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Creating a comtetive signalling maintenance market in Finland

Zum Titelbild:
Begegnungen zwischen Personen- und Güterzügen in mehrgleisigen Einröhrentunnel wie auf den alten Schnellfahrtstrecken sind nicht restriktionsfrei erlaubt. Ein Konfliktwarnsystem, das jetzt im Pilot getestet wird, soll dies ausschließen.
Foto: C. Müller

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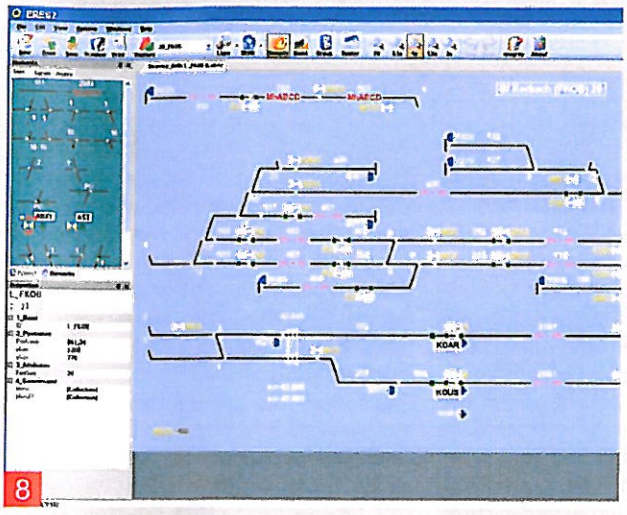

A competitive signalling maintenance market – Finnish practices and experience

Aki Härkönen

The Finnish Transport Agency (FTA) is the government agency responsible for the infrastructure management of the state rail network. Since 1995 track maintenance, including signalling maintenance, has been fully outsourced. The process of competitive bidding has led to a functional market and two domestic companies – VR Track Oy and Destia Rail Oy – currently divide the market between them. FTA has adopted a cloud computing solution for decentralized spare parts management and entered into maintenance support agreements (MSAs) with original signalling suppliers in order to facilitate fast corrective maintenance.

1 Signalling maintenance on Finnish railways

As Finland joined the European Union in 1995, the traditional integrated railway organization, the so called State Railways, was corporatized into railway undertaking VR Group Ltd and other companies. Simultaneously a new government body, the rail infrastructure manager, then the Finnish Rail Administration (RHK), was founded as a lean purchasing organization without its own planning, constructing or maintenance staff. Since 2010 the Finnish Transport Agency (FTA), which is a merged organization combining the headquarters tasks of the former Finnish road, maritime and rail administrations, has been the rail infrastructure manager responsible for the state owned rail network, including signalling infrastructure. The maintenance of the transport routes owned by the Finnish state is now managed within the Maintenance Sector of FTA. In this article, the term "maintenance" refers to the totality of preventive and corrective first line basic maintenance, which is detailed in the framework agreements managed by FTA, but excluding major renewals and overhauls requiring significant investments. Maintenance is 100% outsourced to external contractors.

Since day one of the division, the Finnish rail infrastructure manager FTA (and its predecessor organization RHK) have completely outsourced signalling maintenance to the external maintenance contractors. Now in 2011 one can look back on the 15 years of outsourced signalling maintenance and subsequent developments in the marketplace.

During the first five years after division, the priorities of FTA were not on the maintenance side, and signalling maintenance was contractually agreed to be carried on by the state owned rail infrastructure organization, which as a limited liability company now is known as VR Track Oy (VRT). It took yet another five years of symbiotic mutual development of signalling maintenance practice between RHK and VRT until the time was ripe to have competitive bids for rail maintenance including signalling.

In the Finnish strategy for a competitive rail maintenance market, which was drafted in the early 2000s, the rail network was divided into 12 separate rail maintenance areas (Figure 1). Initially the rail maintenance contracts included three main areas of maintenance, i.e. the signalling, the track and the electrification for traction. It was desirable to have only maintenance contractors whose corporate culture was solidly rooted in the railways, and therefore only companies able to commit to the totality of the three main maintenance areas were accepted, although they were allowed to use subcontracting with named companies.

The competitive bidding for rail maintenance including signalling was launched in 2005 as the three northernmost main-

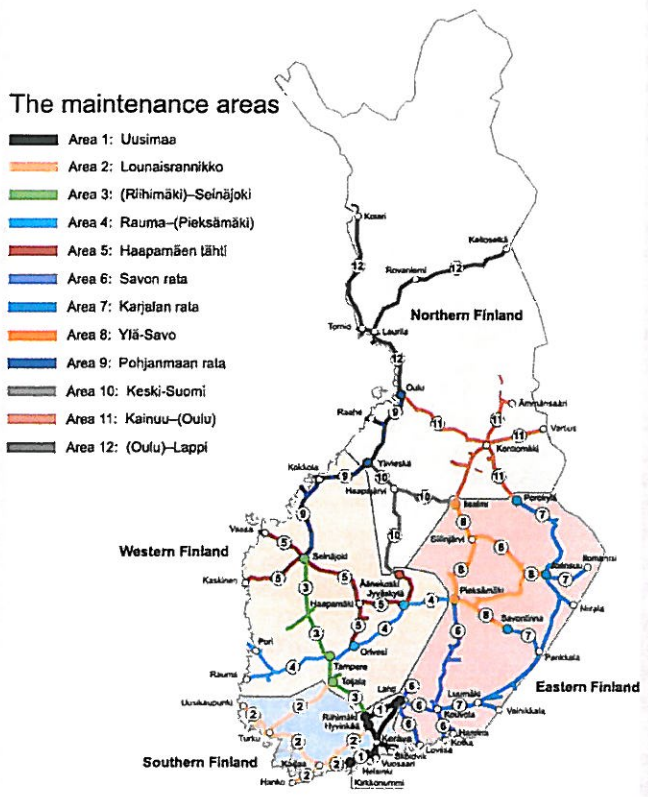

Figure 1: The maintenance areas for track and signalling maintenance, which are geographically divided, taking into account local signalling systems

tenance areas (10...12) started the process. The first round of competitive bidding became even more dramatic as the incumbent maintenance organization, which at that time held 100% of the maintenance market, failed to deliver its bid in due time, delaying seven minutes. Due to the delay its bid could not be accepted and the companies entering into the maintenance market had an easy opening to the market, which in practice has quite high barriers to entry. The three winning companies at that time operate nowadays under the two companies named Destia Rail Oy and Eltel Networks Oy. The three companies each had one maintenance area and others worked for each other as subcontractors. The signalling maintenance in all three areas was delivered by Eltel Networks Oy.

2 Maintaining a diversified installed base of signalling systems with know-how

Finland has a wide range of signalling systems (Figure 2) in use, ranging from free-wired relay interlockings to the most advanced electronic ones. This is challenging in all aspects of signalling maintenance, especially in terms of individual know-how. Signalling electricians deeply knowledgeable in maintaining relay interlocking are necessarily not as adept at repairing failures in electronic interlockings. Computer proficiency and ability to perceive functioning of the complex systems are talents that are not equally distributed. In practice, the individual capabilities of signalling electricians vary more in the area of electronic interlockings in comparison to the previous technological system generations. However, signalling maintenance companies fostering a culture of continuous organizational learning and rigorously emphasizing the importance of individual know-how of signalling electricians in their incentive schemes can create a staff with high competence levels.

When signalling maintenance is put out to tender, at the latest then the question arises of who is capable and qualified to perform the task with sufficient quality and without compromising safety. In Finland all work related to electrical equipment is regulated by national standards for electrical works. Sufficient knowledge of railway processes and specific product knowledge for the object infrastructure are supplementary standards that must be met. Additionally, vocational qualifications for rail signalling infrastructure are also commonly available, so there is a functioning labour market for highly qualified electricians capable of fulfilling all the requirements for signalling maintenance.

FTA follows the principle that when a signalling maintenance contract has been awarded to the winning company, the signalling electricians in that area will have product specific maintenance education for typical electronic interlockings in the area. As the contract period lasts five years, this forms the longest interval for individuals between attended signalling maintenance courses.

During the era when signalling systems were purchased, installed and maintained in-house, and when the maintenance staff had a long career perspective and organizational commitment to job continuation, labour unions grew powerful in their position. Working time requirements, perks and benefits gradually became favourable and only loosely tied to individual performance. This led to disadvantages in terms of competitiveness, and labour unions have more recently been persuaded to rethink their resistance to the more flexible use of the workforce.

3 Enabling factors for successful competitive bidding for signalling maintenance

Successful competitive bidding for signalling maintenance has had a few sig-

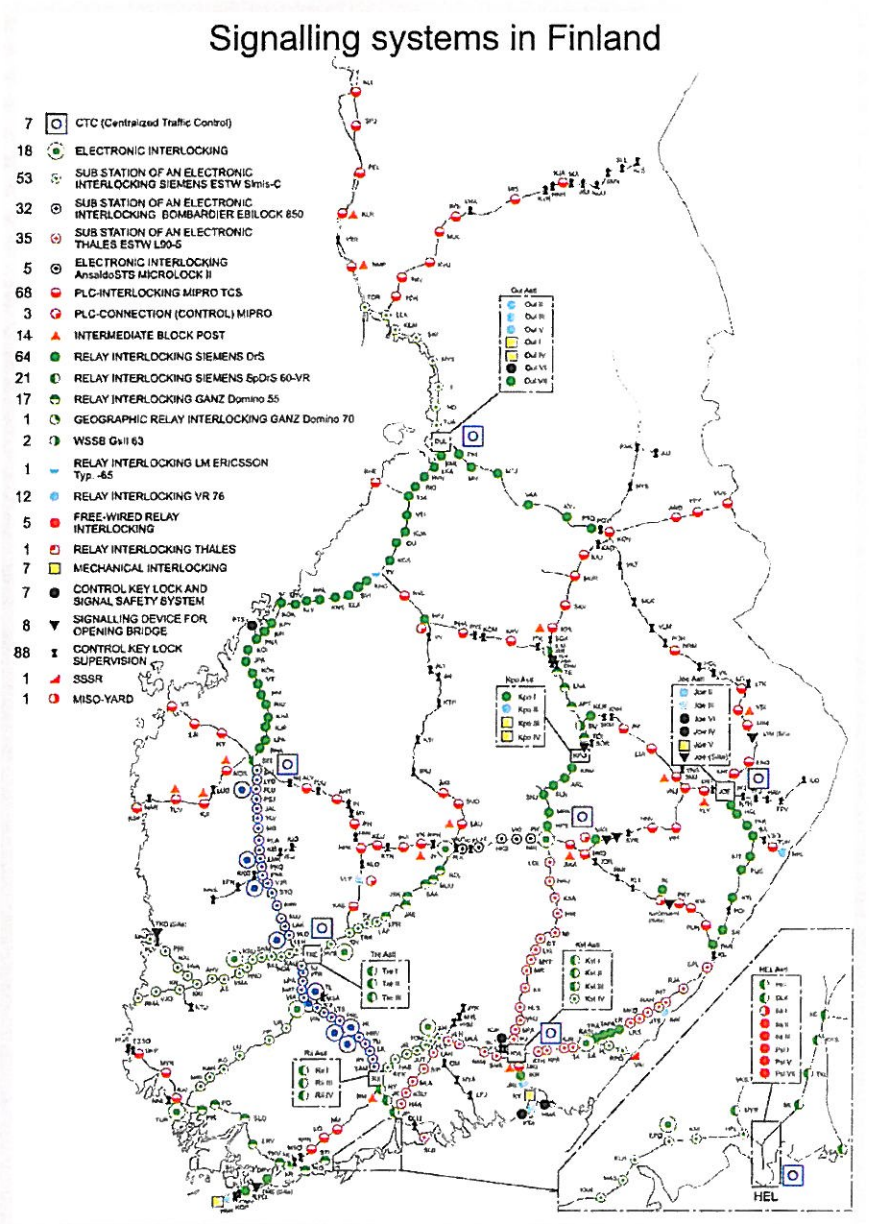

Figure 2: Signalling systems in Finland in 2010

nificant enabling factors. First is the network wide management of signalling spare parts and centralized services of spare parts restoration. Second is the collaborative relationship in product lifecycle management [1] between infrastructure manager, signalling suppliers and maintenance contractors, and especially the maintenance support agreements (MSAs) with original signalling suppliers, which allows the infrastructure manager to have the expertise for technical support in difficult cases where maintenance contractors cannot solve the case by themselves. These two main factors are covered in detail below.

There are also other factors which have positively contributed to the successful competitive bidding process. It is obviously beneficial that all signalling maintenance had previously been fully outsourced when the rounds of competitive biddings started and the infrastructure manager did not have any in-house maintenance production to protect from competition. Also, the strategy of combining the track and signalling contract into one tender helped the infrastructure manager to attract bidders who have sufficient railway background. The strategy also prevents an excessive need for detailed definitions of contractual borders between track and signalling maintenance, which might call for laborious intermediating actions by the infrastructure manager. As FTA is a lean purchasing organization, the work for preparing the tendering materials has also been largely outsourced to outside consultants, who can devote full resources to preparing them. This allows the civil servants at FTA to concentrate on the strategic issues of tendering, while leaving the detailed work for the bidding project.

4 Management of spare parts

Spare parts are essential in signalling maintenance and their cost is key to the profitability of the contract. When competitive bidding started, FTA wanted to abolish unnecessary cost drivers, which arise from uncertainties and difficulties in cost estimations by the bidders. Usage of spare parts is one such uncertain cost driver. Therefore, instead of having the spare parts consumption included in the fixed price of the maintenance contract, the spare parts were removed from it and their cost was assumed by FTA on top of the contractual price.

Spare parts management was originally part of the network wide maintenance contract, but gradually as the rounds of competitive bids and new regional maintenance contracts reduced its scope, spare parts management became regionally decentralized. Signalling spare parts are typically parts that have only one supplier, the original manufacturer. Their delivery times can also be lengthy, therefore anticipating the future need for spare parts and making provisions for their stockpiling has become more complicated with regional maintenance contracts. If the amount of spare parts is optimized for each of the 12 maintenance regions, the stockpiles may grow too large, but if parts are not available when needed, system failure times may become unacceptably long. As an answer to network wide optimization of spare parts and as a solution for having an overall view of the inventory of signalling spare parts, FTA has developed and adopted a simple software application for network wide spare parts management, based on cloud computing. Using a normal internet browser the signalling electricians can in a decentralized manner search and update spare parts inventory information as they use spare parts.

Practices in spare parts storage vary between regions in Finland. In some areas the local maintenance contractor prefers having decentralized storage and distributes the spare parts along the lines in signalling facilities in order to have a fast access to parts, whereas others have chosen a more centralized model. FTA has also agreed with signalling suppliers different models for national buffer storage of spare parts, a typical solution being the so called return and replace service, where maintenance contractors can swap defective parts for new ones.

As modern signalling spare parts have become a combination of hardware and software, it is often most productive to allow the original supplier to download the proper software into the spare part. Such software parameterizing may occur only rarely, and it is not cost-effective to train all signalling electricians to perform it.

Repairing and restoring is economical especially for relay interlocking spare parts. To ensure high quality, a critical mass of parts for sufficient work load and committed personnel, it is beneficial to centralize repairing and restor-

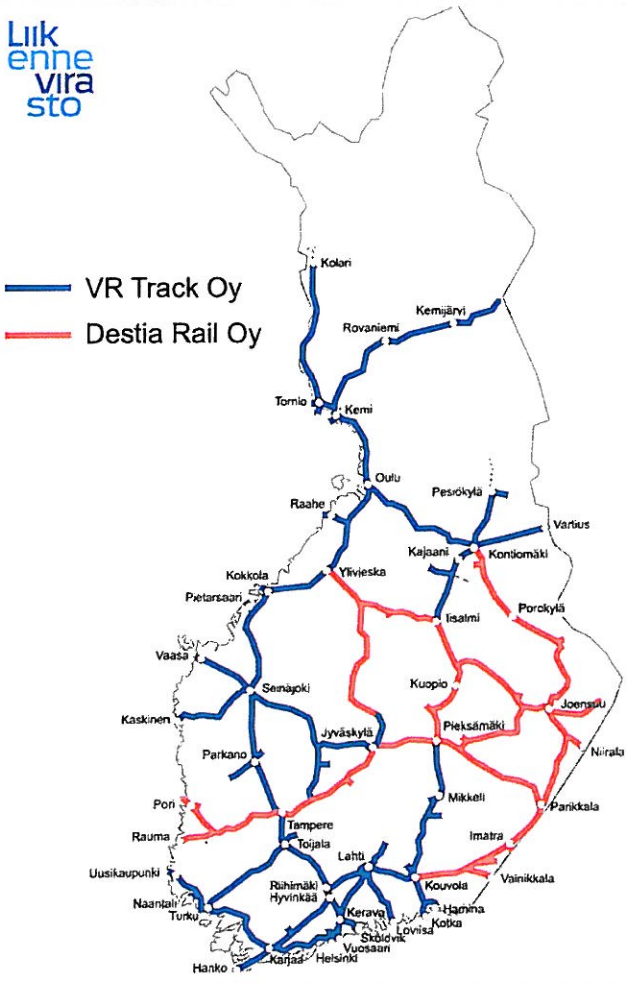

Figure 3: Geographical market shares of the two maintenance companies, VR Track Oy and Destia Rail Oy

ing of spare parts. Original suppliers of spare parts may also offer similar services. Centralized services can provide for planned and systematic overhaul of spare parts as preventive maintenance, helping to reduce the need for corrective maintenance.

5 Maintenance support agreements with original signalling suppliers

Modern signalling systems that utilize programmable logic controllers (PLCs) or electrical interlockings based on software applications can be demanding to maintain. Signalling electricians must be able to utilize the toolboxes of the telecommunications engineer and software programmer in their troubleshooting and corrective maintenance tasks. As the signalling electricians need to be jacks-of-all-trades in maintenance rather than system specialists of individual products, there are practical limits to the tasks they can be expected to perform with high quality without any compromises on safety. Just as one cannot expect Michelin star haute cuisine from a street corner pizza chef, so one cannot expect software debugging skills from every signalling electrician.

Maintenance Support Agreements (MSAs) have proven to be essential in enabling fast and smooth corrective maintenance in difficult cases where the maintenance contractor cannot independently solve the problem without support by the signalling supplier. When infrastructure manager and original signalling supplier reach an agreement on services provided and mutually formulate a MSA, they can cover any deficiencies a local maintenance contractor may have in the practical skills of its staff. In a typical MSA, the signalling supplier provides the local maintenance contractor at least with help desk support via phone, remote access for system diagnostics and yearly surveys of signalling premises. With the resources reserved by the MSA, the signalling supplier can thus flexibly offer technical assistance to the maintenance contractors.

The authors

Aki Härkönen, MEng, MIRSE,
Head of Control and Safety Systems,
Finnish Transport Agency (FTA)
Address: P.O. Box 33, FI-00521,
Helsinki, Finland
E-Mail: aki.harkonen@fta.fi

For the infrastructure manager a MSA is like an insurance policy, which enables it to have technical expert reserves that can be mobilized in exceptional circumstances. First line maintenance by the local maintenance contractor should be able to handle most of the troubleshooting and corrective maintenance independently, but when there is support available, the threshold for asking help from signalling supplier becomes lower and problems are solved in a speedy manner without excessive train delays. The Finnish experience with utilizing MSAs with many signalling suppliers shows that the services are not misused to transfer tasks belonging to the maintenance contractor to the signalling supplier. Instead, in most cases the first line maintenance performs the corrective maintenance without any support under the MSA.

The MSA also offers the three stakeholders –infrastructure manager, signalling supplier and maintenance contractor – a forum for constructive mutual development. In tripartite sessions or in pairs, they can review past experience and discuss lessons learnt, and ultimately find ways of improving the maintenance practices. Yearly reporting of the MSA activities also forms a basis for collaborative product lifecycle management [1], where the parties can plan future actions needed to ensure full safety, functionality and maintainability of the systems.

6 Competitive signalling maintenance market in Finland

In 2011 all but one of the signalling maintenance areas in Finland have been at least once subject to competitive bidding, and in North Finland twice. Only the southernmost area (No. 1 Uusimaa, Figure 1) has not yet been through the process, but its turn will come in 2012.

For each round of competitive bids so far there has been more than one bid, often so that two front running bidders have a neck and neck race and winning can only be ensured by aggressive pricing methods. As the maintenance model has gradually been refined and has become well known in the marketplace, the price aspect has been growing in importance.

Currently the competitive signalling maintenance marketplace in Finland has two successful companies, namely VR Track Oy and Destia Rail Oy (Figure 3). Ironically, they both are fully state owned companies, so that currently state owned companies compete fiercely for government maintenance contracts. Private companies, regardless of their foreign or domestic background, of course have equal opportunities to participate, but the size of the market with its linguistic, geographical and technological characteristics has so far led to this market duopoly. In 2009, FTA even promoted its maintenance market at the Nordic Rail trade fair in Jönköping, Sweden. It also has published brochures to describe its open market tendering [2] and published its schedule for competition for each region years in advance in order to allow companies to have sufficient time to prepare their participation.

The process of rounds of competitive bidding has reinvigorated all the partners in seeking ways to economize and optimize signalling maintenance. In the process, FTA has gained more maintenance with less money, but as the required level of maintenance has also been raised somewhat, the focus has not been in finding lowest possible costs. The Finnish experience shows that creating a competitive signalling maintenance market has taken approximately 10 years and that in the process all the partners have grown in professionalism. As painful as losing a bid can be, it creates Schumpeterian creative destruction and prepares the way for a more competitive organization in the future. Without jeopardizing safety, signalling maintenance can be outsourced and a market for it can be created.

LITERATURE

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[2] Finnish Rail Administration: Become a service provider or contractor in Finland's rail network. RHK publications, 2008

ZUSAMMENFASSUNG

Wettbewerb auf dem Markt der Signalinstandhaltung – finnische Verfahren und Erfahrungen

Die finnische Transportverwaltung FTA ist die für die staatliche Eisenbahninfrastruktur Finnlands verantwortliche Behörde. Seit 1995 ist die Eisenbahninstandhaltung inklusive der Wartung der Leit- und Sicherungstechnik vollständig ausgegliedert. Der Prozess der Ausschreibung hat zu einem funktionierenden Markt mit den zwei Firmen VR Track Oy und Destia Rail Oy geführt. Die finnische Transportverwaltung hat eine DV-Anwendung für das Management der LST-Ersatzteile und Verträge mit den Herstellern der Leit- und Sicherungstechnik, um eine schnelle korrigierende Instandhaltung zu ermöglichen.