

## Factsheet #3- Key Technology Factsheet

The Digital Railway programme will unlock up to 40% more capacity from the existing urban network by delivering key technologies:

- ▶ European Train Control System (ETCS): Scalable digital signalling which is easier than conventional signalling to deploy and which enables more trains to run safely on the track – faster, more reliably, safer and greener.
- ▶ Traffic Management (TM): Whereas ETCS allows more trains on the track, TM maximises network performance by allowing these trains to run together as effectively as possible – maximising the throughput that existing track can support.
- ▶ Automatic Train Operation (ATO): In-cab digital decision support tools give drivers the information they need at the right time to boost performance and safeguard safety.

	Benefits
<b>European Train Control System (ETCS)</b>	<ul style="list-style-type: none"> <li>▶ Cost- Removal of track circuits which fail often and are expensive to maintain.</li> <li>▶ Track Design- New signalling projects are more cost effective once the 'bespoke' element of signalling design has been eliminated, just like deploying lego bricks! Due to the 'one-size-fits-all' approach to designing signals, new infrastructure ends up as a compromise between all different types of trains to come up with the least worst design.</li> <li>▶ ETCS removes this. Limited number of 'Lego bricks' assures once as an assembly job- design the network automatically- don't need a designer. Each design is repeatable.</li> <li>▶ Reliability-increased due to less track circuits (and faulty infrastructure).</li> <li>▶ Safety- less SPADS in total and the consequences of a SPAD would be far more controlled (i.e. it sits within a buffer) .</li> <li>▶ Connections- spaces between signals are no longer calculated through compromise, they can take the train specifics into account.</li> <li>▶ Freight- signals may have once been designed for high performance team are not optimised for freight trains- not optimised for maximum number of freight on the line.</li> </ul>
<b>Traffic Management (TM)</b>	<ul style="list-style-type: none"> <li>▶ Recovery &amp; Flexibility- Concept is that another train could fill the gap of a late train- continual flow of data allows this.</li> <li>▶ Ability to flex and amend services is increased and opens opportunities to run more train paths.</li> <li>▶ Improved PPM metrics through better train performance.</li> </ul>
<b>Automatic Train Operation (ATO)</b>	<ul style="list-style-type: none"> <li>▶ Safety: The train system will take over in danger</li> <li>▶ Faster Journeys: Because the unit of currency is braking distance, and once this is optimised (continually, for every type of train and terrain, then this opens up latent capacity on the track).</li> </ul>

### More on ETCS

ETCS (European Train Control System); a signalling and train control system which will see traditional line-side railway signals replaced with a computer display inside train cabs.

Its key characteristics are:

- ▶ Automatic Train Protection (ATP), ensuring trains operate within safe limits and speeds at all times
- ▶ cab signalling, providing safe movement authority directly and continuously to the driver through a cab desk display

ETCS works on the principle of providing to the train:

- ▶ a maximum distance that it can travel
- ▶ the speed profile of the track ahead
- ▶ other track information about the route that has been set

The train then permits the driver to drive the train, but should the distance or speed limit be exceeded, or be in danger of being exceeded, then the ETCS on-board equipment intervenes to control the train, bringing it to stand if necessary.

ERTMS/ETCS can be configured to operate in one of the following application levels:

- ▶ **Level 0**  
ETCS fitted trains operating on lines with no ETCS or any other train protection or warning system.
- ▶ **Level 1**  
Movement authority (e.g. from an conventional line-side signal) is passed to the train via a switched 'balise' or transmitter on the track, repeating the indication from the conventional signalling system, which continues to be used to support safe train separation.
- ▶ **Level 2**  
Movement authority is passed by the GSM-R radio network from a Radio Block Centre (RBC) to the train; conventional train detection systems are utilised in conjunction with interlocking systems used to enforce safe train separation. It is proposed to use the Level 2 system across the GB rail network.
- ▶ **Level 3**  
Builds on Level 2, but enforces safe train separation using safety critical data from the train, rather than conventional train detection systems.