data Preparation activities have focussed on exchanging signalling engineering data between infrastructure managers and market parties. As the evolution of a sector wide comprehensive data model is now in the scope of EU-Rail System Pillar, the applicable results of EULYNX Data Preparation will be integrated into the work of the System Pillar. EULYNX will no longer update the data preparation model.

Assurance

EULYNX ensures that the developments result in assured specifications which can be accepted by all member organisations and their corresponding National Safety Authorities. The EULYNX assurance process is following the principles of CSM, tailored to the scope of delivering assured specifications rather than assured products. The process demonstrates that hazards and threats within the scope of the EULYNX work have been identified and that suitable mitigations are in place. An Assurance Justification report follows each baseline release.

Modelling and Testing

Modelling and Testing cluster provides the system engineering process and modelling methodology for development of EULYNX model-based specifications. Recent activities focussed on the integration of the methodology and results in the work of EU-Rail System Pillar, actively collaborating with the Engineering Environment Team. An important result in 2023 was the consolidation of the model based outputs in close cooperation with experts from UNISIG, fine tuning the specifications outputs for smooth integration into supplier development processes.

Security

Over the course of last year, the EULYNX Security cluster merged with the EUG ESCG group to form a common railway working group for security topics – the Railway Security Expert Group (RSEG). This newly formed working group ensures that railway developments are fully aligned and supported in the sector. The group is also the acting Mirror Group of the EU-Rail System Pillar Security domain.

The EULYNX developments on Security, as published in Baseline set 4 Release 2, have been fully integrated into the work of the EU-Rail System Pillar Security domain. EULYNX will therefore no longer publish own security specifications, and will in the future refer to the relevant System Pillar Security deliverables.

Migration

Migration strategies are becoming increasingly important for EULYNX members. Decades of underfunding in signalling technology have created a significant need for investment. Major rollout programmes are expected across Europe in the next 10 years.

As the CCS sector moves towards the Single European Railway Area (SERA) under the EU-Rail System Pillar, EULYNX members will adjust their rollout strategies to align with SERA's strategic vision, using a step-by-step migration approach.

EULYNX strongly supports well-defined migration steps that build on each other. The modular architecture of EULYNX, with its specified interfaces, provides the essential standardised building blocks needed for these migration strategies. This approach will help the entire rail sector advance the digitalisation of signalling technology in a predictable and coordinated manner. These migration steps, referred to as migration plateaus, define a set of systems and operational rules. They shall be available to all railways from a specific point in time and form the basis for all subsequent rollouts. It is crucial to define the initial migration plateau within the CCS sector as soon as possible.

Deployment support

The EULYNX Consortium initiated a support program to address the needs of infrastructure managers and accelerate preparation of EULYNX tenders. A deployment team has been setup, with key tasks to onboard new members and their experts, and provide technical support related to EULYNX documentation, integration of national specifications, analysis of gaps to legacy national requirement, preparation for marking of IM codes, migration planning and tendering requirements. The deployment activities were started with EULYNX members RFI, TRV and HZ-Infrastruktura.

Compliance testing

As the subsystem and interface specifications are largely complete, and products are now in development, focus shifts to the demonstration of the compatibility and interoperability of different manufacturers' solutions. EULYNX started an activity to support non-profit testing for this emerging market. EULYNX is actively working on a joint framework to establish the testing laboratory, offering product compliance testing, hosting of the test case database and providing development and integration testing support.

Formal cooperation with industry

EULYNX has been engaged in a formal collaboration with the signalling industry through UNIFE, the representative organisation of the European rail supply industry. The UNIFE CCS Platform group has been responsible for collaborating with EULYNX. With the formal commencement of the System Pillar, the cooperation with industry has been transferred to UNISIG. The current collaboration with UNISIG within the System Pillar continues to be productive and constructive, proving as a blueprint for long term collaboration in the sector.

FINANCIAL REPORT

For the financial year 2023, available budget for EULYNX Consortium activities has been set at
1.460.045 EUR.

Annual contribution fees of the 15 EULYNX members amounted
854.545 EUR,
according to the following fee apportionment:

category small size network at
36.364 EUR

category medium size network at
54.545 EUR

and category large size network at
72.727 EUR

Additional funding from other sources amounted
605.500 EUR

Principal outgoings were the costs of the management and technical coordination, technical support to the EULYNX clusters and the deployment activities.

Financial year 2023 has been closed within the available budget.

ERTMS Users Group remains a service provider for the EULYNX Consortium, handling the organisational and commercial issues related to the activities of the consortium.

EULYNX ACADEMY

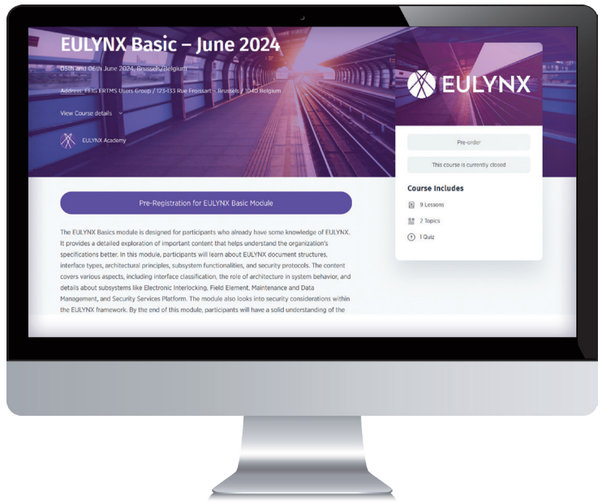
With the growing demand for dissemination, EULYNX started the preparations for the EULYNX Academy - a comprehensive training platform designed to enhance expertise in railway signalling, providing a deep understanding of signalling systems. The academy will offer structured courses for different levels of understanding, organised as individual training modules.

The **EULYNX Introduction Module** aims to provide an overview of the organisation's history, mission, and impact on the railway industry, and includes basic architecture explanation, all available online for self-paced learning.

The **EULYNX Basic Module** will provide further insight, covering detailed document structures, subsystem functionalities and interface definitions, including topics related to maintenance, diagnostics and security. Regular onsite sessions of the Basic Module will be scheduled. On a longer perspective, an online version of the Basic Module will be prepared.

The advanced tailored **Deep Dive Module** will allow participants to focus on specific topics of interest, providing in-depth analysis and practical sessions. This module will be organised by dedicated topics in form of scheduled workshops, however dedicated courses may also be organised for specific teams or organisations.

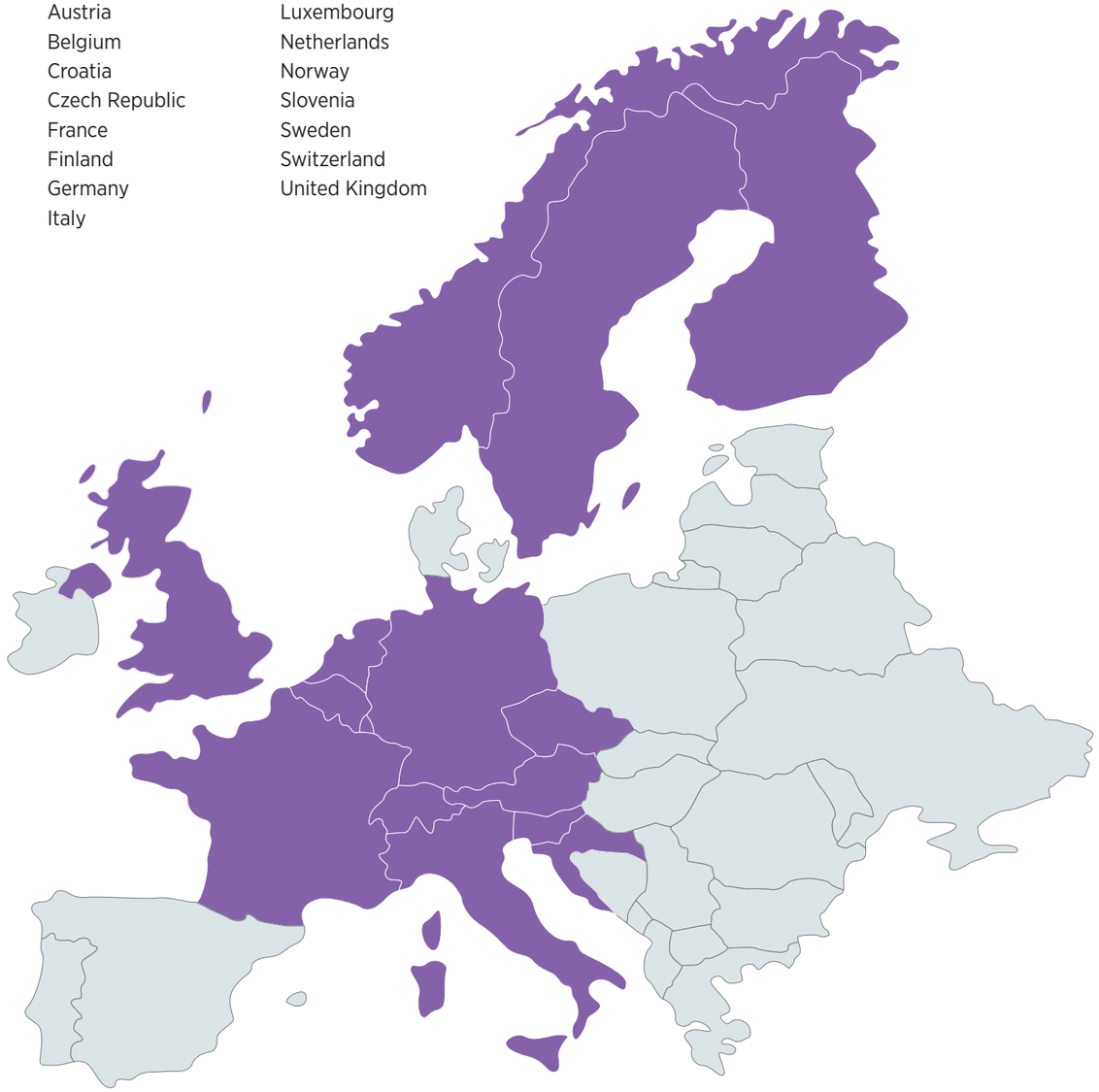
In the course of 2024, the training modules will become gradually available. The EULYNX Academy aims to foster a deep understanding of railway signaling systems.



MEMBER ACTIVITIES

The EULYNX Members

Austria
Belgium
Croatia
Czech Republic
France
Finland
Germany
Italy
Luxembourg
Netherlands
Norway
Slovenia
Sweden
Switzerland
United Kingdom



Trafikverket

TRAFIKVERKET

For Trafikverket, EULYNX is a crucial step towards a more flexible and cost-effective signalling system. Over the past year, Trafikverket has collaborated with DB Netz and system suppliers to harmonise the implementation of EULYNX and reduce differences. Interesting findings have emerged, and the work continues, bringing this initiative under the EULYNX Deployment cluster.

Trafikverket sees the interfaces between the Electronic Interlocking and object controllers (SCI-TDS, SCI-P, SCI-LC, SCI-LS, and SCI-IO) to be the most beneficial from Trafikverket point of view, therefore focusing on these interfaces, and complementing these interfaces with corresponding SDI, SMI and SSI interfaces.

EULYNX-supported functionality is included in an upcoming procurement, which was initially planned for completion in 2024. However, this procurement has been postponed, and new dates will be announced later.

Swiss Federal Railways (SBB)

SBB CFF FFS

To implement the ERMTS strategy of the Swiss Federal Office of Transport, SBB AG is procuring railway signalling equipment in two lots by means of long-term framework agreements. The tender mainly consists of signalling installations with external light signalling, driver's cab signalling and object controllers (OC) based on EULYNX BL4 R1 or higher. In 2023, SBB has released the first version of the specifications and cooperated in the underlying EULYNX BL4 Releases 2 and 3.

Lot 1 consists of construction and integration of electronic interlockings, object controllers based on EULYNX BL4 R1 or higher and a maintenance, data management system MDM and RBCs including follow-up support for all.

Lot 2 consists of the provision of object controllers based on EULYNX BL4 R1 or higher, including follow-up support.

The procurement is carried out as a dialogue procedure. SBB has selected five industry partners and started the one-year dialogue phase with them. The industry partners are ALSTOM, GTS, Hitachi, Siemens Mobility Switzerland and STADLER (Hitachi withdrew from the dialogue process in February 2024 due to corporate restructuring). End of February

2023, they have received the first version of the SBB specifications. Together with the EULYNX BL4, these form the basis for the dialogues that SBB currently conducts until end of Q3 2024. The aim of this dialogue phase is to involve the industry in concretising the railway signalling requirements and thus sharpen the SBB specifications, giving room for innovation based on the EULYNX standard. At the end of the dialogue phase and based on a final specification version, the suppliers will deliver their offers in Q1 2025. The signature of the contracts is planned in Q3 2025. The initial SBB specifications refer to EULYNX BL4 R1. The final tender specifications will be handed over to the industry partners in November 2024 and will refer to EULYNX BL4 R3, planned for release in mid 2024.

In a cross-industry approach with the aviation industry, SBB has procured and integrated a platform that allows them to perform proofs of concept for EULYNX Object Controller. The EULYNX OC behaviour is demonstrated using a simulated EULYNX interlocking, a real main signal and other simulated external equipment. SBB has published the code of the used RaSTA protocol stack as an open source reference implementation on GitHub: GitHub - SchweizerischeBundesbahnen/sbb-rasta-stack: SBB RaSTA Protocol Reference Stack.

Finnish Transport Infrastructure Agency (FTIA / Väylävirasto)

Finnish Transport Infrastructure Agency

A Centralised Traffic Control (CTC) system in Northern Finland will be modernised utilising EULYNX interfaces. The area of the new CTC contains 51 interlockings, both electronic and relay-based interlockings. In order to provide a uniform interface to control the relay-based interlockings, it was decided to create an interface module which can communicate with a EULYNX SCI-CC protocol to CTC and thus control the existing legacy interlockings. In addition, the SCI-CC interface also marks the boundary between system owners. The CTC control centre part belongs to state owned company Fintraffic and the protocol converter and IO-interface together with interlockings are owned by FTIA. This new concept with SCI-CC interface and EULYNX protocol has been commissioned during 2023 for nine stations with relay interlockings, and the project implementation continues. The results has been very positive and promising.

The architecture vision of independent EULYNX object controllers has become clearer at FTIA. It is expected to see a multi-vendor solution available for the future ERTMS/ETCS-level 2 first commercial line in Tampere–Pori/Rauma. In Finland, a company Relesoft Ltd has developed the EULYNX test system based on EULYNX/ERTMS architecture. This system includes all relevant subsystems for full scale simulations and testing with EULYNX compatible equipment.

The FTIA has released a Finnish publication: “Harmonising the interfaces of railway safety systems - European EULYNX cooperation.” (Finnish Transport Infrastructure Agency Helsinki 2023. Publications of the FTIA 63/2023. 44 pages. ISSN 2490-0745, ISBN 978-952-405-106-4).

Austrian Federal Railways (ÖBB)

ÖBB INFRA

ÖBB are specifying and tendering the next generation of digital interlockings for the whole Austrian network. The tender is based on EULYNX specifications. The negotiations about the expected offers will start in 2024. The tender gives potential applicants freedom in terms of planning the cabling in stations and the associated power supply.

The interlockings are to be operated in a small number of data centers in Austria in the future. The tender therefore describes a step-by-step model that enables the centralisation of interlockings. ÖBB will also tender specifications of a centralized maintenance and data management (MDM) system within 2024.

ProRail

ProRail

In 2023, ProRail continued preparing the rollout of the EULYNX specifications in the Dutch signaling system. EULYNX is still an important part of the overall signaling migration strategy within the CCS domain towards ERTMS in the Netherlands and beyond.

The Dutch ERTMS program is preparing to use the EULYNX interfaces in one of the following releases. Also within the legacy system, ProRail integrates EULYNX interfaces to help extend the lifetime of the legacy equipment and prepare for a smooth upgrade to the ERTMS and connect with the ERTMS central safety system. ProRail plans developing an open EULYNX interlocking and object controllers for the lineside assets, following the specifications of EULYNX baseline 4. Communication and architecture follow hereby the constraints of the ERTMS systems.

Since 2018, ProRail and DB have been collaborating on a project in which national systems with EULYNX specifications are formally specified, verified and used for product testing. This brings automated testing within reach. This project finished in 2023 and demonstrated how formal methods can add significant value to engineering and testing of signaling systems.

In 2021 ProRail asked the market to help increasing the speed of ERTMS rollout with innovation. In end of 2021, a contract was signed with Pilz about developing and testing of an adapter, using EULYNX interfaces. The adapter will connect a legacy relay interlocking with the fiberoptic signalling-network, communicating with EULYNX object controllers. It will be used to help reduce blocked tracks during building activities.

These and other activities show that the policy that is being pursued at European level can be applied in practice. The Netherlands actively contributes in activities in the European approach in alignment with EU-Rail System Pillar. The ProRail architecture is fully in line with the objectives of a common European railway strategy.

The Société nationale des chemins de fer français (SNCF)

SNCF

EULYNX has an important role in the SNCF Réseau signalling strategy for the years to come.

The development of Argos pilot projects has progressed throughout 2023. The Argos project aims to renew the oldest interlockings with, as a final target, the implementation of ETCS L2 without lineside signalling. Argos interlockings are expected to be less expensive in overall lifecycle costs, more robust and more performing than current ones. Deployment

will be faster thanks to the introduction of a new process, largely based on digital tools to conceive, configure and validate each specific application. Formal proof techniques will be part of this new process.

Argos interlockings implement generic SCI interfaces based on EULYNX BL4R2. The three Argos suppliers (Alstom, Hitachi and Thales) are currently finalising the development for their pilot projects.

The SNCF Réseau future signalling strategy will be centered around the deployment of new-generation axle counter systems which have been awarded to Frauscher. These new systems will implement SCI and SDI interfaces based on EULYNX BL4R2 (or higher) and will be interoperable with Argos interlockings. The development is on-going, first deployments are expected in 2025.

SNCF Réseau is very active in the EU-Rail System Pillar, participating in all active domains. EULYNX plays a central role in the Trackside Assets Control and Supervision domain and SNCF Réseau has been involved throughout 2023 in the specification of the EULYNX SCI interfaces (SCI-P, SCI-IO, SCI-TDS, SCI-LC).

DB Netz AG

In 2023 DB Netz successfully tested the new digital interlocking from Thales based on EULYNX specifications in the south of Germany on the route section between the Meitingen and Mertingen. The main development target was to test and approve a resilient IP-based communication platform providing end-to-end encryption for interlocking applications. The IP-based communication platform is managed and supervised from a central operation centre including a security operation centre to identify and react on cyber-attacks.

Starting in September 2023, the EULYNX based digital interlocking as well as new maintenance processes for managing and supervising the system, have been extensively and successfully field-tested. Supported by Thales, DB Netz was in charge to prove the integration between the digital interlocking and the new communication platform which has been completed by the end of the year. Having successfully passed all field-tests, DB is planning the commissioning of the EULYNX interlocking in the first half of 2024.

Infrabel

The signalling systems commissioned today at Infrabel still contain legacy interfaces and object controllers. However, the existing frame contracts that started before the availability of EULYNX specifications are slowly going to the end phase. The next contracts for interlockings and object controllers will be mainly based on EULYNX specifications, likely based on EULYNX BL4R3.

Rete Ferroviaria Italiana (RFI)

Over the past year, RFI, supported by the EULYNX Deployment Cluster, undertook multiple activities to align its computer based interlocking CBI platform with EULYNX specifications. Regular expert meetings, including periodic non-expert training sessions, were scheduled throughout the year, including a plenary session with a broad audience organised in Rome.

The training sessions focused on educating RFI staff to interpret EULYNX specification documents. Key areas included understanding the EULYNX document structure, subsystem requirements, and interface roles within the EULYNX architecture.

Post-plenary, gap analysis workshops began. The initial step focused on the logical context diagrams of comparable subsystems, leading to a harmonised EULYNX-RFI CBI architecture. Based on outcomes of the logical context analysis, the EULYNX team reviewed each logical context diagram together with RFI experts and developed block definition diagrams for comparable RFI subsystems. The subsystems Point, Level Crossing, Generic IO, Light Signal, and TDS were analysed in detail.

The goal of the activity is to support the development of the RFI CBI platform to become compatible with EULYNX specifications, targeting specification compliance by 2025.

Network Rail

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

In 2023, Network Rail contributed to the EULYNX and System Pillar working groups for Architecture, Level Crossing, Points and Train detection, along with support to the EULYNX activities in Control Systems and Trackworker Safety Systems, Assurance and Certification clusters.

The migration strategy of the Target190plus programme supports implementation of EULYNX interfaces and aligns with Network Rail's Future-CCS Strategy Reference CCS Architecture and ETCS Long-Term Deployment Plan. This has led to the inclusion of EULYNX interfaces in the tendered and recently awarded Train Control Systems framework that replaces previous major signalling framework contracts.

As part of this strategy, the Target190plus Generic Interface and Boundaries project has continued to work with industry partners to develop EULYNX and has demonstrated as a Proof of Concept the use of SCI-TDS between three suppliers. Network Rail specifications have been produced that align with EULYNX BL4R1 for SMS and SSP that support the already published trackside asset specifications for Level Crossing, Point and TDS. Aim is to develop these further and align with EULYNX BL4R3 with updated standards being available Mid 2025.

Target190plus has also developed a PoC for the F-CCS Synthetic Environment, that provides data outputs in line with the EULYNX Data Prep model. F-CCS Synthetic Environment has now been tendered as MVP and along with the Target190plus CCS in the BIM project will be looking how EULYNX Data Prep model can be used in an integrated Design and Validation Process for F-CCS systems and products.

Správa železnic, státní organizace

Správa železnic became a member of the EULYNX consortium on 1st January 2023. The motivations and reasons for joining the consortium are as follows:

- Our main goal is to have a defined technical specified interface and achieve harmonization of signalling systems. Release of Baseline 4 is a major milestone.
- The specifications in the EULYNX project are created based on the common requirements of the consortium members and the results of the EULYNX project provide an assumption that these agreed interface specifications will have pan-European or global validity. EULYNX specifications should be part of the TSI in the future period.
- Using the technical specifications of the interface, we can interconnect devices from different suppliers and solve various modifications and replacements of devices in complete parts.

A pilot installation of the signalling system in the Czech Republic using EULYNX specifications is being prepared. We prepared a tender for the first technical construction in the railway station Batelov. In the first step, we want to focus on the use of SCI-ILS, SCI-RBC, SCI-CC interfaces.

Members of Správa železnic have joined the consortium working structures and we believe that our participation in the consortium will be beneficial and fruitful for all parties.

SZ-Infrastuktura

In June 2023, BL4 RL2 was published. This release was prepared in close collaboration with the European CCS sector. Slovenian Railways recognise the importance of harmonised standards and interface specifications. Consequently, we have been actively participating in the EULYNX working. Simultaneously, efforts are underway to appropriately modify national specifications to prepare for the implementation phases of the initial projects through the adoption of EULYNX specifications. Slovenian Railways are preparing public procurement announcements for the modernisation of railway signalling devices on numerous lines (main line No. 20, regional lines No. 21, 70, 71, 80, and 81). These public procurement notices will integrate EULYNX specifications in the tender documentation. Using EULYNX interfaces, the main emphasis will be on the connectivity of trackside devices.

The Société Nationale des Chemins de Fer Luxembourgeois (CFL)

In 2023, CFL has issued a public tender for a complete replacement of the signalling systems and train protection systems of a major passenger and freight hub in Luxembourg. The specifications comprised EULYNX BL3R8 for SCI-ILS, SCI-P, SCI-LS, SCI-TDS and SCI-RBC, as well as ETCS Level 1 Full Supervision and simplified lateral signalling.

HZ-Infrastruktura

HZ-Infrastruktura has joined the EULYNX Consortium in 2023, joining the goals of the EULYNX members, to standardise the interfaces for the future modernisation and migration of the modern centralised control-command and signalling and interlocking subsystems. The focus will be the interfacing of two adjacent electronic interlockings via the SCI-ILS protocol, which will be further applied in all future tenders. HZ is working actively to integrate the requirements into SCI-ILS specifications for the upcoming EULYNX BL4R3. In addition to the SCI-ILS protocol, the next step will be the formation of a Remote Traffic Management Center, applying the SCI-CC interface, and the integration of SCI-LC/LX and SCI-TDS interfaces.

Bane NOR

At Bane NOR, system testing of our new ERTMS signalling system is ongoing. The system uses the EULYNX interface architecture. The first line with this signalling system was originally planned to go into operation in November 2022, due to delays it will be commissioned late 2024.

The following EULYNX interfaces are implemented and tested:

- SCI-CC: Currently we use a slightly modified SCI-CC to fulfil our functional needs.
- SCI/SDI-TDS: Used in trackside application and tested during field tests.
- SCI/SDI -P: Used in trackside application and tested during field tests.
- SCI/SDI -IO: Used in trackside application and tested during field tests.
- SCI/SDI -LS: Used in trackside application and tested during field tests.

For the next versions of the ERTMS signalling system, Bane NOR intend to implement SCI-RBC, SCI-LX and SCI-ILS. Level crossing systems are currently supported by using SCI-IO.

EULYNX specifications are a significant part of our ERTMS Programme. The specifications enable Bane NORs infrastructure to move towards standardisation and support further evolution.

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