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THE EUROPEAN RAIL INDUSTRY

Factsheets

ERTMS LEVELS
DIFFERENT ERTMS/ETCS APPLICATION LEVELS
TO MATCH CUSTOMERS' NEEDS

The ERTMS/ETCS application "levels" define different uses of ERTMS as a train control system, ranging from track to train communications (Level 1) to continuous communications between the train and the radio block centre (Level 2). Level 3, which is in a conceptual phase, will further increase ERTMS' potential by introducing a "moving block" technology. Whilst it is commonly acknowledged that to date, ERTMS level 2 offers considerable benefits, the use of level 1 already brings significant advantages for the railways and allows for High Speed travel.

What is ERTMS level 1? What are the advantages?

ERTMS level 1 is designed as an add-on to or overlays a conventional line already equipped with lineside signals and train detectors. Communication between the tracks and the train are ensured by dedicated balises (known as "Eurobalises®") located on the trackside adjacent to the lineside signals at required intervals, and connected to the train control centre. Receiving the movement authority through Eurobalises, the ETCS onboard equipment automatically calculates the maximum speed of the train and the next braking point if needed, taking into account the train braking characteristics and the track description data. This information is displayed to the driver through a dedicated screen in the cabin. The speed of the train is continuously supervised by the ETCS onboard equipment.
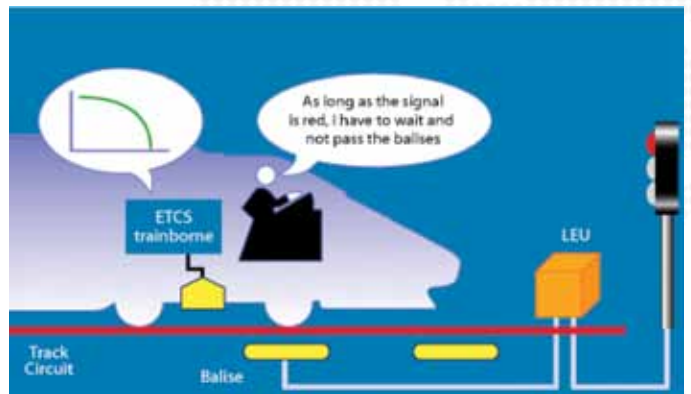
The main benefits brought by ERTMS Level 1 are interoperability (between projects and countries) and safety, since the train will automatically brake if exceeding the maximum speed allowed under the movement authority.

What is ERTMS level 2? What are the advantages?

As opposed to level 1, ERTMS level 2 does not require lineside signals. The movement authority is communicated directly from a Radio Block Centre (RBC) to the onboard unit using GSM-R. The balises are only used to transmit "fix messages" such as location, gradient, speed limit, etc. A continuous stream of data informs the driver of line-specific data and signals status on the route ahead, allowing the train to reach its maximum or optimal speed but still maintaining a safe braking distance factor.
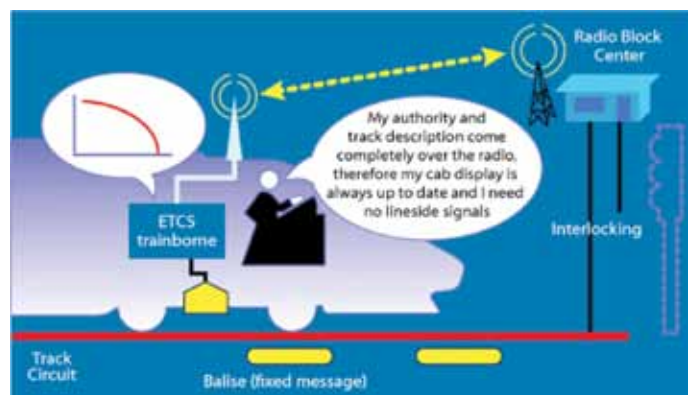

Whilst enabling greatly reduced maintenance costs through the removal of lineside signals, ERTMS Level 2 also presents the possibility for substantial line capacity increase by enabling higher operational speeds and offering reduced headways: more capacity means more trains moving, thus more benefits.

What will be the features of ERTMS Level 3?

ERTMS Level 3, still in its conceptual phase, allows for the introduction of a "moving block" technology. Under ERTMS level 1 and 2, movement authorities are determined using "fixed blocks" - section of tracks between two fixed points which cannot be used by two trains at the same time. With ERTMS level 3, accurate and continuous position data is supplied to the control centre directly by the train, rather than by track based detection equipment. As the train continuously monitors its own position, there is no need for "fixed blocks" – rather the train itself will be considered as a moving block.
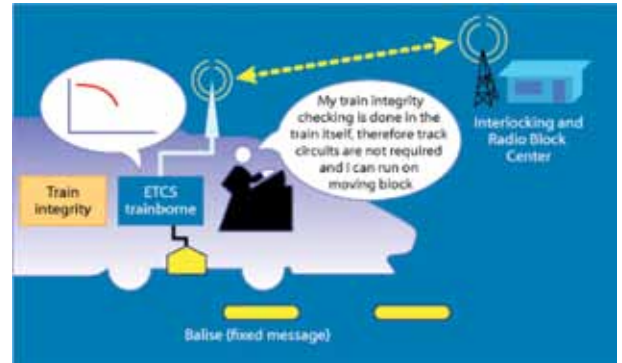
Is it possible to upgrade from one level to the other?

Yes – ERTMS allows for a smooth migration from one level to the other. For instance, upgrading level 1 to level 2 mainly necessitates the installation of the radio network, the Radio Block Centre and some additional balises for positioning.

Introducing Level 3 will enable the train to monitor and report its own integrity thus releasing the need for track detection circuitry e.g. axle counters and/or track circuits.

Why should one opt for one ERTMS level or another?

ERTMS has been designed to meet the railways' needs and this is reflected by the different levels available. The existence of another signalling system on the line, the possibilities to equip the line with GSM-R technology, the maximum speed allowed or capacity upgrades, are amongst the factors which come into play when choosing a particular ERTMS Level. However, it is commonly acknowledged that ERTMS Level 2 brings the full benefit of the system to a reality, as it allows for increased capacity and significant costs savings for maintenance through the removal of lineside signals.

What is the difference between ERTMS "levels" and ERTMS "baselines"?

An «ERTMS level» as described above is just the abbreviation for «ERTMS/ETCS application level», whereas an «ERTMS baseline» refers to the currently applicable set of technical specifications. The baseline number is usually identical to the SRS document (e.g. 2.3.0), but as the SRS document number did not change with the last update of the technical specifications to make a distinction, the current baseline is called «2.3.0d».

Want to know more about ERTMS? Please check www.ertms.com or contact UNIFE at unife@unife.org