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Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) —

Part 14: Parking information (TPEG2-PKI)

Systèmes intelligents de transport — Informations sur le trafic et le tourisme via le groupe expert du protocole de transport, génération 2 (TPEG2) —

Partie 14: Information de parking (TPEG2- PKI)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition cancels and replaces the first edition (ISO/TS 21219-14:2016), which has been technically revised.

The main changes are as follows:

— four new Feetypes values have been added in Table 44;

— the document has been changed from a Technical Specification to an International Standard;

A list of all parts in the ISO 21219 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 History

TPEG technology was originally proposed by the European Broadcasting Union (EBU) Broadcast Management Committee, who established the B/TPEG project group in the autumn of 1997 with a brief to develop, as soon as possible, a new protocol for broadcasting traffic and travel-related information in the multimedia environment. TPEG technology, its applications and service features were designed to enable travel-related messages to be coded, decoded, filtered and understood by humans (visually and/or audibly in the user's language) and by agent systems. Originally, a byte-oriented data stream format, which can be carried on almost any digital bearer with an appropriate adaptation layer, was developed. Hierarchically structured TPEG messages from service providers to end-users were designed to transfer information from the service provider database to an end-user's equipment.

One year later, in December 1998, the B/TPEG group produced its first EBU specifications. Two documents were released. Part 2 (TPEG-SSF, which became ISO/TS 18234-2) described the syntax, semantics and framing structure which was used for all TPEG applications. Meanwhile, Part 4 (TPEG-RTM, which became ISO/TS 18234-4) described the first application for road traffic messages.

Subsequently, in March 1999, CEN/TC 278, in conjunction with ISO/TC 204, established a group comprising members of the former EBU B/TPEG and this working group continued development work. Further parts were developed to make the initial set of four parts, enabling the implementation of a consistent service. Part 3 (TPEG-SNI, later ISO/TS 18234-3) described the service and network information application used by all service implementations to ensure appropriate referencing from one service source to another.

Part 1 (TPEG-INV, later ISO/TS 18234-1) completed the series by describing the other parts and their relationship; it also contained the application IDs used within the other parts. Additionally, Part 5, the public transport information application (TPEG-PTI, later ISO/TS 18234-5), was developed. The so-called TPEG-LOC location referencing method, which enabled both map-based TPEG-decoders and non-map-based ones to deliver either map-based location referencing or human-readable text information, was issued as ISO/TS 18234-6 to be used in association with the other applications of parts of the ISO 18234 series to provide location referencing.

The ISO 18234 series has become known as TPEG Generation 1.

0.2 TPEG Generation 2

When the Traveller Information Services Association (TISA), derived from former forums, was inaugurated in December 2007, TPEG development was taken over by TISA and continued in the TPEG applications working group.

It was about this time that the (then) new Unified Modelling Language (UML) was seen as having major advantages for the development of new TPEG applications in communities who would not necessarily have the binary physical format skills required to extend the original TPEG TS work. It was also realized that the XML format for TPEG described within the ISO 24530 series (now superseded) had a greater significance than previously foreseen, especially in the content-generation segment, and that keeping two physical formats in synchronism, in different standards series, would be rather difficult.

As a result, TISA set about the development of a new TPEG structure that would be UML-based. This has subsequently become known as TPEG Generation 2 (TPEG2).

TPEG2 is embodied in the ISO 21219 series and it comprises many parts that cover an introduction, rules, toolkit and application components. TPEG2 is built around UML modelling and has a core of rules that contain the modelling strategy covered in ISO 21219-2, ISO 21219-3 and ISO 21219-4 and the conversion to two current physical formats: binary (see Annex A) and XML (see Annex B); others can be added in the future. TISA uses an automated tool to convert from the agreed UML model XMI file directly into an MS Word document file, to minimize drafting errors; this file forms the annex for each physical format.

TPEG2 has a three-container conceptual structure: message management (ISO 21219-6), application (several parts) and location referencing (ISO/TS 21219-7). This structure has flexible capability and can accommodate many differing use cases that have been proposed within the TTI sector and wider for hierarchical message content.

TPEG2 also has many location referencing options as required by the service provider community, any of which may be delivered by vectoring data included in the location referencing container.

The following classification provides a helpful grouping of the different TPEG2 parts according to their intended purpose. Note that the list below is potentially incomplete, as there is the possibility that new TPEG2 parts will be introduced after the publication of this document.

— Toolkit parts: TPEG2-INV (ISO 21219-1), TPEG2-UML (ISO 21219-2), TPEG2-UBCR (ISO 21219-3), TPEG2-UXCR (ISO 21219-4), TPEG2-SFW (ISO 21219-5), TPEG2-MMC (ISO 21219-6), TPEG2-LRC (ISO/TS 21219-7).

— Special applications: TPEG2-SNI (ISO 21219-9), TPEG2-CAI (ISO 21219-10), TPEG2-LTE (ISO/TS 21219-24).

— Location referencing: TPEG2-OLR (ISO/TS 21219-22), TPEG2-GLR (ISO/TS 21219-21), TPEG2-TLR (ISO 17572-2), TPEG2-DLR (ISO 17572-3).

— Applications: TPEG2-PKI (ISO 21219-14 - this document), TPEG2-TEC (ISO 21219-15), TPEG2-FPI (ISO 21219-16), TPEG2-SPI (ISO 21219-17), TPEG2-TFP (ISO 21219-18), TPEG2-WEA (ISO 21219-19), TPEG2-RMR (ISO/TS 21219-23), TPEG2-EMI (ISO/TS 21219-25), TPEG2-VLI (ISO/TS 21219-26).

TPEG2 has been developed to be broadly (but not totally) backward compatible with TPEG1 to assist in transitions from earlier implementations, while not hindering the TPEG2 innovative approach and being able to support many new features, such as dealing with applications with both long-term, unchanging content and highly dynamic content, such as parking information.

This document is based on the TISA specification technical/editorial version reference:

SP20009-TPEG2-PKI_1.2/001.

Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) —

Part 14:
Parking information (TPEG2-PKI)

1 Scope

This document specifies the TPEG parking information (PKI) application which has been designed to deliver parking information to a variety of receivers using a number of different channels, particularly digital broadcasting and internet technologies. Parking information can be presented to the user in many different ways, including text, voice or graphics.

Today, traffic congestion has become a serious problem in urban areas. Some traffic congestion is attributed to drivers searching for parking spaces. Timely provision of parking information can help to ease traffic congestion. Furthermore, parking information is valuable for visitors, particularly when it can be used to signal where a temporary parking facility is established for a special event.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21219-1, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 1: Introduction, numbering and versions (TPEG2-INV)*

ISO 21219-9, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 9: Service and network information (TPEG2-SNI)*

ISO 21219-10, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 10: Conditional access information (TPEG2-CAI)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21219-9 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
location referencing
LR
means of providing information that allows a system to accurately identify a location

Note 1 to entry: The content of a location reference allows the location to be presented in a graphical or textual manner to the end-user (e.g. coloured network graphs), as well as to be used for navigational systems purposes.

3.2
location referencing container
LRC
concept applied to the grouping of all the *location referencing* (3.1) elements of a TPEG-Message together in one place

Note 1 to entry: See TPEG2 LRC documents (e.g. ISO 21219-7) for full LRC explanations.

3.3
message management container
MMC
concept applied to the grouping of all message elements including message management information of a TPEG-Message together in one place

Note 1 to entry: See TPEG2 MMC documents (e.g. ISO 21219-6) for full MMC explanations.

4 Abbreviated terms

For the purposes of this document, the abbreviated terms listed in ISO 21219-1, ISO 21219-9, ISO 21219-10 and the following apply.

ACID application and content identifier

CA conditional access

LGV large goods vehicle

RFID radio frequency identification

5 Application specific constraints

5.1 Application identification

The word “application” is used in the TPEG specifications to describe specific subsets of the TPEG structure. An application defines a limited vocabulary for a certain type of messages, for example, parking information or road traffic information. Each TPEG application is assigned a unique number, called the application identity (AID). An AID number is defined in ISO 21219-1 whenever a new application is developed.

The AID number is used within the TPEG2-SNI application (ISO 21219-9) to indicate how to process TPEG content. It facilitates the routing of information to the appropriate application decoder.

5.2 Version number signalling

Version numbering is used to track the separate versions of an application through its development and deployment. The differences between these versions can have an impact on client devices.

The version numbering principle is defined in ISO 21219-1.

Table 1 shows the current version numbers for signalling PKI within the SNI application.

Table 1 — Current version numbers for signalling of PKI

Major version number	1
Minor version number	2

5.3 Ordered components

PKI does not generally require a fixed order of TPEG components, except where explicitly modelled. The order for the PKI message components is shown in Figure 1. The first component shall be the MMC. This shall be the only component if the message is a cancellation message. Otherwise, the MMC component shall be followed by the one or more ADC component(s) which include(s) the application-specific information.

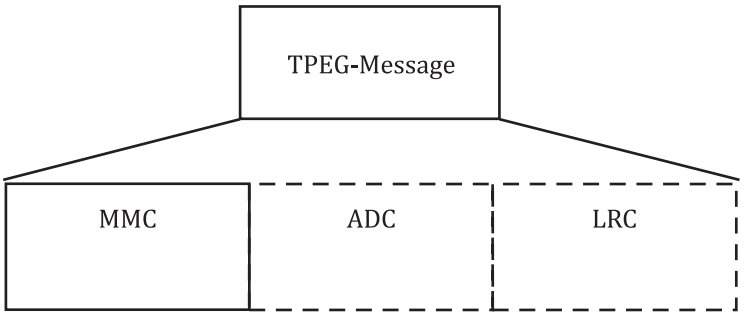

Figure 1 — Composition of TPEG messages

5.4 Extensions

Future application extensions may insert new components or may replace existing components by new ones without losing backward compatibility. This means that a PKI decoder shall be able to detect and skip unknown components.

5.5 TPEG service component frame

PKI makes use of the "service component frame with dataCRC and messageCount and priority" according to ISO 21219-5.

6 PKI message components

6.1 ParkingMessage

A parking message shall hold one of the MessageManagement components and optionally may have one ParkingLocation, one ParkingSiteDescription and multiple Advice components, as well as one CurrentCapacity and multiple ExpectedCapacity components, as illustrated in Figure 2 and Table 2. The binary format and XML format of the TPEG2-PKI application for use in transmission shall be in accordance with Annexes A and B, respectively.

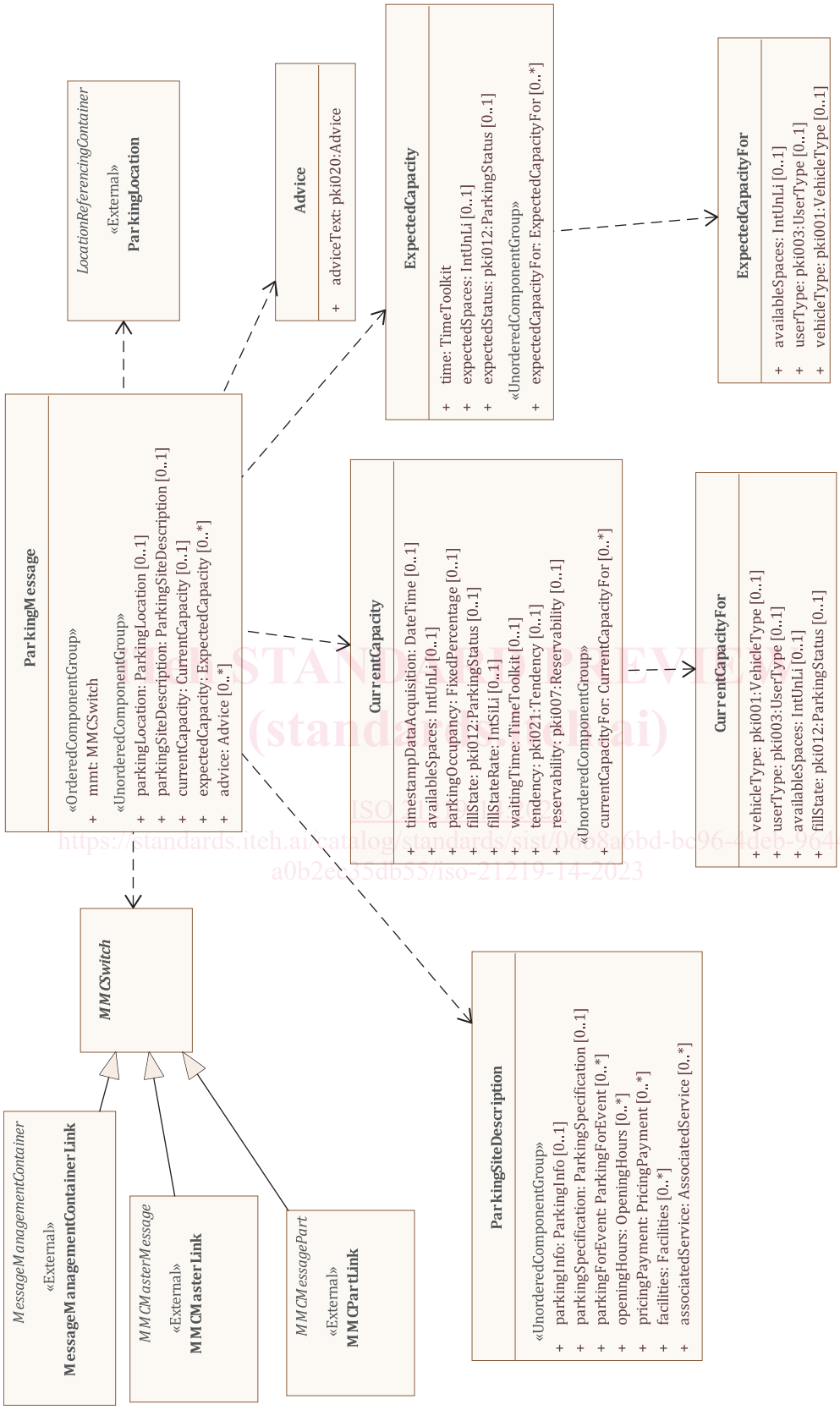

Figure 2 — Structure of the parking message

TPEG-MMC (ISO 21219-6) methods may be used to transmit static data independently to dynamic data.

NOTE 1 The components have been grouped to facilitate such dynamic updates.

For example, the name and the location of a parking site do not change frequently and thus, these data may be transmitted less frequently than, for example, the number of available spaces. It is important nonetheless, that the basic information required to display a sensible message to the user should be sent in suitable intervals to allow receivers just switched on to decode and display data within a reasonable time.

Clients should decode messages with the same version number (and PartID in case of partial messages) only once.

Table 2 — Parking message

Name	Type	Multiplicity	Description
Ordered components			
mmt	MMCSwitch	1	Includes one of the MMC types.
Unordered components			
parkingLocation	ParkingLocation	0..1	see ISO/TS 21219-7.
parkingSiteDescription	ParkingSiteDescription	0..1	n/a
currentCapacity	CurrentCapacity	0..1	n/a
expectedCapacity	ExpectedCapacity	0..*	n/a
advice	Advice	0..*	n/a

6.2 MMCSwitch

The MMCSwitch is an abstract container that allows the use of the different message management options.

6.3 MessageManagementContainerLink

The MessageManagementContainerLink serves as a link to the message management container.

6.4 MMCMasterLink

The MMCMasterLink serves as a link to the message management container.

6.5 MMCPartLink

The MMCPartLink serves as a link to the message management container.

6.6 ParkingLocation

The ParkingLocation serves as a link to the LocationReferenceContainer.

6.7 ParkingSiteDescription

The ParkingSiteDescription component is a wrapper for largely static information about a parking facility. The information is grouped in the ParkingName, ParkingSpecification, OpeningHours, PricingPayment, Facilities, ParkingForEvent and AssociatedService components; see Figure 3 and Table 3.

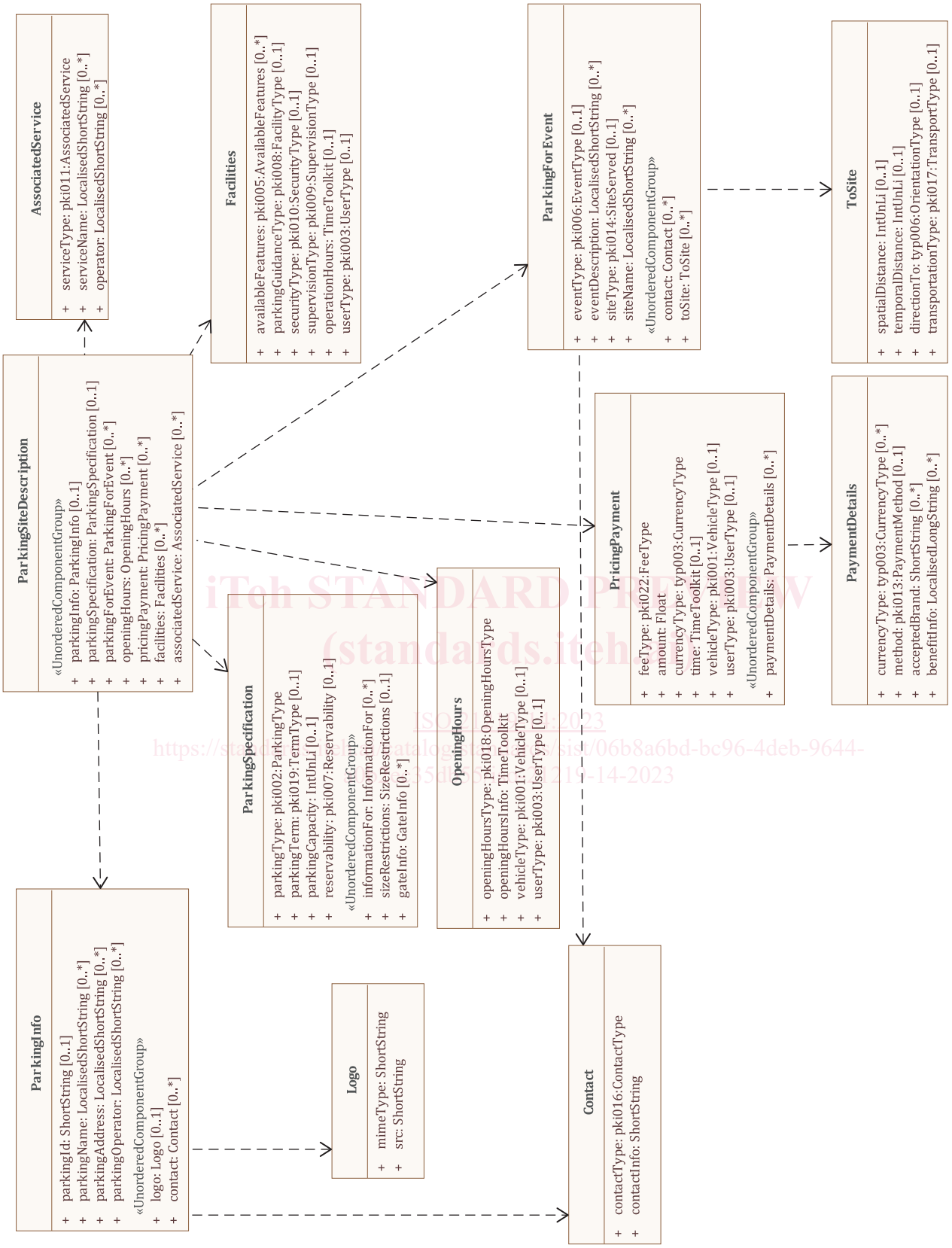

Figure 3 — Structure of parking site description

Table 3 — ParkingSiteDescription

Name	Type	Multiplicity	Description
Unordered components			
parkingInfo	ParkingInfo	0..1	n/a
parkingSpecification	ParkingSpecification	0..1	n/a
parkingForEvent	ParkingForEvent	0..*	n/a
openingHours	OpeningHours	0..*	n/a
pricingPayment	PricingPayment	0..*	n/a
facilities	Facilities	0..*	n/a
associatedService	AssociatedService	0..*	n/a

6.8 ParkingInfo

The ParkingInfo component contains address and contact information about a parking facility to be displayed to the user. This includes name, address, operator, logo and the contact details for the parking facility, as shown in Table 4.

Table 4 — ParkingInfo

Name	Type	Multiplicity	Description
parkingId	ShortString	0..1	This attribute may hold a parking-site-specific ID string, allowing linking of this site to other referencing schemes. It shall not contain language-specific descriptions and should preferably not be presented to the user as a description.
parkingName	LocalisedShortString	0..*	Name of the parking site in various languages.
parkingAddress	LocalisedShortString	0..*	Address of the parking site in language-specific formats. e.g. for German: Frauensteige 2, D-89075 Ulm
parkingOperator	LocalisedShortString	0..*	Language-specific strings representing the name and/or company of the operator.
Unordered components			
logo	Logo	0..1	n/a
contact	Contact	0..*	n/a

6.9 Logo

The logo component provides a URI and a mimeType for a company or parking site logo type. It does not contain the image data itself, as shown in Table 5.

Table 5 — Logo

Name	Type	Multiplicity	Description
mimeType	ShortString	1	The mime type of the image at the provided source.
Src	ShortString	1	URI where the logo can be retrieved.

6.10 Contact

This component provides contact information, as shown in Table 6.