

SODA-IIoT4RailTransport: Application to Railway Signalling System to ensure correct configuration through secure updates

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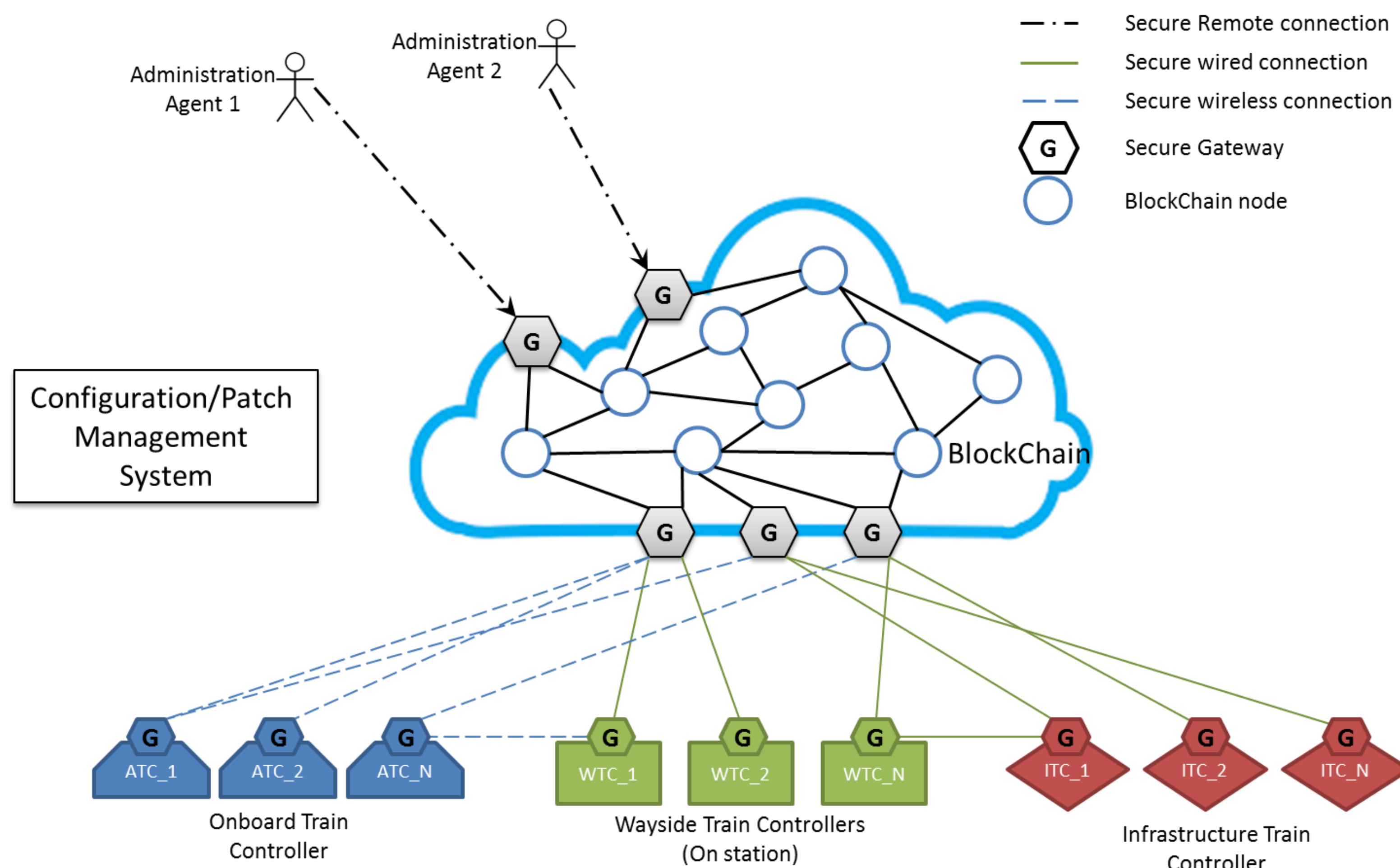
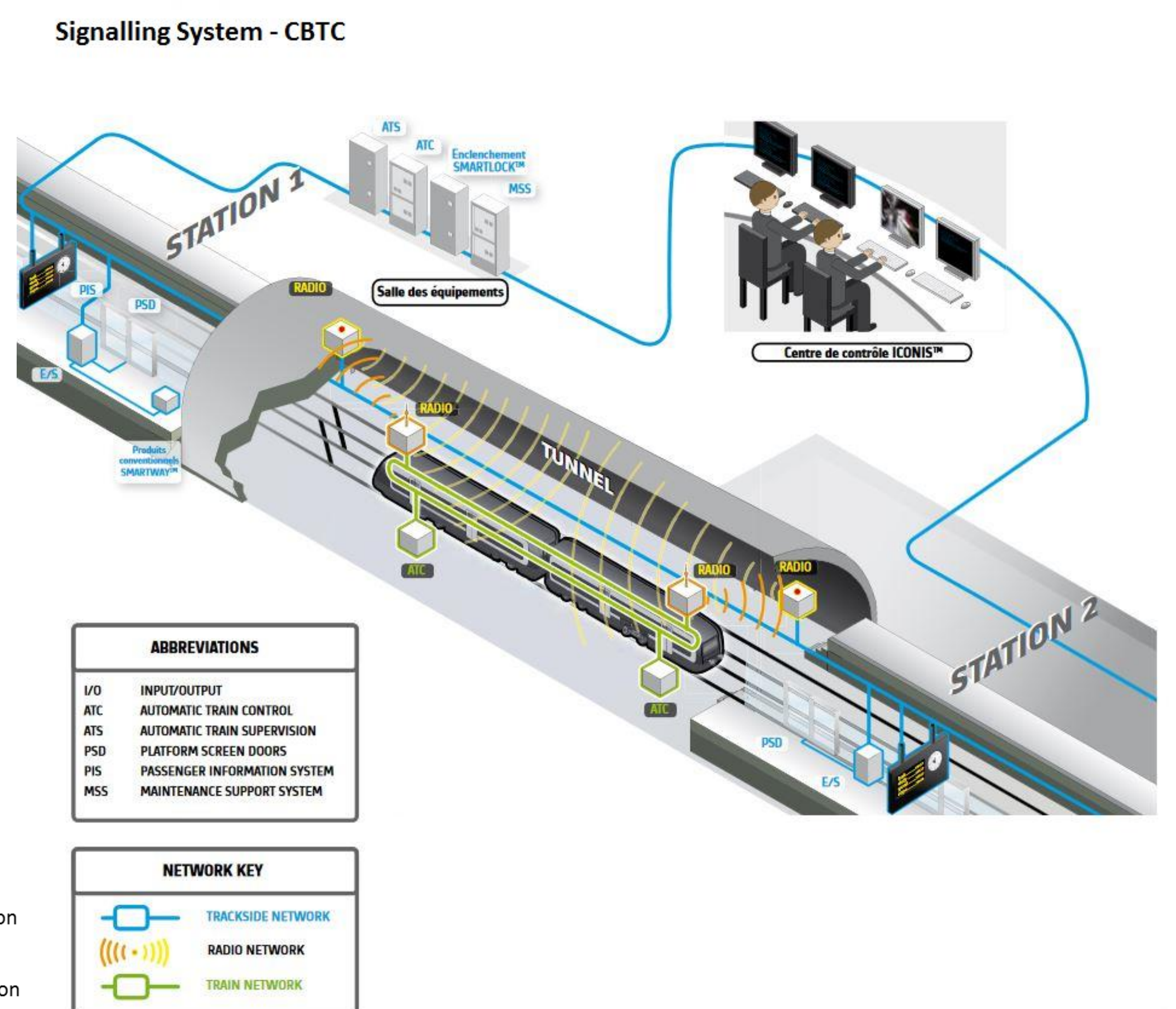
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Railway urban systems are complex interconnected systems combining heterogeneous components (Control system based on some hardware and software components, communication devices and physical plant) (Right figure).

The correct configuration of signalling system is required to ensure the security properties of the system. It concerns all parts of the system (Control system based on execution platforms, IO modules, servers, databases, communication material...). It encompasses all hardware configuration (board version, pinout mapping ...), software configuration (including firmware, OS, drivers, applications, operation parameters...) and network configuration (firewalls, routers, gateways ...).



In that context, one important maintenance function for Alstom is to update a coherent configuration in a secure manner. In this work, this function is performed by the SODA-IIoT infrastructure developed within IRT SystemX.

Without loss of generality, railway system (trains, stations and infrastructures) could be represented as a set of interconnected computational nodes (ATC_i, WTC_i, ITC_i) (Left Figure). Where ATC is onboard train controller, WTC is train controllers on station and ITC is infrastructure controllers.

The configuration parameters (firmware, OS, drivers, applications, operation parameters...) of these computational nodes are updated through a **blockchain** infrastructure (with redundant nodes) and **secure gateways** (manage access rights and secure communications). In this manner, the **integrity** of a new configuration is ensured and with high **availability**.

Co-designed with Alstom Transport, SODA-IIoT4RailTransport offers a secure way to update the configuration of the railway signalling system.

Secured On-the-pouce Decentralized Architecture for the Industrial Internet of Things (SODA-IIoT), co-designed with IRT SystemX, CEA Tech List and Airbus Innovation Group, features innovative solutions to manage IIoT access rights management & secure software and firmware updates through **Blockchain technology & cryptographic signatures.**



The **SODA-IIoT4RailTransport** demonstrator is built on top of the **CHES** platform (Cybersecurity Hardening Environment for Systems of Systems), an experimental and technical cybersecurity platform funded by **ANSSI** to support cybersecurity research effort at Institute for Technological Research SystemX - Paris-Saclay (EIC & CTI R&D projects). This platform is part of French Government "Nouvelle France Industrielle", Cybersecurity plan, action 8: set up one or more testing and demonstration cybersecurity platforms.

