

積極參與國際軌道行業協會

- ▶ 參與軌道行業標準制定
- ▶ 掌握趨勢，發展新世代技術應用



EU H2020


Scope of Shift2Rail Program



Goals

- Double railway capacity
- 50% increase in reliability and punctuality
- 50% reduction of life-cycle costs

➤ 5 Innovation Programs (IP1 to IP5)

IP1	Cost/efficient and reliable trains	Moxa is in 
IP2	Advanced traffic management and control systems	
IP3	Cost-efficient, sustainable and reliable high capacity infrastructure	
IP4	IT solutions for attractive railway services	
IP5	Technologies for sustainable & attractive European Freight	

COONECTA-2 & Safe4RAIL-2協作

推動新世代更安全的TCMS系統

- Increase the flexibility and reliability of TCMS communications
- Reduce development and maintenance costs
- Enable the interoperability of manufactures' subsystems

CONtributing to Shift2Rail's

NExt generation of high

Capacity and Safe TCMS

BOMBARDIER

SIEMENS

ALSTOM

CAF

SNCF
Phase 2

DB

WESTERN DIGITAL

MOXA
Reliable Networks Sincere Service

EURECOM

in rolling Stock 2

ETAS
DRIVING EMBEDDED EXCELLENCE

LIEBHERR

參與 Drive by Data 技術發展

▶ A Deterministic Drive by Data Architecture

- A New Redundant Architecture
- TSN-based ETB & ECN Networks in NG-TCN

▶ Future Wireless TCMS



CONNECTA-2

CONtributing to
Shift2Rail's NEXt
generation of high
Capable and safe TCMS.
Phase 2

Safe4RAIL2

SAFE architecture for
Robust distributed
Application Integration
in roLLing Stock 2

Drive-by-Date Network Architecture

Objective

Develop a deterministic wired TCN with the safe integration of mixed critical and non-critical data in a train

Bandwidth

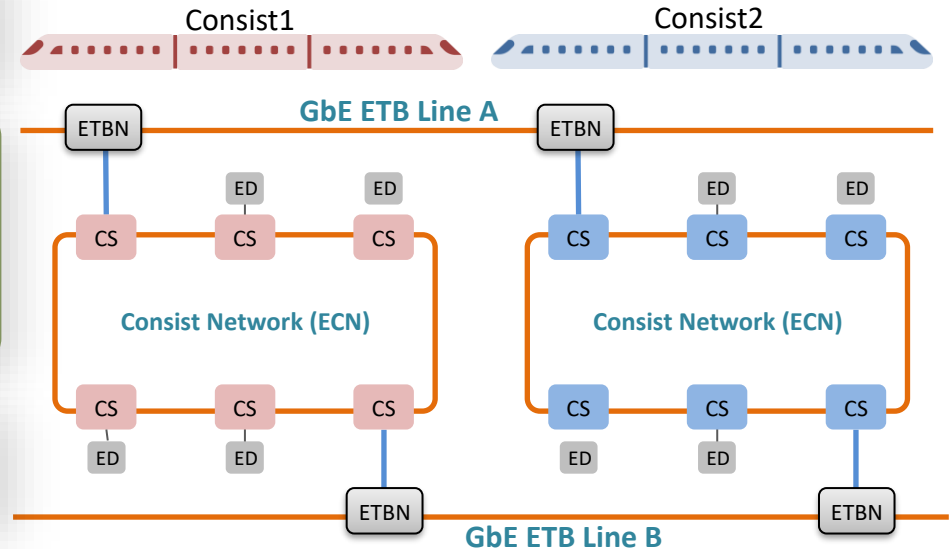
Gigabit speed for ETB and ECN Networks

A New Redundant Architecture

- Separated GbE ETB Lines along the train to ensure redundant operations
- Physical ring topology inside consist

Converged and deterministic Train Wide Communications over **TSN**

A Wired NG-TCN Architecture



Safe Integration of All Critical & Non-Critical Data with TSN

Safe4RAIL2

Safe4RAIL aims to create a safe architecture for robust application integration in rolling stock

TSN
Enabled

- **Robust Clock Synchronization**

Ensures all TSN devices to synchronize clocks with each other over a common time reference to support real-time traffic

- **Reliable Scheduled Traffic**

Defines time slots to prioritize real-time flows of safety-critical data over non-critical data traffic

***** ADVANTAGE**

Provides deterministic Ethernet service while increasing efficiency and safety of the TCMS



Truly Interoperable & Real-Time Train Wide Communications

▶ Redundant Clock Synchronization

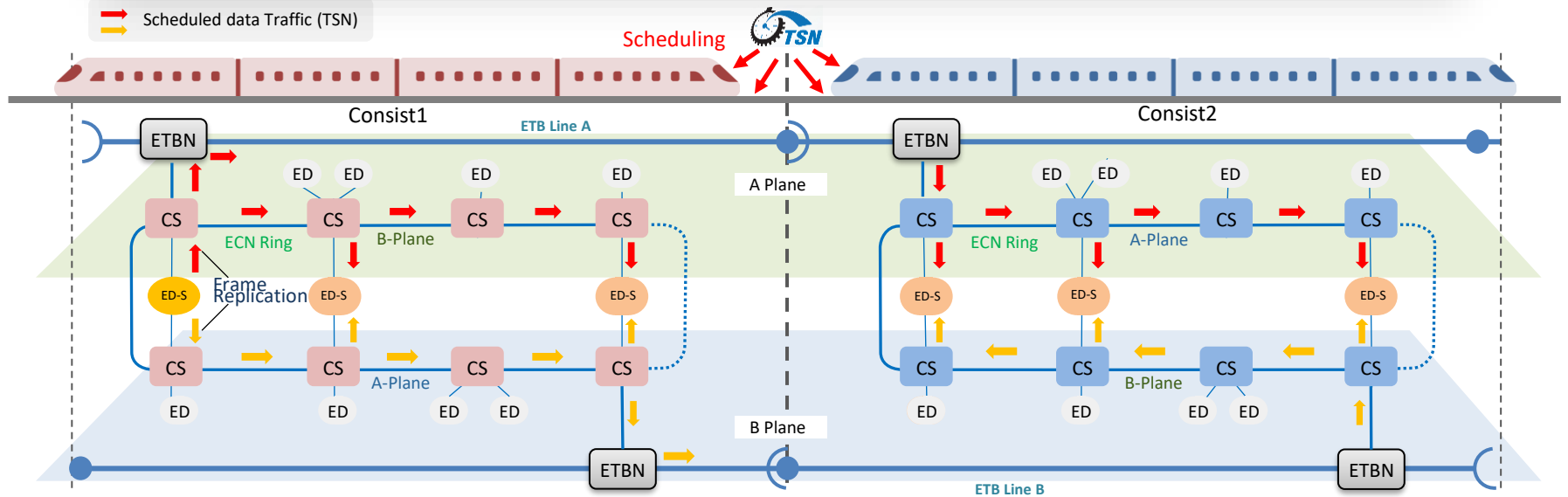
Shares a common real-time clock across the network and between multi-domain networks

▶ Deterministic Traffic Transmission

Supports scheduled traffic based on IEEE 802.1Qbv for critical data delivery at a scheduled time

▶ Redundant Critical Traffic

Transfers redundant critical traffic between ECNs on both ETB lines based on IEEE802.1CB



Truly Interoperable & Real-Time Train Wide Communications

▶ Redundant Clock Synchronization

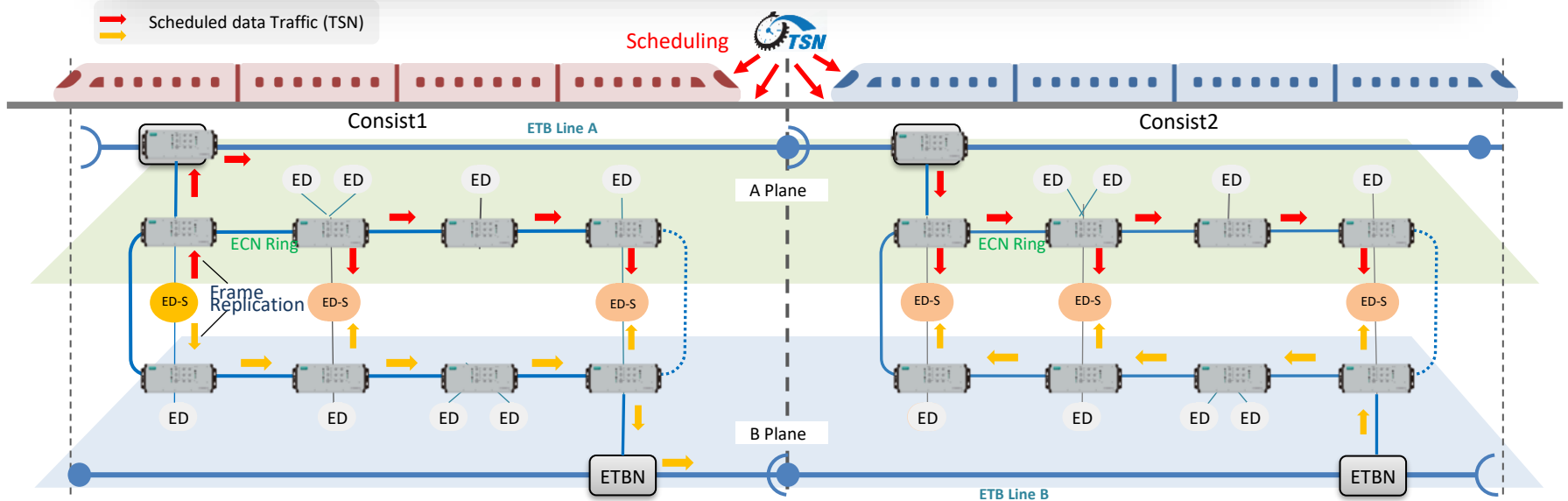
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▶ Redundant Critical Traffic

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Future Wireless TCMS

Objective

Create more flexibility of train operation and innovative applications while reducing wiring and maintenance costs

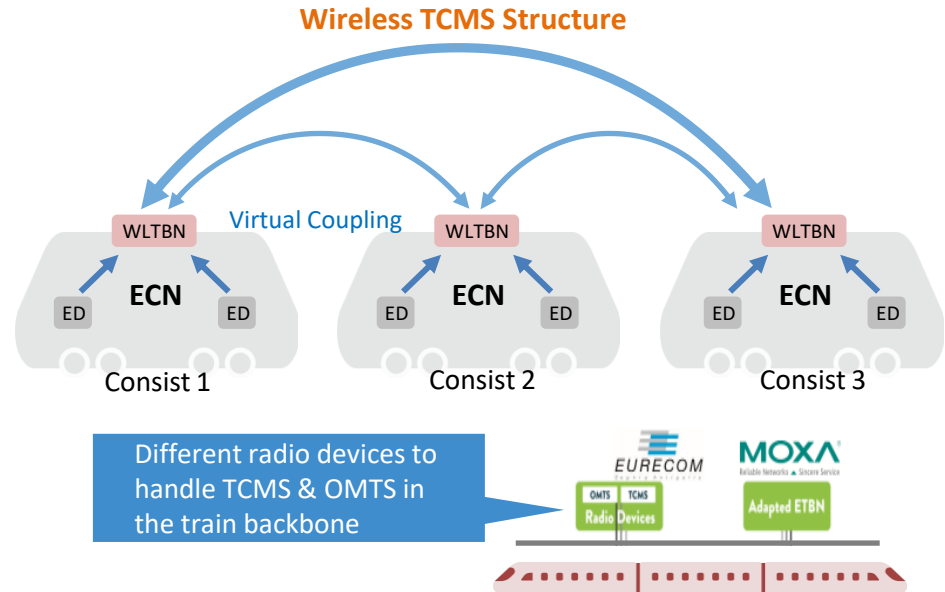
Wireless Train Backbone (WLTB)

Virtual Coupling

- To avoid time losses due to manual coupling and improve the capacity
- **Wireless Train Inauguration**
- To enable end-to-end communication via train backbone

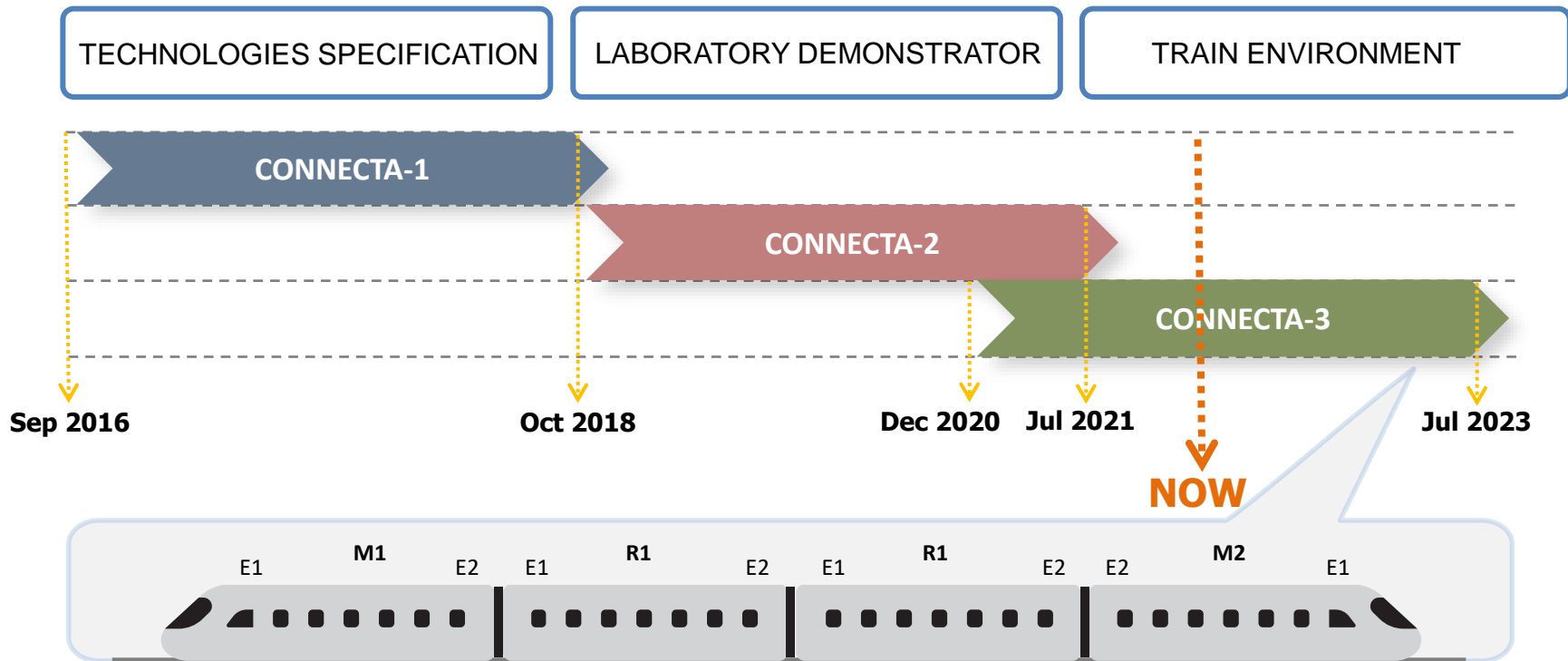
Wireless Train Consist (WLCN)

- Increase the flexibility and scalability of the communications inside the train



CONNECTA-3 / Safe4Rail-3 Project 啟動

Urban Demonstration - Timeline



Moxa將持續參與Safe4Rail-3



To advance safe architecture and components for next gen TCMS
to reach highly available and reliable train operations

Safe4RAIL-3 Grant Agreement 826073



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The image features a white background with several blue decorative elements. A thick blue line starts from the top center and extends diagonally down to the left. Another thick blue line starts from the top center and extends diagonally down to the right. A light blue triangle is positioned on the right side of the image, pointing towards the center. The text "Thank You" is centered in a bold, black, sans-serif font.

Thank You