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Public transport — Distribution APIs for MaaS

National foreword

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Öffentlicher Verkehr - Verteilte Programmierschnittstellen (APIs) für Mobility as a Service (MaaS)

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European foreword

This document (CEN/TR 17949:2023) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

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Introduction

Mobility-as-a-Service (MaaS) is a concept that was created in the Nordics and in Austria several years ago. The original idea was quite straightforward: allow any traveller to go seamlessly from A to B using only one single mobile application and based on his/her personal preferences. As technology has evolved and as travellers were experimenting with new types of services (eg, free-floating shared scooters), it seemed that the term MaaS was used to cover a very wide range of realities. To make this document clearer, here MaaS will be considered in its original definition and parameters: one single mobile application that allows any traveller to search, plan, book, pay, and travel (with support when needed) from A to B using at least one modality with the operations side invisible to the eye; the above-mentioned actions not being necessarily logically linear nor unique.

MaaS operations, based on MaaS apps, conventionally start with journey planning systems that use timetables (eg CEN OJP). Sometimes fares are used as well. There are well-established standards for the exchange of this data, such as GTFS and Transmodel/NeTEx for Public Transit. In the EU, there are legal obligations on many transport operators to make such data available using the Transmodel/NeTEx standards. These standards are managed by a CEN (the European Standards body) working group (TC CEN/278/WG 3 Public Transport).

The next stage in full MaaS development is the ability to check availability, to make bookings, to take payment, to get tickets for travel, etc, for both conventional public transport modes and newer forms of mobility services. A key aspect is the separation of task and responsibilities of the MaaS Provider in arranging the trip and transport service operators to execute the trip. MaaS Providers will normally use APIs to access transport operator booking systems and carry out these functions. In this work, these transactional APIs are referred to as distribution APIs. The term is taken from the Global Distribution Systems that distribute the sale of multi-modal transport products from a wide range of transport operators directly to the customer. APIs for air and rail have existed for years, but have more recently been extended for shared mobility and urban modes such as metro and bus.

Standardization of these distribution APIs is helpful to be able to integrate different types of transport operators into one single mobile application. Therefore, in Europe, as part of the Multimodal Digital Mobile Services (MDMS) project, the European Commission is considering whether to choose one or more sets of distribution APIs to add to its regulatory regime. An impact assessment will start Q1 of 2022 with regulatory proposals expected in Q4 2022. If there are to be more harmonized standards, it is likely that these will be managed by the same CEN working group that manages Transmodel/NeTEx. In order to provide an up-to-date view on what already exists worldwide in terms of distribution APIs, a CEN project team has undertaken a survey. From the responses received, it has prepared this state-of-the-art technical report that lists API sets and provides some basic information about each of them.

Policy in relation to distribution APIs for MaaS is clearly topical and during the work of the project several other European and national initiatives on the same topic came to light.

1 Scope

1.1 MaaS distribution API survey

This document describes the execution and results of a survey into distribution APIs for MaaS. API owners have been encouraged to participate if they offer APIs that support the functions or if they were expecting to do so within a reasonable timeframe. Although there seems to be good coverage of European examples, survey responses cannot be treated as representative of the complete worldwide set of APIs, but provide strong indications of the totality of what exists, and the issues raised in terms of standardization and regulation.

The survey has been carried out without any pre-determined agenda in terms of API policy or strategy. It has not been assumed a priori that a single API set could or should meet all multi-modal business needs. Comments are provided in respect of the impacts in standardization, but it was not considered appropriate to make any comments on regulatory implications, as this is not the area of competence for the CEN working group.

1.2 Transport distribution functions

Distribution APIs may be related to one or to a combination of the functionality/ies[1] (processes) described in Table 1.

Table 1 — Functionalities

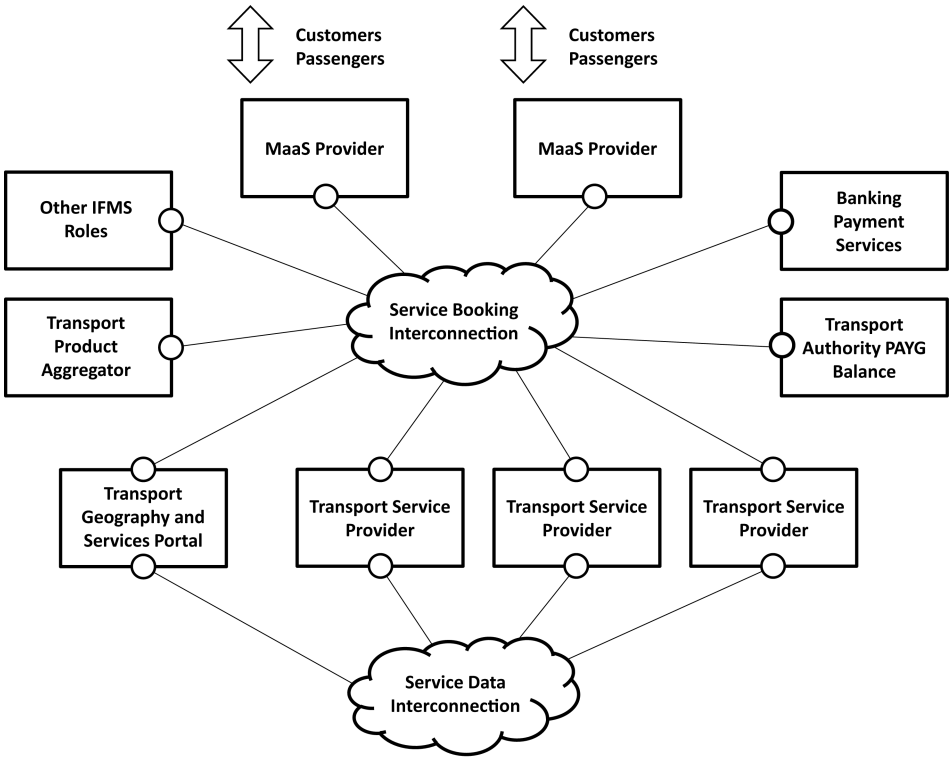
Functionalities based on the MaaS Alliance White paper and Transmodel/NeTEx	Functionalities described in the survey
User registration: registration of detailed information related to the travelling entity (user, group of passengers, etc) such as payment cards, specific needs and preferences, data consent, etc.	Management of customer accounts including for example customer preferences, data and entitlements, the products used, and journeys made
Trip planning: provision of particular trip options taking into account parameters provided by the user (eg, location, time, budget and other preferences)	Passenger trip itinerary for a single transport operator or multiple transport operators Personalisation of itineraries based on individual travel needs and preferences, data and entitlements Personalisation of itineraries based on special needs during booking and travel for example relating to reduced mental or physical ability
Purchasing: commitment to pay a chosen offer	Implicit
After sales: refund/exchange of a booked offer, complaints, etc	Cancellation and/or change to reservations Provision of feedback or complaints
Booking: reservation of the chosen trip options	Reservation of vehicles, seats, sleepers, etc Service availability with fixed or yield-managed prices
Fulfilment: provision of proofs of the sale and/or booking to the customer	Providing passengers with tickets, for example by NFC or barcode access token

[1] Definitions based upon MaaS Alliance White Paper and on Transmodel/NeTEx.

Functionalities based on the MaaS Alliance White paper and Transmodel/NeTEx	Functionalities described in the survey
Pricing: calculation of the price of the trip option according to the pricing rules, such as pay-as-you-go	Calculation of journey price for usage-based tariffs such as pay-as-you-go
Payment: payment of the actual price corresponding to the chosen trip option and to the related pricing rules	Payment, particularly from a funds account held by a transport authority or other entity
Support: providing help to user during travelling by different means	Management of unforeseen events during the journey, for example schedule disruption, reporting of journey and ticket control data
Provision of information on sales conditions: information on sales rules (sales network, distribution channels, the purchase window etc) and on after sales conditions (eg is the access right refundable, etc)	
Provision of information on booking conditions: information on how to book, when, what parts of the trip option are submitted to reservation, etc	
Provision of information on pricing rules: information on price calculation rules, discounts, capping rules, etc	Itinerary tariff rules including rules on refund and change
Provision of information on payment methods: information on how/when the payment takes place (pre-payment, post-payment, pay-as-you go, etc)	
Consumption control: Access right validation and control	
Consumption Control: Fraud management and revenue protection measures	
Consumption Control: Collection and aggregation of consumption data	Provision of management information for MaaS Operators and/or statistics for government
Settlement: management of revenue sharing and clearing house activities	Management of earnings apportionment between multiple transport operators Settlement and clearing of earnings with one or more transport operators

1.3 Transport distribution architecture

The distribution architecture is shown in Figure 1.



Keys

- ○ Defined interfaces

Figure 1 — Distribution architecture

This architecture has been drawn from a number of reference sources covering urban transport, rail transport, financial services, transport regulation and transport standards.

There are the two main entities quoted conventionally in MaaS: the MaaS provider and the transport service provider.

In addition, and particularly relevant in the EU, is the National Access Point to the transport data portal.

In some cases, the transport service provider delegates the distribution of their services to an intermediary or aggregator, including GDSs.

Other IFMS roles include media and identify providers, ticket controllers, security managers, registries and IFMS scheme managers.

MaaS providers receive payment related to their customer's travel both from banks, but also from transport authorities and other entities holding travel purses and travel subscriptions.

The service booking interconnection uses the distribution APIs covered by this Technical Report.

The service data interconnection uses a range of APIs and message formats. In the EU these are predominantly harmonized standards.

1.4 Use of distribution APIs

Most distribution use cases can be categorized in three main ones:

— purchase of a trip offer (access right) for a set price that is valid for a defined set of services

— reservation and a commitment to pay once the price is known after travel

— implicit purchase of a trip offer that uses payment cards for pay-as-you-go (PAYG).

In the first case, a substantial set of distribution API functionalities is needed, including pricing for the journey (the whole set is summarized in the survey questions in section 4.3). The customer explicitly enters into a contract with the MaaS Provider.

In the second case, the price of travel is not known in advance and so distribution API functionality is needed that can explicitly commit a customer to pay the MaaS Provider for their journey after travel and provide a later justification for the charge.

In the third PAYG case, there is no registration or ticketing or pricing in advance and so there is no MaaS Provider in its original conception. The obligation to pay is implicit in entering the system, so the only distribution API functions needed are related to journey planning, plus the ability to demonstrate what journeys were made and how the charges were calculated.

To be noted that in all three cases, there is no requirement that the passenger and the customer are the same person.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1
aggregator
entity that provides technical and other services to several transport service providers to enable retailers and other parties to book tickets on services provided by each service provider

3.2
canonical mapping
use of a data model which is a superset of all the others (“canonical”), and creation of a “translator” layer to/from which all existing modules exchange data with other modules

3.3
distribution APIs
APIs that provide the ability to check availability, to make bookings, to take payment, to get tickets for travel, etc, for both conventional public transport modes and newer forms of mobility services