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MINISTRY OF TRANSPORT AND COMMUNICATIONS

LETTER
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Ministry of Transport and Communications of Finland

European Commission
DG for Mobility and Transport

Finnish report on the implementation of the ITS-Directive

Enclosed is the Finnish 2025 national report concerning the implementation of the ITS Directive and of the delegated acts adopted on the basis thereof. The report also contains an analysis of the main national activities and projects that Finland has initiated regarding the priority areas as well as the availability of data and services listed in Annexes III and IV of the ITS Directive.

This report has been drafted on the reporting template as validated in the Annexes of the Commission Implementing Decision C(2024) 7744 final, 11.11.2024.

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Attachments Finland's implementation report 2025 on the implementation of the ITS Directive

Directive 2010/40/EU Implementation Report 2025 *Finland*

14.3.2025

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1. INTRODUCTION

1.1. General overview of the national activities and projects

The administrative sector of the Ministry of Transport and Communications in Finland consists of the following authority and organisation roles, which are referred throughout this progress report.

Ministry of Transport and Communications is responsible for overall policy and planning in the transport and communications sector. The ministry prepares the political and strategic guidelines and legislation for its administrative branch in line with the Government Programme. The ministry provides guidance for the sectoral agencies.

Finnish Transport and Communications Agency Traficom ("Traficom") is responsible for licence, registration and supervisory matters in the transport and communications sector, including approval matters related to vehicles and transport services. Regarding the implementation of the ITS Directive and its delegated regulations, Traficom as the National Body reports to the Ministry of Transport and Communications. Traficom is currently also responsible for the National Access Point for Delegated Regulation 'a', mainly due to the national legislation.

The Finnish Transport Infrastructure Agency ("FTIA") is responsible for developing and maintaining the state-owned road network, the railways, and the waterways, including maintaining the level of service of transport. FTIA operates in the planning of transport systems as the primary partner of local road authorities, regional councils, municipalities, urban regions, and other stakeholders. FTIA is the owner of national infrastructure databases including Digiroad, which is the database containing the static road data under the delegated regulation 'b'.

Traffic Management Company Fintraffic Ltd ("Fintraffic") is responsible for providing traffic control and management services as well as collection, management and use of traffic control data. The company is a state-owned group with special assignment operating under the ownership steering of the Ministry of Transport and Communications. Fintraffic has formed a strategic partnership with FTIA through which most of its investments and operations are funded. Fintraffic is responsible for maintaining the National Access Point (Digitraffic) for Delegated Acts 'b' and 'c' containing dynamic road and traffic information. The company has four subsidiaries with responsibilities of traffic management on the roads, rails, air and sea. For clarity, the name Fintraffic is used throughout this report when referred either to the company Fintraffic or its subsidiary Fintraffic Road Ltd responsible for road traffic management. Fintraffic owns and operates the road traffic management centres and roadside ITS infrastructure.

The Finnish Meteorological Institute ("FMI") makes observations and research on the atmosphere, the near space and the seas and provides services on weather, sea, air quality, climate and near space for the needs of public safety, business life and citizens. FMI is an administrative branch of the Ministry of Transport and Communications.

Fintraffic set up a national traffic data ecosystem in 2021 to foster opening, sharing and re-use of traffic and transport system related datasets and to build new business opportunities and operational efficiency to the transport sector. The ecosystem has organised its work under several working groups and has also published a common traffic data ecosystem rulebook which creates a contractual framework that will facilitate data sharing and building of mutual trust within the traffic sector. The Rulebook is a tool for sharing increasing quantities of data either free of charge or for a fee, as agreed jointly. In practical terms, this will improve

confidence in data integrity, quality, security, operator identity, operator roles and terms and conditions of use.

The reporting period in this report has been set to projects and initiatives that have been started between the previous report (October 2023) and the end of the year 2024. The report also provides general information on the more established elements such as NAPs that have been in operation for a longer period.

There are several key initiatives accomplished during the reporting period, many of which take a holistic approach towards development of safe and sustainable society, while simultaneously promoting efficient utilization of digitalisation. The most important initiatives are presented below.

Finnish national transport system plan (so called "Traffic 12 plan") is a strategic plan for the development of Finland's transport system. The preparation of the plan is based on the Act on the Transport System and Roads (503/2005). The Ministry of Transport and Communications has recently prepared a draft for the next period of 2026-2037, which is currently opened for stakeholders' review and comments until 5th of March 2025. Regarding traffic management, the basic funding level shall be ensured to facilitate further development or increased scope of operations. Consequently, the objectives include improved prevention of incidents and accidents, improved traffic flow, and more efficient use of existing network capacity. The guiding planning principle in the plan is so called "four step principle" which prioritises activities that affect the transport demand and efficient use of existing transport infrastructure over major investments to new infrastructure (including the use of ITS).

Furthermore, decrease of emissions and enhanced response to the needs of automatization and digitalization are among the objectives. Regarding the development of travel chains, the focus is on data and development of travel nodes. By utilizing data, end-user-oriented passenger information and ticketing services can be developed, aiming to improve especially the service level of sustainable modes of transport. Successively, digitalization can also promote creation of new mobility and transport services. Furthermore, Fintraffic, together with public authorities and business operators, promotes the utilization of information to obtain improvements in the quality of timetable and route information, while aiming to ensure nationwide coverage of the information. Municipalities and other regional actors organising public transport (public transport authorities, market-based transport operators) will continue to cooperate to improve the interoperability of ticketing and payment systems. The state (Traficom) will support the development of interoperability by clarifying the principles of ticketing cooperation. For freight transport services, the state promotes operating opportunities of companies for example by facilitating the use of information and preparing for possible disruptions.

The Traffic 12 plan also provides a separate chapter for the development of traffic system Digitalisation. The state shall create a common and centrally managed information management system for the development of transport asset management, traffic management and transport services within the administrative sector of the Ministry of Transport and Communications. At the same time, the State shall promote the national implementation of interoperable, scalable digital solutions and standardized operating methods utilizing common standards. The long-term goal is to create a real-time digital copy of the transport system (digital twin). Regarding transport system automatization, the aims include human-oriented development and utilization of automation, better utilization of information from automation perspective, and enabling of regulation. Road traffic automation trials should focus on development of new service and business models but supporting measures to facilitate the automatization are also needed.

Strategic land use, housing and transport agreements (MAL) for years 2024-2035 have been agreed between the State of Finland and the largest urban regions during 2024. The agreements provide guidelines for sustainable transportation and land-use policies in the long term, while prioritising key measures and projects in the short term. The regional MAL-agreements mainly focus on the development of land-use and associated transport infrastructure, including public transportation infrastructure and services. Regarding digitalisation, there are some activities to which the parties have committed during the agreement period:

- The municipalities commit to cooperating with the State Transport Administration and other MAL regions to develop operating models and solutions that work together to manage and share digital traffic information. The cooperation will define essential traffic data and prepare a plan for how the data will be collected and shared with the national contact point. The plan must ensure the compatibility of the operating models, collection methods and information systems used and the use of standards in accordance with industry regulations. The State will enable an open cooperation forum through which it aims to more closely involve municipal sector actors in the development of the digital transport environment. The cooperation will make use of studies already prepared in the MAL regions.
- Municipalities shall deliver the traffic data they have already collected from street networks to the National Access Point in the standard format required by the sector's regulations.
- The regional public transport authorities and municipalities will implement the Traffic Automation Roadmap prepared in the region and promote utilisation of new technologies to improve transport system efficiency. The state will develop legislation to enable automation applications permanent use.
- Municipalities will promote the integration of new travel and goods transport services (enabled by digitalisation and automation) into land use, traffic and street planning.

Based on previous discussion, the regional MAL contracts are used as a tool to enhance the collection, harmonisation, distribution and re-use of the essential datasets, as well as transport system automatization, in Finland’s largest conurbations.

Regarding the facilitation of automated driving, the Ministry of Transport and Communication has set a working group to prepare a proposal for national regulation that enable the deployment of automated vehicles on public roads in Finland in a manner that ensures a high level of road safety. The regulation of automation in road transport requires both type-approval regulation related to vehicle technology (UNECE and EU) and regulation on the use of vehicles in traffic (decided at the national level). The proposal, which has been under an open consultation and hearing in the spring 2024, sets e.g. the definitions for an automated driving system (ADS) and determines the related responsibilities. Considering a vehicle as self-driving in Finland would require an application submitted to Traficom. When a vehicle is no longer driven as usual by a driver who is responsible for the vehicle's behaviour in traffic, this must be replaced by some legal entity which can assume responsibility for these obligations. In principle, every self-driving vehicle should have such an operator, an *automated driving provider*, that must also submit an application to Traficom. Currently the working group is finalising the proposal based on the hearings and is expecting to submit the Government´s legislative proposal to the Parliament during autumn 2025.

1.2. General progress since 2023

This chapter provides an overview of the progress made between October 2023 and December 2024 within the four Priority Areas of the ITS Directive.

In general, the most impactful new initiative is the Dataspace II regulatory reform initiated by the Ministry of Transport and Communications in the Spring 2024. The aim of the renewed legislation is to address the changes in the updated ITS Directive and the related Delegated Acts and to align those with the existing national legislation on the same fields. In the preparation the level of ambition is set high, partly higher than in the European regulation, to ensure that the datasets that are critical for the high-quality end-user services shall be available in good quality and network coverage. The renewed legislation shall provide clear basis for the roles and responsibilities for different authorities and other actors, an issue that has previously hindered swift development activities. The legislation shall set to force in the beginning of 2026.

Regarding Priority Area I. Information and mobility ITS services, the national auhorities Traficom and FTIA together with Fintraffic have taken significant steps to prepare for the renewed European legislation. In a study implemented in spring 2024 the requirements related to RTTI datasets were clarified, and necessary actions to fulfill the gaps were identified. The results of the study were also published in English by NAPCORE -project. In addition, Fintraffic prepared a detailed plan to improve the detection and digitisation of "underlying" SRTI events and is expecting to implement the necessary changes to processes and ICT systems during 2025.

Regarding road traffic data distribution and re-use, Digitraffic is being developed towards a widely used national data platform with the aim of enabling other organisations such as municipalities and commercial operators to provide datasets to the service in the near future. Solutions are being developed to address issues arising from different data models and APIs.

Digital twin of the road traffic system is also in active development for both static and dynamic data types. The digital representations developed will facilitate several road infrastructure related processes such as asset management and maintenance as well as traffic management, including ITS, C-ITS and CCAM services. Fintraffic has initiated a four year programme called "Digital Road Services" to facilitate the utilisation of new datasets (including vehicle data), data analytics and modeling to improve traffic management automatization, traffic information services and e.g. winter maintenance operations.

Regarding multimodal data, completed actions include alignment of data formats towards the European regulation as well as inclusion of new datasets.

On the Priority Area II. Travel, transport and traffic management ITS services, Fintraffic has prepared a study regarding the possibilities to utilise new datasets and models and to increase the automatisation of the traffic management systems used on certain road sections in Finland. Data fusion and higher data processing level are identified methods for increasing automation and thereby improving the quality of situational awareness in the Traffic Management Centre. The short-term goal is for Fintraffic to be able to operate road traffic variable speed limit systems that utilize weather and road condition information fully automatically. The identified development activities, such as weather and road condition modeling, integration of new real-time datasets as input to the models as well as production of road weather and conditions digital twin have been programmed for the following years.

The Ministry of Transport and Communications launched a project to update the Government's decision in principle on the digitization of logistics to speed up the development of the logistics industry and the utilization of data, and to achieve efficiency, safety and sustainability benefits

with these. National preparation for the electronic freight transport information (eFTI) regulation has also been progressing as a national study of implementation preparations was published in 2024 and Finland has taken an active role in the European collaboration, including eFTI4EU and eFTI4All projects as well as organising the eFTI conference in Brussels and DigiLog3 seminar in Finland.

Regarding Priority Area III. Road Safety and Security ITS services, Fintraffic has been participating very actively to the collaboration with both OEM's and service providers in the Data for Road Safety (DfRS) ecosystem. Fintraffic has prepared a proof-of-concept for slipperiness warnings provided by an OEM, and has tested the data against different ground truth sources. Moreover, the real-time incident information is currently distributed to service providers via Post-Lux API service, a common access point used within the ecosystem.

Lastly, on Priority Area IV. ITS services for cooperative, connected and automated mobility, there have been several significant pilots and national level studies implemented during the reporting period. On four pilot sites, robot buses have been succesfully tested for last-mile trips connecting residential areas to the public transport network as well as providing senior citizens an access connection to different services. The social acceptance has been very high. The pilots have shown that self-driving robot buses require a high level of winter maintenance. In one pilot the remote control centre was able to succesfully control the vehicles in various situations. Also two separate pilots were organized to test the use of self-driving vehicles in parcel/good transport. The identified benefits include improved services, reduced emissions and better optimisation of logistics processes.

Regarding C-ITS development, Finland has been an active participant in several European projects and platforms. Traficom has commissioned several interlinked studies and pilots, co-funded by the European Commission, running in 2023-24, increasing national readiness on e.g. organisational aspects (roles and responsibilities), use of commercial mobile networks in the deployment of C-ITS services as well as the use of short-range communication together with long-range communication. Furthermore, there are two ongoing studies facilitating the implementation phase in the near future, the first one developing the national C-ITS deployment model and the prerequisites for the implementation and the second one preparing a recommendation for the set of priority use cases to be deployed in the first phases of the national C-ITS deployment programme.

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2 MAIN PROJECTS, ACTIVITIES AND INITIATIVES

2.1. Priority area I. Information and mobility ITS services

2.1.1. Description of the main national activities and projects

Description of the relevant initiatives, their objective, timescale, milestones, resources, lead stakeholder(s) and status:

Digitraffic is a service operated and developed by Traffic Management Company Fintraffic Ltd (Fintraffic) offering real time traffic information from road, rail and maritime traffic. The service has been operational since 2008. The objective of the service is to connect stakeholders of the transport sector and enhance transport ecosystem services. Digitraffic enhances the road safety and boosts the efficiency of infrastructure use and traffic operations for both passengers and freight. The service is constantly updated.

Most of the data in the Digitraffic service is gathered from Fintraffic's own data sources, which include loop detectors, road weather stations, and road weather & surface cameras. The service also provides historical data, road weather forecasts, and incident information. Furthermore, as new datasets cycling counts data and road maintenance status information is also available. Digitraffic offers several APIs for developers. The data is available free of charge under the Open data licence Creative Commons 4.0 BY. For rail traffic, the open API provides data on train compositions and schedules including real-time traffic information, future schedules and history data. Regarding maritime data, the location of the ships, support systems for wintertime operations, and information on warnings are nowadays available.

Digitraffic is being developed towards a widely used national data marketplace with the aim of enabling other organisations such as municipalities and commercial operators to provide datasets to the service in the near future. Currently real-time street maintenance data from the cities of Oulu and Kuopio is shared through Fintraffic's API. The identified challenges in the national level aggregation of municipal datasets include different APIs and varying data models. The challenges are to be resolved in the future by introducing national recommendations and guidelines regarding common data models, formats and APIs. Other ongoing and planned national coordination actions for municipalities include; a metadata catalogue for NAP, data conversion services, access to existing data distribution channels for service providers, access to Fintraffic's information services as well as operative collaboration with traffic management centres.

Digiroad is a national database for static road data containing the geometry of the Finnish road and street network featured with the most important road attribute data. Digiroad has been available for users since 2004. The Finnish Transport Infrastructure Agency (FTIA) administrates the service, and it is constantly updated. Digiroad data covers the entire country and is available free of charge. The Road Traffic Act of 2020 sets requirements for opening the GIS information of traffic signs, traffic signals and other traffic control infrastructure, from both national roads and municipal streets, and setting that data available from the centralized content access point, namely the Digiroad.

The data provided in the Digiroad-service consists of the centre line geometry of the transport network, road-related attribute data and other transport system objects. The centre line geometry covers the vehicle-accessible roads, ferry connections, cable ferry connections, railways, and separate pedestrian and cycle routes. Traffic-related attribute data includes data of traffic elements as well as the rules, restrictions, limits, and other features of the road and street network.

Consequently, the Digiroad data enables and supports the development and commercialisation of services and applications for e.g. route planning, navigation, tourism, and intelligent transportation systems. Therefore, Digiroad supports the optimal use of road, traffic, and travel data. It also supports development of applications for traffic information and traffic management in the C-ITS-sector.

Digiroad data is open for everyone to use, and the data can be downloaded from the FTIA's service. The maintenance organisations for the data are FTIA, the National Land Survey of Finland, and the Finnish municipalities, whose maintenance activities are fostered with national legislation. Development activities are ongoing regarding the integration of municipalities' IT systems and the Digiroad database to allow direct and automated updates to the Digiroad database. In 2024 several cities worked with solutions to develop fully automated data exchange with Digiroad. TN-ITS interfaces are operational.

Regarding the maintenance of static road network data, traffic volume data and many other road attributes that are required in transportation and infrastructure planning, the FTIA has taken into use a new IT system called "Tievelho" (eng. "Road Wizard). The system can be seen as the first phase in the vision for road information management, which aims at building a real digital twin of the whole national road network. The virtual copy of the physical road infrastructure enables a comprehensive and up-to-date status information as well as utilisation of historical and predicted information for steering planning and decision-making of investments and maintenance actions. Tievelho will also contain information about the condition of the road infrastructure.

Traffic situation service presents map-based graphic traffic information from all modes (road, maritime, rail, air) collected by Fintraffic and its partners. It covers all railway stations, ports and public roads. Regarding road traffic, the service provides information for example about road traffic incidents, traffic volumes, roadworks, weight limitations, road condition, weather (including forecast), and road camera pictures. Information on rail traffic includes arrival and departure times of commuter and long-distance trains and their punctuality. The service also provides information of the maritime traffic (navigational warnings and vessels in port and arriving vessels). Consequently, the service promotes optimal use of road, traffic and travel data, while improving the interoperability, continuity and punctuality of mobility and transportation services. Several cities have already joined the service and can visualise their data on a map through this service. The service is available in the internet.

Fintraffic also offers a free Fintraffic Mobile application, which is available for both IOs and Android phones. The application provides similar real-time content as the traffic situation service for both road and rail traffic. In addition, the user can set preferences to obtain push-messages for nearby traffic incidents. It also contains a crowdsourcing feature that enables users to send alerts to road maintenance operators and other users about e.g. traffic incidents, broken down vehicles, animals on the road, slippery road, and poor road or roadside equipment conditions.

The single most significant initiative since the last report has been the launch of Dataspace II regulatory reform by the Ministry of Transport and Communications in 2024. The reform is partly based on the renewed ITS Directive of the European Union and its national implementation and partly on national regulatory development needs and the digitalisation goals set in the current Government Programme. The aim of the reform is to create a holistic and harmonised basis for the coordinated implementation and use of intelligent transport systems in Finland, as the existing national legislation is partially fragmented and outdated. The key elements in the regulatory reform are improvement of the availability and accessibility of

transport system related digital datasets, a holistic approach to the implementation of the National Access Point as well as clear and appropriate setting of roles and responsibilities of different public and private stakeholders. The objectives set in the preparation phase of the reform have been rather ambitious since the requirements to ensure data availability (digitization requirements) may be partially stricter than the renewed ITS Directive's requirements. The objectives reflect the understanding that many datasets are paramount in providing high-quality and geographically comprehensive services. Furthermore, the objectives reflect that many datasets are already available in digital machine-readable format. The key principle in the reform is to set digitization requirements for the stakeholders responsible for the initial data creation processes. Regarding the renewal of the National Access Point, the reform aims at single access point that serves the implementation of RTTI, SRTI, MMTIS, and AFIR delegated acts with clear designation of the responsible actor. Currently there are no Safe and Secure Truck Parking Areas in use in Finland, as defined by the European Regulation. In addition to the planned data catalogue features in the NAP, the new legislation shall set obligations to create and maintain national level aggregation databases for certain data types. The aim of the Ministry of Transport and Communications is to provide the legislative proposal for the Parliament's scrutiny and approval in autumn 2025 and have it set to force by 1st of January 2026.

Due to the updated RTTI Delegated Act (2022/670) and the ITS Directive, the Finnish National Authorities (FTIA, Traficom, and Fintraffic) prepared a study regarding the updated regulatory obligations. The objective of the study was to examine each article of the new RTTI Regulation in detail and, where necessary, provide interpretations of the text and specifications of the individual data types. In addition, the report discussed the amendments to the production and distribution of real-time traffic information and safety-related traffic information introduced by the updated ITS Directive. Several RTTI data types are already included in the Finnish national legislation that requires road authorities to digitise and distribute infrastructure-related data. The corresponding/overlapping regulations were studied to find out, how the obligations have factually changed. Furthermore, the report outlined and described current European cooperation projects related to e.g. the development and application of the DATEX II and TN ITS standards, while also examining the Recommended Reference Profiles as well as uniform data quality definitions. Finally, the report compiled the obligations and recommended measures for different stakeholders in a table in chronological order.

Based on the European and national policies on digitalisation as well as the government agenda, which emphasize the need to improve the efficiency of the transport system operation, the Finnish transport and road authorities have developed different levels of digital representations of the road transport infrastructure and traffic for more than a decade. Therefore, the development of these technologies specifically with regard to Digitraffic, Digiroad, and Digital Road Services are discussed below. At the FTIA, the active use of digital models in infrastructure planning and building (BIM) and asset management (AIM) has continued and expanded. The actions to transform the digital models into real-time digital shadows have commenced along with the development of visual tools for the utilisation of the digital models and shadows in the various road operator processes including ITS and traffic management. Actions on data interoperability ensure that various datasets are compatible and can be used in different user and API interfaces. The specifications and data models are developed for the various road asset and environment related geometry, point clouds, equipment, condition status, traffic and other data sets. In addition to ITS, C-ITS and CCAM services, the digital representations developed will facilitate also other road network operation services.

Authorities, FTIA and cities have developed data flows from road operation and contractor processes to data management systems by utilizing automation. These processes include planning, construction, maintenance, repair, and data collection using alternative data collection methods such a laser scanning and 360 degree photography. This involves development of new methods to efficiently analyse roadway assets from point cloud data and images using artificial intelligence and other technologies. These improvements will ensure more accurate, up to date and reliable data in digital shadows, resulting in more effective road network operation services.

As part of the national digital twin development, Fintraffic has taken up an initiative and started to develop the critical dynamic parts of the digital twin that are related to road traffic. The development activities have been organised under a project called ”Digitie” (eng. ”Digital Road Services”) that started in early 2024 and is planned to continue until the end of 2027. Currently Fintraffic’s operational situational awareness and information services provision is based mostly on information provided by roadside equipment such as induction loops, traffic cameras, and road weather stations. Regarding road weather and conditions, the Digital Road Services project promotes the National Traffic Safety Strategy’s goal where Fintraffic (in cooperation especially with FMI) can produce, based on weather and road condition data measured from intelligent transport infrastructure and vehicles, real-time and predictive situational awareness with an accuracy of a few tens of metres for the various needs of road transport. This data set is tied to road geometry, and SRTI and RTTI data are formed from it, which widely serve traffic control and information services, and provide significant added value to the current data offered for winter maintenance. The data production is based on high-quality meteorological modelling, refined by observations produced by roadside equipment and vehicles. The data is offered to commercial operators who integrate the information as part of their traffic information services (e.g., navigation, vehicle ADAS systems).

Similarly, a development goal has been set for a digital model of real-time traffic situation, utilizing five different levels of development each of which will bring benefits to several use-cases in traffic management and other activities. Currently Fintraffic has built an action plan for the following four years that consists of numerous separate activities including data acquisitions, data analytics development, ICT development as well as pilots, research & development activities and international cooperation. The first activities are currently under way.

The Finnish National Authorities Traficom and FTIA are active participants in the CEF-funded project C-Roads Extended which started in 2024. In addition, national players have been actively participating in the planning of some European project initiatives, namely VERKKO, TISGRADE and NAPCORE-X. The goals of these initiatives include the development of collection and digitisation of “base” datasets regarding RTTI, which can then be utilised in many types of use cases and services, including C-ITS. TISGRADE also aims at improving NAPs performance as well as promoting data quality assessment and feedback loop from private service providers to road authorities.

FINAP is an open mobility service data catalogue in Finland, to which mobility service providers are obliged to submit essential information on their services via digital machine-readable interfaces. The goal of FINAP is to enable easy-to-use multimodal mobility and information services. FINAP is not an end-user service as such, but it is aimed for service providers and developers to publish and consume essential information regarding mobility services. FINAP was originally initiated by the national Transport Services Act, but it also serves as a National Access Point for multimodal traffic and travel information as set out in the Commission Delegated Regulation 2024/490. FINAP is operated by Fintraffic, and the Finnish Transport and Communications Agency Traficom acts as a supervisor and national body. The

recent development activities regarding FINAP and its contents have been focusing on the future alignment of the national and EU regulation and the use of data standards presented in the MMTIS Delegated Act.

Majority of the scheduled public transport service industry in Finland relies on open General Transit Feed Specification (GTFS) and GTFS-RT standards. Regarding the use and harmonisation of the European standards Traficom and Fintraffic are targeting the use of Nordic Profiles of Netex, developed by the Norwegian Entur. There are two public transport authorities and a national railway operator VR who also provide dynamic data in Siri format.

Digitransit platform is an open-source journey planning solution that combines several open-source components into a modern, highly available route planning service. Route planning algorithms and APIs are provided by Open Trip Planner. In addition, Digitransit offers other developer tools such as Mobile friendly user interface, Map tile serving, Geocoding, and various data conversion tools. The platform is offered by Helsinki Region Transport (HSL), Fintraffic, and Waltti Solutions Ltd. and is used in most of the route planning services in Finland. The code is open source so all interested parties can participate in the development of the service. Currently almost 90% of public mobility services in Finland are included in the Digitransit service. In addition, Digitransit contains analytic tools that ensure high data coverage and quality.

Digitransit has the readiness for interoperability between the national and European regions. There are two main options for the future implementation of interoperability: first, open journey planner routing or secondly, interoperable Transmodel data. Finland participates actively in the NAPCORE project that studies the Netex and Siri interoperability. The Digitransit roadmap 2025 includes Transmodel support for Netex and Siri.

New Digitransit datasets in 2024 include E-scooter (or electric kick scooter) data. Furthermore, inclusion of taxi services data as a part of the Digitransit service and therefore part of the multimodal travel chain is a current working item on the development.

The Finnish Traffic Data Ecosystem includes around 200 organisations who have created common rules for a fair data economy in the traffic market in Finland. The ecosystem has a Travel information working group which “promotes comprehensive, multimodal, and European-compatible travel information infrastructure alongside a market of travel information solutions that are beneficial to society, while promoting the export potential of the resulting expertise. In addition, the working group monitors topical projects, the development of travel information between companies and the public sector, and produces perspectives on matters such as EU regulation, cooperation between actors and interfaces that integrate services.”

2.1.2. Progress since 2023

Description of progress in the area since 2023

In general, the most impactful new initiative is the Dataspace II regulatory reform initiated by the Ministry of Transport and Communications in the Spring 2024. The aim of the renewed legislation is to address the changes in the updated ITS Directive and related Delegated Acts and to align those with the existing national legislation on the same fields. During the preparation, the level of ambition is set high, partly higher than in the European regulation, to ensure that the datasets that are critical for the high-quality end-user services shall be available in good quality and network coverage. The renewed legislation shall provide clear basis for the roles and responsibilities for different authorities and other actors, an issue that has previously hindered swift development activities. The legislation shall set to force in the beginning of 2026.

Regarding road traffic related topics, the national authorities Traficom and FTIA together with Fintraffic have taken significant steps to prepare for the renewed European legislation. In a study implemented in spring 2024 the requirements related to RTTI datasets were clarified, and necessary actions to fulfill the gaps were identified. In addition, Fintraffic prepared a detailed plan to improve the detection and digitisation of "underlying" SRTI events and is expecting to implement the necessary changes to processes and ICT systems during 2025.

Regarding road traffic data distribution and re-use, Digitraffic is being developed towards a widely used national data platform with the aim of enabling other organisations such as municipalities and commercial operators to provide datasets to the service in the near future. Solutions are being developed to address issues arising from different data models and APIs.

The road traffic system digital twin is also in active development for both static and dynamic data types. The digital representations developed will facilitate in addition to ITS, C-ITS and CCAM services also other road network operation services. Fintraffic has initiated a four-year programme called "Digital Road Services" to facilitate the utilisation of new datasets (including vehicle data), data analytics and modeling to improve traffic management automatization, traffic information services and e.g. winter maintenance operations.

Regarding multimodal data, completed actions include alignment of data formats towards the European regulation as well as inclusion of new datasets.

2.1.3. Delegated Regulation (EU) 2017/1926 on the provision of EU-wide multimodal travel information services (priority action a)

Progress made in terms of the accessibility, exchange and reuse of the travel and traffic data types set out in the Annex:

Important nationwide services and structures have been established in 2024 which provide further capabilities to provide and analyse services. A new national aggregated mobility database has been started which provides all MMTIS data to the service providers from one access point. Also, static data and real-time API is provided in the Fintraffic websites. The FINAP MMTIS data catalogue also has an existent legacy transport database of General Transit Feed Specification (GTFS) data.

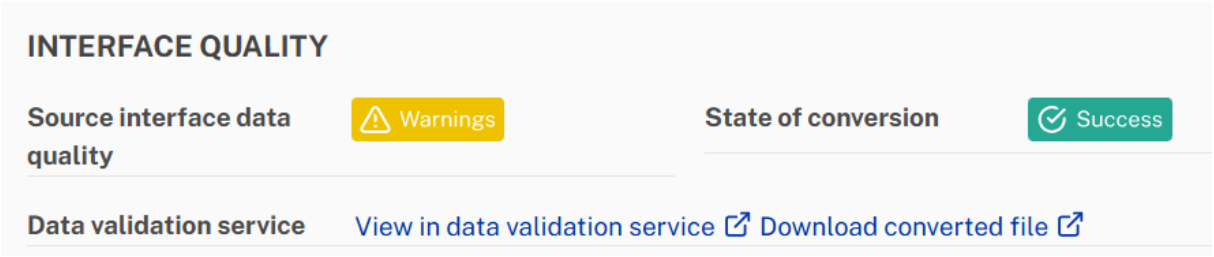
During 2024 Finland has completed 100% coverage for the Netex data. Fintraffic completes automatic validation for the data received from the service providers. The Transmodel data is also given quality evaluation by Fintraffic and the quality evaluation results are provided to the service providers. The quality data evaluation also checks the Mobilitydata.org developed data standards, such as GTFS. If the service provider does not have native Netex data available, the FINAP validation and conversion service automatically converts the data to Netex Nordic data format which aligns with the EU regulation. In 2024 first native Netex has been received from regional public transport authorities and by end of 2024 received from national railway operator VR.

Advances have been made in the following MMTIS areas. First, an inventory was implemented for national railway access node accessibility information and the data was published nationwide in 2024. Secondly, national Park & Ride editor and database "Liipi" was expanded nationwide in 2024. The Liipi Park & Ride editor provides editing capabilities for the public and private service providers which enhance national capabilities for the use of the information. Thirdly, route and schedule editor "RAE" has been opened for the public and demand responsive transport service providers. The service supports all modes, even funicular service in the city of Turku, to edit routes and schedule.

Geographical scope of the data set out in the Annex accessible via the National Access Point, and their quality, including the criteria used to define this quality and the means used to monitor it:

Geographical scope is national. Currently there is a quality assurance process in place regarding the GTFS-datasets, that are validated by a specific software, and data suppliers are informed about possible shortcomings.

The validation result is published on FINAP as presented in the below figure.



Linking of travel information services:

Upon request, travel information service providers shall provide to another travel information service provider routing results based on static, historic, observed and dynamic travel and traffic. The Digitransit journey planner offers capability to implement linking of travel information services although this is not implemented.

Results of the assessment of compliance referred to in Article 9:

Traficom as the national supervisory authority, or national body, has identified certain deficiencies in some datasets such as location of parking places and is working together with data providers to correct these.

The digitalised data is published in FINAP and if Transmodel formats do not exist at the source conversion is made in FINAP. The national Traffic Services Act contains similar regulations that are partially stricter than the European Regulation. No declarations of compliance have been received during the reporting period.

Where relevant, a description of changes to the national or common access point:

The National Access point FINAP is operated by Fintraffic, and Traficom acts as a supervisor.

The recent development activities regarding FINAP and its contents have been focusing on the future alignment of the national and EU regulation and the use of data standards presented in the MMTIS Delegated Act.

Additional information (e.g. have mobilityDCAT-AP or other metadata catalogues been implemented?):

The NAP metadata catalogue, that has undergone changes as explained above, includes, for example, passenger transport services (by road, sea and air); stations, ports and terminals; vehicle-for-hire services and commercial shared mobility services; general commercial parking

services and brokering services. Data is provided both by the actors own machine-readable interfaces or from the NAP after it has been digitised with the NAP tools. The NAP itself is machine-readable, and the user interface allows filtering the content based on transport operator, transport name, type, operating area, mode of transport and interface content.

Some of the data categories of the MMTIS delegated regulation 'a' are published in different access points which are introduced in the Traficom national website; the multimodal transport service information data categories include topographic locations, transit connection links and transfer times and road-, cycling- and pedestrian network.

All transport services are published in a GeoJSON export, which can be formed with the transport-operator-id and id fields in the service search API response default objects. The JSON-schema contains all the properties of the different transport-service types. NeTEx enumerations are used wherever possible. NeTEx is now provided by the public transport authorities and operators using the conversion explained in the previous chapter. The Nordic countries have agreed on a Nordic NeTEx profile, which serves as a basis for further Finnish development.

According to national Act on Transport Services the interfaces to dynamic data have to be published in the NAP if they are available.

There is uncertainly related to the taxi service data requirements and responsibilities, i.e. what format the data should be provided and who has the responsibility to provide the data. Guidelines and practices are welcomed in Europe to solve these uncertainties related to the taxi service data.

2.1.4. Reporting obligation under Delegated Regulation (EU) 2022/670 on the provision of EU-wide real-time traffic information services (priority action b)

Progress made in terms of the accessibility, exchange and reuse of the data types set out in the Annex:

Since 2023, no significant changes have been made regarding the accessibility and exchange of the RTTI data types. However, many municipalities have been working with digitization of their static RTTI data types as well as the exchange of this data to the National Access Point. Therefore the quality of the data contents has likely been improving year by year.

Due to the updated RTTI Delegated Act (2022/670) and the ITS Directive, FTIA, Traficom and Fintraffic prepared a study regarding the updated regulatory obligations. The required actions regarding RTTI data types were identified and the responsibilities described for the relevant stakeholders for the following years, according to the deadlines presented in the regulations. Regarding the dynamic RTTI data types, Fintraffic has programmed the necessary actions to digitise all their "underlying information" that may be relevant for road users.

Geographical scope of the data accessible via the National Access Point, changes to the primary road network and to the data content of real-time traffic information services and their quality, including the criteria used to define this quality and the means used to monitor it:

NAP covers all sections of the road network as designated by the Member State.

Regarding dynamic RTTI (and SRTI) data types, Fintraffic has started a development task to update the used DatexII version to 3.5 and simultaneosly to take on the use of the common

European Recommended Reference Profiles to improve the ease-of-use of their datasets among service providers. This work will be finished in 2025.

Results of the assessment of compliance referred to in Article 12 with the requirements set out in Articles 3 to 11:

Traficom as the national supervisory authority is not aware of any shortcomings or deviations regarding the implementation of the Delegated Regulation. Traficom is actively participating in the NAPCORE Working Group 5 “National Body” in order to develop and take use of the harmonised compliance assessment methods.

No declarations of compliance were received during the reporting period.

Where relevant, a description of changes to the national or common access point:

Due to the updated RTTI Delegated Act, Fintraffic has initiated the development of data catalogue within Digitraffic, the National Access Point for dynamic data types. The intention is to enable stakeholders such as municipalities and different service providers the possibility to link their databases to the National Access Point as per the regulation. The development will be ready in the spring of 2025.

In addition, Fintraffic has prepared a plan for the new NAP architecture that will address the updated regulations and enable many crucial needs for a future, such as:

- data maintenance interfaces
- support services for data producers
- ETL services (Extract, Transform, Load)
- data quality control
- data management
- data aggregation services
- data warehousing
- data catalogue and distribution
- developer support services.

The Ministry of Transport and Communications is preparing updates to the national legislation, and the open questions regarding the roles and responsibilities of NAPs will be defined there. The legislation will come to force in 1.1.2026.

Additional information (e.g. what data types are being provided? Have mobilityDCAT-AP or other metadata catalogues been implemented? Are quality requirements being checked?):

Fintraffic has been developing a data catalogue service for the dynamic RTTI data types, and the catalogue will be based on mobilityDCAT-AP metadata standard. During the reporting period, Fintraffic has been actively participating in the RTTI Task Force as a national representative.

2.2 Priority area II. Travel, transport and traffic management ITS services

2.2.1. Description of the main national activities and projects

Description of the relevant initiatives, their objective, timescale, milestones, resources, lead stakeholder(s) and status:

Traffic Management Company Fintraffic Ltd has prepared a study regarding the possibilities to utilise new datasets and models and increase the automatisation of the traffic management systems used on certain road sections in Finland. The project is part of the "Digital Road Services" project described earlier (chapter 2.1.1). Even though there are many datasets available for traffic management, level of automatization is currently rather low. Data fusion and higher data processing level are identified methods for increasing automation and thereby improving the quality of situational awareness in the traffic management centre. The short-term goal is for Fintraffic to be able to operate road traffic variable speed limit systems that utilize weather and road condition information fully automatically using advanced situational awareness data. The identified development activities, such as weather and road condition modeling, integration of new real-time datasets as input to the models as well as production of road weather and conditions digital twin ("nowcast" and forecast), have been programmed for the following years.

In May 2024, the Ministry of Transport and Communications launched a project to update the Government's decision in principle on the digitization of logistics. The project outlines key actions of the Government to achieve the goals of the logistics digitalization strategy to speed up the development of the logistics industry and the utilization of data, and to achieve efficiency, safety, and sustainability benefits with these. First public discussion event titled as "smooth and safe logistics" was organized on 27 May 2024. The term ends in April 2025. The core topics include implementation of the European Electronic Freight Transport Information (eFTI) and European Maritime Single Window (EMSW). One of the recent topics has also been resilience in logistics. The Traficom Finnish National Cyber Security Centre and its Information Sharing and Analysis Centre (ISAC) has organised information sharing groups also for logistics and transport.

For the European Electronic Freight Transport Information (eFTI) regulation, which will become mandatory and active for member states in 2027, national preparation has been ongoing, and the following is summary of the actions already taken by end of 2024. Finnish Transport and Communications Agency Traficom published a report "Preparation for eFTI implementation" in April 2024 as of which an English executive summary was also released. The report concluded that "eFTI regulation significantly changes the data sharing practices in logistics and preparation requires cooperation, training, piloting, investments in cyber security and open communication."

Regarding the national implementation of the eFTI regulation, Traficom and Fintraffic have been coordinating the development work that is estimated being ready in 2027 depending on when the delegated act sets into force. Traficom is responsible for the EU and national legislation preparation as well as implementation. Fintraffic will set up the necessary IT platform to enable data exchange between the competent authority and the logistics companies and helps companies to fully utilise the new system. The digital freight information is expected to present many societal benefits such as improved safety, efficiency, trust, and sustainability of freight transport. In addition, the reliability increases, the management costs decrease, and communication between players in the logistic chain becomes easier. Fintraffic offers logistics companies and competent authorities such as the police and the Finnish Customs a possibility to pilot the functioning of the electronic dispatch list before 2027. Finland is also one of the

main partners in the joint European project called eFTI4EU, which aims to harmonise the implementation of EFTI regulation within Europe. Nine countries will test the data exchange in different use-cases nationally in cross-border within the project.

The Finnish Innovation Fund Sitra published a report titled as "The possibilities and benefits of digitalizing logistics waybills – Better organization and utilization of freight information leads to efficiency, cost savings and competitiveness" in June 2024. This publication was based on a project that piloted the conversion of information from a transport company's ERP system to eFTI and eCMR format and its sharing within the transport chain. The project showed that the use of electronic transport information can bring significant benefits to SMEs, especially in terms of transport planning and scheduling, improving the efficiency and quality of processes. Companies can cope with larger volume fluctuations without compromising quality, while at the same time reducing errors caused by manual work steps.

Following European collaboration and participation in forums have taken place:

- Traficom and Fintraffic in Finland have been an active member in the Digital Logistics Transport and Logistics Forum.
- Finland and Estonia have signed an eFTI Memorandum of Understanding.
- In the eFTI4EU (Electronic Freight Transport Information for the European Union) Finland has been an active member collaborating and providing feedback regarding the upcoming EU legislation.
- The eFTI4All project has also included active Finnish transport companies.
- CaaS Nordic non-profit association promotes Corridor as a Service expertise, data sharing, and piloting activities in regional and international cooperation. Aim is to promote data federation of digital and sustainable transport corridors in the Nordic and Baltic Sea region. Traficom is a member of the CaaS Nordic.
- Northern Dimension Partnership on Transport & Logistics (NDPTL) is Nordic member states collaboration which is a partner in the eFTI4EU where it disseminates information about the collaboration results.
- The IBA-3 project will advance cooperation in the NDPTL on promoting the green transition and digitalization of logistics in the Baltic Sea transport corridors. The project will pilot the sharing of electronic transport data and its utilization in emissions calculation based on the Count Emissions initiative. The project is funded by the Ministry of Foreign Affairs, Finland, and Traficom is the project coordinator.

Following communication and dissemination activities as well as recognition of achievements have taken place:

- The eFTI4EU project organised a conference in October 2024 at the Finnish delegation to the EU in Brussels. The conference provided insight and collaboration between the public and private parties.
- DigiLog3 seminar was organised in November 2024 third time in Finland. The seminar is yearly organised in Finland and participants have included for example the European Commission. The conference programme included authority and industry views, networking, collaboration and knowledge sharing on digitalization and resilience of logistics.

- Status information of the logistics in Finland is published and update in the tieto.traficom.fi web address in Finnish and English language.

European Maritime Single Window (EMVS) harbour data management system received recognition. It enhances logistics in harbour by exchanging information digitally.

2.2.2. Progress since 2023

Description of progress in the area since 2023:

Fintraffic has prepared of study regarding the possibilities to utilise new datasets and models and increase the automatisation of the traffic management systems used on certain road sections in Finland. Data fusion and higher data processing level are identified methods for increasing automation and thereby improving the quality of situational awareness in the traffic management centre. The short-term goal is for Fintraffic to be able to operate road traffic variable speed limit systems that utilize weather and road condition information fully automatically. The identified development activities, such as weather and road condition modeling, integration of new real-time datasets as input to the models as well as production of road weather and conditions digital twin have been programmed for the following years.

The Ministry of Transport and Communications launched a project to update the Government's decision in principle on the digitization of logistics to speed up the development of the logistics industry and the utilization of data, and to achieve efficiency, safety and sustainability benefits with these. National preparation for the eFTI regulation has also been progressing as a national study of implementation preparations was published in 2024 and Finland has taken an active role in the European collaboration, including eFTI4EU and eFTI4All projects as well as organising the eFTI conference in Brussels and DigiLog3 seminar in Finland.

2.3. Priority area III. Road safety and security ITS services

2.3.1. Description of the main national activities and projects

Description of the relevant initiatives, their objective, timescale, milestones, resources, lead stakeholder(s) and status:

In 2024 Traffic Management Company Fintraffic Ltd prepared a plan how to develop their safety-related information data production following the obligations arising from the updated ITS Directive. The new obligations to digitise "underlying" information and distribute that via NAP come into force by the end of 2025 and Fintraffic aims to have new improved data production processes in place in a timely manner. These development activities have been organised under the "Digital Road Services" project.

For many SRTI data types such as unprotected accident scenes the processes will remain similar as before, but new data will be utilised and steps will be taken towards full automatization of incident warnings. Regarding weather-related SRTI data types, the plan is to fuse road weather station measurements with meteorological models, and later with vehicle-generated SRTI-warnings, to produce accurate warnings that cover the whole national main road network. For short-term road works, the plan is to use data derived from the road maintenance companies APIs to produce timely and geographically accurate warnings for ongoing road works with security aspects. Moreover, a national policy has been designed which defines the threshold conditions for events that are safety-critical for road users and should therefore be distributed as SRTI-information. The development works will take place in 2025.

2.3.2. Progress since 2023

Description of progress in the area since 2023:

Since the last national report in October 2023, Fintraffic has been participating very actively in the collaboration with both OEM's and service providers in the Data for Road Safety (DfRS) ecosystem. Fintraffic has prepared a proof-of-concept for slipperiness warnings provided by an OEM, and has tested the data against different ground truth sources. Moreover, the real-time incident information is currently distributed to service providers via Post-Lux API service, a common access point used within the ecosystem.

2.3.3. 112 eCall (priority action d - Delegated Regulation (EU) No 305/2013)

Information on any changes regarding the national eCall PSAPs infrastructure and the authorities that are competent for assessing the conformity of the operations of the eCall PSAPs:

The information system of the Emergency Response Centre, the operator of the Finnish PSAPs, is being updated. The upgrade of the PSAP information system covers also the eCall functionality of the PSAP. During the update of the PSAP information system, eCall has been continuously available and operational. Pre-conformance tests have been carried out for the eCall functionality in the new version of the PSAP information system. The results of pre-conformance tests indicated that the eCall functionality in the tested system version would not pass a conformance assessment carried out according to EN16454. However, the items of the system identified as non-conformant are likely to have only from minor to moderate impact on the eCall service. More information on the test results can be found in the report.

Additional information:

Impacts of eCall in Finland are currently being studied. The objective is to assess for Finland the safety impact of eCall in 2019-2023, the safety impact of eCall after 2027, taking into account the introduction of NG eCall and the shutdown of 2/3G networks, and the potential of eCall for motorcycles and heavy vehicles. In the study, emergency call data, rescue events logs and in-depth accident data will be analysed and traumatologists, Emergency response centre personnel and Rescue service personnel interviewed.

2.3.4. Reporting obligation under Delegated Regulation (EU) No 886/2013 on data and procedures for the provision, where possible, of road safety-related minimum universal traffic information free of charge to users (priority action c)

Progress made in implementing the information service, including the criteria used to define its level of quality and the means used to monitor its quality:

Fintraffic is also active member in the Data for Road Safety ecosystem and has taken the SRTI quality level criteria and requirements as a starting point in their SRTI data production development plan described earlier. In their future SRTI feed, the data quality estimations will be provided to users as recommended in those specifications.

Regarding SRTI data types, Fintraffic has started a development task to update the used DatexII version to 3.5 and simultaneosly to take on the use of the common European Recommended Reference Profiles to improve the ease-of-use of their datasets among service providers. This work will be finished in 2025.

Results of the assessment of compliance with the requirements set out in Articles 3 to 8 of Delegated Regulation (EU) No 886/2013:

Based on the declaration of compliance received from Fintraffic, the Finnish Transport and Communications Agency Traficom performed a random check for Fintraffic's SRTI data production and distribution processes using the NAPCORE template. No new declarations of compliance were received during the reporting period.

Traficom as the national supervisory authority is not aware of any shortcomings or deviations regarding the implementation of the Delegated Regulation. The national body Traficom is actively participating in the NAPCORE Working Group 5 "National Body" in order to develop harmonised compliance assessment methods.

Where relevant, a description of changes to the National Access Point:

Changes are currently in planning, see 2.1.4.

Additional information (e.g. sources of data used for the provision of safety-related traffic information):

Fintraffic is using multiple methods to identify safety-related events and provide timely warnings to road users through various channels. An important source for unprotected accident area information is the API service of the Emergency Response Centre, through which

Fintraffic receives most of the preliminary incident alerts on the whole national road network and municipal street networks. In the near future, many new data sources will be integrated into the data production process, as described in 2.3.1.

2.3.5. Reporting obligation under Delegated Regulation (EU) No 885/2013 on the provision of information services for safe and secure parking places for trucks and commercial vehicles (priority action e)

Number of different parking places and parking spaces on their territory:

At the moment there are no parking places in Finland that fall under the criteria of safe and secure parking places for trucks and commercial vehicles that are defined in the Delegated Regulation 'e'. Therefore, no data is available in the National Access Point either.

There are more than 5000 traffic rest areas on main roads in Finland, of which 10% are commercial, 25% are commercial refuelling points and 65% owned by the Government. The development needs of the service areas have been studied (amount, locations, services). There is no market in Finland for parking services that are safer and more secure, due to the already existing high quality parking services as well as good overall safety and security situation in Finland. Crime is not a major problem in the rest areas (primarily fuel thefts). The rest areas on highway E18 are reported to the common European information portal.

TRANSPark portal offers detailed information of over 4 000 parking areas in 41 countries with regard to services, number of parking slots and security level. In Finland, 300 refuelling points and two ports (Hanko and Vuosaari) offering parking areas are listed in the service. The portal is maintained by the International Transport Forum (IRU).

Percentage of parking places registered in the information service:

As explained above.

Percentage of parking places providing dynamic information on the availability of parking spaces and the priority zones:

As explained above.

Additional information:

The rest areas on the highway network are listed in the European Access Point for Truck Parking.

2.4. Priority area IV. ITS services for cooperative, connected and automated mobility

2.4.1. Description of the main national activities and projects

Description of the relevant initiatives, their objective, timescale, milestones, resources, lead stakeholder(s) and status:

The CEF-supported NordicWay 3 project dealt with Cooperative, Connected, and Automated Mobility (CCAM) through 19 pilot projects conducted in cities and on main road networks across Finland, Sweden and Norway. These pilots demonstrated and tested CCAM services, focusing on the development of technology, infrastructure, and business models in real-world conditions. The NordicWay3 Pilot actions in Finland produced highly important input to be used in the deployment of CCAM in Finland. These are detailed in the NordicWay3 final report.

NordicWay3 also included an evaluation activity providing an evaluation report. The evaluations covered ecosystems for CCAM deployment, user acceptance, technical performance and quality of service, driver behaviour, and socio-economic impacts.

In automated road transport the pilot activities continued. In the city of Lahti, a robot bus of the company Remoted transported senior citizens to services with the assistance of a safety driver. The aim was to improve the accessibility of the area and diversify mobility, especially for senior citizens. The robot bus provided the senior citizens access to the city hospital, shops, and services. The service was used by more than 500 passengers per month.

In the city of Tampere, a robot bus of Remoted operated feeder traffic from a residental area to a tramway stop and vice versa, on a route about 1 km long. The aim was to improve the accessibility of public transport in this residential area popular among families with children.The service was well accepted and used.

In Tampere and Lempäälä, the EU project SHOW piloted self-driving feeder shuttle and bus feeder service to mobility hubs and stop, operating in all conditions including also adverse road weather conditions. The vehicles had a safety driver on board and transported more than 18,000 passengers during the pilots. The average operational speed ranged from 11 to 19 km/h with the maximum operational speed at 30 km/h. The passengers were happy with the service also in the adverse conditions. The pilot highlighted the need to have good winter maintenance on the routes of self-driving vehicles.

The Tampere pilots also investigated the performance of remote supervision and the operation of a remote-control centre. The remote supervision succeeded in the supervision of several vehicles and the operating environment at the same time, the vehicle's starts and stops along the route, evasive action to surpass an obstacle on route, and the transfers of vehicle supervision between the safety driver and the control centre.

In the city of Kuopio, a robot bus pilot under the SHOW projects provided connections between various key hubs in the university campus area for six months. The aim was to verify the technical performace, user acceptance, and transport system level impacts of the robot buses.

Also in the city of Lahti, the Kempower company used Remoted's robot buses in transporting goods between two factories. The objective was to increase the efficiency and automate its goods transport between the company's plants. The pilot aimed to test and verify how autonomous vehicles are suited to transporting modular power units between the production unit and production facilities. Previously, the power units were transported by trucks. At the same time, the aim was to pilot the smart charging of the autonomous vehicles at Kempower's plants. The benefits observed include increased production efficiency, reduced expensive

intermediate storage, reduced emissions as well as optimised production and logistics processes.

In the city of Helsinki, the URBANCE-EU project piloted the transportation of tools with an autonomous delivery robot and a cargo bike from a warehouse to construction sites, as well as home deliveries of e-commerce parcels using a delivery robot equipped with a parcel locker system. The delivery robot enabled home deliveries at desired times, eliminating the need for consumers to wait all day for their packages. Furthermore, the pre-defined pick-up points were generally closer to homes than traditional parcel lockers. The most significant benefits were the improved services offered to residents, zero-emission last-mile delivery, and collaboration between logistics operators, which could lead to urban consolidation centres becoming the norm for local no-emission distribution in the future.

The goods delivery robots have increasingly beend deployed and used by grocery shops in a number of Finnish cities.

Finnish Transport and Communications Agency Traficom commissioned a literature review on the potential impacts of automation in road transportation for four different use cases (privately owned passenger cars, public transport, robotaxis and logistic solutions) and five different impact areas (vehicle kilometres travelled and modal split, traffic flow, environment, traffic safety and interaction between road users).

With regard to Cooperative ITS (C-ITS), major steps have been taken to prepare the national C-ITS deployment. Finland has committed to European C-ITS deployment and compliance to C-Roads specifications as an active member of the C-Roads Platform from 2017 onwards. Finland is also an active partner in the CEF-supported C-Roads Extended project working for the harmonisation and cross-border interoperability of C-ITS services in Europe. There Finland leads task force TF4 (Hybrid Communication) focusing on IP based and hybrid communication in C-ITS. IP based communication includes the "long range" communication solution described in the C-Roads profile specifications. Hybrid communication in C-ITS covers C-ITS use cases which involve both long-range and short-range communication technologies.

Traficom has commissioned several interlinked studies and pilots running in 2023-24. The first one investigated and provided a recommendation on the roles of authorities and other public sector actors in the deployment and operation of C-ITS services. The results took on board all European and national regulations as well as the stakeholder roles identified in those as well as in the common European C-ITS related platforms and strategy documents.

The second one dealt with the utilisation of commercial mobile networks in the deployment of C-ITS services proving that the existing commercial networks can facilitate C-ITS services with high enough quality except for very exceptional conditions.

The third one was a pilot to study and evaluate the performance of short-range communication together with long-range communication. A special emphasis was on security and overall latency. The results indicate that C-ITS deployment will require a transition to security level 2 of EU CCMS, creating requirements for C-ITS station operators and devices.

The fourth, currently ongoing one is developing the national C-ITS deployment model and the prerequisites for the implementation of the large-scale deployment. Finally, the fifth, also ongoing one is investigating the societal and user needs for the various C-ITS use cases and preparing a recommendation for the set of priority use cases to be deployed in the first phases of the national C-ITS deployment programme. The deployment is to start from 2025 onwards.

According to the results of the public sector actor roles, Traffic Management Company Fintraffic Ltd has deployed and is currently further developing the national interchange node.

This is the key building block of the hybrid C-ITS deployment concept developed in the CEF-supported and C-Roads Platform linked NordicWay projects.

The Aalto university is carrying out SmartEdge (EU project) tests in Helsinki on the Smart Junction concept, where the junction is equipped by sensors that measure traffic at each intersection from all directions using a unit comprising a radar, an IP-camera, and a processing and communication unit as well as an interface to signal controllers. These provide C-ITS messages to cooperative vehicles to prevent collisions at the junction.

2.4.2. Progress since

Description of progress in the area since 2023:

There have been several significant pilots and national level studies implemented during the reporting period. On four pilot sites, robot buses have been succesfully tested for last-mile trips connecting residential areas to the public transport network as well as providing senior citizens an access connection to different services. The social acceptance has been very high. The pilots have shown that self-driving robot buses require a high level of winter maintenance. In one pilot the remote control centre was able to succesfully control the vehicles in various situations. Also two separate pilots were organized to test the use of self-driving vehicles in parcel/good transport. The identified benefits include improved services, reduced emissions, and better optimisation of logistics processes.

Regarding C-ITS development, Finland has been an active participant in several European projects and platforms. In addition, Traficom has commissioned several interlinked studies and pilots running in 2023-24, increasing national readiness on e.g. organisational aspects (roles and responsibilities), use of commercial mobile networks in the deployment of C-ITS services as well as the use of of short-range communication together with long-range communication. Other two studies are ongoing.

2.5. Availability and accessibility via NAPs of data types listed in Annex III to Directive 2010/40/EU

2.5.1. Data relating to the provision of EU-wide road traffic information and navigation services

The results of the implemented data inventory regarding static and dynamic RTTI data types are presented in the following table. For each data type, it was checked that the respective data element exists in the National Access Point (for static data types Digiroad and dynamic data types Digitraffic). A check was also made that the related data content is available in the NAP from the geographical coverage required, proving that the respective authorities have the processes in place to digitise and transmit data to the NAP in case a relevant rule is applied or event is detected. For the Finnish Urban Nodes it was also checked that for the data types required in the Geographical coverage column content actually exists in the database. It should be noted that typically the processes and systems used to digitise road and traffic information are applied to the whole national road network in similar manner. Therefore, the geographical scope is either 100% or 0% of the network length. If the type of traffic regulation is not used in Finland overall, no percentage is shown.

Data type	Geographical coverage	% of geographical scope where data type is available		Comments
1. Data relating to the provision of EU-wide road traffic information and navigation services:				
1.1 Category: Static and dynamic traffic regulations, where applicable, concerning:				
1.1.1 Subcategory: - access conditions for tunnels - access conditions for bridges - speed limits	The trans-European *core* network for roads	access conditions for tunnels*	*100%*	
		access conditions for bridges*	*100%*	
		speed limits*	*100%*	

- overtaking bans on heavy goods vehicles - weight/length/width/height restrictions		overtaking bans on heavy goods vehicles*	*100%*	
		weight/length/width/height restrictions*	*100%*	
	The comprehensive trans-European network for roads, other motorways and sections of primary roads, where the total annual average daily traffic is more than 8 500 vehicles, and all roads in the cities at the centre of each Urban Node (if applicable limited to > 7 000 vehicles/day)	access conditions for tunnels*	*100%*	
		access conditions for bridges*	*100%*	
		speed limits*	*100%*	
		overtaking bans on heavy goods vehicles*	*100%*	
		weight/length/width/height restrictions*	*100%*	
Subcategory: - one-way streets	*Road infrastructure in the cities at the centre of each Urban Node*	one-way streets*	*100%*	
Subcategory: - freight delivery regulations	*Road infrastructure in the cities at the centre of each Urban Node*	freight delivery regulations*	*0%*	*Data type not implemented in Digiroad (NAP)*
Subcategory: - direction of travel on reversable lanes	*The core and comprehensive trans-European network for roads, other motorways and sections of primary roads, where the total annual average daily traffic is more than 8 500 vehicles, and all roads in the cities at the centre of each Urban*	direction of travel on reversable lanes*	*%*	*Reversible lanes not used in Finland*

	Node (if applicable limited to > 7 000 vehicles/day)			
Subcategory: - traffic circulations plans	*The core and comprehensive trans-European network for roads, other motorways and sections of primary roads, where the total annual average daily traffic is more than 8 500 vehicles, and all roads in the cities at the centre of each Urban Node (if applicable limited to > 7 000 vehicles/day)*	traffic circulations plans*	*%*	*Data type not used in Finland currently*
Subcategory: - permanent access restrictions	*The core and comprehensive trans-European network for roads, other motorways and sections of primary roads, where the total annual average daily traffic is more than 8 500 vehicles, and all roads in the cities at the centre of each Urban Node (if applicable limited to > 7 000 vehicles/day)*	permanent access restrictions*	*100%*	
Subcategory: - boundaries of restrictions, prohibitions or obligations with zonal validity, current access status and conditions for circulation in regulated traffic zones	*The core and comprehensive trans-European network for roads, other motorways and sections of primary roads, where the total annual average daily traffic is more than 8 500 vehicles, and all roads in the cities at the centre of each Urban Node (if applicable limited to > 7 000 vehicles/day)*	boundaries of restrictions, prohibitions or obligations with zonal validity, current access status and conditions for circulation in regulated traffic zones*	*100%*	*Full coverage of restrictions for heavy goods vehicles and dangerous goods vehicles*
1.2 Types of data on the state of the network:				
Subcategory:	*The trans-European core network for roads*	road closures**	*100%*	

- road closures - lane closures - roadworks		lane closures**	*100%*	
		roadworks**	*100%*	
	The comprehensive trans-European network for roads	road closures**	*100%*	
		lane closures**	*100%*	
		roadworks**	*100%*	
Subcategory: - temporary traffic management measures	*The trans-European core and comprehensive network for roads*	temporary traffic management measures**	*100%*	*Traffic diversion in case of incidents is informed within Traffic Incident information messages*

2.5.2. Data relating to information and reservation services for safe and secure parking places for trucks and commercial vehicles

At the moment there are no parking places in Finland that fall under the criteria of Safe and secure parking places for trucks and commercial vehicles that are defined in the Delegated Regulation 'e'. Therefore, no data is available in the National Access Point either.

Data type	Geographical coverage	% of parking places for which data are available		Comments
2. Data relating to information and reservation services for safe and secure parking places for trucks and commercial vehicles:				
Category: static data *Subcategory:* - static data related to the parking areas - information on safety and equipment of the parking area	*The trans-European core network for roads*	static data related to the parking areas	*%*	*Not used in Finland*
		information on safety and equipment of the parking area	*%*	*Not used in Finland*
	The comprehensive trans-European network for roads	static data related to the parking areas	*%*	*Not used in Finland*
		information on safety and equipment of the parking area	*%*	*Not used in Finland*
Category: dynamic data *Subcategory:* - dynamic data on availability of parking places including whether a parking is: full, closed or number of free places which are available.	*The trans-European core and comprehensive network for roads*	dynamic data on availability of parking places including whether a parking is: full, closed or number of free places which are available.	*%*	*Not used in Finland*

2.5.3. Data on detected road safety-related events or conditions relating to road safety-related minimum universal traffic information

For the SRTI data types, systems and processes are in place to produce and transmit digital information when relevant safety-related event is detected. This applies to the whole TEN-T network and other motorways.

Data type	Geographical coverage	% of geographical scope where data type is available		Comments
3. Data on detected road safety-related events or conditions relating to road-safety-related minimum universal traffic information:				
Category: dynamic data *Subcategory:* - temporary slippery road - animal, people, obstacles, debris on the road - unprotected accident area - short-term roadworks - wrong-way driver - unmanaged blockage of a road	*The core and comprehensive trans-European network for roads and other motorways not included in that network*	temporary slippery road**	*100%*	*New SRTI process under planning.*
		animal, people, obstacles, debris on the road**	*100%*	*Full coverage according to current policy.*
		unprotected accident area**	*100%*	
		short-term road works**	*100 %*	*Full coverage for certain road work types. SRTI processes under development.*

		wrong-way driver**	*100%*	
		unmanaged blockage of a road**	*100%*	
Subcategory: -reduced visibility - exceptional weather conditions	*The core and comprehensive trans-European network for roads and other motorways not included in that network*	reduced visibility**	*100%*	*New SRTI process under planning.*
		exceptional weather conditions**	*100%*	*New SRTI process under planning.*

2.5.4. Static multimodal traffic data for EU-wide multimodal travel information services

**** Where possible, provide figures per scheduled transport mode, referred to in the Annex to Delegated Regulation (EU) 2017/1926 (such as air, rail including high-speed rail, conventional rail, light rail, cableways, long-distance coach, maritime including ferry, inland waterways, metro, tram, bus, trolley-bus)*

The Finnish access node's location data is available nationwide, i.e. includes also the urban nodes. The European ERSAD railway legislation now requires all the rail access nodes accessibility information to be available and collection of such information has been finalised. The collection of accessibility information will also be expanded to cover access nodes of other modes of transport. Regarding paths within an interchange the Finnish network relies on the Open Street Map (OSM) information; the use of OSM for example in the Finnish Digitransit service further enhances OSM coverage and quality. Static data is available from all modes, e.g. taxi services. Real-time data is available only limited from private service providers, estimated 80 % of departures. Therefore, to summarise, although the location data of identified access nodes for all schedules modes are available, there is not yet accessibility information available which is why the % of nodes where data is available is marked as 0 %.

Data type	Geographical coverage	% of nodes where data are available for the scheduled transport mode		Comments
4. Static multimodal traffic data for EU-wide multimodal travel information services:				
Category Location of identified access nodes for all scheduled modes, including information on accessibility of access nodes and paths within an interchange (such as existence of lifts, escalators)	*Urban nodes as defined in Article 3, point (p), of Regulation (EU) No 1315/2013 and listed in that Regulation, including those administered by the cities*	Location of identified access nodes for all scheduled modes, including information on accessibility of access nodes and paths within an interchange (such as existence of lifts, escalators)***	0%	For travel modes used in Finland, the locations of access nodes are available. For rail and bus services, accessibility information is under planning, and paths are based on OSM format. For other modes, accessibility and path information are not available in the required format.

	The entire transport network of the Union	Location of identified access nodes for all scheduled modes, including information on accessibility of access nodes and paths within an interchange (such as existence of lifts, escalators)***	0%	For travel modes used in Finland, the locations of access nodes are available. For rail and bus services, accessibility information is under planning, and paths are based on OSM format. For other modes, accessibility and path information are not available in the required format.

2.6. Availability of services listed in Annex IV to Directive 2010/40/EU

2.6.1. Road safety-related minimum universal traffic information services

Service	Geographical coverage	% geographical scope covered
Road safety-related minimum universal traffic information (SRTI) service	The ***core and comprehensive*** trans-European network for roads	100%

The road-safety related mimimum universal traffic information services are currently the traffic situation services produced by Traffic Management Company Fintraffic Ltd Liikennetilanne and the "Fintraffic mobile" mobile device application. The SRTI warnings currently provided by Fintraffic are presented to road users in these services, among other data types. As the SRTI data production plan is implemented by the end of 2025, there will be more SRTI data types and events provided in these services.

2.7. Other initiatives / highlights

2.7.1. Description of other national initiatives / highlights and projects not covered in priority areas 1 to 4:

Description of the relevant initiatives, their objective, timescale, milestones, resources, lead stakeholder(s) and status:

The city of Helsinki has continued a project (LIDO-TIKU) that aims to collect traffic data from various sources to a centralized data platform and to develop its usability for situation awareness and statistical purposes. The city has tested some sensor types, such as Flow Cube, Lidar, and Telraam for traffic data collection. In the project Smart Junction, an algorithm-based traffic signal control based on real-time traffic data has been developed. The city is also an active partner on pilot projects related to traffic signal C-ITS services.

The city of Tampere has been active in implementing and piloting of ITS services. In 2023–24, some main objectives were exploring and piloting information resources related to C-ITS data exchange and utilising artificial intelligence and video image interpretation in traffic data collection. The city's goal is to use C-ITS services to make the transport system safer and more efficient. However, for many services the actual deployment requires national alignments on technical principles.

Some of the key projects carried out and ongoing in 2023–2024 were:

- Testing of information resources and information sharing related to traffic light C-ITS services
- Development of the current adaptive traffic signals control system for better alignment of the control principles with city's transport policy goals
- Development of the city's static and dynamic traffic data resources and related processes to comply fully with the national and European regulations regarding data

digitization and accessibility. Export of traffic data to the relevant National Access Points and European Data Spaces.
- Digital twin testing in Hervanta, city of Tampere (traffic signals and cameras).

In the city of Turku the following services have been implemented as part of Horizon 2020 Scale-up project:

- An interface for park and ride and event parking has been added as part of Turku Parkkihub (a parking database that collects and stores parking data from digital sources). Park and ride services have been tested during Tall Ship Race event as well as in cooperation with supermarkets located outside city centre.
- Several new data sources have been introduced to the mobility map view of the service map, such as real-time maintenance data, traffic measurement points, road works, air quality, train and air traffic timetables, parking information, accessibility maps of schools as well as new walking and cycling routes.

The city of Oulu and the Centre for Economic Development, Transport and the Environment in North Ostrobothnia completed three ITS related development projects in the beginning of 2024:

- Cooperative and interactive traffic management (Traffic Management 2.0 concept)
- Update of Oulu region traffic management plan
- Traffic automation road map 2035.

In all of development projects above, various actions and pilot projects for Oulu and North Ostrobothnia region were identified. Towards the end of 2024 the regional players have started studies on the development of the RTTI datasets (to fulfill regulatory requirements), the use of vehicle data from buses on traffic management are actively searching for funding possibilities for larger scale pilots regarding ITS and CCAM. The city of Oulu is also preparing for C-ITS pilots on signalised intersections.

Network licenses for mobile networks granted to mobile network operators (MNOs) are technology neutral, meaning that MNOs can choose the mobile technology generation they use based on market conditions.

2G cellular mobile networks telecommunications license conditions in 900 and 1800 megahertz frequency bands in mainland Finland were reviewed in 2023 with a public opinion round. The Government decided to amend the 2G network license terms. The three national MNOs have obligations to maintain their 2G-networks with 99% population coverage in mainland Finland (excluding Åland) until the end of 2029. MNOs may then, if they so wish, adopt newer technologies in the frequency bands currently reserved for 2G technology. The users will need to replace their devices with terminals supporting 4G/5G technology.

The three Finnish MNOs operating national mobile networks closed their 3G networks during the years 2023-2024. The frequencies used by the 3G networks can be used by newer mobile technologies. Consequently, terminals that only support 2G/3G technology use the 2G network, which only supports low data rates.

The amount of data circulating in the 2G network is relativity small. Still, large number of systems, meters and control devices, for example related to electricity, water, gas, district heating or cooling networks (2G M2M/IoT), and the vehicle emergency call system eCall have a long-life cycle and use 2G.

The regional MNO in Åland will continue to maintain their 3G network in Åland, Finland, but their 2G networks will be closed in February 2025.

The Finnish Transport and Communications Agency Traficom has published information on their website on the closing of 3G networks in the mainland and the 2G network by the regional MNO in Åland and is following possible reported problems.

The closure of 2G and 3G networks is ongoing worldwide. Finland has actively participated in the work at EU level (e.g., RSPG and BEREC).

The Finnish Transport and Communications Agency Traficom published a research report on Utilisation of commercial mobile networks in the deployment of C-ITS services in 2024. The report concluded that from coverage availability and system capacity points of view, the mobile networks of today are well suited to carry the average expected C-ITS messaging traffic levels in 2030 traffic environment, although environmental dependencies exist.

4G and 5G networks are well deployed throughout the country, with (technology neutral) coverage obligations of 99% of households and all roads and railroads (basic coverage). 5G networks have been deployed throughout Finland from 2020, with a basic coverage of 91% of households. A fast (100 Mb/s) 4G mobile connection is available to 96% of households. At the end of 2023, high-speed 4G mobile communication networks 100 Mb/s covered approximately 65% and 5G networks 100 Mb/s covered about 44% of the highway and trunk road network. 4G and 5G networks 300 Mb/s covered about 34% of main roads.

A number of 5G and 6G research and development projects have been undertaken in Finland during 2023–2024. Those have been listed below.

The 5GTNF or 5G Test Network Finland (5GTNF) ecosystem aims to serve as an 5G and beyond technology open testing environment that supports trials and demonstrations. The testing environment can be customised to suit the needs of different vertical use cases and future users. The environment includes numerous 5G projects.

The 6GTNF or Test Network Finland (6GTNF) aims to fill the gap between laboratory-based B5G and 6G testing environments and commercial network deployments, offer trialling support and tailored infrastructure configurations for telecom and vertical industries and scientific community and strengthen Finnish ecosystem position in B5G and 6G R&D. 6GTNF is a joint effort from industry and academia. The environment includes numerous 6G projects.

The 6G Bridge is a Business Finland program that aims to make Finland the global leader in providing new value with 5G Advanced and 6G technologies for sustainable industries and societies e.g. in smart cities, smart energy, smart ports, and smart factories with different ecosystem players. The program includes numerous 6G projects.

The 6G Finland is an active coalition of Finnish 6G R&D organizations to advance the impact of Finnish 6G expertise globally, build new international partnerships, and intensify national 6G development efforts towards sustainable and data-driven society enabled by instant and unlimited wireless connectivity. 6G Finland is a national contact point of Finnish 6G know-how.

The 6G Flagship project aims to create the essential 6G technological components, the tools, and the equipment to build a 6G Test Network, develop chosen vertical applications for 6G to accelerate societal digitization and continue to be a recognised vision leader and sought-after research partner in worldwide 6G research. One of the projects is 6G in logistics. The project is run by the Centre for Wireless Communications (CWC) at the University of Oulu in Finland.

The 6GVisible project aims to achieve three main goals: 1) Development of 6G-era service and architecture solutions utilizing autonomous and semi-autonomous driving, 2) integration of physical and logical computational elements to a unified service deploying the enablers provided by the new network technologies, 3) identifying and development of use cases for

real-life verification and validation of the new networks and for fostering Finnish automotive-related and network-related businesses.

The DEDICAT6G project developed sixth generation (6G) wireless networks, which will be deployed in the early 2030s. The main aim was to achieve dynamic coverage extension and distributed intelligence for human-centric applications. The aims were also to include a more efficient use of resources; the reduction of latency, response time and energy consumption; the reduction of operational and capital expenditures, and the reinforcement of security, privacy and trust. The project involved four use cases to be demonstrated: smart warehousing, an enhanced user experience, public safety, and a smart highway.

The **Digirata** is a railway between cities of Kouvola and Kotka, where the biggest and busiest harbour in Finland is located. The scheme is a first in world building of a dedicated communications network, Digirail intends to use a unique radio network solution that utilises existing commercial network connections.

The city of Tampere tram titled as Lyyli has also been available for the use of 5G test networks as a part of the wider living lab development environment. The **Business Finland funded** Lyyli Living Lab for urban environment is an inclusive RDI environment for the development, validation, and the acquisition of market references of sustainable, rail-based, smart urban transport technologies and services.

ITS Finland is a national cooperation forum that brings together representatives of the state, cities, research, and education institutions and companies on a broad basis to promote digitalisation in the transport sector. Currently there are over 100 members in the association. There are numerous public and private companies developing ITS services targeting also to service exports, including the following examples (ITS Finland 2024):

- DC charging solutions (Kempower Ltd)
- Mobile fare collection, emissions counting (Pay IQ Ltd)
- Route planning and ticketing (Perille Ltd)
- Weather Data Solutions (Finnish Meteorological Institute)
- AI powered infra maintenance (Scanwai Ltd)
- Road Weather Services (Vaisala)
- Traffic Management Solutions (Fintraffic)
- Situational Awareness solutions (Siili Ltd).

2.7.2. Progress since 2023

Description of progress in the area since 2023:

In the field of connectivity, the deployment of 4G and 5G high-speed networks has progressed. According to the Finnish studies, the mobile network is also ready to support the vehicle connectivity and cooperative services in future. Activities and projects are already ongoing to think up new ideas on how to use 6G for the same purposes.

National 2G telecommunications 900 and 1800 megahertz frequency licenses together with coverage requirements were reviewed in 2023 by the Finnish Ministry of Transport and Communications. The Government decided to amend the 2G network license terms: “Telecommunications operators will now be expected to maintain 2G technology until the end of 2029. Operators may then, if they so wish, adopt newer technologies in the frequency bands currently reserved for 2G technology.” 3G networks network licenses are technology neutral and therefore telecom companies can already choose the technology they use based on market

conditions. Finnish telecom companies have announced to close their 3G networks during the years 2023-2024 and are moving to newer mobile communication technologies such as 5G.

3. KEY PERFORMANCE INDICATORS (KPIS)

The deployment KPIs are calculated for the TEN-T (based on regulation 1315/2013) and motorway network covering a total length of 5,248 kilometres. A summary of the deployment KPI's is shown in Table 1. The data sources for the analysis are shown below Table 1.

The benefit calculations for road transport regarding change of travel time, injury accidents and emissions are based on estimates by Risto Kulmala made for the projects NEXT-ITS and NEXT-ITS2. The number of accidents is the average from years 2019-2023, while the kilometrage and vehicle hours driven are based on data from year 2023. During reporting data from year 2024 was not available. Consequently, the calculation of other KPIs is also based on the situation during 2023 to align the values of these KPIs with the safety and kilometrage indicators based on 2023 data. The travel time benefit calculations for public transport are based on a national travel survey[1] and a report[2] on a journey planner for the region of Helsinki.

Table 1: Summary of KPI indicators.

	Length (km)	Vehicle km travelled (million / year)	Veh. hours driven (million/year)	Injury accidents (accidents / year)	CO_2 emissions (Mtonnes/year)
TEN-T network	5248[3]	16,123[3]	167,4[5]	538[4]	3,844 [5]
Information gathering: road weather and traffic volume	5248[6]				
Information gathering: travel time	5248[6]				
Traffic management and control measures	490[7]				
Cooperative ITS services and applications	0[6]				
Real time traffic information	5248[6]				

[1] National Travel Survey 2010–2011. Finnish Transport Agency, Transport Planning. Helsinki 2012.

[2] Laine, T., Pesonen, H., Moilanen, P. (2003). An assessment of the effects and cost-effectiveness of a public transport journey planner. FITS publications 22/2003, Ministry of Transport and Communications.

[3] Calculated based on TARVA MT Finnish Road data (9th January 2025), traffic volumes used were average daily traffics from year 2023

[4] Calculated based on TARVA MT Finnish Road data (9th January 2025) using the number of injuries and deaths based on years 2019-2023 and years 2018-2022 for serious injuries.

[5] NEXT-ITS3 based figure.

[6] Check chapter 3.1 "Deployment KPIs.

[7] Matti Huju, Traficon Ltd & Jarkko Johansson, Fintraffic, January 2025

[8] Matti Huju, Traficon Ltd, January 2025

3.1. Deployment KPIs

3.1.1. Information-gathering infrastructures / equipment (road KPI)

Information-gathering equipment covers the whole TEN-T and motorway network. The weather information and traffic volume is gathered from measurement stations, which allow collecting a representative sample of the wheather and traffic flow status in the whole network. The wheather and traffic flow monitoring covered the whole TEN-T and motorway network also during the previous reporting cycle.

The coverage of travel time services has improved compared to the previous reporting cycle. In the previous reporting cycle only 150 kilometres of the network had travel time monitoring. However, since the previous reporting cycle Waze travel times data service has been deployed in the whole TEN-T and motorway network. Based on the above discussion the KPI for road weather, traffic volume, and travel time services is:

KPI = (kilometres of road network type equipped with information-gathering infrastructures / total kilometres of same road network type) x 100

KPI = 5248 km/ 5248 km * 100 = 100

3.1.2. Incident detection (road KPI)

Automated incident detection is currently available in tunnels, where the traffic management is based on the data collected from tunnel equipment. The length of tunnels with automated incident detection is 6.4 km out of the total tunnel length of 11.0 km on TEN-T roads and motorways. Furthermore, automated incident detection is utilized on 1 km of other sections in the highway network.

Manual incident detection through information acquired from the police, rescue services, and road user reports is utilized in the remaining highway sections. Through the manual incident detection, the quality requirements of the Easy Way scheme are satisfied on the whole highway network.

However, only the sections with automated incident detection are included in the KPI calculation. During the previous reporting cycle also sections with manual incident detection were included in the KPI calculation. Therefore, the value of the KPI indicator has decreased compared to the previous reporting cycle. However, no actual change in the length of the highway network with automated incident detection has occurred, and the change is predominantly due to the refined criteria of the KPI calculation. The KPI for automated incident detection is:

KPI = (kilometres of road network type equipped with ITS to detect incident / total kilometres of same road network type) x 100

KPI = 7.4 km/ 5248 km * 100 = 0.14

3.1.3. Traffic management and traffic control measures (road KPI)

Traffic management and traffic control measures such as variable speed limits and message signs are utilized on 490 kilometres of the highway network. The length of sections with traffic management and traffic control measures has slightly decreased compared to the previous reporting cycle. The decrease is due to old control systems having been decommissioned from service, yielding a slight decrease in the KPI value. The KPI value is:

KPI = (kilometres of road network type covered by traffic management and traffic control measures / total kilometres of same road network type) x 100

KPI = 489.9 km/ 5248 km * 100 = 9.33

3.1.4. Cooperative ITS services and applications (road KPI)

Based on the situation at the end of year 2023, no cooperative-ITS services or applications were deployed on the Finnish highway network. Furthermore, no pilot projects on the network were ongoing. The situation has remained unchanged compared to the previous reporting cycle. Thus, the KPI is:

KPI = (kilometres of road network type covered by C-ITS services or applications / total kilometres of same road network type) x 100

KPI = 0

3.1.5. Real-time traffic information (road KPI)

Real-time traffic information is provided on the whole Finnish highway network. The information is provided through the web page and application of the Finnish road network operator Fintraffic as presented earlier in this review. The data is also distributed to third-party users.

Real-time traffic information was available on the whole TEN-T and motorway network already during the previous reporting cycle. Thus, the coverage and KPI have remained unchanged and the KPI is:

KPI = (kilometres of road network type with provision of real-time traffic information services / total kilometres of same road network type) x 100

KPI = 5248 km/ 5248 km * 100 = 100

3.1.6. Dynamic travel information (multimodal KPI)

Dynamic travel information is available for the whole Finnish rail network. Furthermore, dynamic travel information such as real-time timetables are available on all railway stations in Finland. Dynamic travel information was available on the whole network and all stations already during the previous reporting cycle. Thus, the KPI for both the length of the network with dynamic travel time services and number of stations with dynamic travel information is 100.

KPI = (kilometres of transport network type with provision of dynamic travel information services / total kilometres of same transport network type) x 100

Rail length KPI = 100

KPI = (number of transport nodes with provision of dynamic travel information services / total number of same transport nodes) x 100

Rail node KPI = 100

Regarding public transport operated on road network, there are no services offering integrated dynamic travel information for local and long-distance buses. However, several urban public transport authorities and some rural public transport authorities have real-time passenger information services, which are operational within a specific geographical area. Dynamic travel

information is available in 27 regions out of the 33 regions with at least 15 000 inhabitants. Within each of these regions there is at least one transport node (i.e. a bus station). Approximately 910 km of the Finnish TEN-T and highway network are covered by public transport services, from which real time information is available. The availability of dynamic travel information has improved compared to the previous reporting cycle. The number of regions with dynamic travel information and the length of routes operated on the highway network have increased due to new regions adopting real time passenger information services.

KPI = (kilometres of transport network type with provision of dynamic travel information services / total kilometres of same transport network type) x 100

Bus length KPI = 910/5248*100 = 17.3

KPI = (number of transport nodes with provision of dynamic travel information services / total number of same transport nodes) x 100

Bus node KPI = 27/33*100 = 81.8

3.1.7. Freight information (multimodal if possible or road KPI)

There are currently no freight information services providing dynamic information catered specifically for the needs of freight operators. However, static information reqarding height and width limitations are available for the whole Finnish road network. Furthermore, static inforation requarding suitable routes for oversized transport are available. However, due to the lack of the dynamic freight information the KPI is given value 0. The situation has remained stable compared to the previous reporting cycle.

KPI = (kilometres of road network type with provision of freight information services / total kilometres of same road network type) x 100

KPI = 0

The vehicle scheduled vessel arrival and departure times are available on the services of the Finnish road operator, Fintraffic. However, no further freight information services are provided by the national road operator. Some ports have developed limited information services, but the information is not distributed through the road operator. Therefore, the KPI is given value 0, similarly as during the previous reporting cycle.

KPI = (number of freight nodes with provision of freight information services / total number of same freight nodes) x 100

KPI = 0

3.2. Benefit KPIs

The values of all benefit KPIs were calculated on the basis of the same principle identified feasible and accurate enough in the NEXT-ITS projects supported be the EC. The calculations have the followings steps:

A. Divide the relevant road network into specific networks based on

1. ITS services operated on the section so that in any network analysed the ITS service portfolio is identical
2. Operating environment, if the benefits of the ITS service provided in the network differ according to the operating environment (for instance motorway, 2-lane road)

B. Acquire basic transport and KPI related data for the networks analysed for the year 2023 from official statistics maintained by Finnish Transport Infrastructure Agency – note that the figures 3, 4 and 5 represent the "after ITS" figures in the benefit KPI calculations:

1. Length (km)
2. Traffic volume (AADT)
3. Average travel time (vehicle hours)
4. Number of non-fatal injury accidents and non-fatally injured persons
5. Number of fatal accidents and fatalities

C. Compile typical effects of each ITS service involved on the benefit KPIs, based on empirical before-after studies carried out in Finland or similar conditions

D. Calculate the combined effects of the ITS service portfolio in each network, utilising data from A & C (for instance the combination of ITS measures in long tunnels could be 15% reduction in accidents)

E. Estimate the "before ITS" values of Benefit KPIs for each network, utilising the effects from D and the "after ITS" values from B (for instance the number of accidents "before ITS" would be calculated as number of accidents "after ITS" divided by 0.85; this is because multiplication of a number with 0.85 makes it 15% smaller and, vice versa, division by it produces a number compared to which the original figure is 15% smaller)

F. Calculate the Benefit KPI values for the networks and their sum by adding up the "before ITS" and "after ITS" values for whole Finnish road network studied.

3.2.1. Change in travel time (road KPI)

The effects of road ITS systems and services on the TEN-T network and other motorways on the travel times were estimated using the service specific effectiveness percentages based on Finnish and other Nordic evaluation studies utilised in the NEXT-ITS projects. The travel time KPI estimate is a 0.22% reduction in travel times in 2023.

In addition, the improved road safety due to advanced driver assistance and support systems reduces the amount of accident-related congestion and thereby also travel times. The crude assessment indicates a travel time decrease of 0.38% on the network studied due to this impact.

Hence these key ITS services and systems produce a 0.6% reduction in travel times. This considers 16.1 Million vehicle kilometres.

KPI = ((travel time before ITS implementation or improvement – travel time after ITS implementation or improvement) / travel time before ITS implementation or improvement) x 100 =

Benefit Road (travel time) = 100 x (168.4-167.4)/168.4 = 0.60

3.2.2. Change in the number of road crashes resulting in deaths or injuries (road KPI)

The road traffic traffic management and information systems provide a 4.4% reduction of fatal and injury crashes on the TERN and other motorways in Finland.

The automated speed enforcement systems on road links and junctions as well as signal control at junctions provide an additional 7.2%-unit reduction in the number of fatal and injury crashes on the network studied.

Finally, the driver support systems in vehicles decrease the number of the fatal and injury crashes by circa 10% and fatal crashes alone by more than 18%. The total effect of ITS on the number of fatal and injury accidents on the TERN and other motorways in Finland was estimated as a 20.6% reduction.

- Number of road crashes resulting in deaths or injuries before ITS implementation or improvement: 678

- Number of road crashes resulting in deaths or injuries after ITS implementation or improvement: 538

Benefit Road (road crashes) = 100 x (678-538)/678 = 21

3.2.3. Change in traffic-CO_2 emissions (road KPI)

The impacts has been estimated for the TERN and other motorways in Finland with the total length of 5248 km. The traffic management and information services were estimated to reduce CO_2 emissions by 0.31% on the network. The reduction in the number of road crashes also led indirectly to a reduction of the emissions, and this reduction was estimated to be 0.38%. In total, ITS was estimated to reduce CO_2 emissions by 0.7%.

KPI = ((traffic-CO_2 emissions before ITS implementation or improvement – traffic-CO_2 emissions after implementation or improvement) / traffic-CO_2 emissions before ITS implementation or improvement) x 100

Benefit Road (CO_2 emissions) = 100 x (3.844-3.818)/3.844 = 0.7

3.3. Financial KPIs

ITS includes any types of systems and services together.

Annual public* investment in road ITS (as % of total transport infrastructure investments):

** public administrations or publicly-owned entities*

The investment into renewal and development of road management systems in 2023 was approximately 10.5 M€, including new and renewal investments into road ITS and the related ICT systems.

The amount of road investments on the TEN-T road network was 70.8 million euros (2023).

KPI =10.5 M€/70.8 M€ *100% = 14.8 %.

Annual public* operating and maintenance costs of road ITS (in euro per kilometre of network covered):

** public administrations or publicly-owned entities*

The maintenance costs of road ITS systems and the related ICT systems in 2023 was approximately 14.6 million euros. The costs for the TMC operations were 4.4 million euros in 2023 for the whole national operation.

KPI (calculated for the TEN-T road network 5 248 km) = 19 M€ / 5248 km = 3 620 euros/km.

The previously stated investment and maintenance costs exclude the costs for electricity, tunnel lightning, and traffic lights. Currently the ITS investment, maintenance or operational costs cannot be separated for the TEN-T road network and other parts of the national road network due to the accounting systems. However, the presented KPIs above are fairly accurate as most of the ITS systems are implemented on the TEN-T network.

ANNEX II

Key performance indicators (KPIs)

	KPI name	Geographical scope	Timeline
Deployment KPIs	Information-gathering infrastructures / equipment (road KPI)	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + primary roads	Mandatory in 2028 (voluntary before)
		Entire road network	Additional KPI to be provided on voluntary basis
	Incident detection (road KPI)	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + primary roads	Mandatory in 2028 (voluntary before)
		Entire road network	Additional KPI to be provided on voluntary basis
	Traffic management and traffic control measures (road KPI)	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + primary roads	Mandatory in 2028 (voluntary before)
		Entire road network	Additional KPI to be provided on voluntary basis
	Cooperative-ITS services and applications (road KPI)	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + primary roads	Mandatory in 2028 (voluntary before)
		Entire road network	Additional KPI to be provided on voluntary basis
	Real-time traffic information (road KPI)	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + primary roads	Mandatory in 2028 (voluntary before)
		Entire road network	Additional KPI to be provided on voluntary basis

	Dynamic travel information (multimodal KPI)	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + transport nodes + primary roads	Mandatory in 2028 (voluntary before)
		Entire transport network	Additional KPI to be provided on voluntary basis
	Freight information (multimodal if possible or road KPI)	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + transport nodes + primary roads	Mandatory in 2028 (voluntary before)
		Entire transport network	Additional KPI to be provided on voluntary basis
Benefit KPIs	Change in travel time (road KPI)	Core, extended and comprehensive TEN-T + motorways	Mandatory in 2028 (voluntary before)
	Change in the number of road crashes resulting in deaths or injuries (road KPI)	Core, extended and comprehensive TEN-T + motorways	Mandatory in 2028 (voluntary before)
	Changes in traffic-CO2 emissions (road KPI)	Core, extended and comprehensive TEN-T + motorways	Mandatory in 2028 (voluntary before)
Financial KPIs	Annual public investment in road ITS *(+ figures for private investments where possible)*	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + primary roads	Mandatory in 2028 (voluntary before)
		Entire road network	Additional KPI to be provided on voluntary basis
	Annual public operating and maintenance costs of road ITS *(+ figures for private costs where possible)*	Core, extended and comprehensive TEN-T (without urban nodes) + motorways	Mandatory in 2025
		Urban nodes from TEN-T + primary roads	Mandatory in 2028 (voluntary before)
		Entire road network	Additional KPI to be provided on voluntary basis