# Position Paper

The Traveller Information Services Association (TISA) is a market-driven membership association with worldwide scope, established as a non-profit company focussed on proactive implementation of traffic and travel information services and products based on existing standards, including primarily RDS-TMC and TPEG technologies.

TISA's mission is to develop and promote open standards and policies that

- facilitate a timely and cost-effective deployment of TTI services and products that save end users time and money, increase traffic safety, and minimize environmental impact
- improve the quality and minimize the cost of such services and products by maximizing interoperability worldwide

With this Position Paper, TISA wishes to provide advisory information to all concerned with Traffic and Travel Information services and products. It represents the consensus opinion of all TISA membership organisations in areas of business and technology.

# TISA Position concerning a public consultation of the European Commission on the Provision of EU-wide Real-time Traffic Information Services

## INTRODUCTION

The "ITS Directive" [1] of the European Commission has defined Priority Actions for the development and use of specifications and standards (Article 3).

The European Commission has now engaged in the process of defining specifications for each of the priority actions that shall include one or more of the following types of provisions (see Article 6):

- functional provisions that describe the roles of the various stakeholders and the information flow between them;
- technical provisions that provide for the technical means to fulfil the functional provisions;
- organisational provisions that describe the procedural obligations of the various stakeholders;
- service provisions that describe the various levels of services and their content for ITS applications and services.

TISA has the technical as well as business and operational expertise to give inputs into the process of defining these specifications for all issues relevant to Real Time Traffic Information (RTTI).

This TISA position paper makes proposals on issues that need to be dealt with, in a specification for Priority Action (B): "EU-wide real-time traffic information services" regarding the Dynamic Road Data Content and Real Time Traffic Information Services.

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## DEFINITIONS

| | |
|---|---|
| *Real-time Traffic Information Service* | means an information service that provides end users with real-time traffic information. |
| *Real-time Traffic Information* | means any detected and processed real-time traffic data, offered by public and/or private road operators and/or service providers to end users through any delivery channels. |
| *Real-time Traffic Data* | means data collected from any private or public source, which describes traffic conditions in real-time. |

## TISA VIEW ON THE TRAFFIC INFORMATION VALUE CHAIN AND STAKEHOLDER ROLES

For ease of understanding and for establishing a common terminology for this position paper, we first introduce the TISA value chain. In 2012, TISA has published a document EO12013 [2] detailing the different stages of the value chain. For the sake of simplicity, only the highest aggregation level is provided in the Fig. 1 below. For further details, the interested reader is kindly referred to the document EO12013.

It is the TISA viewpoint that all traffic information services are deployed along the same value chain, in principle, with varying degrees of complexity:


**Fig. 1: TISA value chain**

Along this simplified value chain, different stakeholders take a role in detecting and processing content (the Content segment) as well as in the provision and presentation of services to end users (the Service segment).

Note that the different parts of the value chain reflect a logical, or functional, segmentation. In some cases, a stakeholder may in fact cover several stages of this value chain. And often, there are several stakeholders covering the same stage of the value chain for a given region, creating a competitive marketplace and creating options to choose from for the stakeholders in the following segments. Further, the value chain is not static for a given region and it changes over time as stakeholders enter and leave the market.

## CURRENT SITUATION IN EUROPE WITH RESPECT TO REAL-TIME TRAFFIC INFORMATION SERVICES

There is already a multitude of public and private real-time traffic information services in Europe. TISA represents with its membership a large part of the European stakeholders in that area.

To substantiate this claim, TISA gathered data from its members that summarises the current live TMC and TPEG services market situation in Europe (see Annex 1). The available information has been carefully analysed, and proved that a well-developed "ecosystem" of Real-Time Traffic Information Services, along with a multiplicity of its business models, exists in the EU member states. In most of them both private and

public sector stakeholders provide Real Time Traffic Information services. With regards to the above mentioned arguments, TISA considers that an EU Legal Act should encourage rather than 'oblige' Service providers to follow the suggested recommendations on the different aspects of the Real Time Traffic Information Service provision process.

## SCOPE

TISA limits the scope of this position paper to Real-time Traffic Data (as stipulated in the definitions) and Real-time Traffic Information Services. TISA considers Real-time Traffic Information Services to be the road related information which aims at enabling the road users to optimise the use of the road network according to the real time available information on the road network, traffic circulation plans, traffic regulations (such as speed limits and access restrictions), or recommended driving routes.

TISA believes that there is a clear distinction between Real-Time Traffic Information Services and Road Safety Related Traffic Information. The latter may also be real-time, but is currently governed by a separate EU Legislative Act (Delegated Act on Priority Action C of the ITS Directive) [3]

Real-time traffic data including estimated travel times or delays and information about congestion, accidents, road works, road closures and weather conditions, as far as not defined by Road Safety Related Traffic Information, including any other information considered relevant for the planning and the execution of a trip, fall under the definition of Real-Time Traffic Information Services.

Moreover, TISA also sees a clear distinction between Travel Data and Traffic Data (similar to the definition provided on page 3 of the EC Public consultation on Access to Multimodal Traffic and Travel Data in the European Union Background document [4]): the term Travel Data *refers* to guidance data, while the term Traffic Data refers to road related information that *enables* the guidance (non road related modes of transport are excluded here). While the latter falls under the scope of Priority Action B of the ITS Directive and represents the focus of this position paper, travel data in a multimodal context should be addressed by Priority Action A of the ITS Directive.

Conditions in different countries vary with respect to the methods of their detection, the coverage of the road network and the availability of data (number and locations of access points to traffic information, type of interfaces).

In many countries, functioning business relations are established, sometimes over very long periods of time and often involving a mix of public and commercial entities in various positions along the value chain

## TISA VIEW ON INTEROPERABILITY

TISA welcomes the EU initiative to improve interoperability and ease of access to Real-Time Traffic Data.

We consider that the Priority Action B should recommend suitable standards and communication protocols to ensure the provision of high quality content at the point of use. TISA recommends the use of TPEG 2 as standard for the provision of traffic information to the end user. TISA insists in particular for using the TPEG content encoding system which provides a common language for traffic info distribution.

TISA acknowledges the importance of DATEXII in the backbone segment. Whilst collaborating with relevant DATEXII stakeholders, TISA is not in the position to provide recommendations on the use of DATEXII.

The Priority Action B may recommend that some Member States manage national access points for state-owned data covered by Priority action B. Public or private road authorities, road operators or service providers may submit their point of access information to the national access point authority, and the

authority can make this information available via the national access point. Two or more entities having data covered by Priority action B can - on a voluntary basis - merge their data, and make them available through a common point of access. Nevertheless, the priority Action B shall not mandate the setting-up of one national access point per country.

## TISA VIEW ON ROLES AND RESPONSIBILITIES OF STAKEHOLDERS ALONG THE VALUE CHAIN

TISA does not recommend defining roles and responsibilities along the value chain in each country, or attempts to harmonize the value chains across Europe. Each entity shall have the freedom to define its role in the value chain. Both public and commercial actors will choose a role in the value chain that suits their mission and business model. TISA considers any regulation of roles and responsibilities along the value chain as counterproductive; it will likely interfere with already existing business relations

## TISA VIEW ON COLLABORATION BETWEEN PUBLIC AND PRIVATE ACTORS

TISA feels that the collaboration between public and private actors along the value chain (from Content detection to Service presentation) is highly recommended. These public-private collaborations should be based on clear business models, as this will ensure both the viability and sustainability of the cooperation.

Collaborations based on a win-win result coupled with non-discriminatory access to the Real Time Traffic Data (Content detection) should be based on clear EU Competition rules as unclear access conditions may negatively affect existing business and hamper the cooperation among the various actors.

TISA would recommend that EU action aims to ensure non-discriminatory access to the data set (content detection). This should not be in the form of a Legislative Act and it should not undermine the subsidiarity principle that governs EU action. EU action should take the form of a non-legislative character that would encourage rather than enforce private-public collaborations as that would indeed establish EU added value.

## TISA VIEW ON LICENSING MODELS AND TERMS OF USE FOR REAL-TIME TRAFFIC DATA

There are already a number of different licensing models and terms for the use of real-time traffic data within existing European local markets. These models are usually established taking account of local market conditions and tailored to the needs of the actors along the value chain. As the business of collecting traffic data is cost driven, any legislation or legal precedent to oblige the traffic data providers to make their data available could seriously undermine the financial and market framework within which the existing traffic providers have established their markets. It is a real possibility that traffic data providers would decide to stop collecting data on roads targeted by the Directive if the current financial model is changed.

If the Directive Action B requires that data have to be disseminated, then market conditions should apply. If the dissemination is required without sufficient financial compensation, this would lead to some unexpected consequences for market competition between traffic providers/service operators. For instance if the road speed data would be widely available at a very low price, a service operator may decide to stop investment for collecting the field data and simply connect its IT platform to the single point of access in order to exploit its competitor's data.

Recent years have witnessed major innovations in the development of new mass market services based on using traffic data; for example products and mobile applications providing drivers with early warning of 'danger zones' and the rapid development of products and mobile applications using the cellular network to

provide real time traffic and community warning services. These innovations have attracted many millions of subscribers/owners/users across the EU markets. Any planned legislation that provided a significant part of the data value in the public domain could have unintended and negative consequences on the future development for innovation in this dynamic market place.

Given the above, TISA considers that an EU-wide regulation concerning the terms and conditions for how real-time traffic data are exchanged between different actors along the value chain would be inappropriate.

## TISA VIEW ON REQUIREMENTS REGARDING COVERAGE AND THE DATA TO BE PROVIDED

TISA has and continues to provide a platform for continuous improvement in traffic Services by allowing the players in the value chain to discuss and create tools and protocol to ensure a common understanding of the data we deal with on a daily basis. However members in different countries clearly have different needs and different priorities due to the diverse nature of the EU member states. It is not helpful to mandate the provision of certain types of data across Europe, except the ones listed in the event category list of the Action C specifications [5] as requirements and usefulness of different data types differs from country to country.

The provision of different data types will be stimulated by market demands and if there is a demand in a given country. TISA does not consider it helpful to mandate a certain coverage area for the data to be provided, as this may be neither physically nor financially possible. Market demand and local assessment will stimulate the provision of real-time traffic data where there is a real need where currently no service offer exists.

A key enabler to further progress is the definition of a standardized data format and a standardized access method for the professional stakeholders.

## TISA VIEW ON QUALITY REQUIREMENTS ON DATA AND SERVICES

TISA believes that Quality is a very important topic with regard to both Traffic data and Traffic services. However it exhibits different characteristics in the two aspects of Traffic Information (data vs services).

Real Time Traffic Information Service is a process, with multiple actors and steps. Each of the actors has to exhibit quality and each of the steps of this process (see Fig. 1) has to answer to quality requirements:

- availability of the data;
- coverage of the area;
- processing time between content detection and service delivery/presentation;
- freshness (up-to-date)

The above are currently some of the commonly used quality indicators among ITS stakeholders in Europe. All in all, reliability (quality in Traffic data) is difficult to measure (difficult to measure what is missing) while quality on Traffic Services could adhere to a number of agreed indicators. The latter can be measured by comparing the actual speed of the vehicle with the Real Time Traffic Information services.

Nonetheless, in the case of Real Time Traffic Information Services, the value-chain has the ability to regulate itself in terms of quality. If there is an identified ‘weakness’ along the Real Time Traffic Information Services value chain, it gets identified by the actors involved and depending at which step it is along the chain, appropriate corrective action is taken in real time.

As quality in Real Time Traffic Information services is competitive advantage, the market does indeed

regulate itself, leaving low quality Real Time Traffic Information Service providers at a disadvantage.

TISA finds this approach far more effective than an attempt to define quality criteria for each stakeholder in the value chain. The large number and variety of business models currently applying to the EU28 as well as the multiplicity of actors along the value chain would make this an ineffective endeavour[1].

Currently all Real Time Traffic Information Service suppliers have a Quality measurement system in place because, as stated already, this is a means to be competitive in the market. As a result, there is a high degree of Quality assurance among the current actors in the private sector.

The provision of quality information together with Real-Time Traffic Data shall be encouraged. TISA recommends to define harmonised quality criteria and harmonised measurement methods for all Member States. However, TISA considers it counterproductive to require the same quality levels for all e Member States, as the requirements in different countries may differ significantly regarding the content or maturity of ITS implementation.

TISA is currently collaborating with the EIP and researching how quality criteria/characterization can be defined and established, e.g. for the event categories defined in the action C specifications.

## TISA Overall Recommendation

- A well-developed "ecosystem" of Real-Time Traffic Information Services exists in Europe. In most European Member States, both private and public sector stakeholders provide Real Time Traffic Information services. Hence, TISA suggests that the measures specified for ITS Directive Priority Action B are given as suggestions, promoting cooperation and development within the areas covered, and not as fixed requirements. This includes the potential requirement of setting up one national access point per country.
- Stakeholders in different countries clearly have different needs and different priorities due to the diverse nature of the EU member states. Mandating the provision of certain types of data across Europe, except the event categories listed in the ITS Directive Action C, bears the inherent risk of impairing the market, driving costs without demand, hampering innovation and reducing dynamic efficiency of the market.
- There is a clear distinction between Travel Data and Traffic Data. The ITS Directive Action B should pay attention to not apply the same rules to both types of data, as they are fundamentally different in their use.
- TISA feels that the collaboration between public and private actors along the value chain (from Content detection to Service presentation) is highly recommended. These public-private collaborations should be based on clear business models, as this will ensure both the viability and sustainability of the cooperation.
- TISA does not recommend defining roles and responsibilities along the value chain, or attempting to harmonize the value chains across Europe. Each entity shall have the freedom to define its role in the value chain. Both public and commercial actors will chose a role in the value chain that suits their mission and business model. TISA considers any regulation of roles and responsibilities along the value chain as counterproductive; it will likely interfere with already existing business relations.
- There are already a number of different licensing models and terms for the use of Real-Time Traffic Data for most European markets. These models are established and take into account the local market conditions and requirements of actors along the value chain. TISA considers that an EU-wide

[1] This does of course not apply to Safety-related Traffic Information (SRTI). As explained earlier, SRTI falls under the category of Data and not of Services.

regulation concerning the terms and conditions for how real-time traffic data are exchanged between different actors along the value chain would be inappropriate.

- The ITS Directive Priority Action B should recommend suitable standards and communication protocols to ensure the provision of high quality content at the point of use. TISA recommends the use of TPEG 2 as standard for the provision of traffic information to the end user while also acknowledging the importance of DATEX II in the backbone segment.
- As quality in Real Time Traffic Information services is competitive advantage, the market does indeed regulate itself, leaving low quality Real-Time Traffic Information Service providers at a disadvantage. TISA considers this approach far more effective than an attempt to define the same quality levels for all Member States as regional requirements may differ significantly regarding the availability of content or the maturity of ITS implementations. However, TISA recommends to define harmonized quality criteria and measurement methods for the Member States.

## ANNEX 1
## OVERVIEW OF REAL-TIME TRAFFIC INFORMATION SERVICES IN MOST EUROPEAN COUNTRIES

The following Table 1 provides a snapshot overview of the real-time traffic information services provided throughout Europe. The information in this table has been collected from the European TISA members and it contains only services encoded in TMC and TPEG, delivered by means of radio (FM and DAB), wireless networks (GSM, UMTS or WiFi) or Internet (both stationary or mobile). Other real-time traffic information services, e.g. Variable Message Signs (VMS) or spoken radio services, are not covered by this table.

Disclaimer: The Table 1 below represents information that was recently made available to TISA by its members. TISA cannot guarantee the completeness or accuracy of the information provided.

**Table 1: Overview of real-time traffic information services in Europe**

| Country | Public services | Commercial services |
|---|---|---|
| Austria  | ▪ Asfinag/ORF RDS-TMC | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Belgium  | ▪ VVC (Flanders): RDS TMC, XML, internet based service<br>▪ PEREX (Wallonie): RDS TMC, XML<br>▪ Mobiris (Brussels): XML | ▪ Be-Mobile: XML, DAB, RDS TMC<br>▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Bulgaria  | | ▪ Be-Mobile: XML<br>▪ TrafficNav RDS-TMC |
| Croatia  | ▪ HAK: RDS-TMC services and mobile, Internet-based RTTI services in process | |
| Cyprus  | | |
| Czech Republic  | ▪ Service provider: National traffic information centre of Czech Republic, distribution protocol used: TMC, distribution channel: FM RDS<br>▪ Service provider: Administration of Roads of Prague, distribution protocol used: TMC, distribution channel: FM RDS | ▪ Service provider: CE-Traffic: TMC, distribution channel: GSM/UMTS, Internet<br>▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |

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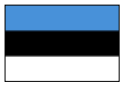
| Country | Public services | Commercial services |
|---|---|---|
| Denmark  | ▪ DRD: RDS-TMC free | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Estonia  | | |
| Finland  | | ▪ Mediamobile RDS-TMC<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| France  | ▪ No TMC/TPEG public services available | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ Michelin Travel Partner RDS/TMC and TPEG (Connected devices).<br>▪ Mediamobile RDS-TMC<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Germany  | ▪ ARD: RDS-TMC, DAB-TPEG | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ Mediamobile DAB-TPEG<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE (internet, RDS-TMC, DAB-TPEG) |
| Greece  | | ▪ Be-Mobile: RDS TMC, XML<br>▪ TrafficNav: RDS TMC, XML<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Hungary  | | ▪ Be-Mobile: XML<br>▪ TrafficNav RDS-TMC<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |

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| Country | Public services | Commercial services |
|---|---|---|
| Ireland  | | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TrafficNav RDS-TMC<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – using OpenLR location referencing)<br>▪ HERE |
| Italy  | | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ Infoblu<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Latvia  | | |
| Lithuania  | | |
| Luxembourg  | | ▪ Be-Mobile: RDS TMC, XML<br>▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Malta  | | ▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using OpenLR location referencing) |
| Netherlands  | ▪ Be-Mobile: RDS TMC<br>▪ ANWB: RDS TMC | ▪ Be-Mobile: DAB, RDS TMC, XML<br>▪ ANWB: RDS-TMC, internet<br>▪ VerkeersInformatieDienst (VID): RDS-TMC; internet<br>▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing<br>▪ HERE |
| Norway  | ▪ NRK: TMC-trial in FM-RDS | ▪ Mediamobile RDS-TMC, TPEG<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |

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| Country | Public services | Commercial services |
|---|---|---|
| Poland  | | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ Mediamobile RDS-TMC<br>▪ Service provider: CE-Traffic: TMC Distribution channel: GSM/UMTS, FM RDS, Internet<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Portugal  | | ▪ Be-Mobile: RDS TMC, XML<br>▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Romania  | | ▪ Be-Mobile: RDS TMC, XML |
| Slovakia  | | ▪ CE-Traffic:: TMC, distribution channel: GSM/UMTS, FM RDS, Internet RDS TMC, XML<br>▪ Be-Mobile: XML<br>▪ TrafficNav RDS-MTC<br>▪ HERE |
| Slovenia  | | ▪ TrafficNav: RDS TMC, XML<br>▪ Be-Mobile: XML<br>▪ HERE |
| Spain  | ▪ DGT (TMC) | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| Sweden  | ▪ STA/ RDS-TMC free<br>▪ STA/Internet/läget i trafiken | ▪ Mediamobile RDS-TMC premium<br>▪ Smartphones apps<br>▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |

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| Country | Public services | Commercial services |
|---|---|---|
| Switzerland  | ▪ Viasuisse/SRG (RDS-TMC) | ▪ Viasuisse/SRG (RDS-TMC)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |
| United Kingdom  | ▪ No Public Service | ▪ INRIX Connected Services (TPEG/GSM based service)<br>▪ Trafficmaster TMC via FM RDS<br>▪ Trafficmaster TPEG via DAB<br>▪ Trafficmaster TMC (and other proprietary formats) via Interne<br>▪ INRIX TPEG service (over DAB)<br>▪ INRIX TMC service (over FM RDS)<br>▪ TomTom Traffic (TPEG/GSM, Datex2/XML, Protobuf/XML – all using TMC and/or OpenLR location referencing)<br>▪ HERE |

## ANNEX 2
## BIBLIOGRAPHY

[1] Directive 2010/40/EU: “Directive of the European Parliament and of the Council on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes transport”

[2] EO12013, Terms and Definitions for the Traffic and Travel Information Value Chain; TISA, Oct 18, 2012

[3] Commission Delegated Regulation (EU) No 886/2013 of 15 May 2013 Supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to data and procedures for the provision, where possible, of road safety-related minimum universal traffic information free of charge to users, Brussels 15.5.2013 in OJ L247 (18..9.2013).

[4] The Consultation period is now closed (31/07/2013 - 25/10/2013). See http://ec.europa.eu/transport/media/consultations/2013-accesstraveldata_en.htm

[5] TISA document ITSTF13004 “Safety related message sets – Selection of DATEX II Codes, TPEG2-TEC-Causes and TMC – Events for EC high level Categories”, www.tisa.org/assets/Uploads/Public/ITSTF13004SafetyrelatedMessage-Sets-DATEXII-TPEG-TECandTMCv3.pdf

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