



## SEAMLESS

# Harmonization of Protocols

**Guidance on the requirements on specifications to support  
seamless data dissemination to in-vehicle devices**

Report Nr. 4

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Project acronym: SEAMLESS

Effective distribution of road authority data

**Project title: Seamless traffic data dissemination across urban and inter-urban networks**

## **Deliverable Nr 4 – Harmonization of Protocols**

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## 1 Introduction

This document summarises the outputs from Workpackage 4 ("Harmonization of Protocols") of the SEAMLESS project.

The "SEAMLESS" project addresses the ERA-NET ROAD Mobility topic "Effective Distribution of Road Authority Data". It considers whether support exists equally for the dissemination of data from local roads authorities as well as for national trunk roads. By ensuring provision of data on local roads, information services become seamless and uptake of these services even on national roads accelerates.

Workpackage 4 considers the work necessary to prepare existing specifications for participation in seamless data dissemination, and has delivered a set of additional specifications, guidance and proposed improvements to existing specifications, to improve dissemination of road authority data.

Workpackages 1-3 identified that architecture for cooperative systems is in flux, with major standards developments underway in parallel to a groundswell of activity using mobile devices based on existing IT standards. Workpackage 3 elaborated architectures for roads authority data dissemination and identified specific gaps which the SEAMLESS project could most usefully fill with technical deliverables from workpackage 4.

This summary report from workpackage 4 identifies (in section 2) all the specific technical deliverables from the workpackage, without replicating their details – the full value of the workpackage should be understood by reading the individual technical deliverables which accompany this report.

This report also summarises (in section 3) the trans-national guidance on the requirements on specifications to support seamless data dissemination to in-vehicle devices.

## 2 Specific deliverables from SEAMLESS WP4

Following from the work of workpackages 1-3, the Seamless project agreed to focus WP4 effort in four areas:

- Profiles and translations along the value chain – traffic information use case
- Profiles along the value chain – traffic light assistant use case
- Applicability of EasyWay Deployment Guidelines for urban roads
- How ETSI C-ITS standards plug into existing national urban ITS specifications.

### 2.1 Deliverables in the traffic information use case

- Improved travel time & traffic condition profile
- XML Schema defining travel time & traffic condition profile
- Comment on CEN 16157-5
- Improvement issues with DATEX II

- Comment on TPEG TFP
- UTMC Guidance – Publishing traffic information
- Guidance on translation of DATEX II travel times and traffic events TPEG.

**Details of deliverables**

DATEX II Profile for Travel Times and Traffic Condition	
Contents summary	Presentation and explanation of a DATEX II profile significantly improving the profile in the EasyWay Deployment Guide, which was informal, unclear and contained some peculiar choices. Includes a formal specification of the profile in the form of an XML Schema.
Filename	DATEX_II_Profile_TravelTimes_01-00-00.pdf
Delivery	Published on datex2.eu, 8/2/13.
Supporting documents produced	<ul style="list-style-type: none"> <li>• DATEX II TravelTimes.EAP – Enterprise Architect UML model file containing the subset of the DATEX II model corresponding to the profile</li> <li>• DATEXprofileTravelTimes.xsd – XML Schema formally defining the profile</li> <li>• PredefinedLocation A93 Germany.xml – illustrative example of a compliant predefined location publication.</li> <li>• TravelTime.sel – intermediate file supporting generation of the schema from the UML model</li> <li>• ExampleTravelTimeData.xml – illustrative example of a compliant travel time data publication.</li> </ul>

Comment on CEN 16157-5	
Contents summary	Comments to resolve issues with DATEX II part 5 elaborated data found during study for urban traffic data publication - with suggested resolutions, using the standard CEN comment template.
Filename	GB comments on CEN TS 16157-5.doc
Delivery	Submitted to BSI 30/11/12, and onwards to CEN.
Supplementary	After the formal comment submission, CEN TC278 sought our further inputs as an alternative method of resolving one improvement issue, and we returned further specific suggestions by email for use in TS 16157-5.

Improvement issues with DATEX II	
Contents summary	Comments to resolve issues with DATEX II part 5 elaborated data found during study for urban traffic data publication.
Filename	n/a – web content
Delivery	Entered on DATEX II issue tracker at <a href="http://datex2.eu">datex2.eu</a> , December 2012.

Comment on TPEG TFP	
Contents summary	Comments requesting clarification and improvement of TPEG TFP, found during analysis of UTMC-to-DATEXII-to-TPEG conversion. In particular on spatial resolution.
Delivery	Issues and questions raised on TISA email reflector, then note passed to TISA TPEG Application Working Group (TAWG).  Matthias Unbehaun, representing TISA and the TAWG, confirmed that our input on TFP spatial resolution has been discussed by the TAWG and will be considered as input for TPEG standards updates at the next convenient timeslot.

UTMC Guidance – Publishing traffic information	
Contents summary	Technical guide intended as a contribution to the UTMC library of guidance documents. Offers advice and guidance for UDG members on the publication of traffic information from UTMC systems to support seamless services. Includes translations from UTMC to DATEX II for travel times, traffic status and traffic events, and guidance on traffic management plans. Follows the improved DATEX II profile produced by the project. Explains the applicability of EasyWay Deployment Guides.
Filename	290822 TN 04 UTMC Guidance – Traffic Info.pdf
Delivery	Sent to UTMC Secretary 11/2/13.  Requested improved visibility of UTMC guidance documents on UTMC website.
Supporting documents produced	<ul style="list-style-type: none"> <li>• 290822 SP 01 UTMC to DATEX II event types.xls – spreadsheet with mapping from UTMC traffic event type codes to DATEX II SituationRecord type and subtype, plus type-specific attribute mappings.</li> <li>• UTMctoDATEXII_trafficevents.xslt – working XSLT transformation illustrating the translation advice in the guide document. Covers traffic events.</li> <li>• UTMctoDATEXII_traveltimes.xslt – working XSLT</li> </ul>

	<p>transformation illustrating the translation advice in the guide document. Covers travel times and traffic status.</p> <ul style="list-style-type: none"> <li>• UTMExampleTrafficEvents.xml – example of the kind of traffic event XML assumed as an input to the XSLT.</li> <li>• UTMExampleTravelTimes.xml – example of the kind of travel times and traffic status XML assumed as an input to the XSLT.</li> <li>• XSL Output TrafficEvents.xml – example output produced by the XSLT.</li> <li>• XSL Output TravelTimes.xml – example output produced by the XSLT.</li> </ul>
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Guidance on translation of DATEX II travel times and traffic events to TPEG	
Contents summary	Technical guide showing how traffic information, sourced from an urban traffic management system and published as DATEX II, can be translated to TPEG for subsequent presentation to motorists. Covers traffic status translation TPEG-TFP and traffic events translation to TPEG-TEC.
Filename	TN 05 DatexII to TPEG travel info.pdf
Delivery	Sent to Christina Lotz in her role in related TISA work
Supporting documents	EasyWay draft DATEX II TPEG event type mapping.xlsx

## 2.2 Deliverables in the traffic light assistant use case

- DATEX II model and profile for traffic light information

### Details of deliverables

DATEX II model and profile for traffic light information	
Contents summary	Presentation and explanation of a DATEX II profile including new model elements for traffic light information. Includes a formal specification of the profile in the form of XML Schemas.
Filename	Profile_TrafficLightInformation_01-00-00.pdf
Delivery	Published on datex2.eu, 27/8/13.
Supporting documents produced	<ul style="list-style-type: none"> <li>• StaticTrafficSignalInformation.xsd – XML Schema formally defining the profile for static data publications on traffic signal geometry and configuration.</li> <li>• DynamicTrafficSignalInformation.xsd – XML Schema formally defining the profile for dynamic data publications on traffic</li> </ul>

	<p>signal states and timings.</p> <ul style="list-style-type: none"> <li>• TrafficSignalQueueInformation.xsd – XML Schema formally defining the profile for dynamic data publications on queues at traffic signals.</li> <li>• StaticInstanceExample.xml – illustrative example of a compliant static traffic signal publication.</li> <li>• DynamicInstanceExampleVector.xml – illustrative example of a compliant dynamic traffic signal publication, using the “vector” method available in the model.</li> <li>• DynamicInstanceExamplePrognosis.xml – illustrative example of a compliant dynamic traffic signal publication, using the “prognosis” method available in the model.</li> <li>• TrafficSignalQueueInstanceExample.xml – illustrative example of a compliant publication of queues at traffic signals.</li> </ul>
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### 2.3 Deliverables from other use cases

- DATEX II model and profile for traffic management plans

Analysis and guidance on this topic for UTMC systems is included in the UTMC Guidance document described in section 2.1. The advice was produced after consultation with UTMC local roads authorities.

#### Details of deliverables

DATEX II model and profile for traffic management plans	
Contents summary	Presentation and explanation of a DATEX II data model and profile including new model elements for traffic management plans for strategic route management.
Filename	DataModelTMPAndNavigationSystems_01-00-01.pdf
Delivery	Published on datex2.eu, 06/11/12.
Supporting documents produced	<ul style="list-style-type: none"> <li>• DATEX_II_PIM_Strategien_01-00-00.EAP – Enterprise Architect UML model.</li> <li>• StrategicRouting.xsd – XML Schema formally defining the data model and profile.</li> <li>• Strategie1.xml – illustrative example of a compliant strategy publication.</li> <li>• PredefinedItenerary Rhinekniebruecke.xml – illustrative example of a predefined location publication to support traffic management plan publications.</li> <li>• Spurfreigabe.xml – illustrative example of a compliant publication of a traffic management action.</li> </ul>



## 2.4 Deliverables on Applicability of EasyWay Deployment Guidelines

Consideration of the EasyWay Deployment Guidelines has been included in the UTMC guidance described in section 2.1 above. To go deeper into the information and quality of service required or recommended on different kinds of urban roads is a matter of policy that should be the remit of Departments for Transport rather than a small research consortium from industry.

## 2.5 Deliverables on linking ETSI C-ITS specifications to urban ITS specifications

- Contribution to UTMC Technical Specifications referring to ETSI specifications on C-ITS.

### Details of deliverables

Contribution to UTMC Technical Specifications referring to ETSI specifications on C-ITS	
Contents summary	Specification, written in the style of the UTMC Technical Specification, designed to be slotted in at a particular point. With explanatory note for specification editor. The level of integration with the ETSI specifications was agreed at a workshop of the UTMC supplier community in October 2012.
Filename	290822 TN 02 UTMC CITS.doc
Delivery	Sent to UTMC Secretary 14/1/13

## 3 Summary of trans-national guidance on specifications

Generic trans-national guidance cannot be given at a detailed level due to the different levels of existing national specifications for urban ITS. Generalising from the steps taken with respect to the UTMC and OTS/OCIT specifications, the process has been:

- Understand the mapping of national urban ITS to SEAMLESS generic architecture for data dissemination and the emerging ETSI/CEN/ISO architectures for cooperative ITS.
- Consult with both the user (road authority) and supplier communities to agree how the existing national specifications (or defacto standards) should accommodate the emerging standards. The user consultation should focus on policy, requirements and applications, while the supplier consultation will consider how the technical architectures plug together.
- Publish material to explain how the emerging C-ITS standards plug into the existing national specifications. This is preferably done through enhancement of the existing national specifications, but may be through a separate explanatory publication.
- Identify the specific technical adaptation required to bridge between specifications. Consider the various paths for data dissemination in the SEAMLESS generic architecture. One path is distribution via service providers, for which SEAMLESS recommends using the urban data to produce a DATEX II service, following standard profiles, then onwards to TPEG.

- Produce technical specifications and guidance as identified, and publish through the most appropriate channel to maximise influence, such as building them into existing national frameworks of ITS specifications and guidance. The products of this phase should include:
  - Translations from local specifications to DATEX II, targeting specific DATEX II profiles as established by the SEAMLESS project. Guidance may include illustrative executable transformations that can be used as a basis for development. If the source data is sufficiently rich and well specified, a formal specification of translation to DATEX II could even be adopted as part of the national specifications, but this is not expected to be possible in most cases. Different application areas may each be considered separately, but given the grouping within DATEX II it is practical to group as follows:
    - traffic events (Situation Publication)
    - travel times and traffic status (Elaborated Data Publication)
    - traffic management plans (new extensions, less critical)
    - traffic light information (new Traffic Signal publications)
  - Guidance on adapting DATEX II to TPEG translations (as produced by SEAMLESS and other initiatives) to meet the specific constraints imposed by the local sources and their available data, including location referencing. SEAMLESS found that the use of DATEX II as an intermediate form between urban data sources and TPEG did not constrain the translation i.e. there was no data or meaning currently available in the urban data sources and expressible in TPEG that would be lost through lack of support in DATEX II.
  - (Possibly) suggested improvements to DATEX II and/or TPEG, although it is hoped and expected that these are becoming progressively fewer as more applications are developed and deployed.
  - (Possibly) suggested extensions to urban specifications to allow richer TPEG messages.
  - Entries within directories of services, such as the [datex2.eu](http://datex2.eu) directory of DATEX II nodes, to advertise compliant implementations to service providers.
  - Recognition of the relevant EasyWay Deployment Guidelines, with commentary to explain relevance for local authorities but also highlighting improved alternative technical advice such as the improved travel times profile from the SEAMLESS project.

Further detailed country-specific harmonization of protocols can usefully study the UK and German examples, using the SEAMLESS deliverables on the ERA-NET ROAD website.