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“Scalable signaling solutions for Metros and Commuter lines”

May 23, 2019

Agenda

- Scalable CBTC systems in metro and commuter environment
- Example of ETCS in regional and commuter lines

Today's railway needs

- Value for money (level of investment vs. benefits for rail operation)
- Low operation & maintenance costs
- Simple technology insertion and maintenance
- Safe and Secure railway system
- System flexibility
- System scalability addressing potential increases in capacity through
  - Railway expansion AND/ OR
  - Fleet expansion
- Mixed train services

Proven scalable systems are critical for flexible railway operations.

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System scalability & flexibility

Automation refers to the process by which responsibility for operation management of the trains is transferred from the driver to the train control system

Grade of Automation	Type of train operation	Setting train in motion	Stopping train	Door closure	Operation in event of Disruption
GoA 1	ATP with driver	Driver	Driver	Driver	Driver
GoA 2	ATP and ATO with driver	Automatic	Automatic	Driver	Driver
GoA 3	Driverless	Automatic	Automatic	Train attendant	Train attendant
GoA 4	UTO	Automatic	Automatic	Automatic	Automatic

ATP - Automatic Train Protection

ATO - Automatic Train Operation

- One scalable platform that can address needs from GoA1 (ATP-only) to UTO
  - **GoA1** system:
    - entry level,
    - GoA1 (ATP) system,
    - Speed Control
    - Red Light Enforcement
    - **upgradeable to full fledged moving block CBTC (same HW) up to GoA4**
  - **GoA2/GoA3/GoA4** moving block CBTC
    - Re-using same HW and SW building blocks as GoA1 system

One multi-railway system platform that can be used in:

- Metro/ MRT/ LRT (e.g. Singapore, London, NY, Kuala Lumpur…)
- Tramways (e.g. San Francisco)
- Monorails (e.g. Las Vegas)
- High capacity commuter lines (e.g. Bundang commuter)

Deployment of GoA1 systems for simple railway operation needs, that can later be scalable up to fully UTO systems without railway operation disruptions.

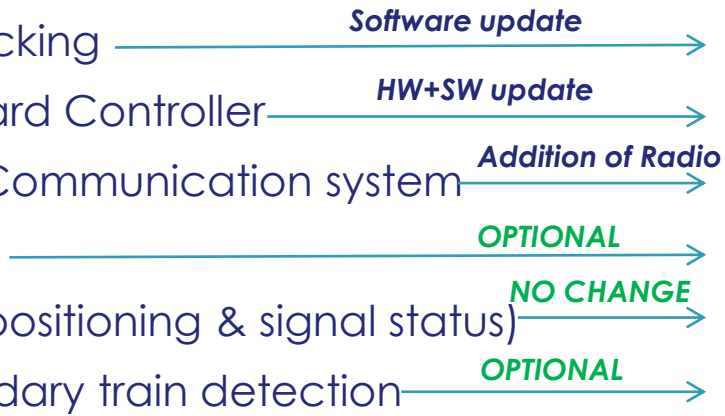
Migration from GoA1 to GoA2/3/4 (CBTC)

GoA1 consisting of:

- Interlocking
- Onboard Controller
- Data Communication system
- Signals
- Tags (positioning & signal status)
- Secondary train detection

GoA2/3/4 CBTC consisting of:

- Zone Controller
- Onboard Controller
- Data Communication System
- Signals
- Tags (positioning and signal status)
- Secondary train detection



ALLOWING MIXED TRAFFIC (CBTC and NON-CBTC) TRAINS TO OPERATE ON THE SAME TRACKS
From 80 to 160KM/h CBTC

No replacement of components, just SW upgrade and HW insertion.

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Case study: Madrid Commuter Lines, Spain

INCREASE OF CAPACITY AND OPERATIONAL EFFICIENCY OF COMMUTER NETWORK WITH A NEW URBAN TUNNEL.

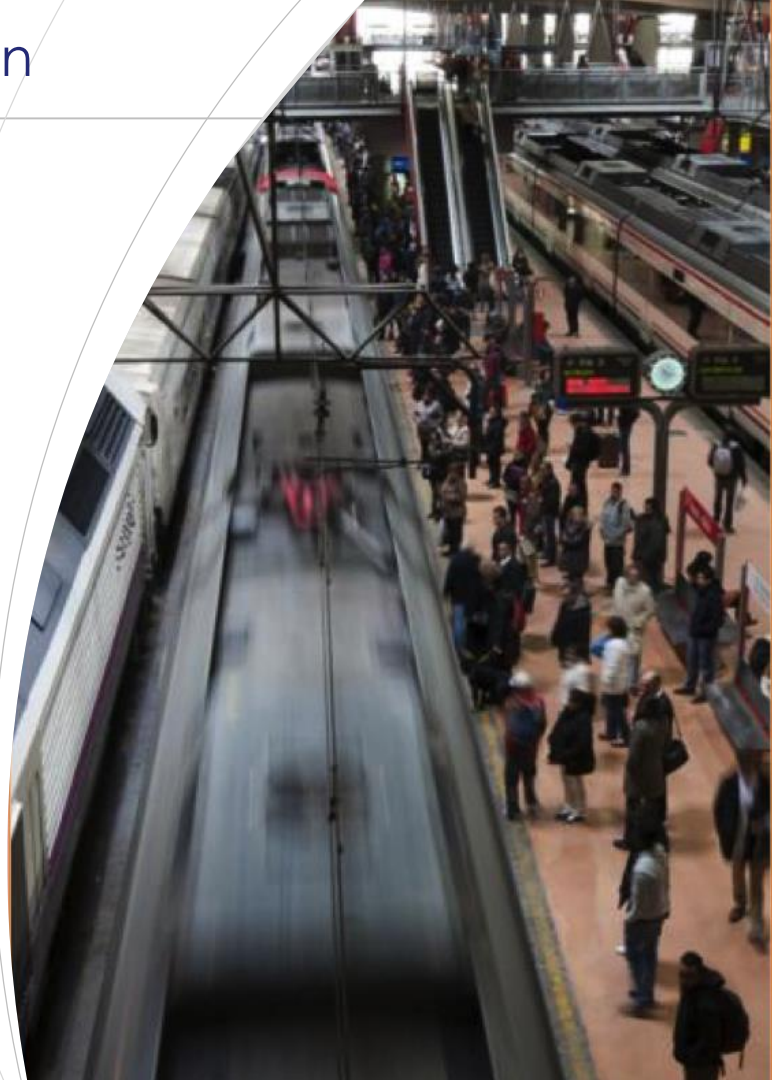
Signalling references

Case study: Madrid Commuter Lines, Spain

Customer challenges

- Alleviate a very congested traffic in the urban tunnel linking the two major train stations with a new one
- Increase operational efficiency and capacity of a commuter network
- New station at the centre of Madrid
- First application
  - in Europe of ERTMS L1
  - In the world of ERTMS L2

  in a high density network



Signalling references

Case study: Madrid Commuter Lines, Spain

Objectives

- Build an efficient, reliable and safe ATP system for the new tunnel and convergent commuter lines
- Work with a reliable and experienced ERTMS supplier

Signalling references

Case study: Madrid Commuter Lines, Spain

Madrid Commuter network overview

- Main data (network):
  - 370km of track
  - 89 stations
  - More than 1.800 operations per day.
  - 231 million passengers in 2012

- Main data (project):
  - 180km of track
  - Includes the two stations with the highest commuter traffic in Spain: Atocha and Chamartín
  - One new train Station: Sol

Signalling references

OPEN

Case study: Madrid Commuter Lines, Spain

Thales answer

A turnkey solution:

- ERTMS L2 in the tunnel and L1 in the rest of the lines
- Experience in application of ERTMS in high density lines (Mexico suburban railway)

Customer benefits

- Advance ATP system for improving operational efficiency
- Low operating and maintenance costs, optimal life-cycle costs
- Passengers will benefit from improved mobility and signalling reliability

Signalling references






Get the most out of your infrastructure