The long march to
interoperability

CHALLENGE The roll-out of the European Rail Traffic Management System on all core corridors has been identified as a key priority in the revised Trans-European Networks programme adopted last month, but much remains to be done to achieve a stable specification and genuine interoperability. Chris Jackson reports from Lille.

'We have taken the big step, but there is still a lot to do', admitted the European Commission's ERTMS Co-ordinator Karel Vinck, addressing the opening session of the Control Command & Railway Communication Conference organised by the European Railway Agency in Lille on November 12.

More than 300 delegates from across the rail sector had registered for the event, which ERA Director Marcel Verslype pointed out was intended to allow engineers, users and decision makers to address 'openly and in depth' the many issues surrounding the specification, implementation and evolution of the European Rail Traffic Management System.

Insisting that ERTMS was 'now a reality in the world', Vinck reminded the delegates that Chile had recently become the 34th country to adopt the technology. However, he accepted that there were 'still some challenges' in deployment, and he called for greater discipline in following the agreed specifications.

Recapping on what had been achieved over the past few years, Vinck said that today 'no-one disputes any more the validity of the European standard'. He looked forward to the publication of a revised TSI on Command Control & Signalling in the coming weeks which reflected 'tremendous work by ERA and the statutory bodies' to prepare for the implementation of the Baseline 3 specifications agreed in 2012.

Compliance becomes essential

Looking at the priorities for the coming months, Vinck said 'I cannot emphasise enough that the number one priority is to get interoperability of ERTMS. Having a European rail network makes no sense without interoperability.'

That he needed to make such a plea is a sobering reflection on the multiplicity of incompatible variants that have emerged in Europe over the past quarter-century. This is not the place to reflect on the open points in the early ETCS standards which led to different interpretations as railways and suppliers struggled to develop their first applications. However, it has left a legacy in additional costs and complexity which will take many years to overcome.
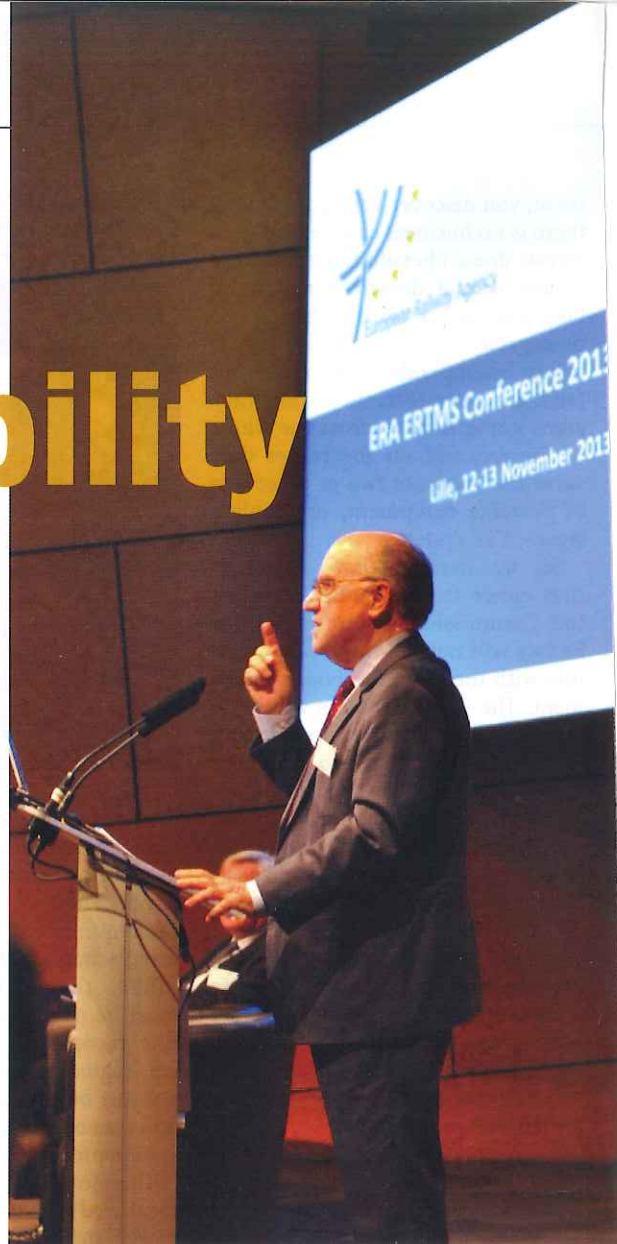
Vinck suggested that the onus was now on the suppliers to ensure that their products were fully interoperable. To that end, he said, train operators and infrastructure managers

Europe's ERTMS Co-ordinator Karel Vinck (above) addresses the inaugural session of the conference in Lille, being followed on stage by UNIFE's Michel van Liefferinge, ERA's Hans Bier and RG Editor-in-Chief Chris Jackson (below).

should no longer accept any equipment that was not fully compliant with the standards.

Several speakers from the European Commission's transport directorate DG Move reinforced the message that local variations should no longer be accepted. And the head of ERA's Cross-Acceptance unit Richard Lockett suggested that in future non-compliant infrastructure should be modified to accept TSI-compliant trains, and not the other way around.

This is clearly a desirable objective on the road to a fully interoperable European network, but for many railways it will represent a fundamental shift from 150 years of short–term thinking. Building special trains to get around infrastructure limitations is a quick and easy solution, at the cost of accepting operational inefficiencies, whereas making major changes to the infrastructure will be neither cheap nor straightforward, even though the TSIs were framed

TSIs were framed to accommodate the majority of trains running in Europe today.

ERTMS implementation remains a backbone of the revised TEN-T programme (RG 11.13 p8) which was formally adopted by the European institutions in December. This would see all of the 'core routes' equipped with ETCS by 2030 and as much as possible of the so-called comprehensive network by 2050. As such, the commission has decided to retain a separate ERTMS Co-ordinator as one of two 'horizontal' co-ordinators working alongside the nine corridor co-ordinators.

In terms of funding, no less than €26·2bn is being made available for the TEN-T programme in 2014-20 through the Connecting Europe Facility, which DG Move's Stéphane Ouaki pointed out was more than three times the €8bn provided in the previous budget period. Of this, between €700m and €1·1bn is expected to be allocated to ERTMS.

CEF funding is intended as co-financing to encourage investment by private partners and member states, at rates varying from 20% to 85%; for ERTMS the Commission would provide up to 50% of the cost of both lineside and onboard equipment. Funds will be focused on the priority corridors and the core network, allocated through multi-annual calls starting in April 2014. However, Ouaki and other speakers made it clear that there would be no EU funding for projects that were non-compliant with the relevant TSIs.

Whilst such a move was welcomed as putting pressure on the supply sector to ensure that their products were compliant, it has raised concerns that some early adopters might be penalised for supporting ETCS from the outset. For example, leasing company MRCE has already fitted much of its locomotive fleet with ETCS in the belief that this was 'the right thing to do'. However, the onboard equipment that was available at the time is now considered not compliant, so MRCE risks being stripped of its EU funding — a move which CER says would send 'all the wrong signals to the market'.

Preparing for Baseline 3

Vinck said his second priority was to ensure a single Baseline 3 standard for ETCS onboard equipment, which would enable trains to operate over

infrastructure equipped with either Baseline 3 or Baseline 2 (essentially the current SRS Version 2.3.0d), in line with the pan-industry Memorandum of Agreement signed in April 2012 (RG 5.12 p3).

He felt that the European Commission was rightly putting the emphasis on cross-border issues, which were

'fundamental' to the emergence of a genuine pan-European rail network. Given that the cross-border issues were 'so complex', he suggested that solving the problems affecting 20 key cross-border routes would address '80% of all interoperability issues'.

But Vinck accepted that greater stability was essential, calling on all players to ensure that 'together we make the efforts to keep the standard as stable as possible, taking account of experience with testing and implementation'. Thus it would be important to consider the validity of any change requests lodged with ERA, to see whether they addressed open points, increased the system capability, or simply risked delaying implementation still further. 'There is no point in coming with all kinds of

request which have a marginal value', he warned.

Reporting on the development of the Baseline 3 specifications since the signing of the MoU, ERA's Hans Bierlein said the agency was working with UNISIG and the ERTMS Users Group (which provides technical support for CER and EIM) to prepare two 'main-

tenance releases'. The first of these was due to be presented to the Commission at the end of 2013 and is expected to be approved by the Railway Interoperability & Safety Committee in mid-2014.

As well as some error corrections and feedback from early implementers, such as DMI indications for Level 1 Limited Supervision, this first release would set out the testing specifications for Baseline 3 onboard equipment. ERA is also putting forward a revised specification for the interface between Radio Block Centres. But Bierlein said the biggest focus would be on ensuring backwards compatibility between Baselines 3 and 2.

Release 2 would follow towards the end of 2015, paving the way for additional functionality such as automatic

'No investment in ETCS onboard equipment has yet showed a payback; subsidy is essential to encourage deployment'

Peter Wilms Mitsui Rail Capital Europe

Early adopter. MRCE has fitted more than 150 locomotives with ETCS onboard equipment, including 30 of its 55 Siemens ES64 U2 multi-system electric locos. However, work on the remaining 25 to operate in Switzerland has been postponed until Baseline 3 compliant equipment becomes available.

Photo: Bernd Piplack

train operation or the use of satellite navigation systems. But the biggest change in this release will be to make the ETCS specifications independent of those for the communications layer, paving the way for alternatives to GSM-R as a bearer. This could facilitate the use of ETCS in countries where the GSM-R radio spectrum is not available, including the use of TETRA, but would also 'future-proof' the train control elements for use with a new generation of commercial communications technologies such as LTE.

UNIFE's Michel van Liefferinge, the current UNISIG General Manager, reminded delegates that funding had been made available under the 2011 TEN-T call for the development of 'ETCS over IP' protocols, which will be needed to facilitate the use of GPRS as well as paving the way for a bearer-independent specification. Meanwhile, the UNISIG suppliers are starting work on the system requirements specification for ETCS to support ATO functions up to GoA2 (attended ATO). And FP7 research funding was allocated earlier this year for work on satellite applications in ETCS, where discussions are underway with the Galileo Agency.

Communications platform

ERA's Hans Bier recapped on the current state of development with GSM-R, including the additional functionality that is now being incorporated. Work is underway on modifying the existing specifications to allow for the introduction of filtering elements (such as external filters or improved receivers) to protect against interference from other radio bands.

These will be incorporated in Version 4 of the current baseline specifications that is due to come into force in mid-2014. There remains some concern over who is to fund the cost of fitting the filters or new receiver modules; some operators believe that 'Europe should pay', but European insiders pointed out that individual member states had caused the problem through the sale of the conflicting spectra, and could therefore be expected foot the bill from their receipts.

According to UIC's Robert Sarfati, GSM-R is now operational on around 70 000 route-km in Europe, with a further 84 000 route-km to be rolled out in the next few years. This compares with around 138 000 route-km outside Europe. He felt that GSM-R

Much to discuss. ERTMS Co-ordinator Karel Vinck (right) compares notes with European Railway Agency Director Marcel Verslype in Lille.

Spanish operator RENFE must modify the ETCS onboard equipment on 240 high speed trainsets as part of the national programme to migrate from SRS Version 2.2.2+ to the interoperable Version 2.3.0d.

had demonstrated that it was possible to combine evolution with stability; an initial demonstration of GPRS to handle train control data is expected during 2014. The suppliers have provided a guarantee that GSM-R will be able to support ETCS until at least 2025, with many operators looking to keep their equipment in use until 2032 or later.

Backwards compatibility

As Vinck indicated, a key element in the evolution of the Baseline 3 standards is the need to ensure backwards compatibility. Baseline 3 currently uses SRS Version 3.3.0 introduced in 2012, with Version 3.4.0 envisaged for the first maintenance release. The track-to-train communication messages include X and Y variables to identify the system versions being used, where a change of X indicates incompatibility.

Bierlein explained that X=1 trackside equipment will work with both

Baseline 2 and 3 onboard equipment, whereas X=2 will only work with Baseline 3. The Y indicator will indicate optional functionality, such as GPRS or the additional Baseline 3 functions which can be safely ignored by a train running on Baseline 2. However, ERA has yet to determine the degree of interoperability between Version 2.3.0d and the proposed Version 3.5.0 for the second maintenance release of Baseline 3, which remains a concern for those operators who have invested heavily in Baseline 2 equipment.

The challenges posed by migration were highlighted by Silvia Domínguez from the Spanish Ministry of Development. Spain was another early adopter, and at present ADIF has more than 2 000 route-km equipped with ETCS Level 1 or 2. Of this, less than half is Version 2.3.0d, as the earlier installations all use Version 2.2.2+. On the rolling stock side, RENFE has 240 high speed trainsets and four locos fitted with Version 2.2.2+ onboard equipment and 217 suburban EMUs using Version 2.3.0d. Equipment has been provided by no less than six suppliers, which has already required a lengthy and complex programme of compatibility tests.

The ministry has now embarked on a programme to convert the 50% of lines using Version 2.2.2+ and all of its high speed fleet to Version 2.3.0d, which is being funded by the TEN-T Executive Agency in order to facilitate international interoperability. However, this migration has to be achieved whilst keeping both track and trains in commercial service, so a

working group drawn from the ministry, ADIF, RENFE, Ineco and testing agency CEDEX has been formed to co-ordinate the process.

Given that 2.2.2+ equipped trains can already run on 2.3.0d infrastructure in Level 1, the working group has proposed that all lineside equipment should be brought up to that specification before the trains are modified. Once the onboard equipment has been updated to 2.3.0d, a third stage would see a transition to Level 2 operation under the new standards.

The ministry believes that Version 2.3.0d will provide all functionality necessary for the foreseeable future. However, the Spanish infrastructure may have to accept Baseline 3 equipped trains in the future and Domínguez was keen to emphasise the importance of maintaining backwards compatibility.

Migration strategies for the TEN-T corridors remain an area of concern. Although corridor management boards have been established under the Rail Freight Regulation, bringing together the various infrastructure managers, these are still dependent on their national governments when it comes to determining the funding and timetables for ETCS implementation, and there still seems to be little common thinking.

One insider pointed out that setting up separate one-stop shops for each corridor did little to benefit train operators whose main traffic flows might make use of several corridors as well non-core routes to access terminals at each end of the journey. Thus an operator would still

Photo: Igor Licen

Having awarded a €40m contract to Thales in 2012 for installation of ETCS Level 1 on the 350 km corridor between Villa Opicina and Hodos on the Hungarian border, Slovenian Railways began test running in late September, using a Bombardier Traxx F140DE locomotive on the Sezana – Pivka and Hodos – Murska Sobota sections. The work is due to be completed by late 2014 or early 2015.

face the challenge of putting together a workable path through different jurisdictions in order to compete with a much more flexible road haulage sector in a highly competitive market. This raised suggestions whether there could be a single one-stop shop for all the corridors, or even greater cross-border consolidation between infrastructure managers.

Scope extension

Of course, the corridors only represent a relatively small proportion of the TEN-T comprehensive network, which in turn accounts for only 40%

Testing of ETCS equipment remains a complex and costly task, but a European Lab Framework Agreement now being signed by UNISIG member companies is expected to simplify the process, according to Michel van Liefferinge.

of Europe's railways. ERA's Pio Guido reported that a three-month public consultation had begun on September 9 over the agency's recommendations for extending the scope of TSI CCS to the 'off-TEN' routes, which account for the remaining 60%. Given that more than 90% of all rolling stock operates both on and off the TEN network, ERA would like to encourage the harmonisation of train control systems, using the same parameters for onboard and trackside equipment. But while member states should be free to support the wider installation of ERTMS and the removal of legacy systems as a 'national measure', the mandatory extension of ERTMS deployment to off-TEN routes 'is not expected under present conditions'.

ERA believes that this should reduce the risk of individual operators or suppliers introducing 'new legacy systems', although as SNCF's Director of Strategy Pierre Messulam pointed out, there would have to be some continuing development to deal with component obsolescence for existing Class B train control systems such as TVM. This has already been a problem on LGV Est, where the infrastructure has been dual-fitted with ETCS Level 2 and TVM 430. ETCS shadow running is expected to resume during 2014, although DB Netz has reportedly removed the unused ETCS equipment from those sections of the Saarbrücken – Frankfurt route where it had been installed. ◄