# ERTMS Deployment in Spain: Current Situation and Future Challenges

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**Signalling & ERTMS Manager**

# ERTMS Deployment in Spain

*October 16th*
*CCRCC '19*
*Valenciennes*

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# Facts & Figures
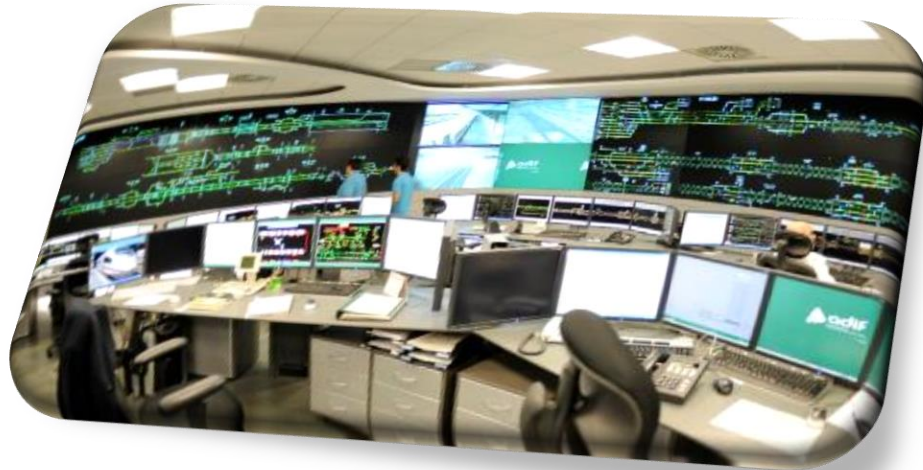
**Strong commitment with ERTMS.** ➡

**Strenght in Numbers.**

> 2500 ERTMS Km in operation.

> 2500 ERTMS additional Km already deployed and in PS process.

> 1000 (and growing!) ERTMS Km in project phase.

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# Facts & Figures





**Availability of qualified human resources in the deployment of ERTMS**

**Huge need of specific profiles: Design and Testing, Requirements, CMS Project Managers, Safety, Traffic Management, Maintenance…**

**Not easy to find!**

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# Historical Background

**Once upon a time...
in Spain.**
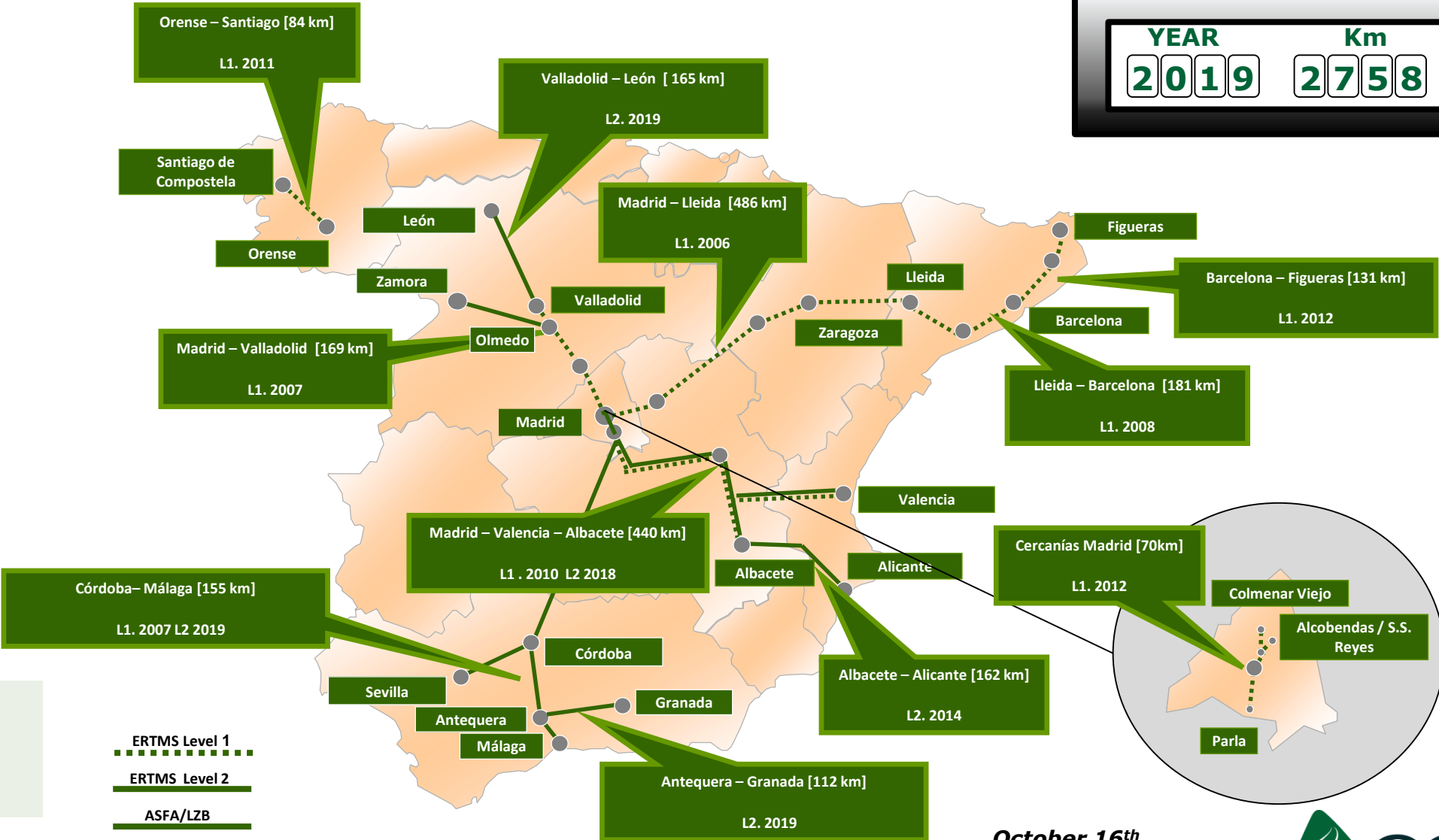
**First ERTMS Contract
(Project & Works): 2000.**

**First ERTMS Placing in Service:
2006 (L1).**
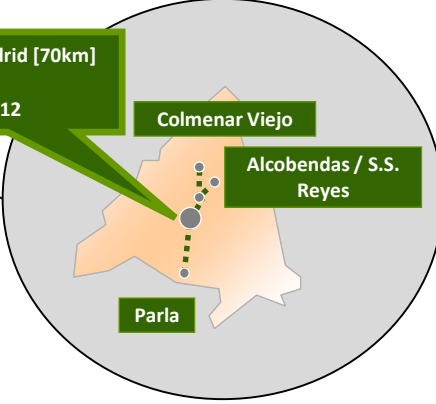
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# Current Status of ERTMS deployment in Spain
## ERTMS Lines in Operation



YEAR 2019    Km 2758

Orense – Santiago [84 km]
L1. 2011

Valladolid – León [165 km]
L2. 2019

Santiago de Compostela

León

Madrid – Lleida [486 km]
L1. 2006

Figueras

Orense

Zamora

Lleida

Barcelona – Figueras [131 km]
L1. 2012

Valladolid

Zaragoza

Barcelona

Madrid – Valladolid [169 km]
L1. 2007

Olmedo

Lleida – Barcelona [181 km]
L1. 2008

Madrid

Valencia

Madrid – Valencia – Albacete [440 km]
L1 . 2010  L2 2018

Cercanías Madrid [70km]
L1. 2012

Córdoba– Málaga [155 km]
L1. 2007 L2 2019

Albacete

Alicante

Colmenar Viejo

Alcobendas / S.S. Reyes

Córdoba

Sevilla

Granada

Albacete – Alicante [162 km]
L2. 2014

Antequera

Málaga

Parla

Total L1   1879 km

Total L2   879 km

⸱⸱⸱⸱⸱ ERTMS Level 1

—— ERTMS  Level 2

—— ASFA/LZB

Antequera – Granada [112 km]
L2. 2019

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Valencia

Cercanías Madrid [70km]
L1. 2012

Colmenar Viejo

Albacete

Alicante

Alcobendas / S.S. Reyes

**Diverse range of suppliers (both tracks and OBUs).**

Thales
Siemens
Alstom
Ansaldo

ERTMS Level 1
ERTMS Level 2
ASFA/LZB

Córdoba

Granada

Albacete – Alicante [162 km ]
L2. 2014

Sevilla

Parla

Antequera

Málaga

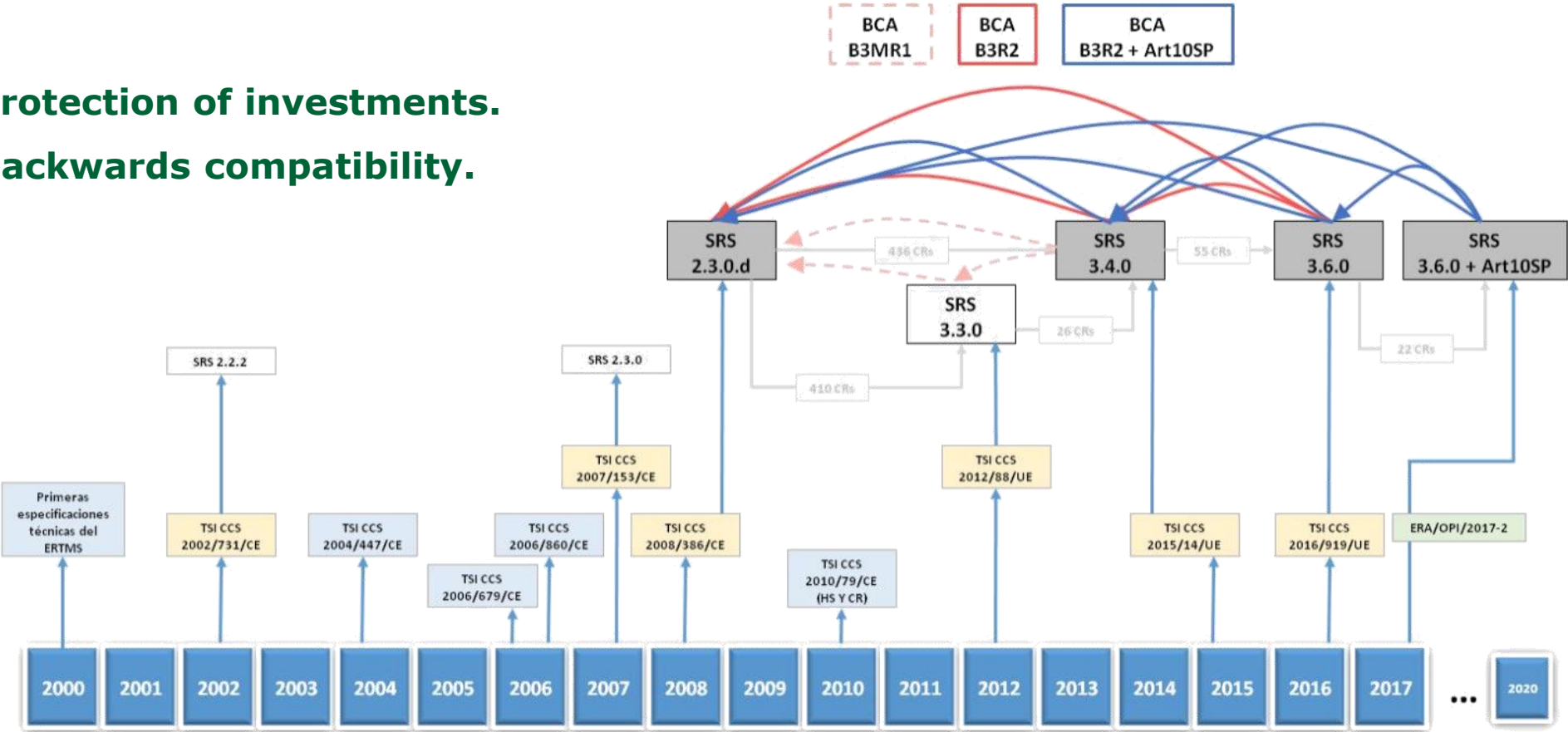Córdoba– Málaga [155 km]
L1. 2007 L2 2019

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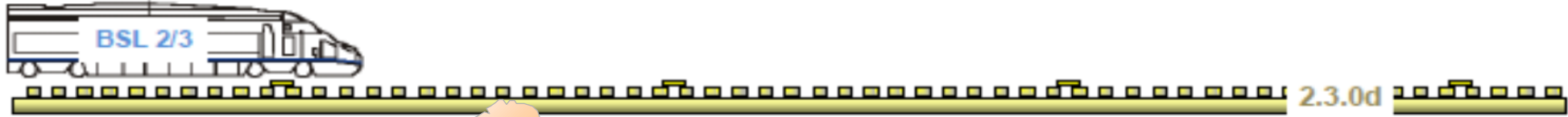# Current Status of ERTMS deployment in Spain
## Parallel ERTMS Specifications changes



- ✓ **Protection of investments.**
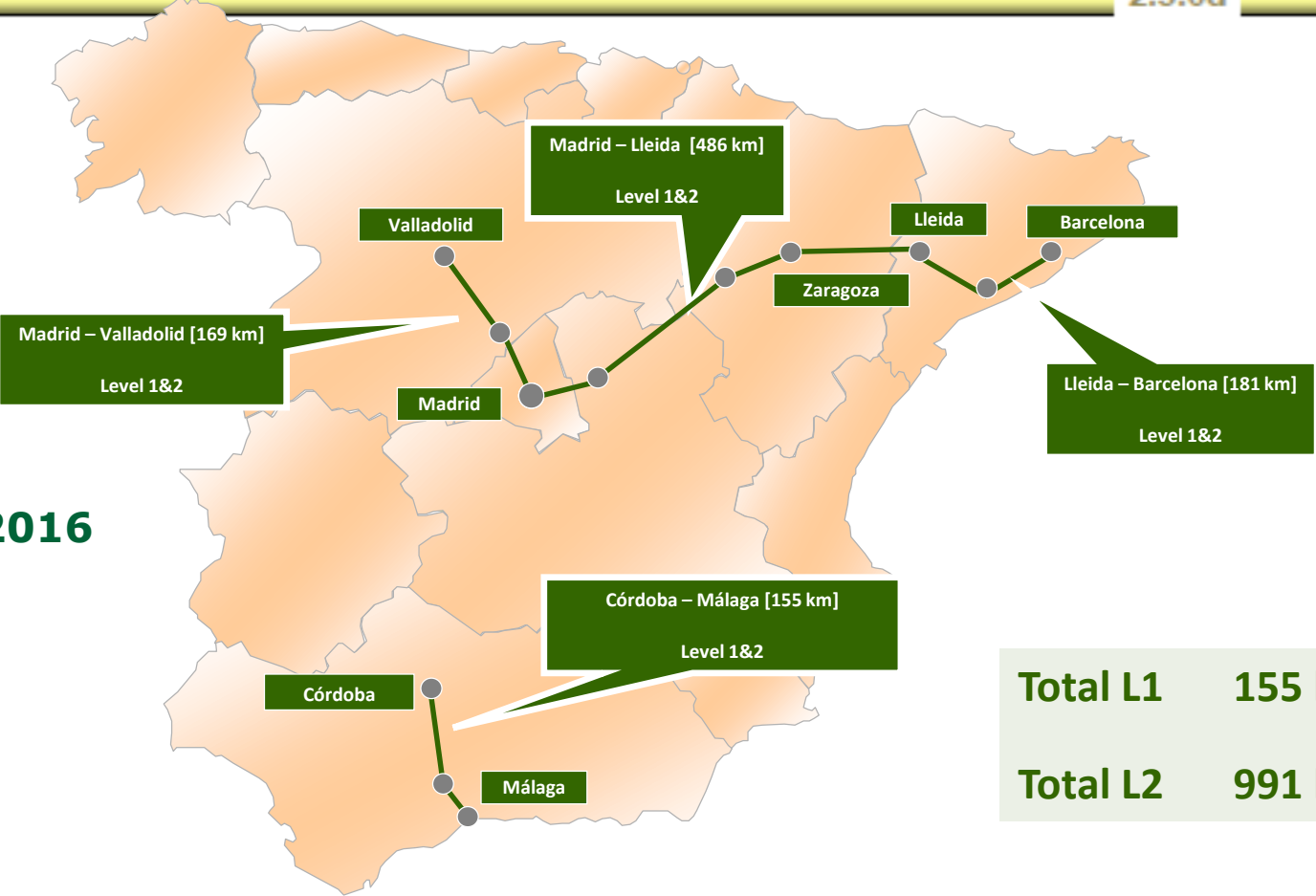- ✓ **Backwards compatibility.**

# Current Status of ERTMS deployment in Spain
## Case study: ERTMS Migration

BSL 2/3

2.3.0d

**Technical Scope: just 4 CRs!**

**Initial Target Completion Date: 2016**

Madrid – Lleida  [486 km]

Level 1&2

Valladolid

Lleida

Barcelona

Zaragoza

Madrid – Valladolid [169 km]

Level 1&2

Madrid

Lleida – Barcelona [181 km]

Level 1&2

Córdoba – Málaga [155 km]

Level 1&2

Córdoba

Málaga

| Total L1 | 155 km |
|---|---|
| Total L2 | 991 km |

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# Current Status of ERTMS deployment in Spain
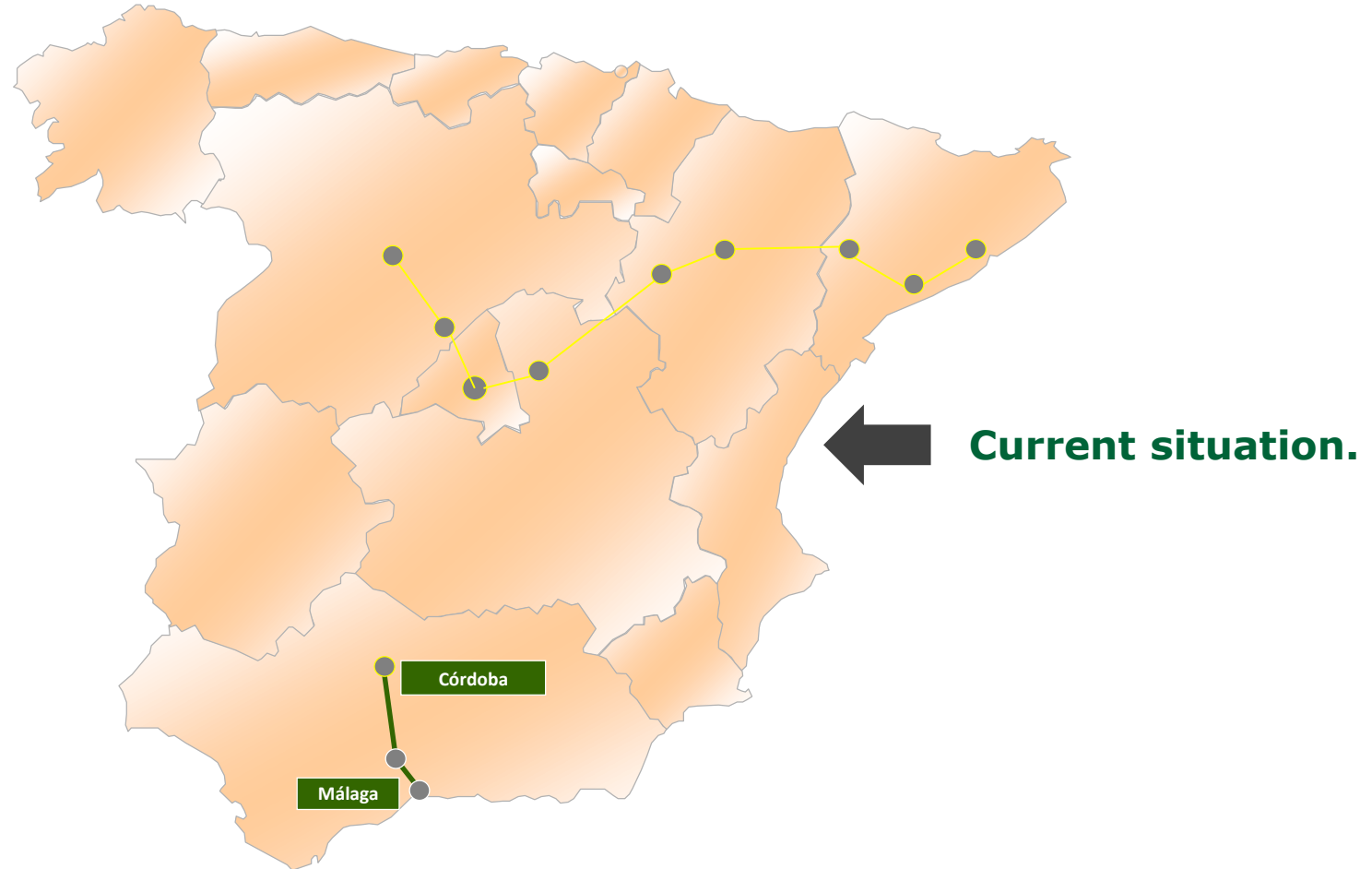## Case study: ERTMS Migration

**Why?**

**Huge interferences with ongoing deployments.**
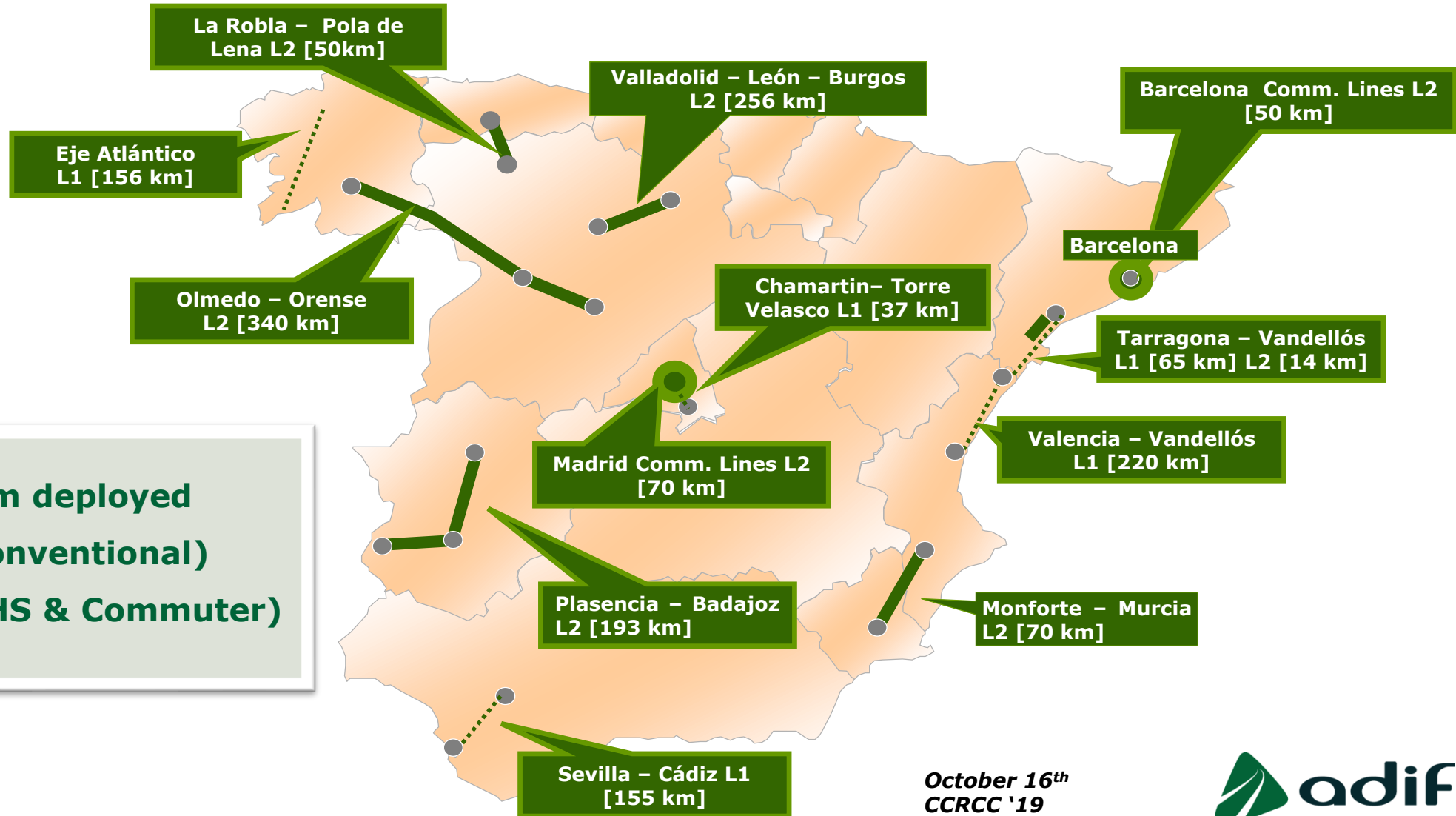
**System downgrading.**

**Certification issues.**

**Complex train retrofitting (re-authorization processes).**

Current situation.

Córdoba

Málaga

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# Future Challenges
## ERTMS Placing in Service



**La Robla – Pola de Lena L2 [50km]**

**Valladolid – León – Burgos L2 [256 km]**

**Barcelona Comm. Lines L2 [50 km]**

**Eje Atlántico L1 [156 km]**

**Olmedo – Orense L2 [340 km]**

**Chamartin– Torre Velasco L1 [37 km]**

**Barcelona**

**Tarragona – Vandellós L1 [65 km] L2 [14 km]**

**Valencia – Vandellós L1 [220 km]**

**Madrid Comm. Lines L2 [70 km]**

**2.3.0.d additional km deployed**

➡ **> 500 L1 km (Conventional)**

➡ **> 1000 L2 km (HS & Commuter)**

**Plasencia – Badajoz L2 [193 km]**

**Monforte – Murcia L2 [70 km]**

**Sevilla – Cádiz L1 [155 km]**

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# Future Challenges
## ERTMS Placing in Service



La Robla – Pola de Lena L2 [50km]

Barcelona Comm. Lines L2 [50 km]

A Coruña

Pola de Lena

Eje Atlántico L1 [156 km]

Ourense

La Robla

Burgos

Valladolid – León – Burgos L2 [256 km]

Vigo

Barcelona

Valladolid

Olmedo – Orense L2 [340 km]

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Thales

Siemens

Vandellós

Alstom

Plasencia

Valencia – Vandellós L1 [220 km]

Ansaldo

Madrid Comm. Lines L2 [70 km]

Bombardier

Valencia

Als/Sie/CAF

Badajoz

Plasencia – Badajoz L2 [193 km]

Monforte

CAF

Monforte – Murcia L2 [70 km]

Murcia

Sevilla

Cádiz

Sevilla – Cádiz L1 [155 km]

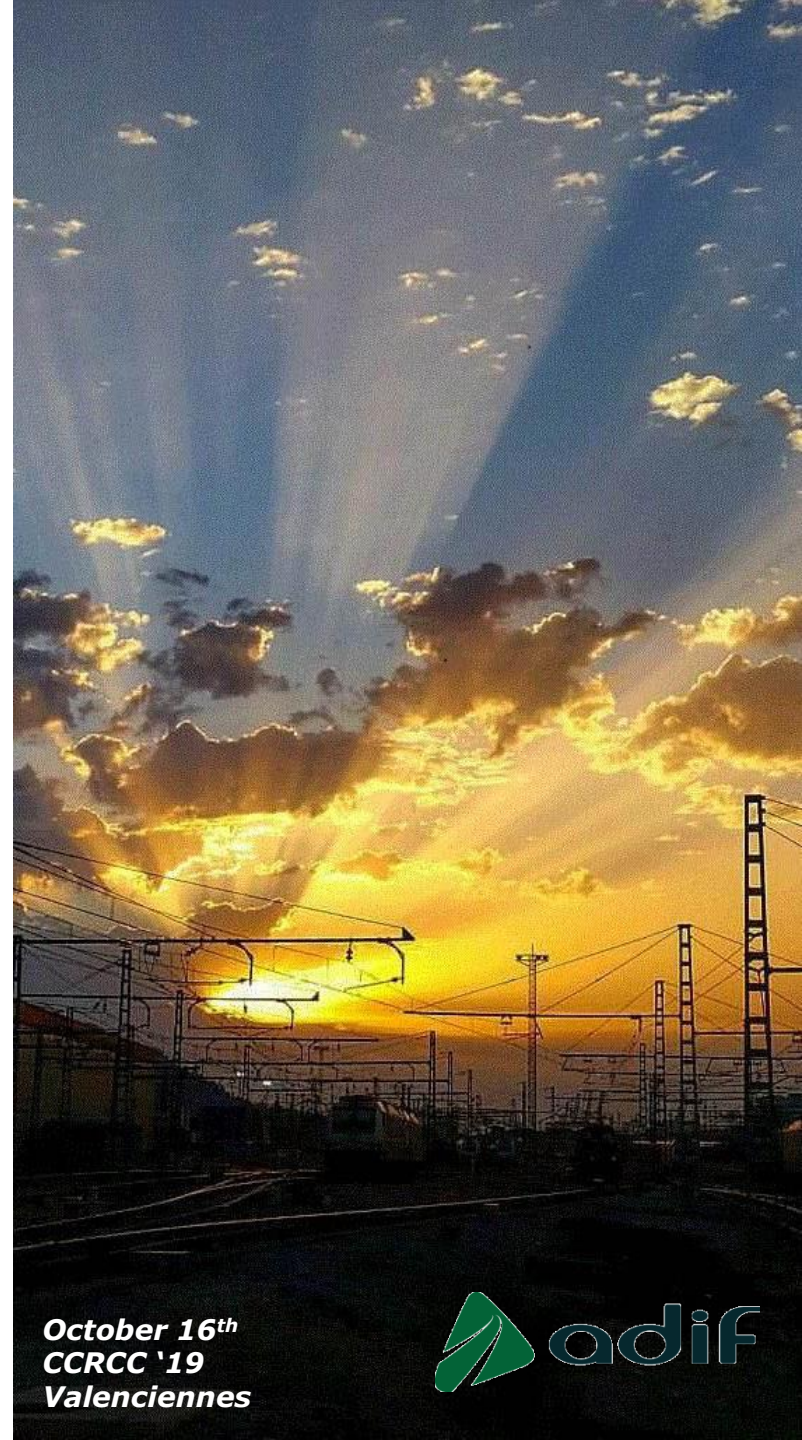*October 16th CCRCC '19 Valenciennes*

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# (Hard) Lessons Learnt

➢ **ERTMS version migration jeopardises ERTMS Deployment & Business Case.**

➢ **Final infrastructure test: issues.**

➢ **L1 still a valid and added value option. (Brown Field scenarios with no ultra high capacity needed). L2 in brown field implementation never easy.**

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# How can we optimize ERTMS deployments?

- ➢ **V&V processes with real operational conditions.**

- ➢ **Protection of investments.**

- ➢ **Stable specs (CRs only for real errors or G. Changers Enhancements) + Backwards compatibility.**

- ➢ **B2 (set of specs #1) kept in TSI or ERTMS operation & deployments to be hampered!!**

- ➢ **Focusing on achievable goals for the next 5-year span:**

  - ✓ **CCS data model standarization.**

  - ✓ **Standardization of high added value interfaces (e.g. IXL-RBC, TMS-ERTMS safety commands)**

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**Thanks for your attention**

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