

Annex F (Interface Specifications)

Annex to the EETS Domain Statement concerning the Danish Kilometer Tolling Scheme

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1 Document history

Date of first appearance of this entry into the register	1 February 2024
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2 Definitions and abbreviations

All definitions in the EETS Domain Statement shall have the same meaning in this Annex.

In addition to the definitions in the EETS Domain Statement the following definitions shall apply for this Annex:

ADU	Application Data Unit
APDU	Application Protocol Data Unit
API	Application Programming Interface
APIM	API Management
ASN	Abstract Syntax Notation
CCC	Compliance Check Communication
CRL	Certificate Revocation List
DSRC	Dedicated Short-Range Communications (DSRC in this context refers to CEN DSRC)
EDU	Education environment, a training sandbox environment for testing APIs
EETS	European Electronic Tolling Service
EFC	Electronic Fee Collection
FQDN	Fully Qualified Domain Name
HTTPS	Hypertext Transfer Protocol Secure
ISO	International Organisation for Standardisation
JSON	JavaScript Object Notation
KmToll	Kilometer Tolling Scheme in Denmark
OBE	On Board Equipment
REST	Representational State Transfer
TC	Toll Charger
TSP	Toll Service Provider. Note this is also referred to as an EETS Provider
UAT	User Acceptance Test, this is either referred to the environment where the UAT is conducted or the actual test
UVI	Unique Vehicle Identifier. A combination of OBE ID, number plate and other fields which uniquely identifies the vehicle. Formally defined in Annex E

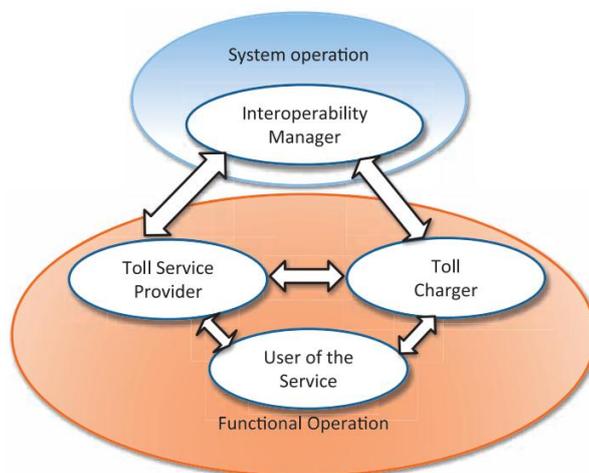
3 Introduction

This Annex describes the interfaces between the EETS Provider¹ (TSP) and Toll Charger (TC) in the Danish Kilometer Tolling (KmToll) Scheme. The purpose for this Annex is to get familiar with the interface design and understand the overall requirements and architecture to get started. This Annex is intended for technical personnel that understand APIs and know how to integrate with APIs.

It is not the intention that this specification describes in detail each field that is exposed in the API endpoint, as this will be documented using the OpenAPI v. 3.0 ([OpenAPI Specification v3.0.1](#)) using REST API. This will help reducing the maintenance of this documentation when APIs are going through updates (versioning).

The architecture of the KmToll Scheme is compliant with the ISO 17573 Electronic Fee Collection (EFC) set of standards. DS ISO 17573-1:2019 defines the roles in an EFC system as shown below:

Figure 1. Roles in an EFC scheme as defined in DS ISO 17573-1



Sund & Bælt will be the Toll Charger (TC). Regular users will buy EETS from a TSP accredited onto the KmToll Scheme. Occasional users (or users who are unable or unwilling to enter a service contract with a TSP) will be able to buy a toll ticket from a website operated by the Toll Charger. Occasional users fall outside the scope of this document. The Interoperability Manager is a divided role with responsibilities split between the TC, The Danish Road Directorate ("Vejdirektoratet") and the Danish Ministry of Taxation ("Skatteministeriet").

This architecture is realised in the diagram shown below (Figure 2), which shows the interfaces between the various system actors. This is adapted from the system architecture diagram in ISO 12855.

Data exchange will as far as it is practical follow the requirements of standard EN 16986, which in turn is based on the underlying ISO 12855:2022 toolbox standard. These standards define the data formats for exchange between the various actors in a tolling system. It is essential that a TSP wishing to connect to the Danish KmToll Scheme is familiar with these standards as they provide the underlying data and messaging formats to be used. All references in this document to ISO 12855 refer specifically to the 2022 version (ISO 12855:2022).

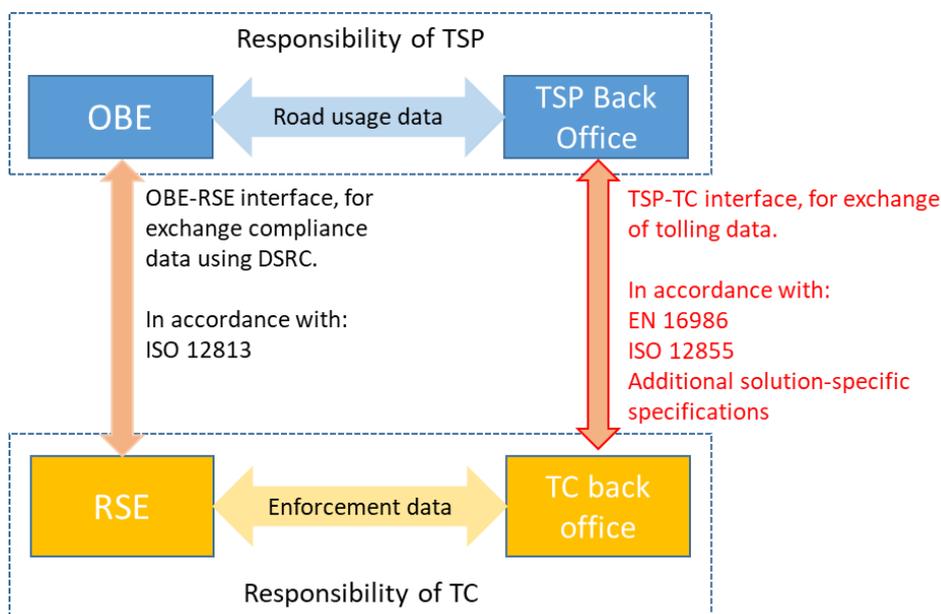
At the time of writing, the current ratified version of EN 16986 is EN 16986:2016. However, this version is outdated and does not adequately address the requirements of a Toll Charger dominant GNSS-based EETS compliant system, hence a new version of EN 16986, currently identified as

¹ The terms EETS Provider (EP) and Toll Service Provider (TSP) are used interchangeably. In this document we use the term TSP.

preliminary version prEN 16986:2023 is in the process of ratification. It is expected that this ratification will be completed within the timescales of this project. However, it is noted that the updates included in prEN 16986:2023 do not adequately meet the requirements of the KmToll Scheme, and the defined interfaces in this document introduce further changes to the standard. As this is no longer a fully compliant implementation of EN 16986, the *aidIdentifier* attribute on all TSP to TC the specifications will be changed in the future to contain the value of 32, indicating a private version of the communications protocol, rather than the value of 17 which has been reserved for EN 16986:2023. At the present time, TSPs must use the value specified in the API schema definition for the *aidIdentifier* field until informed otherwise.

For the purposes of this Annex, all references to EN 16986 refer to prEN 16986:2023, unless specifically identified differently.

Figure 2. Interfaces in the Danish KmToll Scheme



The On-Board Equipment (OBE) and TSP Back Office are the responsibility of the TSP, so the interface which carries the road usage data between them, is outside the scope of this document². The interface between the TC Back Office and the Roadside Equipment (RSE, used for enforcement) is the responsibility of the TC, so is outside the scope of this document.

The DSRC interface between the RSE and the EETS User's OBE must comply with standard ISO 12813:2019. As this constitutes an interface between the TSP and the TC, this interface is elaborated in this document in section 1.

The interface between the TC and TSP Back Office (marked in red) is in scope. These interfaces must be compliant with the Profile standard EN 16986, which in turn uses the toolbox interface standard ISO 12855 as its base standard. While EN 16986 defines the data elements to be used, the standard is insufficiently detailed, so this specification will further elaborate on the data elements to be used, as well as any restrictions to these data elements.

While the TSP to TC interface will follow EN 16986 as closely as possible, a different transfer mechanism will be used from those described in section 6.6.2 of the standard. The options described (web services using SOAP, or file transfer using FTP/FTPS) are no longer appropriate. Instead, a REST API with a JSON payload supported by OpenAPI v3.0 documentation will be used

² Note that ISO 12855 requires that this interface must be compliant with ISO 17575. However, compliance with this is the responsibility of the TSP.

for communication between TC and the TSP. The data exchange process is described in more detail in the following section.

In addition to tolling services using dedicated On-Board Equipment (OBE) as envisaged by EN 16986, the TC intends to allow the TSP to offer a tolling service using non-dedicated nomadic devices as OBE, for example smartphones. For simplicity, we will refer to dedicated OBE as OBE Type 1, and nomadic devices as OBE Type 2.

As OBE Type 2 cannot be assumed to include DSRC capability, additional interfaces between the TSP and TC back offices are specified to facilitate the Compliance Check Communication (CCC) functionality normally implemented on the DSRC interface. These CCC interfaces are not defined in EN 16986, therefore additional solution-specific specifications are defined in this specification.

4 Data exchange process

Restricted information. To be disclosed upon request to any EETS Providers requesting accreditation to the Danish KmToll scheme.

5 Common aspects for all interfaces

Restricted information. To be disclosed upon request to any EETS Providers requesting accreditation to the Danish KmToll scheme.

6 Individual interface descriptions

Restricted information. To be disclosed upon request to any EETS Providers requesting accreditation to the Danish KmToll scheme.

7 Environments & Data Expectation

Restricted information. To be disclosed upon request to any EETS Providers requesting accreditation to the Danish KmToll scheme.