

Relatório de Atividades Traineeship ANTT – ERA

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Introdução

O Programa de Intercâmbio de Conhecimentos Técnicos entre a ANTT e a Agência Ferroviária Europeia (ERA), denominado “*Traineeship ANTT-ERA*” foi realizado na cidade de Valenciennes, na França, durante o período compreendido entre as datas de 01/10/2017 e 28/02/2018.

Teve como objetivo a troca de experiências para melhorias da regulação no setor ferroviário, tanto para cargas como para passageiros; agregar valor para o espaço ferroviário brasileiro como know-how (conhecimento) europeu; ampliar o conhecimento técnico da ANTT; e possibilitar à ANTT alcançar o nível de excelência no setor ferroviário, aprendendo as melhores práticas e técnicas com uma instituição mundialmente reconhecida pelas boas soluções criadas no setor ferroviário.

Cada servidor selecionado conforme o Edital nº 01, de 04 de julho de 2017, foi alocado em uma diferente área temática na ERA. De minha parte, eu fui alocado na unidade referente ao sistema de gestão de tráfego europeu, na então denominada ERTMS Unit. A seguir, à medida que descreverei brevemente a memória descritiva dos trabalhos desenvolvidos, conforme exigência do já citado edital, apresentarei também alguns esclarecimentos que possam parecer estranhos aos leigos no assunto.

Trabalhos desenvolvidos

Alguns dos pré-requisitos necessários ao desenvolvimento de qualquer trabalho dentro da ERA e mais especificamente dentro da Unidade de ERTMS são a compreensão do contexto (político, econômico, regulatório...) em que a ERA está inserida, assim como um entendimento das principais particularidades e características do European Railway Traffic Management System – ERTMS. Nesse sentido, durante todo o período do traineeship (porém com mais ênfase nas primeiras semanas) busquei expandir meus conhecimentos nesses tópicos.

Como produto desse esforço, apresento, nos capítulos a seguir alguns resumos que elaborei durante o período do traineeship. Ressalto o caráter pessoal desses resumos, e destaco que apesar de terem sido baseados em diversas bibliografias, assim como em conversas informais junto ao staff da ERA, não tive o cuidado de registrar todas as fontes e colaboradores. Desse modo, não serão citadas quaisquer bibliografias e nem tributado qualquer crédito a eventuais

colaboradores, uma vez que, novamente ressalto, estes resumos tem um caráter pessoal e representam apenas a consolidação da minha percepção com relação aos novos conhecimentos adquiridos.

Uma última observação é que os capítulos foram originalmente elaborados em inglês, de modo que assim serão apresentados neste relatório.

Os seguinte tópicos serão abordados a seguir:

1. History of Rail Regulation
2. The current scenario
3. ERTMS

1. History of Rail Regulation

The Regulatory Framework

Railway policy has for a long time been among the slowest areas of European integration. The first substantial railway directive was issued only in 1991, and the First Railway Package in 2001. This very cautious approach is explained by two main factors. Firstly, the railway sector market is quite a complex one. It presents highly imperfect opportunities for competition. Networks must remain limited in number. Access is by definition restricted. Sunk costs are enormous. Railways bring a reduction of collective environmental nuisances which is not taken into consideration by the pricing policy of operators. The transport of passengers is essentially local, and freight transport is essentially international. Secondly, Member States remain highly cautious in this domain, since railways play an essential role in local transports of passengers, and since the national companies represent a huge volume of capital and personnel.

Since 2001, however, the European legislator has enacted a series of 'Railway Packages'. EU railway policy has concentrated on three major areas which are crucial for developing a strong and competitive rail transport industry: (1) opening the rail transport market to competition, (2) improving the interoperability and safety of national networks, and (3) developing rail transport infrastructure. This is a specific adaptation of the sector to the traditional more competition/more harmonization approach (in addition to the added financial support for the European networks provided since the entry into force of the Maastricht Treaty).

Though many Regulations and Directives have been adopted, the evolution of the railway transport system remains slow. According to the Commission's latest assessments, the rail modal share for passenger transport remained fairly constant in the EU between 1995 and 2010. The freight transport share has substantially diminished between 2000 and 2009. The opening of the markets remains fraught with various difficulties.

A very slow beginning

Since the beginning of the twentieth century, railway transport across Europe has been fragmented into a number of national, vertically integrated and self-regulated systems, each of which had its own structure and infrastructure. The railway sector presented very diverse policy and regulatory aspects in each country; the diversification between the various systems was huge. For example, in the Iberian peninsula, the size of the gauge track (the space between the rails) was different from the European standard, and there have been five separate electrification systems across the continent. At the international level, there was a strong tradition of company cooperation and associations. However, there was very little pressure, both on the governmental and entrepreneurial sides, to change the status quo, given that the existing systems guaranteed the benefits of monopolistic economy in most countries. In addition, given that, among other things, international train services only constituted (and still constitute) a small portion of the total, there was little inclination to invest in them. Despite the fact that the founding treaty aimed to develop a common transport policy, very little legislation was adopted in the first decades of the existence of the Community. Railway transport was exempt from the application of the competition rules from early on, and state aid was considered compatible with the treaty in so far as it compensated operators for the discharge of a public service.

At the end of the 60s the council issued a couple of regulations, in an attempt of change this scenario. These regulations had the following objectives:

- Required member states to terminate all obligations inherent in the concept of a public service in so far as they did not comply with the definition of being essential in order to ensure the provision of adequate transport services. On the other hand, the economic disadvantages of undertaking public services had to be compensated.

- Normalization of the accounts of railway undertakings, aimed to level the disparities between railway undertakings.

However, despite the adoption of new legislation, governments found ways to keep on subsidizing their railways as much as they did before. The results the Commission had anticipated were thus not achieved

Developments in the 1990s

The need for a change arose in the 1980s and early 1990s, when the rail sector underwent a deep economic crisis when outperformed by truck and car transport. The famous Commission white paper of 1985 on completing the internal market set the first guidelines on the common European transport policy. Its programme aimed to eliminate the obstacles to free access to land transport and to foster harmonization of competition conditions.

The Directive aimed to boost the efficiency of the railway system in order to integrate it into a competitive market, affording railway enterprises the status of independent operators in that market. It also promoted differentiation in management, administration and internal control between the provision of transport services and the operation of infrastructures. Member States retained general responsibility for the infrastructures, had to manage the related payments on a nondiscriminatory basis and also ensure solid financial structures for publicly owned undertakings. In addition, undertakings were encouraged to create international groups of operators which would be mutually granted access to the infrastructures of the other Member States on an equitable basis for the operation of international transport.

All in all, Directive 91/440's major innovation was the formal separation of management from accounts of infrastructures and services. It enabled operators to run businesses on an essentially commercial basis, being charged for the use of infrastructure and compensated for operating uneconomic services in the public interest. This also made it possible for the huge debts of the national companies to be imputed to the infrastructure entities, allowing the services branches to operate commercially. In addition, with the use of infrastructure subject to fees and licences, it was now theoretically possible for rail to compete on an equal footing with road. Even though the impact of the new provisions was modest, Member States had finally acknowledged the possibility of applying market rules in the railway sector and of mutually accessing each other's infrastructure in a non-discriminatory way. This was a great innovation compared to the previous policy of cooperation among monopoly providers.

Punctual initiatives concerning rail transport were adopted in the years that followed. Namely, Directives 95/18/EC and 95/19/EC on licensing of railway undertakings and on the allocation of railway capacity and the charging of infrastructure fees were adopted in 1995. The former measure did not bring about much innovation; it required Member States to establish licensing bodies setting some general standards, but then only allowed undertakings incorporated in the relevant state to apply for the licences. The latter Directive required Member States to establish allocation bodies that should operate in a non-discriminatory way (except for some allowed prioritizations, for example, for public services) and that charges should also be imposed without discrimination.

In the mid-1990s it was thus the case that, other than the well-established arrangements for international cooperation, very few cross-border services were authorized. However, in 1996, following a persistent crisis in the railway sector, the need for more specific action emerged and a new white paper on a strategy for revitalizing the Community's railways was issued. It focused on the opening up of the international freight market. The arrangements of the freight sector were so bad that in 2001 the average speed of cross-border freight services still only amounted to 18 km/h (or 40 km/h). The new initiatives were thus mainly addressed at the rail freight market.

The same year, Directive 96/48/EC on the interoperability of the European highspeed network was adopted. It entered into force in 2002 with a view to enabling operators to use the systems in other Member States. The strategy was to introduce more competition and

harmonization in a new, developing segment of the market. The high speed segment encountered less reluctance concerning standardization, as infrastructure had to be created from scratch rather than adapted, making the embrace of a common approach less complicated. Interoperability, in ensuring harmonized standards for infrastructure, equipment and rolling stock, would constitute a major contribution to the transport policy in the Single Market. The Directive was subsequently amended in 2001 and 2004.

In the 2001 White Paper for European transport policy for 2010: the emphasis was placed on the need to ensure competition within and among the means of transport and to enhance intermodality. A number of structural problems were identified and the priority of opening the markets was established, not only for international goods transport, but also for cabotage and progressively for international passenger transport as well, together with harmonization for interoperability and safety. The main target for the Commission, to be achieved with a series of actions in the run up to 2010, was to create a real single market for rail transport, placing users' needs at the heart of the strategy. In order to achieve these objectives, three 'railway packages' were adopted in 2001, 2004 and 2007 respectively. The fourth package, proposed in 2013 and approved in 2016, aims to complete them.

The Railway Packages adopted

In a nutshell, the First Railway Package (2001) established the basis for the current regulatory system. It required the creation of regulatory bodies, imposed accounts separation, and opened the international freight market to competition. The second package (2004) consolidated these bases. It created the European Railway Agency (ERA) and additionally opened the national freight markets. The third package (2007) began to deal with passenger transport and opened the international passenger market. It also harmonized some aspects of passengers' rights and the certification of train drivers. Finally, the recast (2012) reinforced the first package through more separation of accounts and more independence of network management.

1. *The First Railway Package (2001)*

The First Railway Package (informally known as the 'infrastructure package') was proposed by the Commission in 1998 and adopted in 2001. It has been recast by Directive 2012/34/EU. It aimed to enable rail operators to access the trans-European network on a non-discriminatory basis, to open the international rail freight market to competition and to ensure an efficient use of the infrastructures. The Commission had the general objective of increasing competition in the rail sector, which, despite a slight growth in absolute terms, was still losing market share. The package was composed of three Directives.

The first was Directive 2001/12/EC on the development of the Community's railways. It sought to introduce a wider framework for competition among railway companies in the international freight market. This competition was limited at the beginning to the Trans-European Rail Freight Network, and at a later stage (2008, anticipated for 2007) extended to the entire network. The Directive set the requirements concerning the relationship between the state and the infrastructure manager on the one hand, and between the infrastructure manager and railway undertakings on the other hand. In particular, it singled out some essential functions, such as granting licences and deciding on allocation and charges, which could not be carried out by any entity or firm providing rail transport services. However, it still allowed vertically integrated companies to continue to operate. It required separate accounting for freight and passenger services.

The second, Directive 2001/13/EC, amending Directive 95/18, set out the conditions for freight operators to be granted a licence to operate services on the European rail network, extending the validity of licences throughout the Community. It specified that licencing bodies had to be independent from rail transport undertakings, hence they should not be service providers. The aim of the Commission, by the introduction of this Directive, was to progressively create a 'one-stop shop' to market freeways.

Finally, Directive 2001/14/EC replaced Directive 95/12 on the allocation and charging for infrastructure and safety certification. It was intended to increase transparency and ensure that charges were levied and allocation of train path was carried out in an economic and non-discriminatory way. Infrastructure managers were required to develop and publish network statements publicising all the information needed by those who were willing to run services. In addition, Member States were required to establish independent regulatory bodies in charge of overseeing the application of rules about charges, allocation, and safety certification. These bodies were meant to decide on appeals based on unfair treatment, discrimination or other grievances. Member States were to ensure that, in normal conditions, the accounts of infrastructure management at least balanced income with infrastructure expenditure, while the manager would have incentives to reduce the costs of infrastructure provision and the level of the charges. Charges were set to offset external costs, such as pollution, between modes.

A few weeks later, Directive 2001/16/EC on the interoperability of the trans-European conventional rail system was adopted, taking further steps towards the progressive harmonization of technical and operational standards across the EU. It completed the framework introduced by Directive 96/48 covering the high speed network. For the first time it explicitly took into consideration the environmental implications of the scarce use of railways (according to the Kyoto Protocol requirements), and aimed to improve compatibility between the characteristics of the infrastructure and those of the rolling stock, as well as efficient interconnection of the information and communication systems of the different infrastructures. As is stated in one of the recitals, performance levels, safety, quality of service and cost depend upon such compatibility and interconnection, as does, in particular, the interoperability of the trans-European conventional rail system. In particular, the Directive, albeit with several exceptions, allows that each of the subsystems should be covered by a Technical Specification for Interoperability (TSI), and that Member States should ensure that interoperability constituents are placed on the market only if they enable interoperability to be achieved within the trans-European conventional rail system, while at the same time meeting the essential requirements. Those interoperability constituents which bear the 'EC' declaration of conformity or suitability for use should be considered as complying.

Compliance with the first package's measures presented serious shortcomings in most of the Member States. In 2008 – the transposition period having expired in 2003 – 24 infringement proceedings were initiated by the Commission, 13 of which resulted in cases before the European Court of Justice. The main problems detected were: the lack of independence between the infrastructure managers and the railway undertakings, the inadequate regulation of national authorities and of the fixation of charges.

Although in the last part of the 1990s the railway sector underwent significant growth, it did not improve its market share, which was especially low for the passenger market. The Commission, therefore, with a view to revitalizing the railways sector and preventing it from losing further market share, launched a second railway package.

2. The Second Railway Package

Standardization lay at the core of the Second Railway Package in 2004. Composed of three Directives and one Regulation, it accelerated the liberalization of rail freight services by fully opening the rail freight market to competition from 1 January 2007. The ERA was established in Valenciennes (France) with the aim of developing safety and interoperability in the European rail system and supporting the implementation of community legislation. In addition, the package introduced common procedures for accident investigation and provided for safety authorities to be created in each Member State. A further proposal on international passenger services was ultimately not agreed upon.

The first Directive 2004/49/EC of 29 April 2004 (the 'Railway Safety Directive'), amending Directive 95/18/EC and Directive 2001/14/EC, aimed to define common safety objectives for the entire EU railway system. It requires Member States to ensure that safety rules are laid down,

applied and enforced in an open and nondiscriminatory manner, with the possibility for the Commission to suspend the implementation of national safety rules in case of serious doubts as to their compatibility with Community legislation. It creates a clear procedure for issuing safety certificates that rail companies have to acquire in order to be able to operate on the European network. In addition, it introduces the principle of independent accident investigation, which has to be conducted in each Member State by a permanent body, and sets some requirements for staff training and access to training facilities.

The second Directive, 2004/50/EC of 29 April 2004, unifies the rules on interoperability of high speed railways and of the standards system, amending Directives 96/48 and 2001/16. The scope of the provisions is extended to include the entire European conventional railway network, both conventional and high speed. It also establishes the conditions, in the form of TSIs drafted under the responsibility of the ERA, to achieve the interoperability of the trans-European railway network within the Community, with the possibility of making exceptions. Each constituent is required to have a certificate of conformity to all the relevant TSI and an identification code for safety reasons. All the identification codes should be logged in a register available for consultation by other Member States.

The third Directive 2004/51/EC of 29 April 2004, amending Directive 1991/440, provided full liberalization of freight from 1 January 2007. It has been repealed by Directive 2012/34/EU.

Finally, Regulation 881/2004/EC of 29 April 2004 established the ERA to develop railway safety and interoperability. The agency mainly drafts TSIs and addresses recommendations and opinions to the Commission. Until now, it has only been entrusted with limited powers. Since 2001, the results of the liberalization and harmonization have started to show some encouraging signals. For example, the modal share of rail freight slightly increased and the undertakings showed a growth in productivity. By 2008, one year after the full opening of the freight market, an increase in competition could also be observed, especially in those countries where the market opening process had started on an earlier date.

3. *The Third Railway Package*

The package introduced open access rights for international rail passenger services by 2010. This liberalization was extended to include 'cabotage', meaning that operators may pick up and set down passengers at any station, including those located in the same Member State. Furthermore, it introduced a 'European driving licence' for train drivers, allowing them to circulate on the entire European network. Finally, the new package aimed to strengthen passengers' rights. In particular, minimum quality standards (non-discrimination against handicapped travellers or persons with reduced mobility, liability in case of accidents, availability of train tickets, and personal security of passengers in stations) were guaranteed to all passengers on all lines, and long-distance travellers were assured a wider range of rights. A further proposal on compensation in cases of non-compliance with contractual quality requirements for rail freight services was not ultimately adopted, mainly due to pressure from stakeholders. Four measures were adopted.

The first of them is Regulation 1370/2007/EC of 23 October 2007, concerning public passenger transport services by rail and by road, repealing Regulations 1191/69 and 1107/70. It sets down the conditions under which the competent authorities were required to conclude public service contracts with the operators to whom they granted an exclusive right and/or compensation in exchange for discharging public service obligations (PSOs). The duration of public service contracts was given upper thresholds by the Regulation. It also established rules for the awarding of the PSOs by means of transparent and non-discriminatory competitive procedures which might be subject to negotiation. Low level or budget contracts were, however, exempt from these rules. Member States should provide the Commission with all the information necessary to determine whether the compensation allocated is compatible with this Regulation. Member States were meant to implement the Regulation gradually, as the end of the transition period was fixed at December 2019.

Regulation 1371/2007/EC of 23 October 2007 on rail passenger rights and obligations was the second measure, setting out minimum quality standards that should be guaranteed to all passengers on all lines. The Regulation was mainly built on the existing international law system of COTIF. It established rules concerning information, both before and during the journey, to be provided by railway undertakings, the issuing of tickets and the adaptation of computerized systems. Undertakings must be insured for their liability towards passengers in the event of an accident. On the other side, the regulation strengthens the safeguards for passengers to get compensation and assistance in the event of delay, misconnection or cancellation of a service. It also provides special rules for disabled and reduced-mobility people. Member States were allowed special arrangements for the entry into force of the provisions.

In 2013, the Commission issued a report on the implementation of this regulation. According to this report, while the protection of rail passengers has improved since the Regulation became applicable, around 61% of all national long distance services and 83% of regional and suburban services were not yet applying the full range of rail passenger rights. This was due to the fact that Member States largely opted for transitional periods and exemptions. This practice is likely to become an obstacle to the achievement of a complete rail passenger rights regime in the EU. The third measure is Directive 2007/58/EC of 23 October 2007, on market opening for international rail passenger services. It amended Directives 440/1991 and 2001/14. Member States were still free to limit the right of access related to the picking up and setting down of passengers within the same Member State where the international route was also covered by one or more national public service contracts. In addition, conditions for the grant of levies on passenger services were set. This Directive has been partially repealed by Directive 2012/34/EU, a recast of the first package.

Finally, Directive 2007/59/EC of 23 October 2007 concerns the certification of train drivers. It harmonizes train driver certification within the EU with the aim of fostering safety. It lays down the procedures for obtaining and withdrawing licences and certificates as well as specifying the tasks to be carried out by the competent authorities in EU countries. By October 2018, all train drivers should hold licences and certificates in conformity with this Directive.

2. THE CURRENT SCENARIO

Fourth Railway Package

General problems to be solved / Overview

In 2013 the European railways formed an internal market that was still highly fragmented, and the openness of the national markets varied considerably. Divergences concerning the system's efficiency and the consumers' satisfaction were also growing. Competition levels were still low and access to the market was characterized by discrimination and excessive bureaucracy. Despite being one of the most environmentally friendly modes of transport, rail only covered 6% of the passenger transport market share, and consumer satisfaction across the EU was poor.

Expected results – overview

The 4th Railway Package is a set of 6 legislative texts designed to complete the single market for Rail services (Single European Railway Area). Its overarching goal is to revitalise the rail sector and make it more competitive vis-à-vis other modes of transport. It comprises two 'pillars' which have been negotiated largely in parallel:

The Market Pillar

The market pillar will complete the process of gradual market opening started with the 1st railway package. It establishes the general right for railway undertakings established in one Member State to operate all types of passenger services everywhere in the EU, lays down rules aimed at improving impartiality in the governance of railway infrastructure and preventing discrimination and introduces the principle of mandatory tendering for public service contracts in rail. Competition in rail passenger service markets will encourage railway operators to become more responsive to customer needs, improve the quality of their services and their cost-effectiveness. The competitive tendering of public service contracts will enable savings of public money. The market pillar is expected to deliver more choice and better quality of rail services for European citizens, these being the overriding objectives.

The 'market pillar', which was adopted in December 2016, includes:

- Regulation (EU) 2016/2338 amending Regulation (EU) 1370/2007, which deals with the award of public service contracts for domestic passenger transport services by rail ('PSO Regulation')
- Directive 2016/2370/EU amending Directive 2012/34/EU, which deals with the opening of the market of domestic passenger transport services by rail and the governance of the railway infrastructure ('Governance Directive')
- Regulation (EU) 2016/2337 repealing Regulation (EEC) 1192/69 on the normalisation of the accounts of railway undertakings

The Technical Pillar

The technical pillar is designed to boost the competitiveness of the railway sector by significantly reducing costs and administrative burden for railway undertakings wishing to operate across Europe. In particular, it will

- save firms from having to file costly multiple applications in the case of operations beyond one single Member State. ERA will issue vehicle authorizations for placing on the market and safety certificates for railway undertakings, valid throughout the EU. So far,

railway undertakings and manufacturers needed to be certified separately by each relevant national safety authority.

- create a "One stop shop" which will act as a single entry point for all such applications, using easy, transparent and consistent procedures.
- ensure that European Rail Traffic Management System (ERTMS) equipment is interoperable.
- reduce the large number of remaining national rules, which create a risk of insufficient transparency and disguised discrimination of new operators.

The 'technical pillar', which was adopted by the European Parliament and the Council in April 2016, includes:

- Regulation (EU) 2016/796 on the European Union Agency for Railways and repealing Regulation (EC) n° 881/2004
- Directive (EU) 2016/797 on the interoperability of the rail system within the European Union (Recast of Directive 2008/57/EC)
- Directive (EU) 2016/798 on railway safety (Recast of Directive 2004/49/EC)

2.1. The technical pillar – ERA as an authorization body

1. Problem to be solved

The current problems can be illustrated by the enormous variations among the Member States in the fees required for the operators' safety certificates (from nothing to €70,000). The same applies to vehicle authorizations. This kind of procedure can additionally be very time consuming, taking up to two years in some cases. The amount and legal status of the human resources dedicated to this task are particularly varied. Consequently, huge assets are currently immobilized and investments are certainly not encouraged. In some cases ERTMS trackside projects are not fully compliant with the Interoperability requirements, creating problems at the level of the technical compatibility that prevents the European wide use of ERTMS equipped vehicles.

2. Expected results

- The adoption of the technical pillar is expected to increase economies of scale for railway undertakings across the EU, reduce administrative costs and speed up procedures. It should also help to avoid any covert discrimination in the issuing of safety certificates and vehicle authorizations.
- Concerning safety, the proposals also aim to ensure that risk controls are duly implemented, due to the possible worsening of these controls as a consequence of the fragmentation of the responsibilities and the recurrent recourse to outsourcing.
- According to the Commission, the proposed measures pursue a 20% reduction in the time to market for new railway undertakings and a 20% reduction in the cost and duration of the authorization of rolling stock. Overall, this is supposed to lead to a saving for companies of €500 million by 2025.

3. How to achieve these results

To put an end to the diversification of authorizations and safety certificates procedures, the proposal aims to give the ERA new powers. It would become a 'one-stop shop' issuing single (EU-wide) authorizations for placing vehicles on the market as well as single safety certificates for operators.

Also ERA will issue an approval for the ERTMS trackside project, which is a binding opinion on ERTMS trackside specification that is required by NSAs in the authorization of trackside projects.

2.2. Market Pillar

The Market Pillar of the proposed reform concerns the institutional separation ('unbundling') between infrastructure management and rail services operators. It is introduced through a proposal amending the Recast First Package Directive 2012/34. Rail undertakings, independent of infrastructure managers, should have immediate access to the internal passenger market by 2019.

1. Problems to be solved

According to the impact assessment to the proposal to amend the Recast First Package Directive 2012/34, national domestic passenger markets remain largely closed. Moreover, the great majority of domestic passenger services are not provided under a commercial basis but under public service contracts. 'Directly awarded public service contracts constitute 42% of all EU passenger-kilometres, contributing to the fact that in 16 out of 25 member States with rail, the incumbent holds above 90% market share.' Former Commissioner Kallas has also explained that, in the markets which are open, improvements in quality and availability of services have been observed, along with passenger satisfaction and growth, to rise year on year, amounting in some cases to over 50% over ten years.

Summarizing, the problems to be solved are:

- Monopolies and lack of competitiveness
- Bundling – which is perceived by the Commission and some governments as facilitating discrimination leading to the possibility that infrastructure managers, who are mainly state-owned entities, cross-subsidize the commercial activities, for instance, by diverting state funds.

1. Expected results/how to achieve them

- The fourth package proposals intend to open the access for all EU operators on all domestic passenger markets. Companies should thus be able to offer domestic rail passenger services across the EU: either by offering competing commercial services within the market, or through bidding for public service rail contracts.
- In particular railway undertakings should be guaranteed open access for the purpose of operating domestic passenger services, which comes as a major innovation.
- The proposal introduces public tendering as the general rule for the allocation of public service contracts starting from 2019.
- The proposal aims to strengthen infrastructure managers so that they can control all the functions at the heart of the rail network. To that end, it sets out all the relevant functions of infrastructure management that are to be performed in a unified way. The proposal creates a forum for the cooperation of infrastructure managers across borders, with a view to developing the European rail network. This includes cooperation on the establishment of

the core network corridors, the rail freight corridors and the implementation of the European Rail Traffic Management System (ERTMS) deployment plan.

3. How to achieve these results

The introduction of the institutional separation of the infrastructure manager from transport undertakings would operate by prohibiting the same legal or natural person from having the right to control or exercise influence over an infrastructure manager and a railway undertaking at the same time.

However, this requirement allows for a number of exceptions. For instance, Member States should have the possibility of being the owners of both legal entities, while control should be exercised by public authorities that are separate and legally distinct from each other.

This separation concept has provoked copious discussions between the stakeholders. It appears that the initial proposal on the table did not provide for the above-mentioned exceptions granting the possibility for integrated undertakings to own both sides of the rail system, though with the relevant guarantees. Bundling is perceived by the Commission and some governments as facilitating discrimination leading to the possibility that infrastructure managers, who are mainly state-owned entities, cross-subsidize the commercial activities, for instance, by diverting state funds.

Different commentators, however, maintain serious doubts about this strict approach:

- According to Roland Berger Strategy Consultants, 'both the findings from data analysis and comments by CEOs, ministry officials and experts in the study raise doubts as to whether the separation of infrastructure and transport services is the right way to increase intramodal competition and railway performance.
- For J. Drew and C. Nash, 'academic literature provides no evidence that vertical separation leads to efficiency gains although one study indicates that, if vertical separation is necessary for introducing competition, it may increase efficiency indirectly. ... The analysis shows no correlation between vertical separation and the growth in rail freight traffic or rail's share of total freight traffic (two surrogate measures of attractiveness of rail services to customers which should reflect efficiency and service quality). Indeed, if the key objective is to promote the efficiency and growth of rail freight, vertical separation may in some circumstances, particularly those in some Central and Eastern European countries where adequate government funding for infrastructure is not available, impede rail growth. Also, despite the higher passenger growth in some countries which have introduced vertical separation, this cannot be attributed to vertical separation

Anyway, it is important to notice that the Commission had already been obliged to weaken its original project. Its draft directive regarding governance was based on a strict separation between infrastructure and transport operators. Due to pressure from various sources, and especially due to the Deutsche Bahn intervention relayed by the German chancellor, this orientation was watered down in the final 2013 proposition.

2. ERA POWERS: PRESENT AND FUTURE

2.1.

3.1. Situation before de 4th RP

The ERA was established by Regulation 881/2004/EC of 29 April 2004 and was operational by mid-2006. Article 1 of the Regulation sets its objectives, which are to contribute, on technical

matters, to the implementation of the EU legislation aimed at improving the competitive position of the railway and at developing a common approach to safety on the European railway system, in order to contribute to creating a European railway area without frontiers and to guarantee a high level of safety. In pursuing these objectives, it will take account of the process of enlargement and of links with third countries.

In practical terms, the Agency was established to provide the EU Member States and the Commission with technical assistance in the fields of railway safety and interoperability. This involves the development and implementation of TSIs and a common approach to questions concerning railway safety. The Agency's main task is to manage the preparation of these measures.

In addition, the Agency acts as the system authority for the European Rail Traffic Management System (ERTMS) project, in the sense that it is responsible for the organization and the process of the control management change, ensuring the quality and completeness of the ERTMS specifications.

Regulation 881/2004/EC, which was in force before the 4th RP, did not provide the Agency with specific decision-making powers. We had the following situation:

- The ERA is in fact only entitled to address recommendations and to issue opinions to the Commission and the relevant national regulatory bodies.
- The Commission implements the recommendations through a Regulatory Committee involving the Member States.
- The Agency is conferred mandates by the Commission, namely concerning the development and revision of TSIs, common safety methods (CSMs), common safety targets (CSTs) and common harmonized requirements for safety certifications. It also cooperates with and coordinates NSAs, and monitors the overall safety performance of the railway system.

Regarding the administrative organization, the Agency is managed by its Executive Director and is provided with an Administrative Board which is composed of Commission and national representatives, and is assisted by interest-groups and a Norwegian representative. The Administrative Board adopts the general report of the Agency and its yearly work programme, adopts the budget, establishes its rules of procedure and appoints the Executive Director, over whom it exercises disciplinary authority. The Executive Director represents and manages the Agency by preparing the work programme, adopting instructions and orders, establishing a performance-assessment system, preparing a report that is submitted to the Administrative Board, appointing staff, preparing a draft statement on revenues and expenditure and implementing the budget.

2. The new proposed powers

The Fourth Railway Package and the technical pillar in particular, seek to introduce a considerable expansion in the competencies and powers of the Agency. They intend to transform it into a 'one-stop shop' mainly for the issuing of safety and interoperability-linked authorizations for the whole EU, with the aim of making it easier to access the market on an ideal common playing-field. The Agency should contribute to the creation and effective functioning of a single European railway area without frontiers, and to guaranteeing a high level of safety, while improving the competitive position of the railway sector.

1. *The proposal to recast the Agency Regulation*

According to the 4th RP, the Agency is established as a body of the Union with legal personality. The types of acts that the Agency can adopt, in addition to opinions and recommendations, are decisions – concerning safety certificates, vehicle and vehicle type authorization and approval of trackside projects regarding control-command and signaling subsystems in the tendering phase – technical documents, audit reports, guidelines and other non-binding documents. It will conduct an impact assessment of its recommendations and opinions. More specifically, the recommendations involve in particular TSIs, common safety methods that are adopted by the Commission. The Agency will set up a limited number of working parties for drawing up recommendations. When relevant, the social partners, or freight customers and passengers, will be consulted. The Commission will be empowered to adopt delegated acts concerning fees and charges in relation to the certificates and authorizations issued by the Agency.

The Agency is entrusted, with a view to their reduction, with the task of examining draft national rules and rules currently in force in the field of safety and interoperability, while the Safety and Interoperability Directives establish the procedure for their notification.

The Agency also has the task of acting as the system authority for ERTMS, maintaining its technical specifications to ensure its coordinated development in the EU. The Agency will define, publish and apply the procedure for managing requests for changes to those specifications.

One chapter of the present regulation is dedicated to the monitoring tasks of the Agency in relation to the Single European Area. In particular, the Agency should be entitled to monitor and audit the performance and decision making of NSAs, which it can also inspect.

Besides NSAs, the Agency will monitor the notified conformity assessment bodies (NoBos and AsBos) through assistance to accreditation bodies, audits and inspections.

The Agency will monitor the overall safety performance of the railway system and the improvement of the interoperability. It will also collect relevant data on accidents and incidents, with the contribution of the national investigation bodies.

A series of 'other tasks' of the Agency, provided by the 4th RP, include certification of drivers, acting as the system authorities for registers and databases, establishing networks of NSAs, investigating bodies and representative bodies in order to exchange information, promote good practices and exchange data on railway safety indicators. The Agency will be in charge of communicating, disseminating and providing training to stakeholders and information on the railway legislation, developing standards and guidance. It will contribute to research activities, and to promoting innovation. In addition, the Agency will provide technical assistance to the Commission with the implementation of the legislation and the assessment of a rail project for which EU financial support has been submitted. These 'soft tasks' already largely existed, but were strengthened by a specific legal basis.

2. Safety

The Directive (EU) 2016/798 on railway safety aims to develop the safety of the EU's railways and improve access to the market for rail transport services. It provides that the Agency will become the only body entitled to grant the single safety certificates allowing access to the railway infrastructure to railway undertakings, which should ensure a high level of railway safety and equal conditions for all railway undertakings. Safety certificates will be granted by the Agency on the basis of the evidence that the railway undertaking has established its safety

management system and meets the requirements laid down in the TSIs and in the relevant legislation in order to control risks and provide transport services safely on the network.

As far as the infrastructure managers are concerned, in order to be allowed to manage and operate rail infrastructure, they will obtain a renewable safety authorization from their NSA.

The Directive provides that each railway undertaking, infrastructure manager and entity in charge of maintenance should ensure that its contractors and other parties implement risk control measures. It largely maintains the former provisions providing for fair and non-discriminatory access of railway undertakings and infrastructure managers to training facilities for train drivers and other staff.

It also provides that each vehicle, before it is used on the network, will have an entity in charge of maintenance assigned to it and that this entity will be registered in the national vehicle register. The proposal requires Member States to lay down a series of tasks that the NSA will be entrusted with by Member States. Among them: authorizing the placing in service of the energy and infrastructure subsystems; issuing, renewing, amending and revoking safety authorizations of infrastructure managers; making sure that the interoperability constituents are in compliance with the essential requirements provided in the interoperability Directive; supporting the Agency in the issue, renewal, amendment and revocation of single safety certificates; supervising the railway undertakings; and monitoring, promoting, and, where appropriate, enforcing and updating the safety regulatory framework. NSAs will cooperate, together with the Agency, to ensure information for railway undertakings, particularly concerning risks and safety performance, is shared.

3. *Interoperability*

The Directive (EU) 2016/797 on the interoperability of the rail system within the European Union has the objective of achieving technical harmonization and facilitating, improving and developing international rail transport services within the Union and with third countries, and contributing to the progressive creation of the internal market in equipment and services for the construction, renewal, upgrading and operation related to the rail system.

The Directive provides that the Agency will draft TSIs and their amendments, along with relevant recommendations, according to a mandate conferred by the Commission, which, in its turn, should be empowered to adopt delegated acts in this regard. Each subsystem – defined as the structural or functional parts of the rail system – will be covered by a TSI. The drafting, adoption and renewal of the TSIs will take account of the opinion of the social partners and of the users.

A whole chapter of the Directive is dedicated to interoperability constituents. Member States have the responsibility to ensure that these constituents enable the interoperability and meet the essential requirements and that they are used in their area of use and are suitably installed and maintained.

Concerning the placing on the market and the placing in service of fixed installations, such as the trackside control-command and signalling, energy and infrastructure subsystems, they will be placed in service only if they are designed, constructed and installed in such a way as to meet the essential requirements, and the relevant authorization is received. NSAs have the responsibility of authorizing the placing in service of the energy, infrastructure and trackside control-command and signaling subsystems. Regarding the CCS subsystem, the Agency will grant the approval of trackside projects regarding control-command and signaling subsystems

in the tendering phase, in order to possibility the posterior approval to put in service by the NSA.

Likewise, the mobile subsystems such as the rolling stock subsystem and the onboard control-command and signalling subsystem will be placed on the market only if they are designed, constructed and installed in such a way as to meet the essential requirements.

In order to be able to place a vehicle on the market, a vehicle authorization for placing on the market must be issued by the Agency. The applicant will produce a file indicating evidence of the placing in the market of the mobile subsystem composing the vehicle, and its compatibility with such subsystems and their safe integration within the vehicle. The authorizations will be issued within a predetermined, reasonable time, and, in any case, within four months; they will be valid in all Member States, and could also concern a series of vehicles. After authorization is granted, vehicles should be registered in the European register of authorizations, kept by the Agency. Railway undertakings can only place vehicles in service after they have received the relevant authorization.

The Agency will issue also vehicle type authorizations and provide detailed guidance on how to obtain such authorization. When it issues a vehicle authorization, it will at the same time issue a vehicle type authorization.

Any vehicle placed in service in the EU's rail system will carry a European vehicle number (EVN) assigned by the NSA competent for the relevant territory, before the first placing in service of the vehicle. Each Member State will keep a register of the vehicles placed in service in its territory. The Agency will keep a register of authorizations to place vehicle types on the market.

3. ERTMS

Before talking specifically about the European Railway Traffic Management System, it is important understand what factors lead Europe to adopt this kind of solution.

3.1. Driving factors for change

1. Open procurement under competition

Procurement under open competition based on public tendering is a fundamental requirement for modern railways like for many other public sectors. In the past, this has been seriously hindered by the lack of standardized requirements and specifications especially in the signaling and control-command area.

2. Interoperability

- Operational and technical interoperability.
 - Technical Interoperability is the pre-condition for trains being able to cross the border. It will lead after a transition period (migration phase) to a simplification for the trackside and on-board equipment.
 - Operational interoperability facilities from an organizational and human resource point of view the long distance train circulation over national borders. It requires in addition to the technical standardization the harmonization of all kind of procedures, rules and regulations for the train operation.
- Track gauge - there are 6 major different versions in Europe. The standard gauge 1435mm is the most used – however 5 more are present. For instance, the Iberian gauge is 1668mm and there are plans to convert this whole network to standard gauge. Nowadays, interoperability is achieved via rolling stock with variable gauge. The Spanish train TALGO 250 is an exemple. It changes gauge while running at 20km/h.
- Clearance gauge - there are 6 major different versions in Europe.
- Power supply systems - there are 9 different kinds of electrifications in Europe.
- Control-command and signaling - From all these domains, the control-command and signaling is the most problematic, as there exist nowadays more than 20 incompatible systems. The traditional way for ensuring interoperability in this domain consisted in equipping traction units for international lines with several legacy control-command systems in parallel. The costs for this may well reach 20-25% of the total cost for a locomotive.

3. Safety and quality of conventional and high-speed train service

4. Increase of transport capacity

- More and more railways are confronted with a need for increasing the transport capacity of lines and/or nodes. As the construction of new lines and the extension of stations is expensive and time consuming, there is high

interest in exploiting the potential of modern signalling and train control technology for increasing the train density up to the physically possible limits. A key issue in this context is the passage from traditional train spacing based on fixed block sections towards moving block.

5. Reduction of life-cycle costs

- The railway market is small compared with other sectors and therefore the benefits from modern technology can only be obtained by concentrating and combining efforts for railway specific developments.
- Significant cost reductions are also necessary for operation and maintenance in the area of rail traffic management, especially for the signalling, train control-command and train communication subsystems.

3.2. ERTMS – Brief Introduction

Once we understand the context, what is ERTMS?

ERTMS stands for 'European Railway Traffic Management System'. It is a control, command, signalling and communication system. It is a software based system for the railway management and safe regulation. It was adopted by the European Union as a standard, allowing an interoperable rail frame in Europe. ERTMS is not the same as ETCS, ERTMS is composed of ETCS and GSM-R.

- ETCS (European Train Control System), is an automatic train protection system (ATP) that continuously ensures that the train does not exceed the safe speed and distance. In addition, it provides the relevant information to support the task of the train driver.
- GSM-R (Global System for Mobile Communications - Railways), GSM-R is a dedicated radio communication system for voice and data services supporting railway operations.

How does the ERTMS work?

The ERTMS is composed of two subsystems: trackside and on-board, and in order to make it function, both the infrastructure and the train must be equipped.

In the ERTMS system, the ERTMS system installed on trackside and the ERTMS system installed on the vehicles exchange information. This information allows the ERTMS equipment installed onboard the vehicles to continuously supervise the maximum speed allowed for operation and to give the driver all the necessary information to operate with cab signalling. This includes the means to establish voice services.

What are the basic functions of ERTMS?

The basic functions of ETCS would include: management of the movement authorities that trackside sends to the trains, supervision of the most restrictive speed profile depending on fix/variable information. The GSM-R would include voice and data services. Voice services includes functionalities as group calls, emergency call and other railway specific applications.

ERTMS – Potential Benefits

Benefits for Infrastructure Managers

- Safety Increase;
- Higher speeds;
- Higher capacity on lines;
- Potential maintenance cost reduction;
- High reliability rates (punctuality);

Benefits for Railway Undertakings

- Uniformization of the onboard signaling system;
- An easier and quicker certification and approval process for onboard equipment;
- Removal of `signal borders`;
- Less time lost at borders due to formalities.

Benefits for Infrastructure Managers

- Reduction of investments on signaling systems equipment (due the increase of scale and competitiveness).

Benefits for Society

- Safety Increase;
- Gradual shift to rail (a greener way of transport).

Benefits for the Railway Sector

- Increase of the competitiveness in the sector;
- Decrease of the complexity of the onboard signaling equipment;
- Facilitation of the implementation of the interoperability master plan.

ERTMS – Problems with its implementation

Past problems

- Lack of political support by the Member States;
- Immaturity of the system;
- National technical requirements (NTR`s).

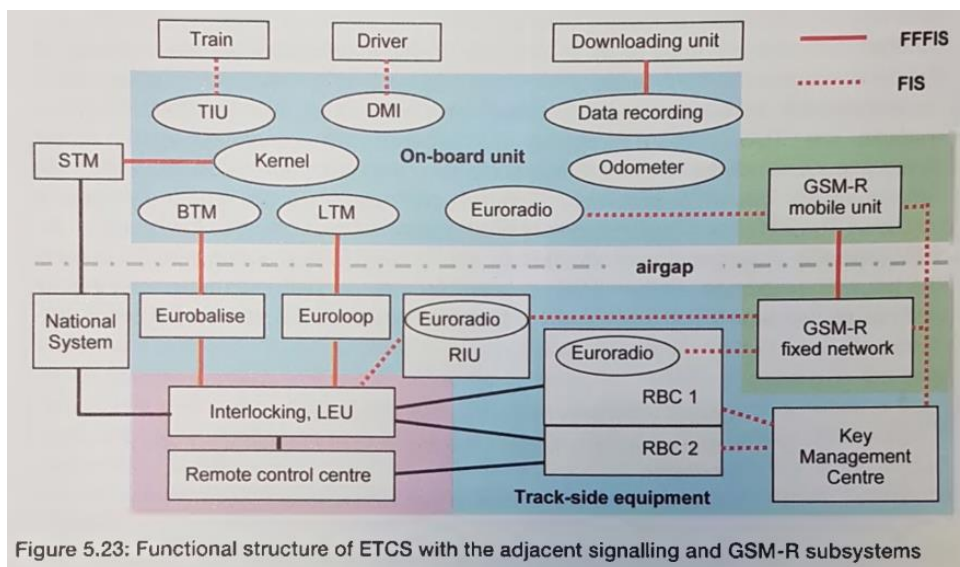
Current problems

- Financial means, provided by the Member States, are not sufficient;

- Therefore EU contribution plays an eminent role (The amount made available so far to ERTMS under the 2007-2013 programming period is € 770 million distributed over 5 calls);
- Problems with ETCS suppliers
 - The European industry requests very high costs for equipment delivery and engineering
 - The costs of marginal software changes are too high as well.
 - None of the suppliers is able to deliver their products on time. Delays in delivery are additional costs for the Railway undertakings and infrastructure managers.
- Problems with NSA's
 - Authorisation costs linked to the deployment of ERTMS are too expensive, both in terms of infrastructure and in terms of on-board equipment.

3.3. ETCS System description - ETCS Multi-level system architecture

3.1.1. General



- TIU – Train Interface Unit
- DMI – Driver Machine Interface
- BTM – Balise Transmission Module
- LTM – Loop Transmission Module
- LEU – Line-Side electronic Unit
- RBC – Radio Block Centre

- Eurobalise – U.d. interm. trans.
- Euroloops – U.d. s.c. trans.
- Euroradio-interface – link ETCS with GSM-R for bi-directional continuous data trans.

3.2. Levels

Why levels?

- Great variety of configurations in the signaling equipment

Which levels?

- Levels 0, STM, 1, 2, and 3.

3.2.1. ETCS Level 0

- ETCS Equipped trains;
- ETCS non equipped lines (or national systems, or yet lines with ETCS in comissioning)
- Line-side signals – movement authorities
- Active ETCS functionalities:
- Indication of train speed; supervision of the maximum speed; Reading of Eurobalises.

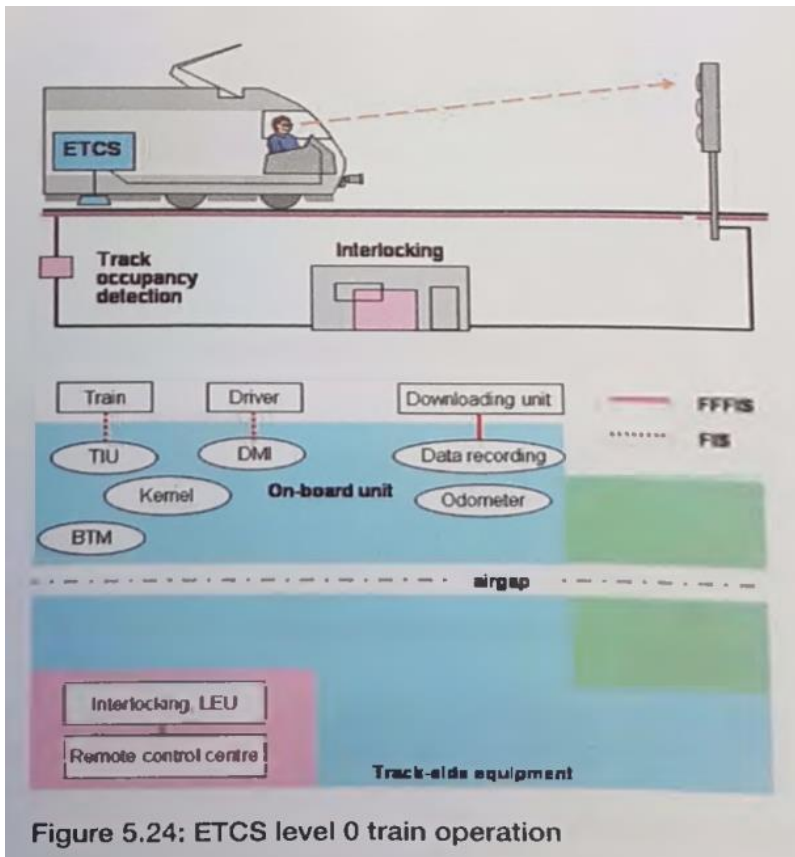


Figure 5.24: ETCS level 0 train operation

3.2.2. ETCS Level STM

- ETCS Equipped trains;
- Lines equipped with legacy national CCS
- STM – Specific Transmission Module
- One STM per each legacy system
- Level of supervision is similar to the one provided by the underlying legacy system
- ETCS track-train transmission only to announce or command level transitions (by read of Eurobalises)

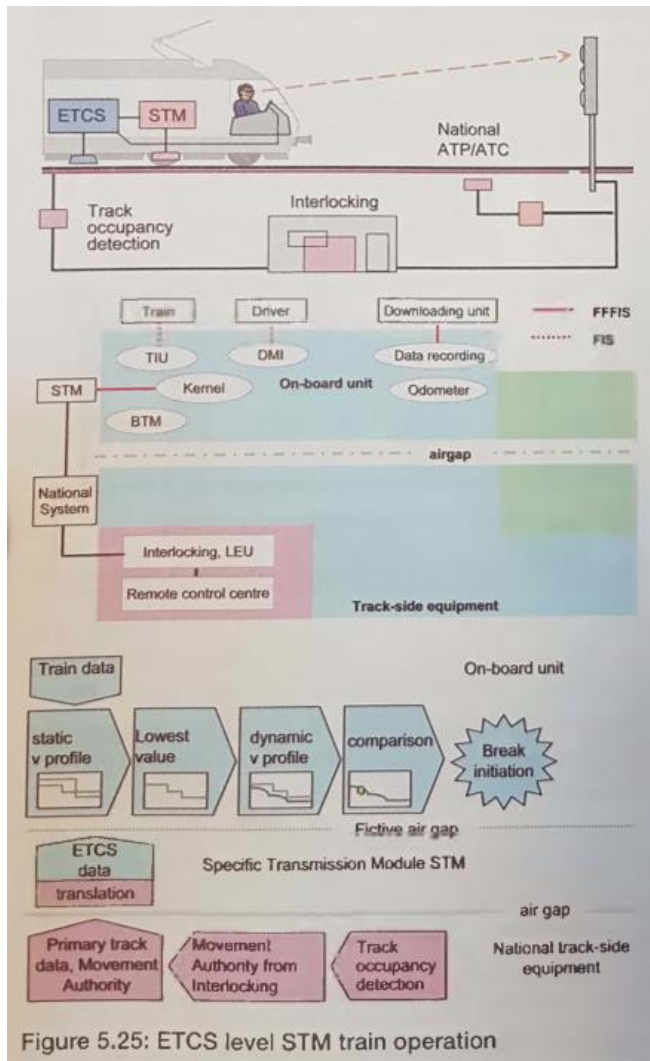
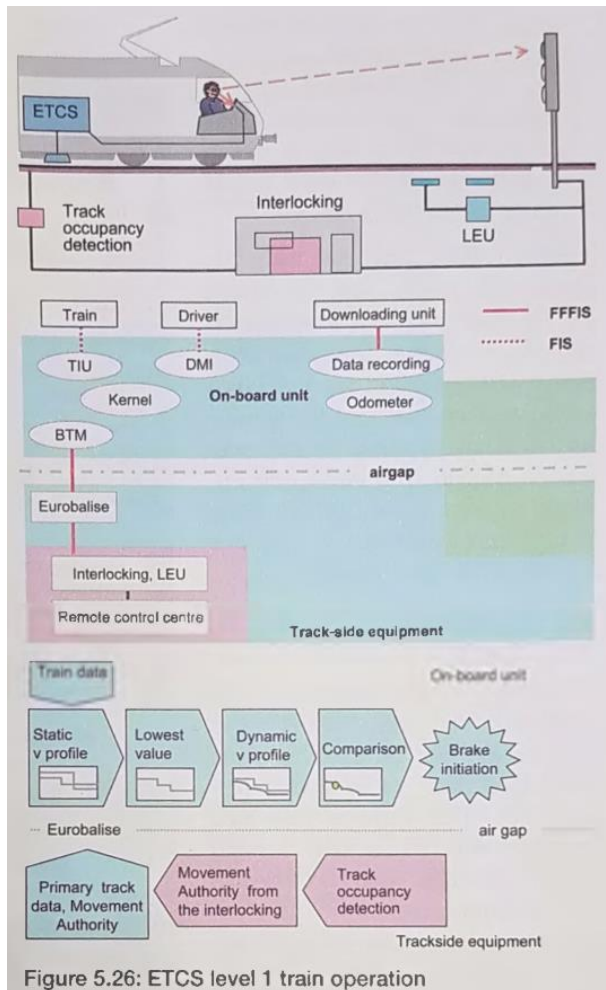


Figure 5.25: ETCS level STM train operation

3.2.3. ETCS Level 1

- ETCS Equipped trains;
- ETCS overlaid to the traditional signalling equipment
- The trains position is still detected by traditional TS occupancy controlling devices which are linked with the interlockings
- Line-side signalling is kept
- Data is transmitted from track to trains by means of Eurobalises (only this type is activated at this level)
- Balises are needed at the beginning and end of each supervised line section (minimum)



3.2.4. ETCS Level 2

- Line and Train equipped
- Data transmission: GSM-R and Eurobalises
 - GSM-R – the interlocking reports the status of the objects controlling the routes of the trains to the RBC (Radio Block Centre)
 - The RBC generates the correct movement authorities for the different trains in the section;
 - Eurobalises – calibration of the odometry and transmission of fixed infrastructure data to the trains.
- Line-side signals are no longer necessary
- Traditional block control with TS occupancy proving devices is still kept

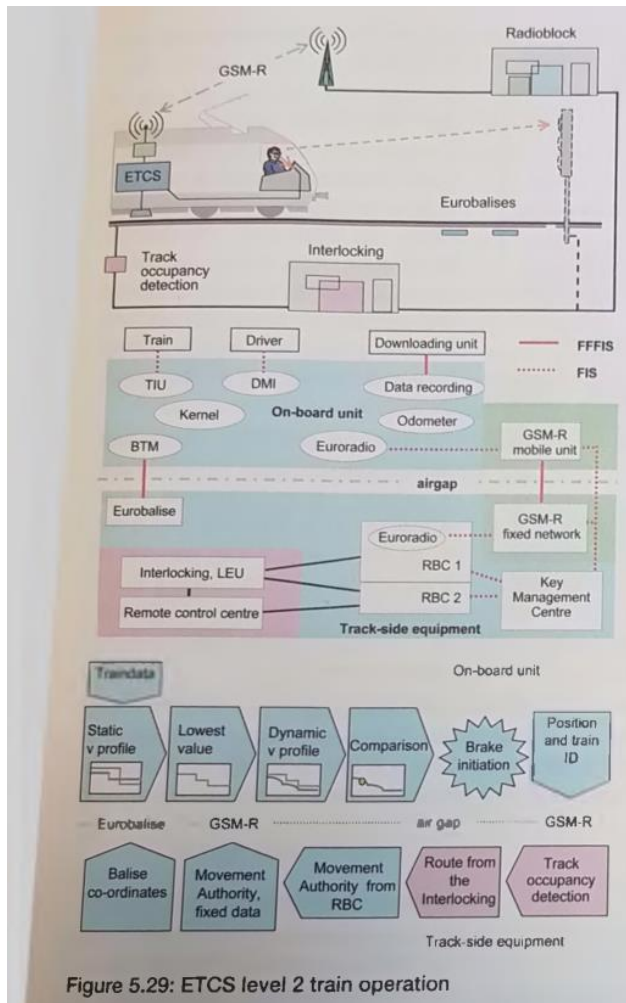
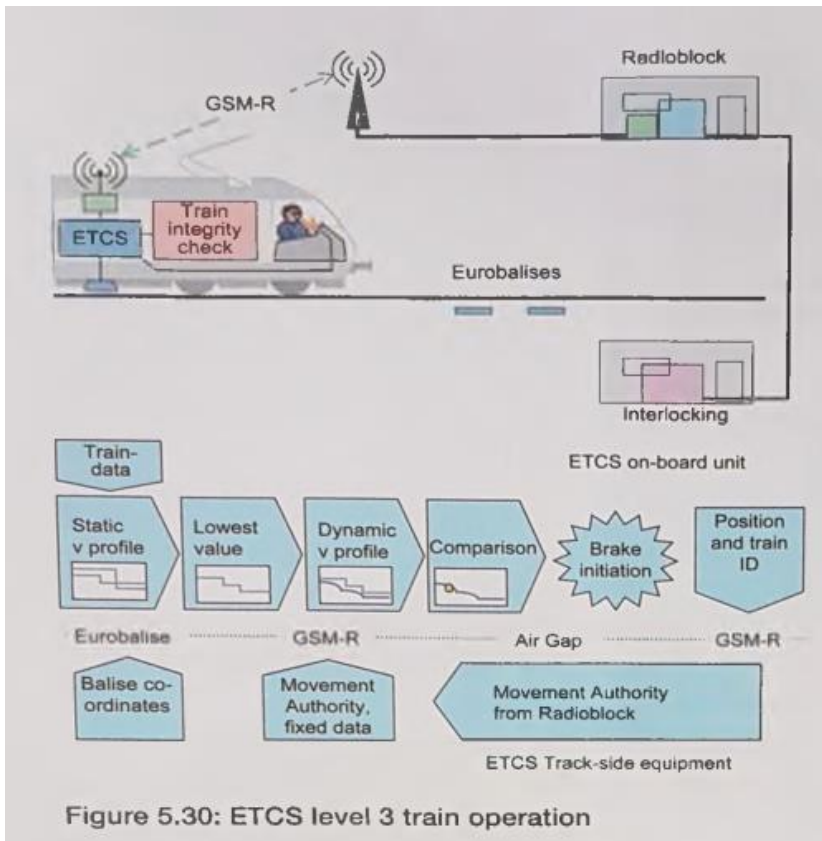


Figure 5.29: ETCS level 2 train operation

3.2.5. ETCS Level 3

- There's no TS equipment, but Eurobalises
- Location of the train – odometry, corrected by balises and reported to the TS RBC via GSM-R.
- The completeness of the train is checked by a technical device on the train
- Moving blocks - RBC receives positioning of each train continuously and calculates smallest possible train distances at any time
- Although the precision of the location of the train will depend of the distance between the balises
- ETCS L3 is currently still under standardization



3.2.6. Transitions between the ETCS levels

- Downwards compatibility principle
- Upgrade allowed:
 - Level 1
 - Level 2 – level 1 + radio transmission part
 - Level 3 – level 2 + train integrity supervision device

