CENTRE D'INGENIERIE DU MATERIEL
4 allée des Gémeaux
72100 LE MANS

Open ETCS
WP2 Workshop

Paris

November 22nd / 23rd

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Agenda

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Goals of the meeting

What are we talking about ? Reminders about ETCS

Results from TU BS « state of the art » study

Results from AeBT study

3 workshops:

- 1st workshop : Model and tools requirements

Proposed animators: Systerel (team 1) / Alstom (Team 2)

- 2nd workshop : Architecture / API (requirements)

Proposed animators: Alstom (team 1) / SNCF (team 2)

- 3rd workshop : Process / Methodology and V and V strategy

Proposed animators: DLR (team 1) / AeBT (team 2)

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Thursday 22nd of Nov.:

14:00 : Introduction / Agenda (SNCF)
14:15 - 14:40: What are we talking about ? ETCS (SNCF)
14:40 - 15:15: Results presentation from the state of the art regarding Methods (TU BS)
15:15 - 15:45: Formal method at SNCF presentation (SNCF)
15:45 - 16:00: Break

16:45 - 17:15: WP3a presentation (expectation son WP2) (FormalMind)
17:15 - 17:45: Siemens presentation

16:30 - 17:30: 1st workshop session (two teams) => shifted to Friday
17:30 - 18:00: Put together / share results

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Friday 23rd:

09:00 - 09:30: Results presentation from the state of the art regarding 50128 (AeBT)

09:30 - 09:45: workshop team composition and goals
09-45 - 11:15: 3 workshops
11:15 - 12:15: Put together / share results

12:15 - 13:30: Lunch

13:30 - 14:00: ERTMS Solution presentation
14:00 - 15:00: Define next steps

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3 workshops:

- **1st workshop : Model and tools requirements**

- **2nd workshop : Architecture / API (requirements)**

- **3rd workshop : Process / Methodology and V and V strategy**

10-15 - 11:30: 3 workshops
11:30 - 12:30: Put together / share results

12:30 - 13:30: Lunch

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1st workshop : Model and tools requirements

- Who ?

L. Mussat, V. Prevosto, F. Mejia, M. Glückmann, S. dal Zilio, S. Callet

- Proposed animator / reporter: SNCF

- Questions / thematics :

- Identify the toolchain needs vs different steps of design
- Identify choice criteria and importance
- Other

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2nd workshop : Architecture / API (requirements)

- Who ?

U. Steinke, D. Mentré, M. Pokam, M. Hasc, F. Cochetti, M. Rousseau

- Proposed animator / reporter: Alstom

- Questions / thematics :

- Identify the scope / architecture

- Which requirements on modularity (functional, software architecture includ. API)

- Other

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3rd workshop : Process / Methodology and V and V strategy

- Who ? M. Behrens / S. Jagush / J. Welte, R. Kaseroni, R. de Landtsheer, S. de la Maza

- Proposed animator / reporter: DLR

- Questions / thematics :

- Identify the different steps of the project
- Which process at which step
- Link to « post Open ETCS » activities (application projects)
- What about the demonstrator

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What are we talking about ?

ETCS

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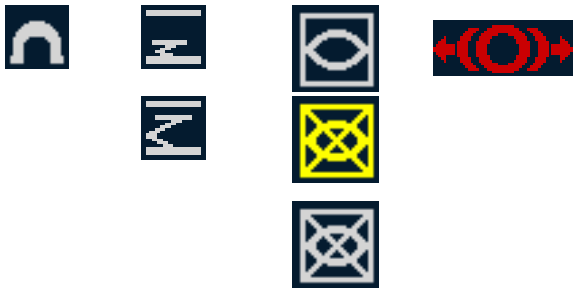
ERTMS fundamentals

- *Cab signalling*
- *Speed control*
- *Orders to driver*



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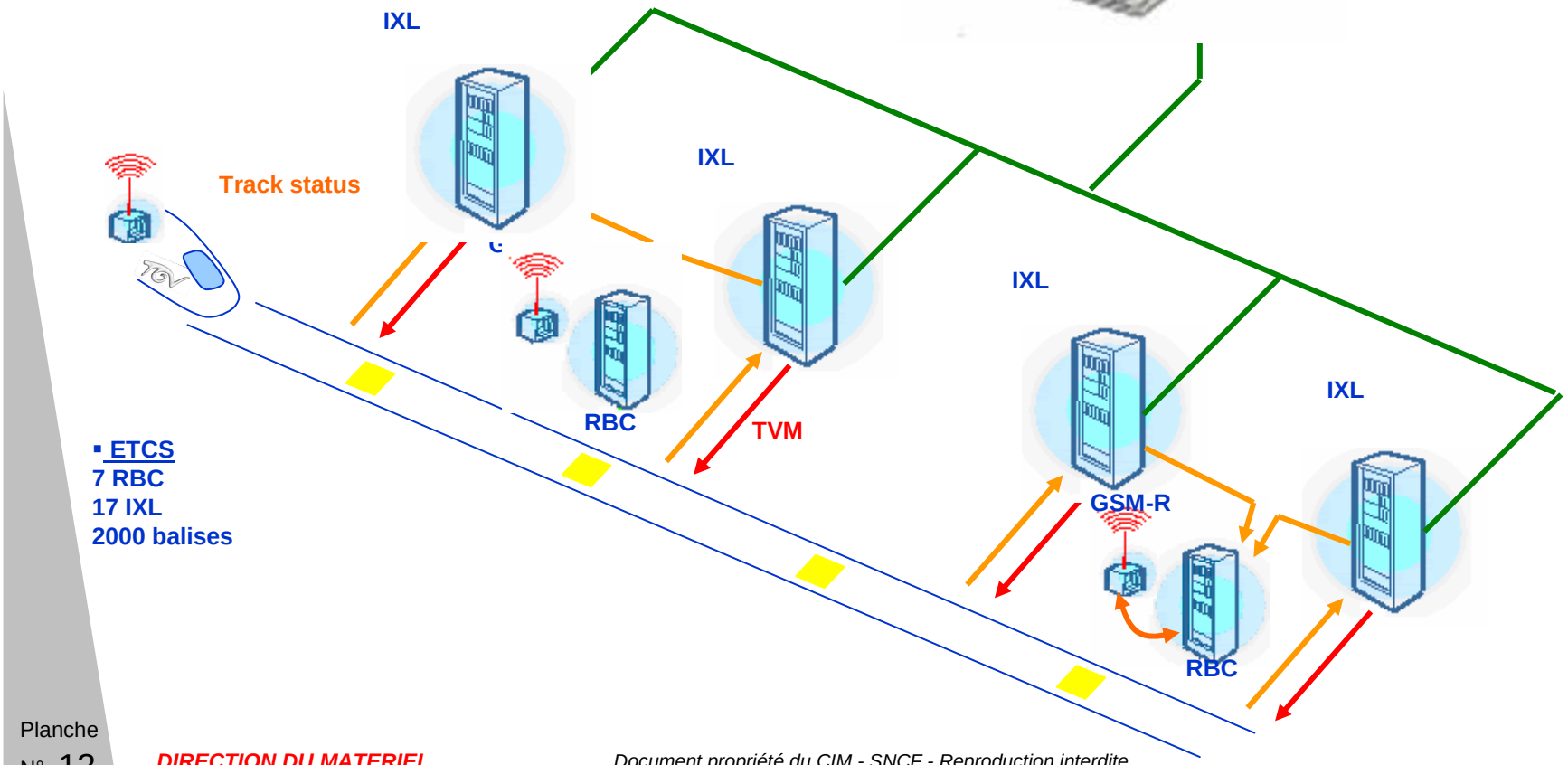
Example of a ERTMS Line



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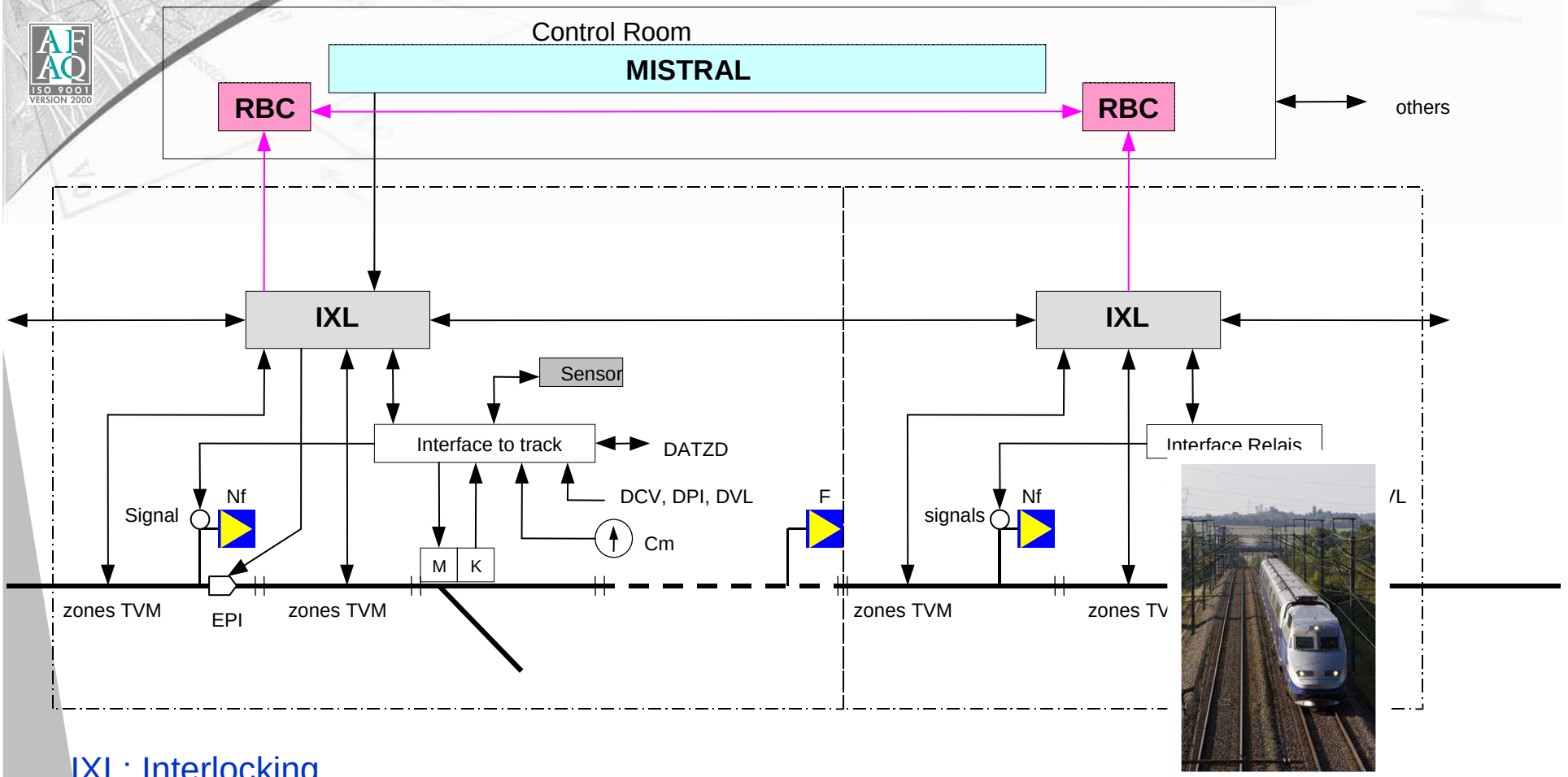

IXL: Interlocking
RBC: Radio Block Center

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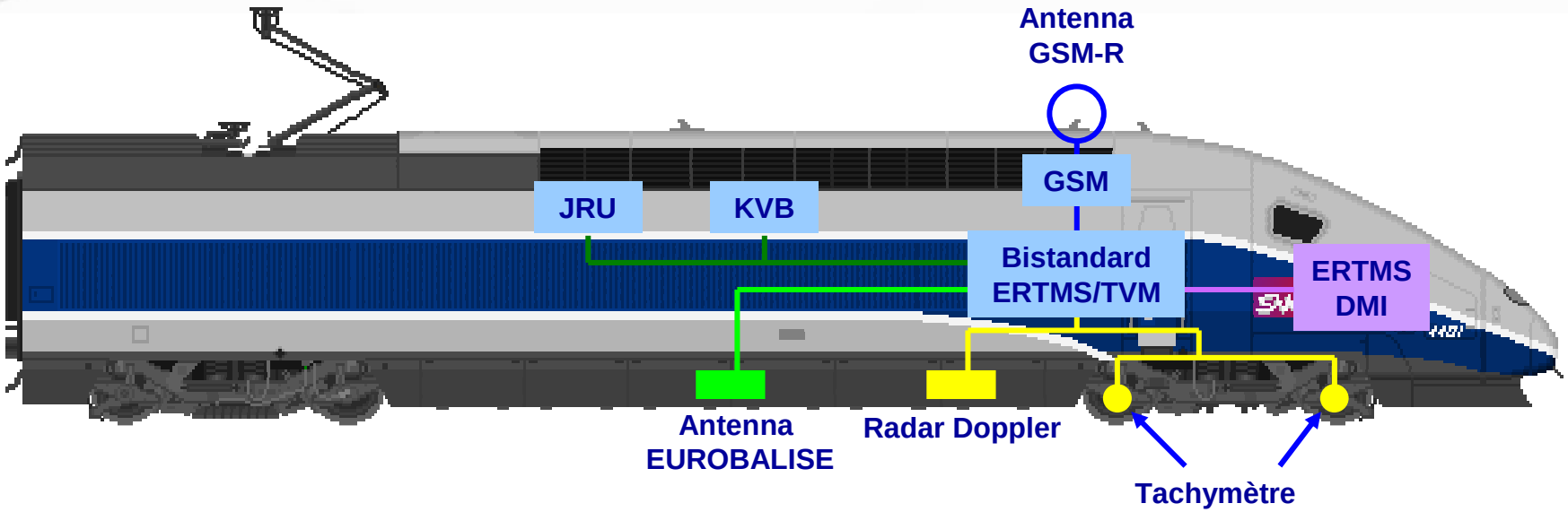
ON-BOARD ERTMS(-TVM) ARCHITECTURE



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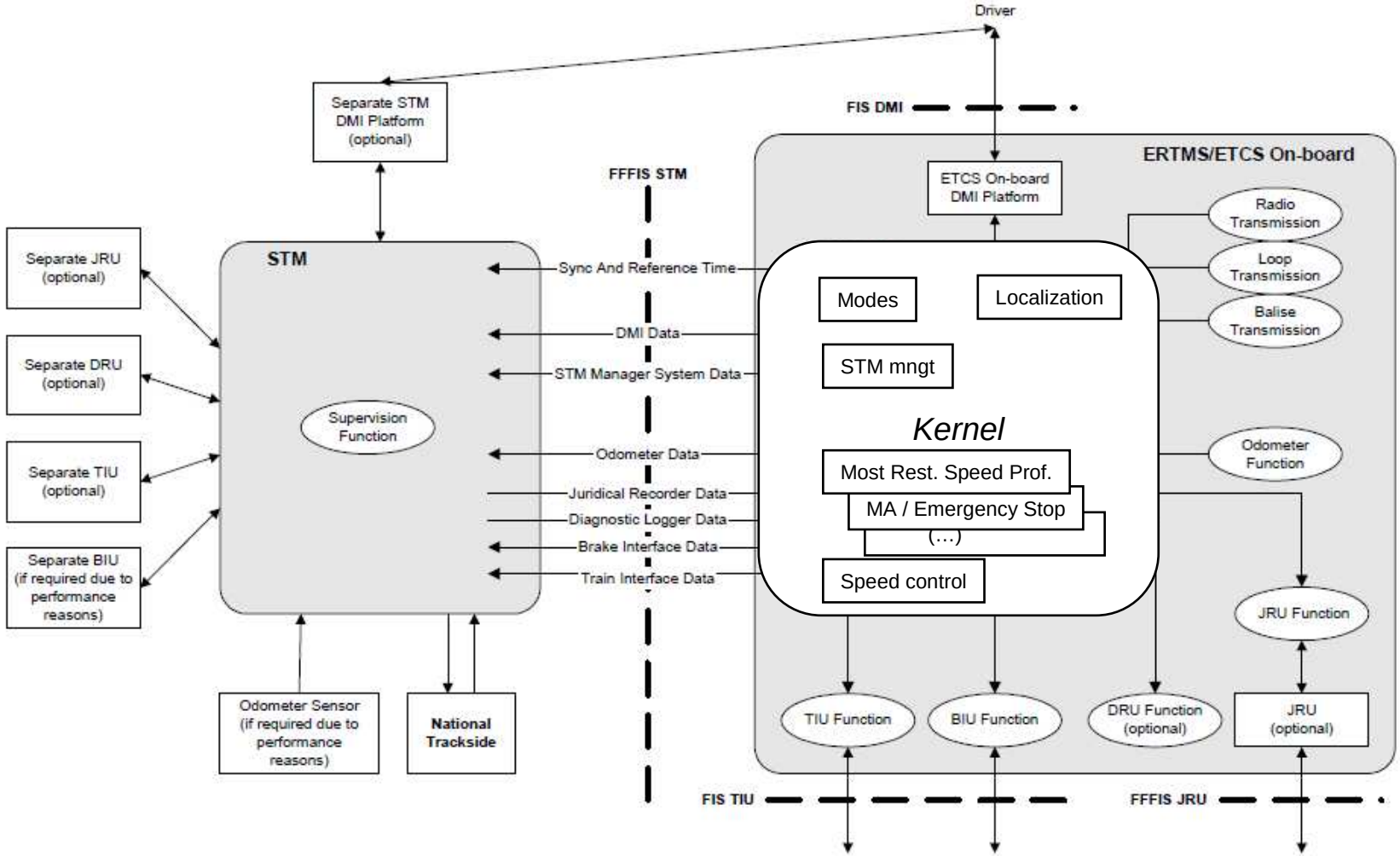
ERTMS fundamentals



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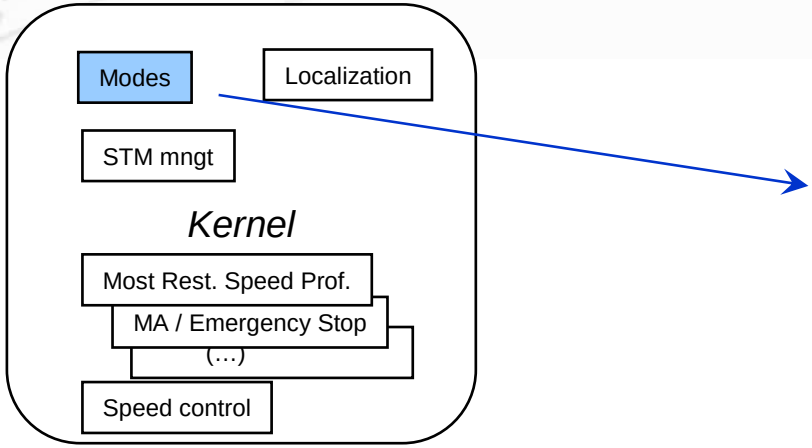

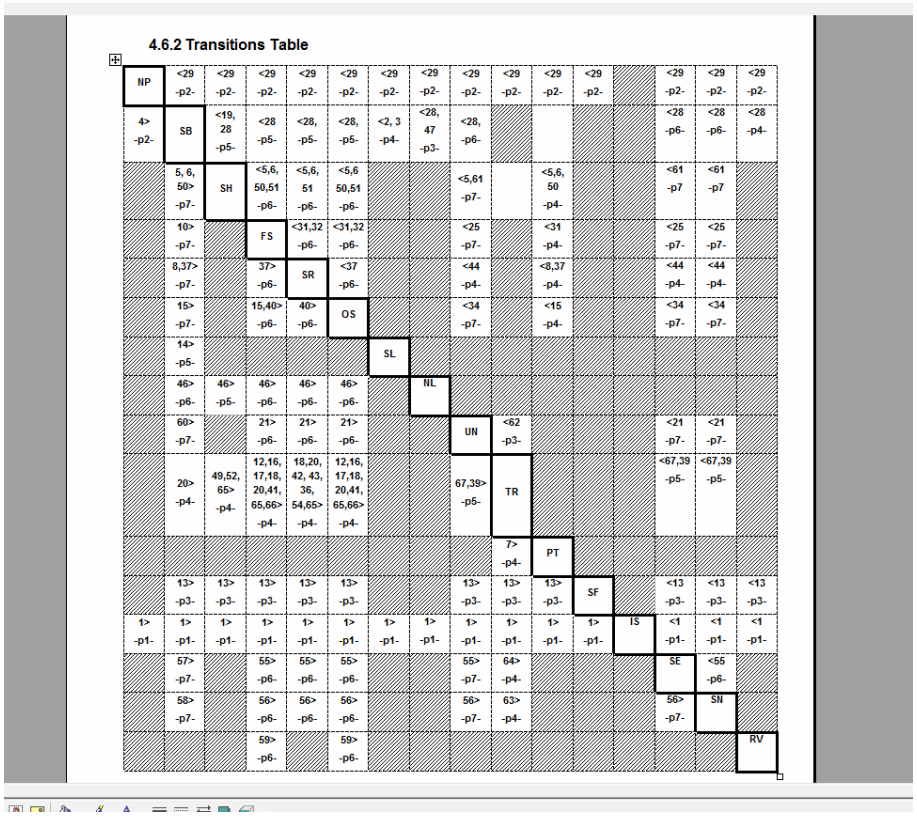

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ERTMS Main Functionalities

ONBOARD-FUNCTIONS	NP	SB	SH	FS	SR	OS	SL	NL	UN	TR	PT	SF	IS	SE	SN	RV
Data Consistency																
Check linking consistency				X		X										
Balise Group Message Consistency		X	X	X	X	X		X	X	X	X			X	X	X
Check correctness of radio messages		X	X	X	X	X	X	X	X	X	X			X	X	X
Check radio link (only level 2/3)				X		X										
Determine Train Speed and Location:																
Determine train speed, train acceleration, train standstill		X	X	X	X	X	X	X	X	X	X		O	X	X	X
Determine Geographical Position		X		X	X	X		X	X	X	X					X
Report train position		X	X	X	X	X	X	X	X	X	X	X	O	X	X	X
Manage MA																
Request MA Cyclically (level 2/3)				X		X										
Determine EOA/LOA, SvL, Danger Point, etc…				X		X								X		
Handle Co-operative MA revocation				X		X										
Manage Emergency Stop				X	X	X					X					

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ERTMS Main Functionalities

ONBOARD-FUNCTIONS	NP	SB	SH	FS	SR	OS	SL	NL	UN	TR	PT	SF	IS	SE	SN	RV
Determine Most Restrictive Speed Profile, based on :																
SSP				X		X										
ASP				X		X										
TSR				X	X	X			X							
Signalling related SR				X		X										
Mode related SR			X		X	X			X							
Train related SR			X	X	X	X			X							X
Ceiling speed for revers. superv.																X
Supervise Train Speed																
Dynamic Speed Monitoring based on MRSP, MA, release speed, gradient, mode profile, and route unsuitability location				X		X										
Dynamic Speed Monitoring based on STM Profile Data (MRSP, MA and gradient)														X		
Dynamic Speed Monitoring based on MRSP									X							
Dynamic Speed Monitoring based on MRSP, allowed distance to run in Staff Resp. mode					X											
Ceiling Speed Supervision (no DSM) based on MRSP			X													X
Supervision of permitted speed limit when "Override EoA"			X		X				X					X	X	

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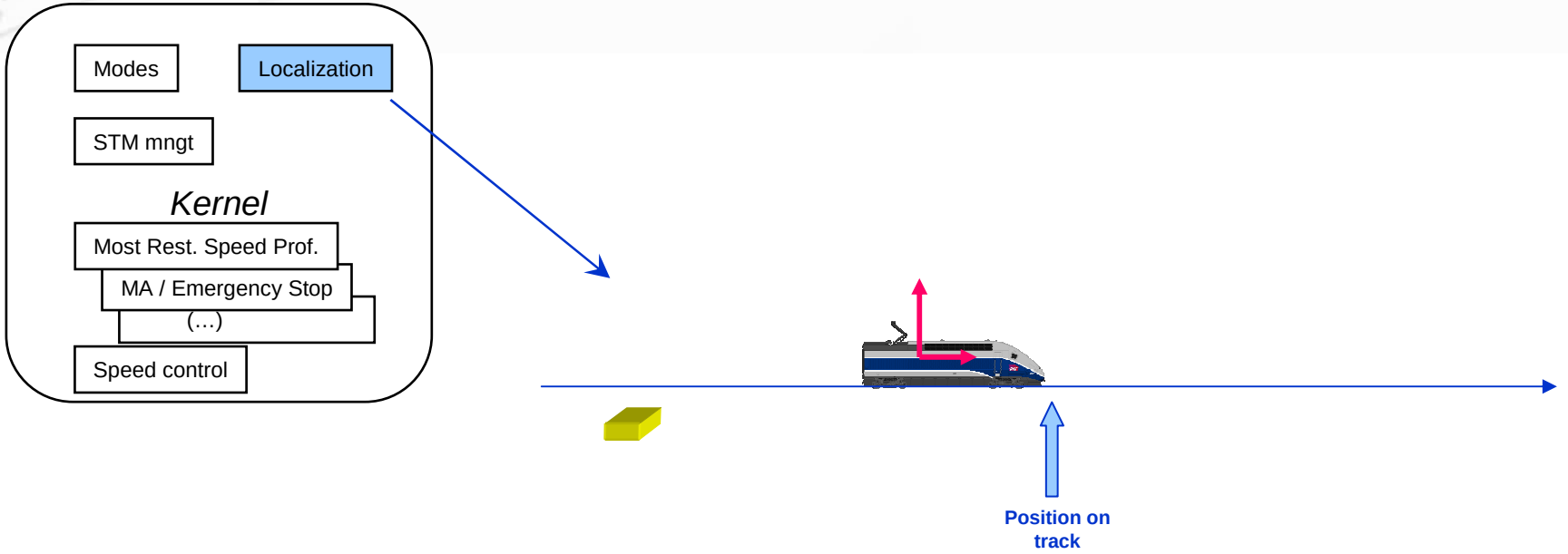
ERTMS Main Functionalities

ONBOARD-FUNCTIONS	NP	SB	SH	FS	SR	OS	SL	NL	UN	TR	PT	SF	IS	SE	SN	RV
Supervise Train Movements																
Backwards Distance Monitoring											X					X
Roll Away Protection			X	X	X	X			X		X			X		X
Reverse Movement Protection				X	X	X					X			X		X
Standstill Supervision		X														
Supervise "danger for shunting" information and list of expected balises for shunting			X													
Supervise "Stop if in SR"					X											
Command Emergency Brake	X									X		X				
Determine Mode and Level																
Determine ERTMS/ETCS Mode	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Determine ERTMS/ETCS level		X	X	X	X	X	X	X	X	X	X		X	X	X	X
Other functions																
Manage Communication Session		X	X	X	X	X	X	X	X	X	X			X	X	X
Delete Revoked TSR		X		X	X	X			X		X					
Override (Trip inhibition)			X		X				X					X	X	
Manage Track Condition		X	X	X	X	X	X	X	X	X	X	O		X	X	X
Manage Route Suitability				X		X										
Manage Text Display to the driver		X		X	X	X		X	X		X					
Manage RBC/RBC Handover				X	X	X	X	X		X						
Manage Track Ahead Free Req		X			X	X					X					
Allow access to MMI, train itf, JRU and odometer for STM														X	X	
Provide Fixed Values, and Default/National Values		X	X	X	X	X	X	X	X	X	X			X	X	X
Capture Train Data		X		X	X	X			X					X	X	
Capture Additional Data		X		X	X	X		X	X					X	X	
Provide Date and Time		X	X	X	X	X	X	X	X	X	X			X	X	X
Record Juridical Data		X	X	X	X	X	X	X	X	X	X	X		X	X	X

ERTMS fundamentals



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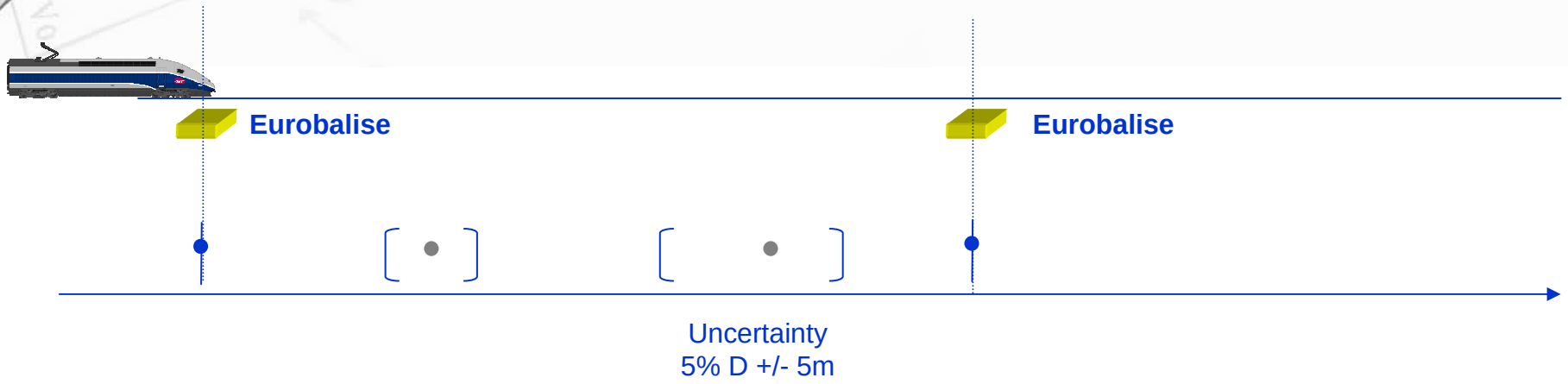
ERTMS fundamentals

Train position



Odometers examples

odometer

radar doppler

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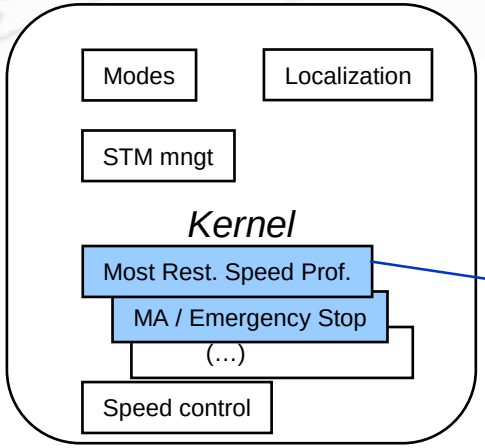
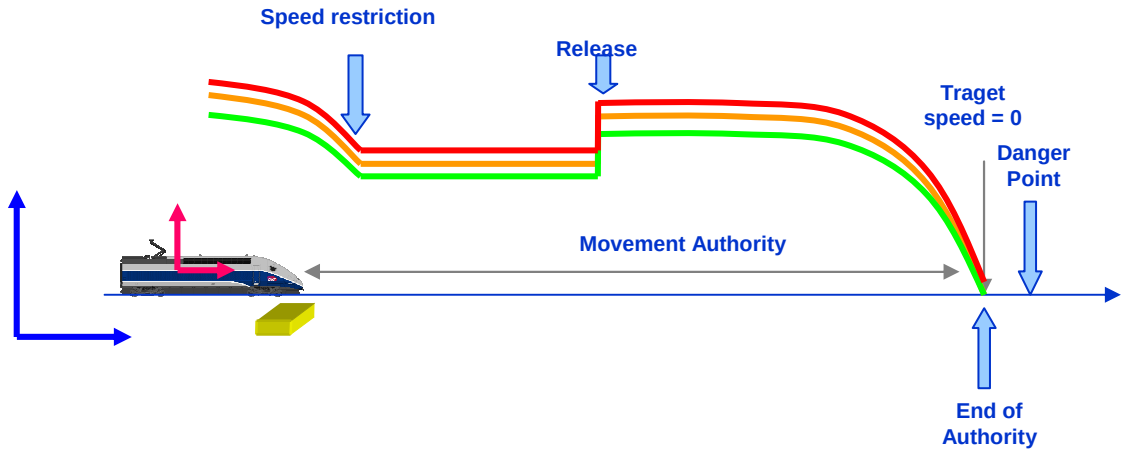


❑ Movement Authority



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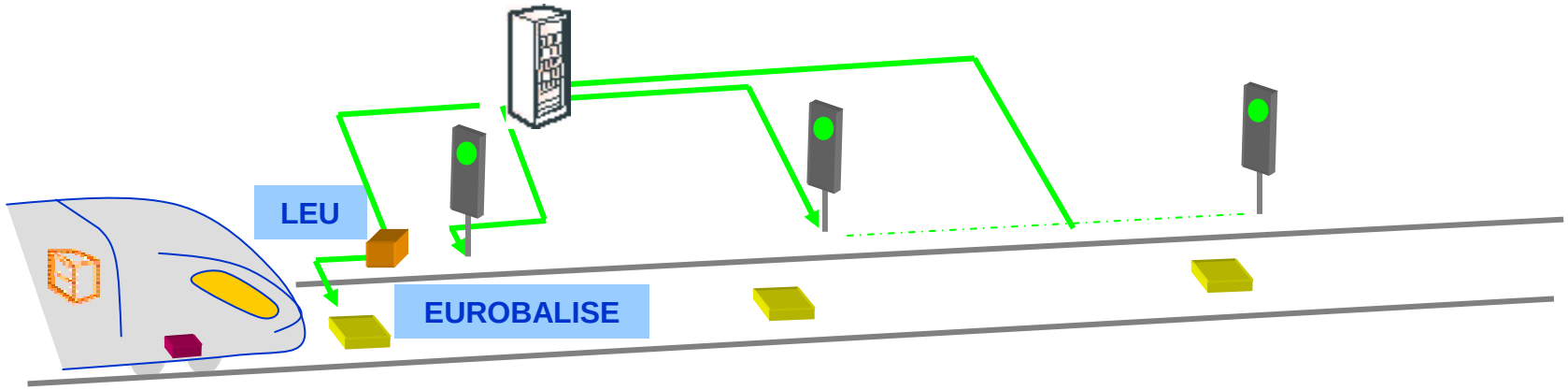
ERTMS fundamentals – Level 1

IXL / Track occupancy



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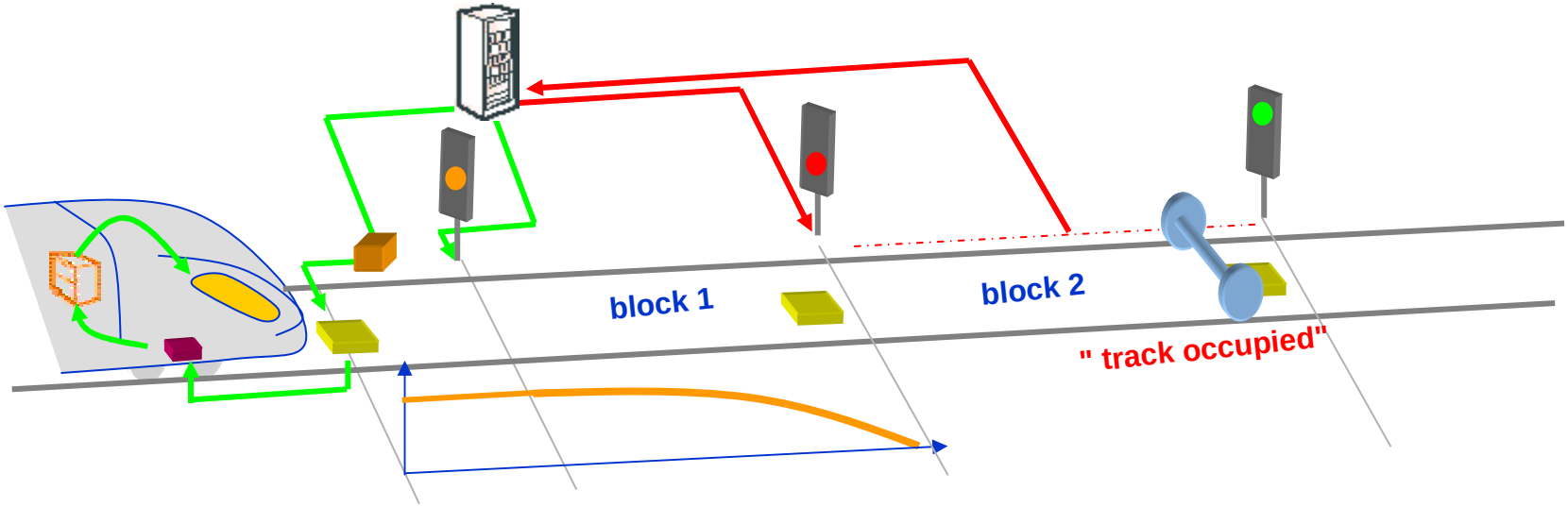
ERTMS fundamentals – Level 1



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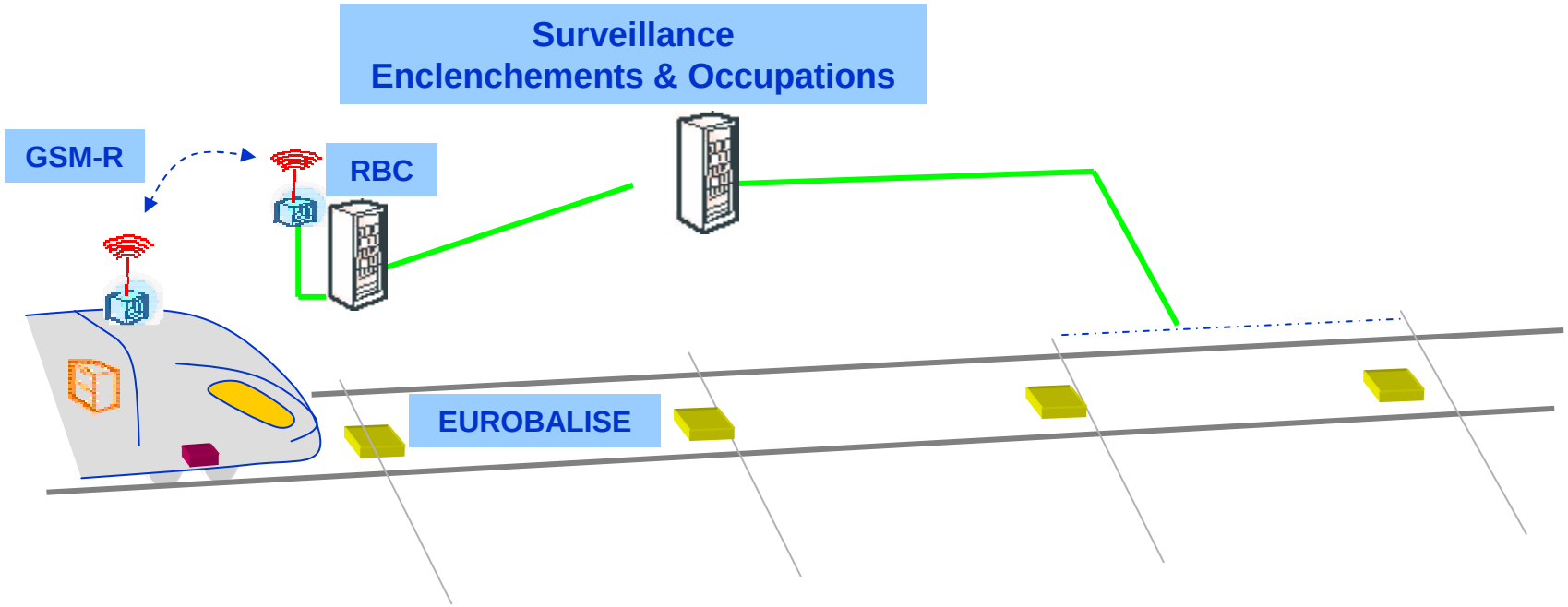
ERTMS fundamentals – Level 2



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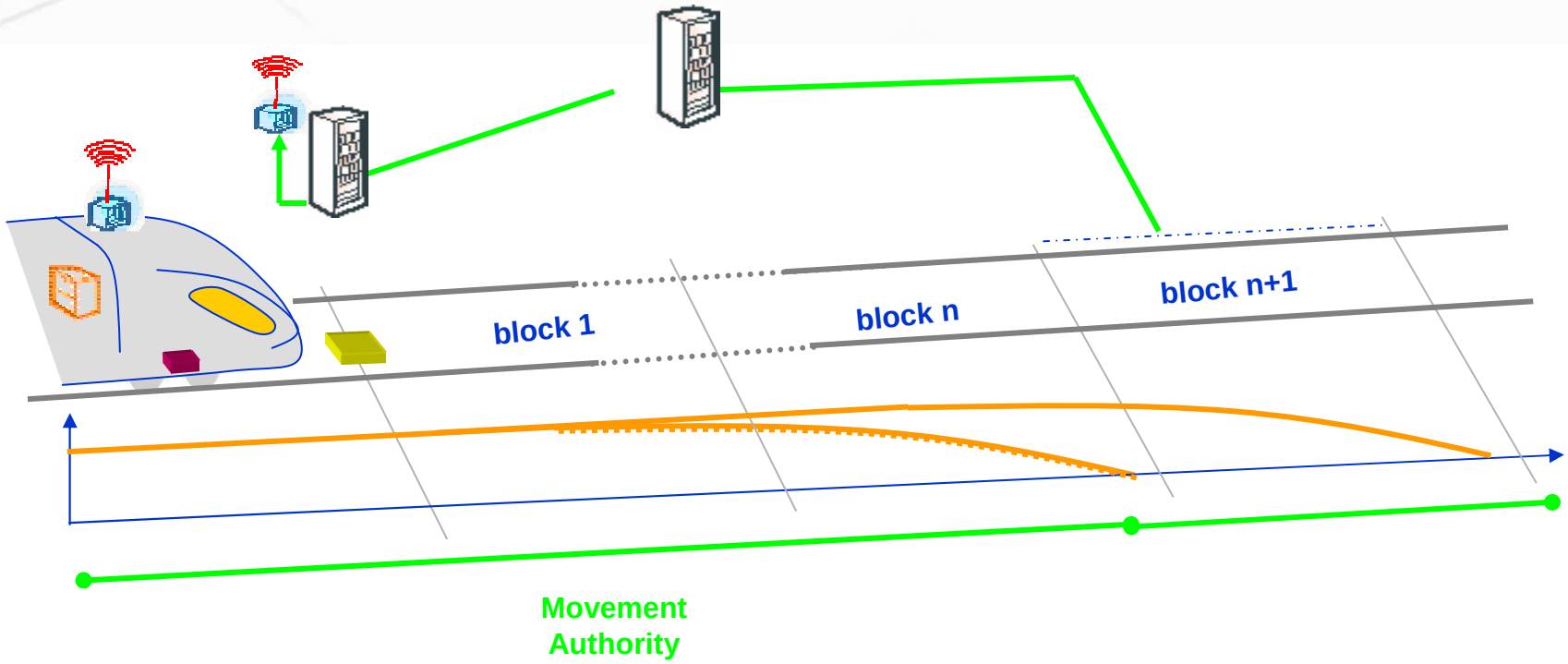
ERTMS fundamentals – Level 2



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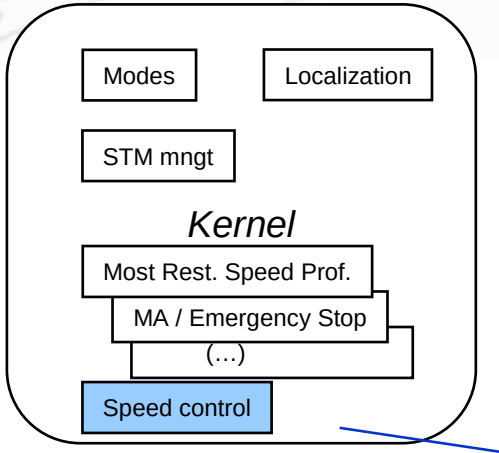
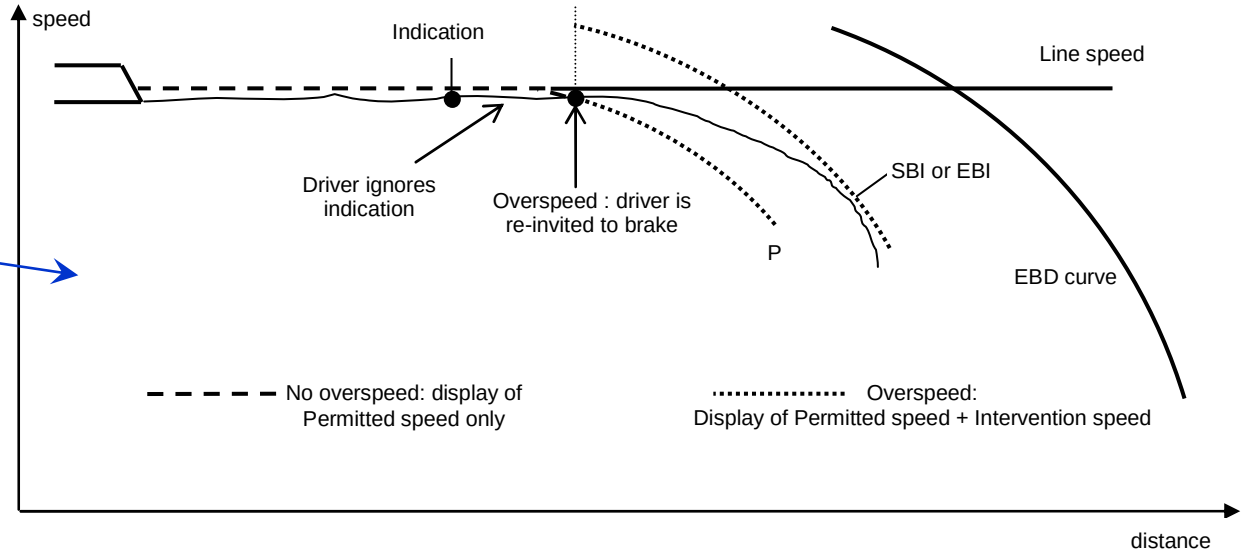


❑ Different curves



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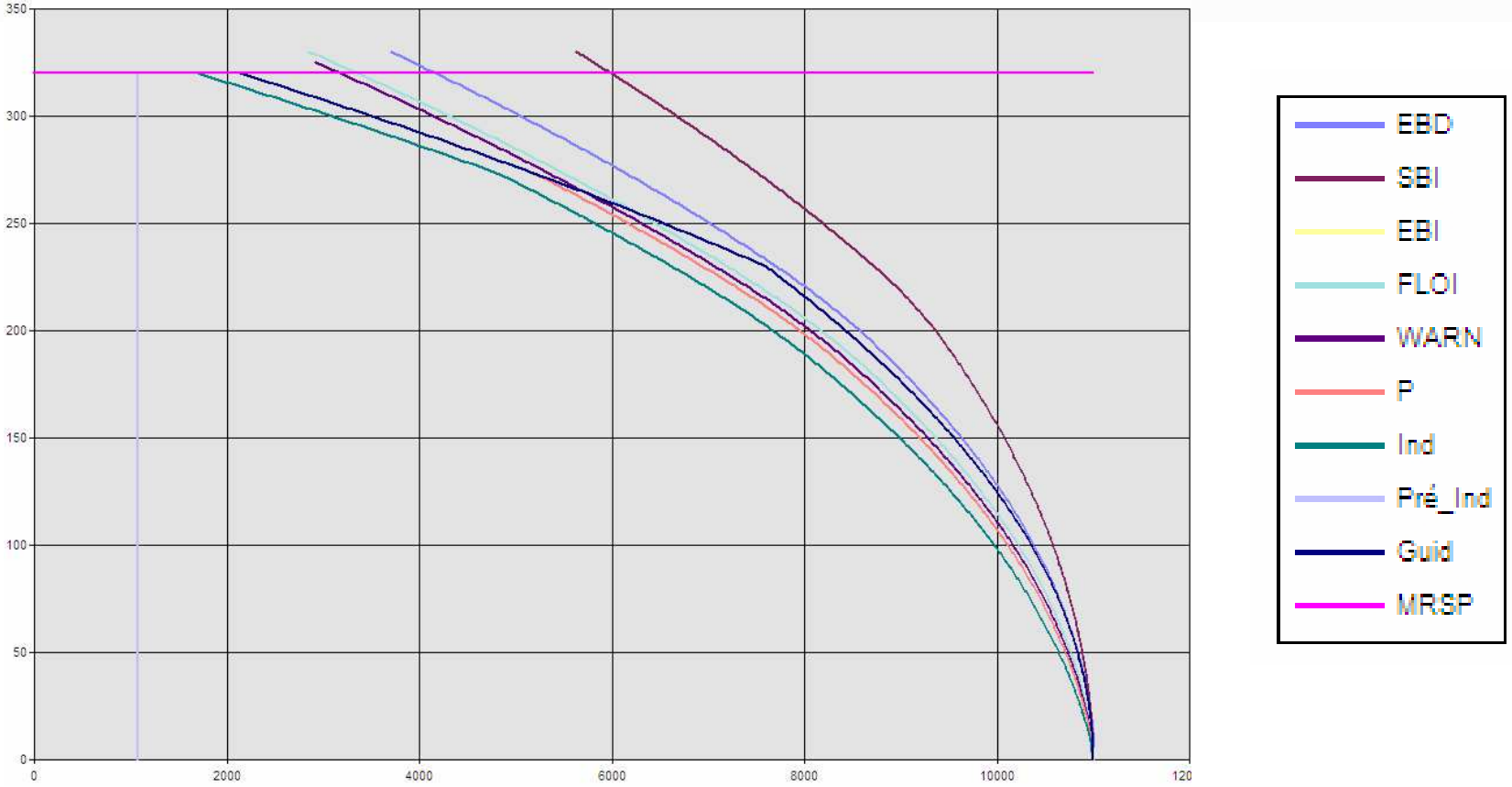
ERTMS fundamentals

Different curves



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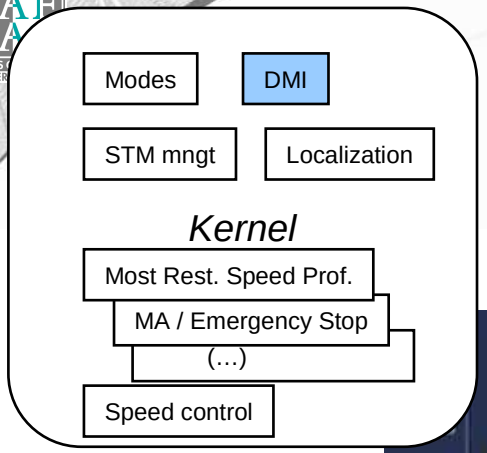
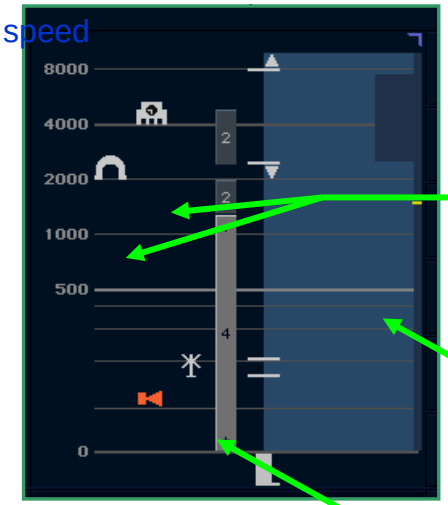


TRACK CHARACTERISTICS



Max speed

Particular points

Target distance

Speed profile

Slopes / ropes

Actual speed

Target speed

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ERTMS Main Functionalities

Modes

Localization

STM mngt

Kernel

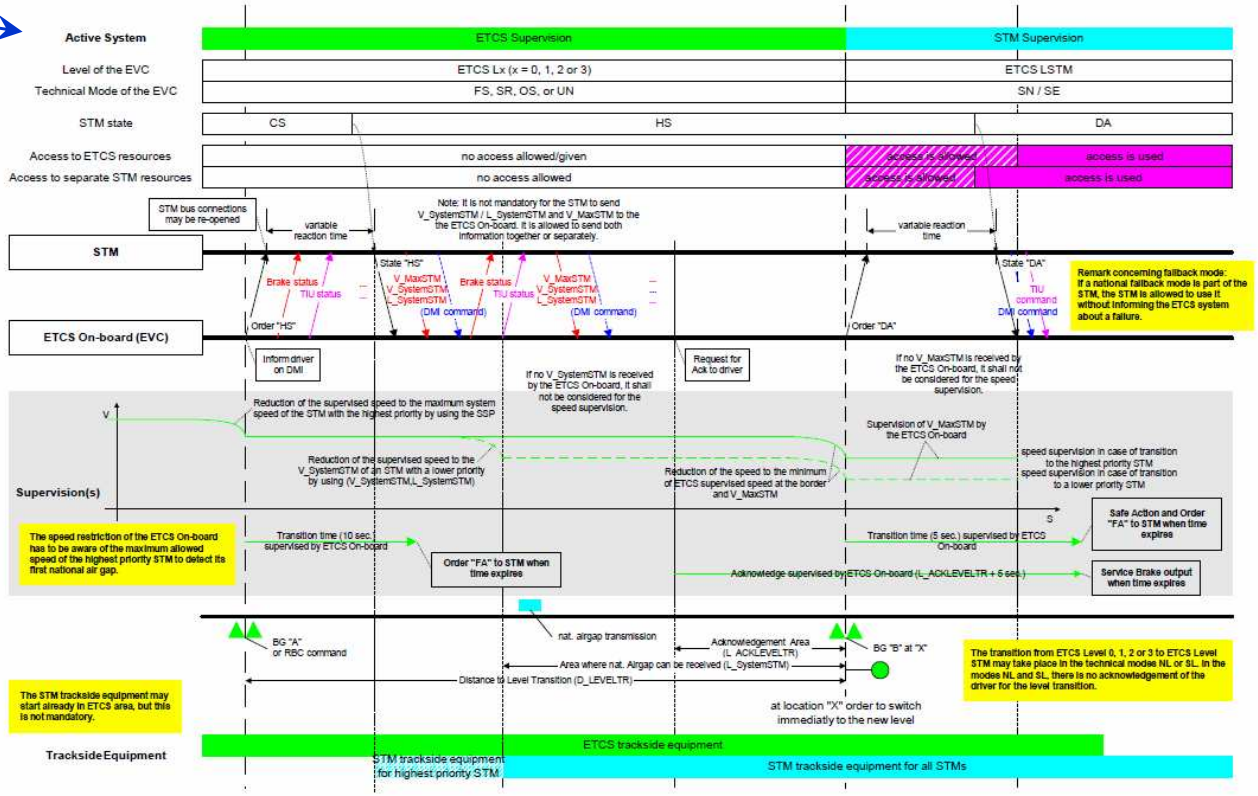
Most Rest. Speed Prof.

MA / Emergency Stop

(…)

Speed control

ETCS -> STM



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Overall system