FareXChange

A NeTEx Profile

for UK Fares data

Part3 Fare Data elements

(FXCP-FM)

[Review DRAFT]

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1 Introduction

This document describes the fare elements for the UK Fare Exchange profile (FXCP); it is the third of three documents describing the UK profile.

- For an overview of the UK Profile scope -see UK Profile Part 1. (**FXCP-IN).**
- For a description of the basic elements, see UK Profile Part 2 –(**FXCP-NT**).
- For a description of the Fare elements, (This document) (**FXCP-FM**).

The document is derived from the documentation for the CEN NeTEx Standard TS 16614-3 (Fares) and Transmodel V6 EN 12896-5)

It uses the same conventions for presenting a profile as does the FXCP Part1, based on those of the common EU Profile (TS 16614:PI Profile) for exchanging stop and network data.

The FXCP can be regarded as condensed and focused version of the full NeTEx specification.

1.1 Profile Scope

The nature, purposes and scope of the profile are described in UK Profile Part1 (FXCP-IN); the main purpose of the UK profile is to exchange fare data for UK bus fares to passenger information systems.

Typical use cases for the Passenger Information Profile are:

- provision of information about fare zones and networks for maps and online visualisations.
- provision of fare data to a journey planner.

The fare profile requires;

(a) Use of some common NeTEx Framework features (NeTEx Part1), as described in FXCP-NT.
(b) Use of use some common NeTEx components (NeTEx Part1 & NeTEx Part2), as described in FXCP-NT.
(c) Use of a subset of the NeTEx Fare model (NeTEx Part3), as described in this document (FXCP-NT)

The document omits many NeTEx elements that are not needed for the UK profile. See the full NeTEx profile for further details.

1.1.1 Use of UK PT Reference data

The FXCP profile in particular shows how the existing UK National data sets for places (NPTG) and stops (NaPTAN), operator (NOC) and lines (TransXChange)can be used to describe the Network data for bus fares.

1.2 Structure of this document

This Fare profile document is made up of five parts

1. Introduction
2. **Fare Model details**, with separate sections on the use of each of the components of the NeTEx Fare model for UK fare data.
    a. Use of Network elements in Fare structures.
    b. Fare Prices.
    c. Fare Structures.
    d. Fare Products.
        i. Products and Access rights.
        ii. Usage Parameters.
    e. Sales Offers.
    f. Fare Frames.
3. **Common Rules** for encoding dare data.
4. **Guidance on resenting FXCP data in tables** and spreadsheets.
5. **Annexes** with a data dictionary and supplementary material.

1.3 Basic and extended fare profiles

Fare structures and fare products vary greatly in their complexity and in practice some products are very common, while others are less common or even quite rare. Furthermore, the advent of mobile technology is transforming both the way fares are delivered, and the products that are offered, so the mix of products is changing and likely to continue to change, and it is vital to ensure that profile supports modern as well as classical tariff structures.

However, while even very complex fare structures can be expressed in NeTEx, the majority of bus fares are more straightforward and so the scope of FXCP categorises the features to be supported into two groups: A **basic fare profile (FXCP-FM1)**., and an **extended fare profile (FXCP-FM2)**.

The main focus of the explanations given in this document is on the basic features as it is presumed that supporting an exchange of basic tariffs will be a necessary first step for all implementors. The advanced profile includes additional components, in particular it allows the definition of derived prices; further conditions describing the use of fares; and some additional product types and usage parameters.

1.4 Efficiency considerations for tariff structures

The choice of the optimum model for the exchange of fare prices involves making a trade-off between complexity and size; one may choose to exchange either a small data set of parameters requiring a complex set of calculations to interpret, or a larger data set needing much simpler processing by a consumer.

In particular, for the simplest representation of prices for use by a consumer system, a point-to-point tariff, the size of a table of prices is a combinatorial function of the number of stops. The magnitude of the table as determined by the network size is then multiplied additionally for every further option that has a differentiated price (e.g. user type, media, etc.) by the number of choices for each option (e.g. if there are separate adult, child and senior options, each with a different price, then there will be thrice the number of fare prices). Consequently, it is not practical to exchange every price if the network size is above a certain number of stops or zones (say about 100).

As an outline illustration, consider a medium size bus network with say ten intersecting lines, each with say fifty stops, split into fare stages about ten stops apart, with a progressive pricing such that there are price bands for consuming three, six and nine sections and separate child and adult prices derived from the adult full fare. Let's say there is also a 10 % discount for using a mobile app rather than a cash paper ticket, giving rise to a second set of prices for a different packaging of the same underlying fare product – a single trip.

The simplest possible representation for a consumer system – a point to-point table across the whole network, with absolute prices for each option for each O/D pair – is impractically large; with 500 combinatorial (approx. 125,000 O/D pairs) x 3 (user profiles) x 2 (sales offer packages) or approximately 750,000 possible prices, but a point to-point table for each line might be viable and is one of the options compared below.

We can make a very approximate estimate of the likely size of the price data sets using the various fare structures from Transmodel / NeTEx.

1.4.1 As a stage fare representation with derived prices

A representation of the network fare as a section or stage fare would require:

- At least ten journey patterns (one for each line) each with say at least five stops marked as fare stages.
- Four interval ranges (0-3, 3-6, 6-9 and 9+ sections).
- Three user profiles.
- Two pricing rules for the two derived discounted prices for the *child* and *senior* user profiles.
- Two type of travel document.
- A discount pricing rule for purchase of the *mobile apps* sales offer package.
- A fare product.
- Two sales offer packages, one for paper and one for mobile app.
- A fare table of just four interval base prices.

Computation of a price for a trip between any two stops would involve:

1) Counting the number of stages consumed on each leg of the trip.
2) looking up the interval price for the number of stages used for each leg of the trip.
3) Applying the appropriate discounting pricing rule for the given user profile (*child, senior*, etc).

4) Applying the appropriate discounting rule for the given sales offer package (i.e. *mobile app* or not).

5) Adding up the prices of the two legs (assuming interchanging is not allowed on the same ticket).

Comment: The Fare table is very concise, but the calculation is quite complex.

1.4.2 As a stage fare representation with absolute prices

If the derived prices were precomputed as absolute prices, the pricing rules need not be exchanged but the fare table would be a bit larger, thus as above but;

- A fare table of just 4 [intervals] x 3 [profiles] x 2 [sales offer] prices, thus 24 prices.

Computation of a price for a trip between any two stops would involve:

1) Counting the number of stages consumed on each leg of the trip.

2) For a given user profile and sales offer package, looking up the interval price for the number of stages used each leg of the trip.

Comment: The price table is slightly larger, but the calculation is much simpler

1.4.3 As a point-to-point fare representation per line

The same data could be represented as a simple point-to-point stop fare on a per line basis.

- 5 lines each with 50 x 50 combinatorial Origin/Destination stop pairs (1225 in all).
- Three user profiles.
- Two type of travel document.
- A fare product.
- Two sales offer packages, one for paper and one for mobile app.
- A fare table of 2500 [O/D pairs]) x 3 [user profiles] x 2 [sales offer] prices, thus 15,000 prices (assuming the prices are the same in each direction).

Computation of a price for a trip between any two stops would involve more simply:

1) Looking up the O/D pair for each leg of the trip.

2) For a give user profile and sale offer package, looking up the price for the O/D pair for each leg of the trip.

3) Adding up the separate legs.

Comment: The price table is much larger, but the calculation is simple.

1.4.4 As a zonal fare representation

The number of prices is also of course greatly reduced by a zonal fare system. The data set for a unit zone system has a similar magnitude to that of a fare stage system (with a price for every interval step of unit zone) but does not require stages to be specified for each route. The size of the data set for a zonal tariff will increase as a function of the number of zones offered; theoretically every permutation of zones might be offered as an option, but in practice only certain combinations are usually made available.

A representation of the network given above as a zonal fare would require:

- If there were three disjoint zones, say available as individual zones or in any combination, there would be seven permutations (A, B, C, AB, AC BC, ABC) of FARE ZONEs, each of which might have a base price.
- Each zone definition would have to state which stops were members; assuming at every stop is in at least one zone, that would require a minimum of 500 reference elements to specify.
- Three user profiles.
- Two type of travel document.
- A fare product.
- Two sales offer packages, one for paper and one for mobile app.
- A fare table of 7 [base zone prices] x 3 [user profiles] x 2 [sales offers] prices, thus 42 prices.

And computation of a price for a trip between any two stops would involve also be quite simple and involve:

1) Determining the zone or the start and end stops of a trip.
2) Looking up the O/D zone pair for the trip.
3) For a give user profile and sale offer package, looking up the price for the O/D zone pair for the trip.

Comment: The price table is quite small larger, but the calculation is quite simple.

1.5 NeTEx versions

Both the EPIP and the FXCP are specified based on the revised version 1.1 of NeTEx, issued in 2019. They may also be used with the original version 1.0 of NeTEx, issued in 2014, though certain elements are of course lacking.

If recourse to the NeTEx specification is needed, it is strongly recommended that the 1.1 version is used as it contains numerous clarifications and corrections to the original 1.0 document.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CEN

- EN 12896, *Road transport and traffic telematics - Public transport - Reference data model (Transmodel) Parts 1 to 9.*
- CEN/TS 16614-1 — *Network and Timetable Exchange (NeTEx) - Network description*.
- CEN/TS 16614-2 — *Network and Timetable Exchange (NeTEx) - Timing information.*
- CEN/TS 16614-3 — *Network and Timetable Exchange (NeTEx) - Fare description.*
- CEN/TS 16614-PI Profile — *Passenger Information European Profile*
- EN 15531-1, *Public transport — Service interface for real-time information relating to public transport operations - Part 1: Context and framework.*
- EN 15531-2, *Public transport — Service interface for real-time information relating to public transport operations - Part 2: Communications infrastructure.*
- EN 15531-3, *Public transport — Service interface for real-time information relating to public transport operations - Part 3: Functional service interfaces.*

DfT

- *NPTG & NaPTAN Schema Guide v2.5 2014*
- *TransXChange Schema Guide v2.5 2014*

XML Schema

The NeTEx XML schema (v1.1 or higher) can be downloaded from http://netex-cen.eu, along with available guidance on its use, example XML files, and case studies of national and local deployments.

[V1.1 not yet published – download1.09c from NeTEx.org.uk site]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12896 (Transmodel V6) and CEN/TS 16614 (NeTEx) and the following apply.

3.1 absolute price

a price stated as an amount in a unit such as a currency.

3.2 attribute

property of an entity.

3.3 conceptual data model

description of a real-world domain in terms of entities, relationships and attributes, in an implementation independent manner. It should provide a structure on which the rest of the development of an application system can be based.

3.4 conformant

satisfying all the rules of a specification, both syntactic and otherwise; conformance may be strict, augmented, or extended.

3.5 consumer

a system that imports profile conformant data.

3.6 data domain

data structure (in this European Standard, a part of the Reference Data Model for Public Transport) made up of data related to each other, through the fact that there is a functional area or group of functions using this data set as a whole.

3.7 data model

description of a real-world domain in terms of data and relationships.

3.8 derived price

a price that is computed from another rice using a (“Base price”) pricing rule.

3.9 data provider

organisation responsible for providing data (this may be distinct from that of the data source or the producer).

3.10 Interval distance tariff

Tariff whose pricing is based on intervals distances between stops, regardless of the actual stops used.

3.11 dominant validity condition

validity condition that attaches to a version frame and applies to all its contents.

3.12 entity

object (data) that has its own existence (as opposed to an attribute).

3.13 external reference

a reference to another object in a document other than the document holding the reference.

3.14 fare management

all activities related to the collection of money from passengers.

3.15 functional area

arbitrarily defined set of activities, used, in this European Standard, to define the objectives and limits of the data model and exchange profile.

3.16 internal reference

a reference to another object in the same document as that holding the reference.

3.17 interoperability

ability of (sub)systems to interact with other (sub)systems according to a set of predefined rules (interface).

3.18 logical normalised model

relational data model that is not fully normalised, i.e. does not completely follow the normalisation rules and thus may be redundant.

3.19 object-oriented data model

data structure expressed according to principles that allow for a direct implementation as an object-oriented database, where information is represented in form of objects, i.e. respecting the principle of encapsulation meaning in particular that each data is accessed or modified through operations (methods) belonging to it.

3.20 operations monitoring and control

all activities related to the transportation process, i.e. real-time functions related to the driving and transportation of passengers according to given instructions, including the monitoring of the driving process and its control in case of deviations, as well as all activities that support the driving process (traffic light priority, track switching, bay selection, advance/delay advice, etc.). Such functions are often assisted by computer-aided tools, known as Automated Vehicle Monitoring (AVM).

3.21 passenger information

all activities related to informing the users either about the planned or about the actual transportation services.

3.22 producer

a system that outputs data intended to be conformant to a profile.

3.23 profile

subset of a standard selecting the needed concepts (entities and associated attributes) for a specific use case or set of use cases, and complemented by rules defined to restrict possibilities of divergent interpretations of open parts of the standard.

3.24 profile code value

metadata used to describe a profile; a standardised code value, unique with the namespace of the profile, that helps define the profile.

3.25 profile metadata

data describing the properties of a profile, such as the permitted frame types and restricted code values.

3.26 profile validator

software tool that checks the content of a profile conformant XML document to ensure that it is compliant with the profile specification.

3.27 point-to-point tariff

Tariff whose pricing is based on individual origin / destination pairs, where the origin and destination are stops.

3.28 scheduling

see Tactical Planning.

3.29 specific frame

version frame that may only contain certain types entities concerned with a particular functional area, e.g. to describe a timetable.

3.30 strict conformance

conformance to a profile such that a document contains only the specified elements (i.e. that is not augmented or extended).

3.31 tactical planning

all activities related to the tactical planning of transportation, split into vehicle scheduling, driver scheduling, rostering.

3.32 XML document

A file containing data marked up with XML tags conforming exactly to an XML schema that specifies precise syntactic rules for the names, nesting and cardinalities of the tags and for the formats of the data values.

3.33 XML validator

A software tool that checks the content of an XML document to ensure that it is compliant with a schema.

3.34 zone-to-one tariff

Tariff whose pricing is based on individual origin / destination pairs, where the origin and destination are ones.

4 Presentation conventions

The conventions used in this document are an extension of the ones used in the main NeTEx document.

4.1 Recap of NeTEx presentation conventions

NeTEx follows certain conventions for the presentation of technical terms:

- Transmodel conceptual model elements ('ENTITIES') are shown in UPPER CASE, for example, "LINE", "SCHEDULED STOP POINT". For readability, they may be pluralised with a lower case 's', e.g."some LINEs."
- All XML elements in the NeTEx XML schema are shown in ***bold italic,*** *f*or example, ***Line***. Compound names are camel cased without a space and are never pluralised, e.g. "***ScheduledStopPoint".***
- Properties that are implemented as the XML class attributes of a complex class are in ***bold lower-case italic***, for example, "***id"***, "***order"***.
- Properties of an entity that are implemented as an XML child element, are also capitalised and shown in bold for example, "***ScheduledStopPoint*** / ***Name", "SiteElement / IsCovered***". This is regardless of whether the child element is a simple XML type (e.g. *xsd:boolean*') or a complex XML type (e.g. *PresentationStructure*).
- Restricted lists of enumeration values, (which are mostly in *lowerCamelCase)* are shown in *italics*; where values appear within free text, they are encased in single quotes to distinguish them from the plain text words, for example, '*busStop', 'canalBarge', 'rail'.*
- One-to-one relationships that are implemented as versioned references are shown as simple attribute names, for example, ***ScheduledStopPointRef, ZoneRef.*** When there is a reflexive relationship, or more than one relationship between the same two types these are qualified by a prefix to distinguish between them for example, ***ParentZoneRef, FromPointRef, ToPointRef***, etc.
- One-to-many relationships that are implemented as collections are lower cased and are always plural, for example, ***stopPoints***, ***vehicleJourney;*** *thus, the relationship name is used as a wrapper tag*. Such collections may variously comprise sets of simple versioned references (e.g. multiple instances of ***ScheduledStopPointRef)*** or of embedded elements whose full defining is included inline within the enclosing element (e.g. multiple instances of ***ScheduledStopPoint).***

- Data types are shown in *italic*; built-in xml types are shown in *italic* and *lowerCamelCase*, usually with the *xsd* namespace prefix, for example, *xsd:dateTime, xsd:normalizedString, xsd:integer*. NeTEx data types are shown in *italic* and *UpperCamelCase*, without a prefix. e.g. *LengthType, EmailType, DirectionTypeEnumeration*.
- The NeTEx data types that are complex (and hence have a further definition elsewhere) are shown with an underline, e.g. *DataManagedObject*, *Line*, etc. An exception is made for the common utility types such as *MultilingualString*, and all subtypes of *VersionOfObjectRef,* which are shown without an underline.
- All compound names of data types are camel cased without a space, for example, *ScheduledStopPointIdType*.
- Stereotype names are enclosed in guillements (chevrons), for example, «TM VIEW», «enum», «FK».

4.2 Additional profile presentation conventions

A few additional conventions have been added beyond those used in NeTEx in order to cover specific aspects of the EPIP and the FXCP:

(1) Indication of which attributes are included in the profile.

The profile uses highlighting to mark up the NeTEx model definitions as follows:

Table 0 - Additional presentation convention

«FK»	***dataSourceRef***	*DataSourceIdType*	0:1	Data system which originated data instance.
	created	*xsd:dateTime*	0:1	Date and time of creation of ENTITY. This is a specific addition (rule, constraint, e the profile.
	changed	*xsd:dateTime*	0:1	Date and time of last change to ENTITY.

No highlight means that it is elemnt is inculded in the profile

Light Grey highlight emphasis an additional rule or constraint added to the original NeTEx text

Blue highlight means that this attribute is not selected for the EPIP

Note: Unselected attributes (highlighted in blue) can still be used since they will still be valid for the NeTEx XSD. However, they are not required to be read and understood by the consumer. Moreover, they may be the source of issues for those deciding to use a reduced or optimised XSD. Therefore, using them should only be by agreement.

UK☞ Notes and comments specific to the UK implementation are indicated by an Index pointer.

(2) Profile code values

Wherever possible, the FXCP standardises the code values used to classify and characterise elements to a systematic set of documented values. In NeTEx, several different mechanisms are used to specify the permitted code values;

a. **Fixed enumerations** defined as part of the NeTEx schema (see presentation convention above e.g. '*riverBus'*). The FXCP mandates a subset of the NeTEx codes - see Annex B for the permitted values.
b. **Specialisations** of TYPE OF VALUE, used to define open ended code sets which may be added to over time without changing the schema, and for arbitrary user classifications, for example, to record legacy entity classifications. FXCP itself uses the TYPE OF VALUE mechanism in a few cases to specify additional standardised codes: these are assigned to an "*fxc_metadata'* CODESPACE (https://netex.org.uk/fxc) indicated by an *'fxc'* prefix. (The PIP similarly uses an epip_data codespace) The identifiers of FXCP values are shown in lower case italics (if necessary, with underscore marks between words), and appear within italics in text, for example, '*fxc:administrative_district'*.
c. ***TypeOfFrame*** instances: The FXCP uses several different TYPEs OF FRAME to specify the usage of VERSION FRAMEs in the profile. The identifiers of the ***TypeOfFrame*** instances are shown in upper case italics with underscore marks between words, for example, '*fxc:UK_PI_LINE_*OFFER'**.**

(3) Indication of Abstract classes

NeTEx makes extensive use of class *inheritance*; this significantly simplifies specification by avoiding repetition since shared attributes are declared on a superclass and subclasses are then defined that have the common properties of the superclass without having to repeat them. Most superclasses are 'abstract' – that is, there is no actual instance of them; only the terminal subclasses are 'concrete'.

An inconvenience of inheritance is that if one wishes to understand the properties of any single concrete class, one must look also at all of its superclasses (and it is not always obvious whether this should best be done before or after studying the concrete class). For this reason, the FXCP profile includes the necessary abstract classes to understand the concrete classes, even though the concrete classes are never directly instantiated in a NeTEx document.

- The superclasses are flagged in headings by the suffix '(**Abstract)'** and are generally presented in top down order of inheritance (so they will appear before the concrete class of actual interest)**.**
- In UML diagrams (as for NeTEx and Transmodel), the names of abstract classes are shown in *italics*.
- Certain superclasses are technically not abstract in the NeTEx, but are not used as concrete classes in the FXCP. These are flagged **(Abstract in FXCP)**

In this document

(4) Subcomponent Classes

A number of the profile classes have subcomponents that make up their definition. These provide ancillary detail (for example ***AlternativeText***, ***AlternativeName, TrainComponent***) and are flagged in headings by the suffix '(**Subcomponent of XXX)',** where XXX is their usual parent. They can be ignored on a first reading.

(5) Emphasis of key points to note

In this document, underscore is used to emphasise important points (since italic and bold emphasis is mostly used to distinguish XML elements).

4.3 Transmodel definitions and the FXCP

The NeTEx specification uses the same formal definitions to describe its XML class elements as those used by Transmodel to describe the corresponding ENTITies.

The FXCP adheres to these definitions but, since it is intended to be as readable as possible, in certain places the FXCP specification simplifies, annotates, reorders or paraphrases the formal definitions in the interests of clarity or brevity. In particular in its narrative it adds comments and examples as to the purpose and intended use of specific features. It also makes similar revisions to the NeTEx definitions of attributes. Regardless of this, the original Transmodel definitions (For which see Annex A) should be considered definitive for the interpretation of concepts and the NeTEx specification definitive for the interpretation of additional attributes.

Note that for readability, the FXCP specification also uses a different order of presentation of the elements compared to that used in Transmodel and NeTEx.

5 UK Fare Profile overview

The rest of this document gives a summary of the elements in the UK fare profile.

5.1 Fare Specification aspects

NeTEx defines fare structures and prices using a layered set of reusable components. The following diagram summarises the main layers as four separate columns (Sales Offer, Fare Product, Fare Structure and Fare Price).

- A TARIFF is a coherent set of FARE STRUCTURE ELEMENTs which serve to describe the different aspects of the fare structure and relate them to the underlying transport network - for example the available tariff zones, stop-to-stop transitions, pass durations, etc.

- A FARE PRODUCT is a marketable set of access rights, specified as one or more VALIDABLE ELEMENTs, each referencing one or more FARE STRUCTURE ELEMENT.

- A SALES OFFER PACKAGE packages one or more FARE PRODUCTs as an offering which may be purchased by a customer; it adds information of the types of ticket and distribution channels and other commercial conditions. It also specifies what TYPE OF TRAVEL DOCUMENT (i.e. how the product is materialised as a ticket).

- FARE PRICEs specify the prices for the different elements to which a price may attach. Prices may be held at many different levels and there will be separate prices for each allowed combination of product options.

Each of these aspects is described further in the chapters later below.

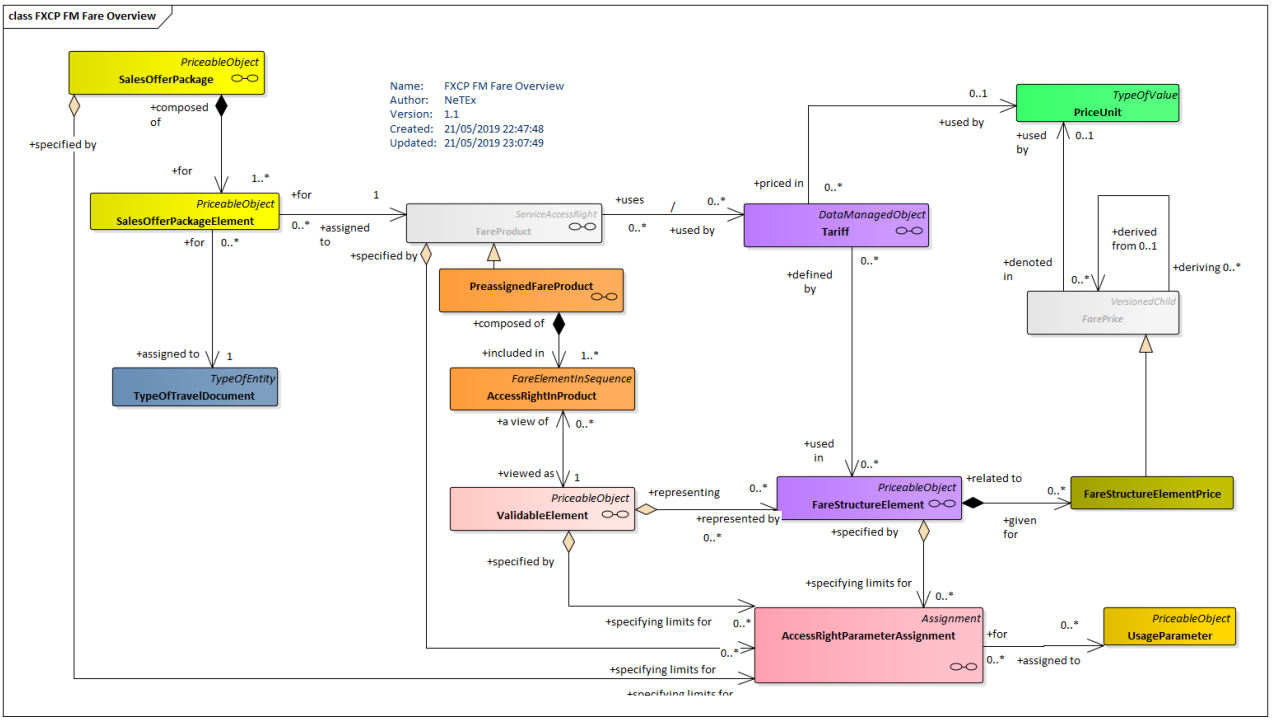


Figure 1 — High level Overview of Fare Model (UML)

5.2 Fare Model Submodels

NeTEx Fare model is modularised into a number of submodels defined as UML packages, these in turn depend on packages in NeTEx Part1 and Part2 that define framework and transport network components.

- The FARE ZONE Models describe the network related fare constructs.
- The FARE PRICE Model present FARE PRICEs and PRICE GROUPs; the FARE CALCULATION Model holds common pricing parameters; The FARE TABLE Model presents FARE TABLEs for organising large groups of prices.
- The FARE STRUCTURE Models provide the various types of element used to represent different tariff structures.
- The FARE PRODUCT Models describes the available FARE PRODUCTs.
- The USAGE PARAMETER Models describe the limiting conditions for the fare products.
- The FARE ACCESS RIGHT PARAMETER Models assign the access rights to specific products and limiting parameters.
- The SALE OFFER PACKAGE Model describes how the fare elements are combined as marketable components using various TYPES OF TRAVEL DOCUMENT
- The FARE FRAME Model describes the elements used to group fare data for exchange.

6 Fare Network

The NeTEx fare structures references the same descriptive elements that are used to describe the network topology and its timetables. (as stops, lines, services etc). These include

- LINE, GROUP OF LINES, NETWORK
- OPERATOR, AUTHORITY, GROUP OF OPERATORS
- VEHICLE MODE
- STOP PLACE, SCHEDULED STOP POINT and STOP ASSIGNMENT

See FXCP-NT Part2) for further details.

NeTEx Part1 includes the concept of a TARIFF ZONE, which can be used to define the permanent fare zones of a network. A given SCHEDULED STOP POINT can belong to one or more TARIFF ZONEs.

- Many networks will use TARIFF ZONEs. A TARIFF ZONE is a view of a ZONE, specifically defined for fare calculation. It is composed of SCHEDULED STOP POINTs. A TARIFF ZONE may have specific points on its borders, the TARIFF POINTs. Some such points activate an automatic detection of the NeTEx Part3 FARE ZONE MODEL extends these elements and also adds further concepts relating to the network that can be used additionally to underpin fare structures.
- FARE SCHEDULED STOP POINT specialises SCHEDULED STOP POINT, extending its definition with additional fare related attributes
- A FARE ZONE is a specialization of TARIFF ZONE that may have additional properties, in particular FARE SECTIONs associated with it.
- A FARE SECTION is another type of fare structure parameter. It is a subdivision of a JOURNEY PATTERN, consisting of consecutive FARE POINTs in PATTERN, each referencing a SCHEDULED STOP POINT in that JOURNEY PATTERN. FARE SECTIONs allow arbitrary sections of the network to be associated with a specific FARE ZONE.

UK☞ The NPTG defines TARIFF ZONEs for PlusBus.

UK☞ NaPTAN defines SCHEDULED STOP POINTs for the UK.

UK ☞ TransXChange defines LINES and JOURNEY PATTERNS that use specific SCHEDULED STOP POINTs for UK. Bu schedules.

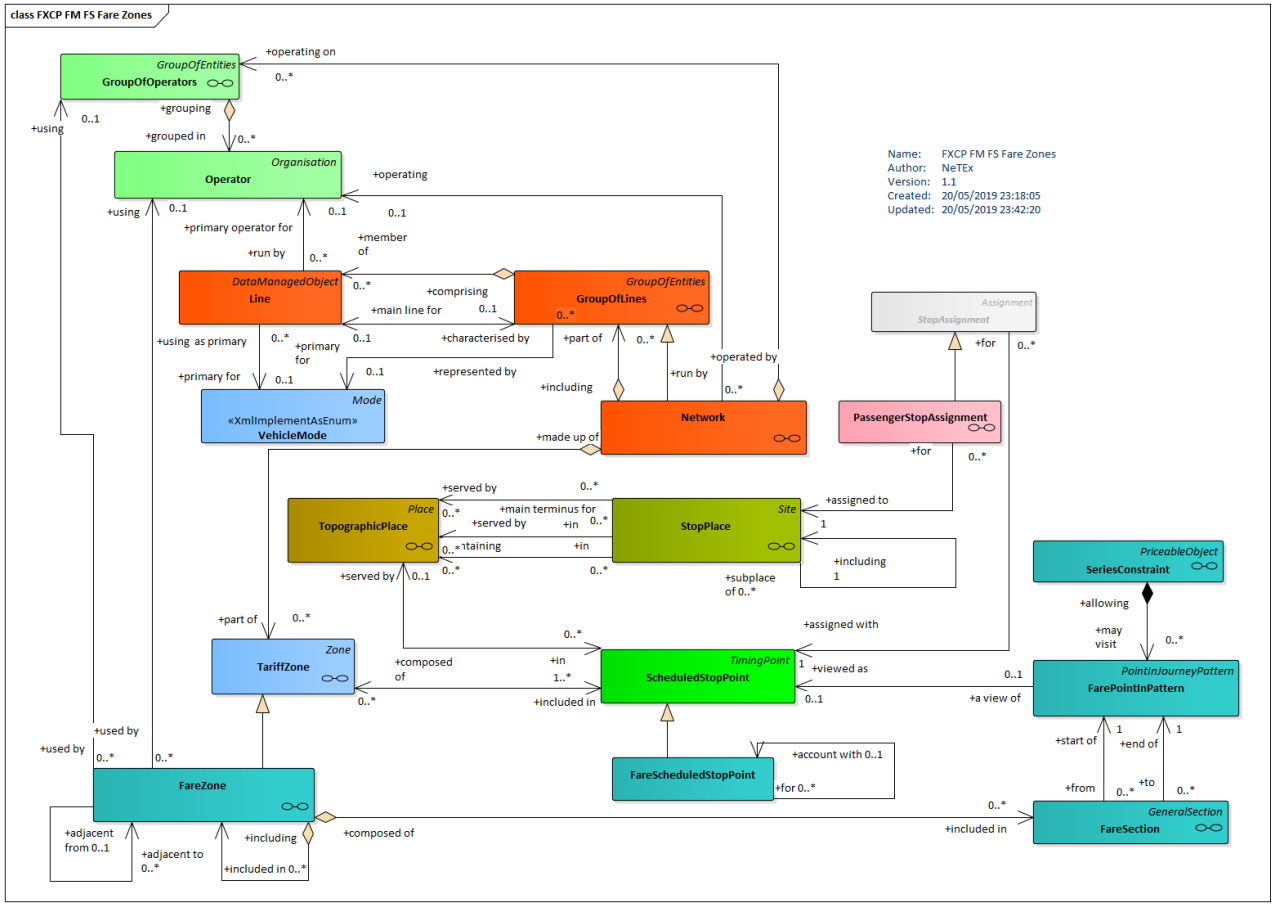


Figure 2 — Basic use of Network elements for fares (UML)

6.1 FareScheduledStopPoint

A specialisation of SCHEDULED STOP POINT describing a stop with fare accounting and routing characteristics.

A FARE SCHEDULED STOP POINT is used just as if it were a SCHEDULED STOP POINT, but has some extra attributes.

UK☞ A NaPTAN stop identifier is used for a FARE SCHEDULED STOP POINT.

Table 1 – *FareScheduledStopPoint* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*ScheduledStopPoint*	::>	FARE SCHEDULED STOP POINT inherits from SCHEDULED STOP POINT. See NeTEx Part1.
«PK»	***id***	*FareStopPointIdType*	1:1	Identifier of FARE SCHEDULED STOP POINT.
	SiteFacilitySet	*SiteFacilitySetRef*	0:1	Set of Facilities available at the stop.

	NameOnRouting	*MultilingualString*	0:1	Name to use to indicate station on routings and itineraries.
«FK»	***AccountingStop-PointRef***	*FareScheduled-StopPointRef*	0:1	Identifier of another station to use for accounting purposes for this station.
«FK»	***BorderPointRef***	*BorderPointRef*	0:1	BORDER POINT associated with FARE SCHEDULED STOP POINT.

6.2 FareZone

A specialization of TARIFF ZONE to include designated FARE SECTIONs.

A FARE ONE is used just as if it were a SCHEDULED STOP POINT, but has some extra attributes.

UK☞ A NPTG PlusBusZone identifier is used for a FARE ZONEs.

Table 2 – *FareZone* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*TariffZone*	::>	FARE ZONE inherits from TARIFF ZONE. See NeTEx Part1.
«PK»	***id***	*FareZoneIdType*	1:1	Identifier of FARE ZONE.
«FK»	***ParentFareZone Ref***	*FareZoneRef*	0:1	Parent FARE ZONE of which this is part.
«enum»	***ZoneTopology***	*ZoneTopologyEnum*	0:1	Topology of FARE ZONE with regard to other zones. See allowed values below. • *ring; annular; nested; tiled; sequence; overlappingSequence; other*
«enum»	***ScopingMethod***	*ScopingMethodEnum*	0:1	Indication of how member stops of a FARE ZONE are specified; The default value is '*explicitStops'.* • *explicit* • *implicitSpatialProjection* • *explicitPeripheryStops* • *other*
«FK»	***Transport-OranisationRef***	*(TransportOrganisationRef) OperatorRef | AuthorityRef*	0:1	Reference to OPERATOR of FARE ZONE.
«cntd»	***GroupOf-Operators***	*GroupOfOperators*	0:*	Reference to GROUP OF OPERATORs (also AUTHORITies) for FARE ZONE.

«cntd»	***fareSections***	*FareSection*	0:*	FARE SECTIONs in FARE ZONE.
«cntd»	***neighbours***	*FareZoneRef*	0:*	Adjacent FARE ZONEs.

6.3 FareSection

A subdivision of a JOURNEY PATTERN consisting of consecutive POINTs IN JOURNEY PATTERN, used to define an element of the fare structure.

Table 3 – *FareSection* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*CommonSection*	::>	FARE SECTION inherits from COMMON SECTION. See NeTEx Part1.
«PK»	***id***	*FareSectionIdType*	1:1	Identifier of FARE SECTION.
	Name	*MultilingualString*	0:1	Name of FARE SECTION.
«FK»	***JourneyPatternRef***	*JourneyPatternRef+*	0:1	Reference to a JOURNEY PATTERN that FARE SECTION follows.
«FK»	***FromFarePointRef***	*FarePointInPatternRef*	0:1	Reference to FARE POINT IN PATTERN at which FARE SECTION starts.
«FK»	***ToFarePointRef***	*FarePointInPatternRef*	0:1	Reference to FARE POINT IN PATTERN at which FARE SECTION ends.

6.4 FarePointInPattern (Subcomponent of FareSection)

A POINT IN PATTERN which represents the start or end of a FARE SECTION.

Table 4 – *FarePointInPattern* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*PointInJourneyPattern*	::>	FARE POINT IN PATTERN inherits from POINT IN JOURNEY PATTERN. See NeTEx Part1.
«PK»	***id***	*FaresPointInPattern-IdType*	1:1	Identifier of a FARE POINT IN PATTERN.
	ScheduledStop-PointView	*ScheduledStopPointView*	0:1	Derived information about the SCHEDULED STOP POINT, such as its name – see NeTEx Part1.
	Abridgment-Ranking	*xsd:integer*	0:1	Relative ranking for omitting this FARE POINT IN PATTERN when presenting an abridged version of the series as an itinerary. 1=High, i.e. Omit first.

«enum»	***Presentation-Position***	*SeriesPresentationEnum*	0:1	Relative position for showing this FARE POINT IN PATTERN in an itinerary when there is a choice according to rail conventions. For example, *(A / B) * C* versus *(B/A) * C.* • *noStation; requiredStation; optionalLeft; optionalRight*
	IsForbidden	*xsd:boolean*	0:1	Whether use of fare point is forbidden- can be used to explicitly exclude certain routings. The default value is '*false*'.
	Interchange-Allowed	*xsd:boolean*	0:1	Whether interchange to another service is allowed at this STOP POINT.
	IsFareStage	*xsd:boolean*	0:1	Whether stop is considered to be a fare stage. +v1.1

7 Pricing

The FARE PRICE Model allows prices to be specified for any element of the tariff structure which may hold a price value used in the overall price calculation.

An important principle of Transmodel is that prices should be separate from the things that they price. This allows for alternative price sets with different validities to be exchanged without revising the rest of the fare model.

7.1 Fare Prices

A FARE PRICE represents an individual price (both value and pricing related parameters) that can be associated with a PRICEABLE OBJECT. Its value is in a stated PRICE UNIT (currency or otherwise).

A FARE PRICE may be given as an **absolute** amount (e.g. £23.00) or be **derived** using a PRICING RULE from another base price (e.g. the child fare is 50% of adult fare). When it is computed, a derived price is resolved into an absolute value (which may in turn be used as a base price for a further derivation); it may however also retain references to the base price and rule from which it is derived as well as the resulting amount, thus providing a justification.

UK☞ In the Basic profile all prices are absolute

UK☞ In the Advanced profile all prices may also be derived

Note: In NeTEx, FARE PRICEs may also be **dynamic (***rather than* **static)**, that is provided by a named PRICING SERVICE at run time. Dynamic prices are excluded from the FXCP.

A specialised FARE PRICE is defined for each PRICEABLE OBJECT, for example

- CONTROLLABLE ELEMENT PRICE;
- FARE STRUCTURE ELEMENT PRICE;
- GEOGRAPHICAL INTERVAL PRICE;
- DISTANCE MATRIX PRICE;
- TIME INTERVAL PRICE;
- VALIDABLE ELEMENT PRICE;
- USAGE PARAMETER PRICE;
- FARE PRODUCT PRICE;
- SALES OFFER PACKAGE PRICE.
- FULFILMENT METHOD PRICE.
- Etc

It may be necessary to group price entities into PRICE GROUPs, in order:

- to group all possible access rights or products into a few categories of “”, each of them having a price reference (products of price ‘A’, ‘B’, etc.);
- to group prices into categories to which the same increase, in value or percentage, may be applied.
- To organize large numbers of prices.

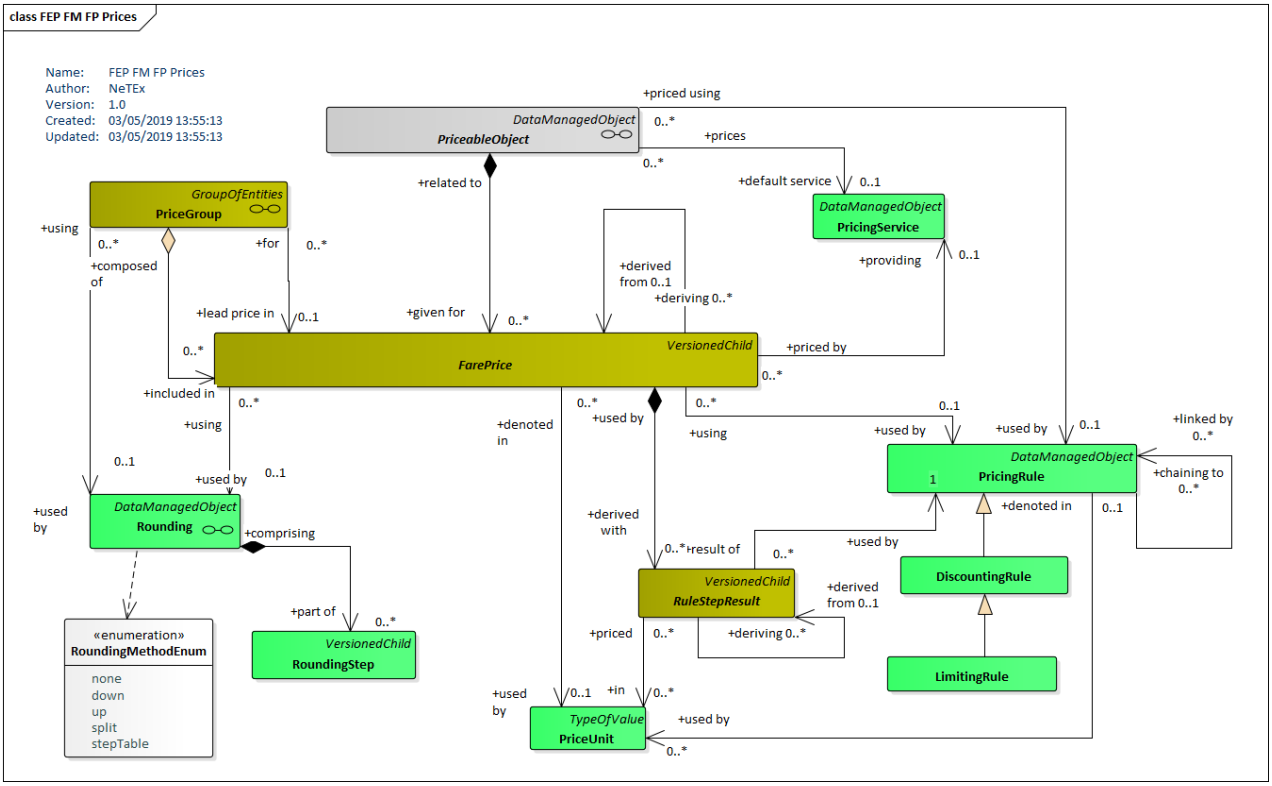


Figure 3 — FarePrices (UML)

7.1.1 FarePrice

A set of all possible price features for a Fare element.

Table 5 – *FarePrice* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*VersionedChild*	::>	FARE PRICE inherits from VERSIONED CHILD
«PK»	***id***	*FarePriceIdType*	1:1	Identifier of FARE PRICE.
	Name	*MultilingualString*	0:1	Name of PRICE.
	Description	*MultilingualString*	0:1	Description of PRICE. +v1.1
	PrivateCode	*PrivateCode*	0:1	External identifier of PRICE. +v1.1
	StartDate	*xsd:date*	0:1	Start date for PRICE validity.
	EndDate	*xsd:date*	0:1	End date for PRICE validity.
	Amount	*AmountType*	0:1	Price in a specified currency.
	Currency	*CurrencyType*	0:1	Currency ISO 4217 code (This in an optimization to allow PRICE UNITs to be omitted).
«FK»	***PriceUnitRef***	*PriceUnitRef*	0:1	Reference to a PRICE UNIT; may be a currency.
	Units	*xsd:decimal*	0:1	Amount in designated unit.
«cntd»	***ruleStepResults***	*RuleStepResult*	0:*	RULE STEP RESULTS describing derivation of price.
	IsAllowed	*xsd:boolean*	0:1	Whether the FARE PRICE is allowed. The default is '*true*'.
«FK»	***PricingServiceRef***	*PricingServiceRef*	0:1	Reference to a PRICE SERVICE which can provide / provided price.
«FK»	***FarePriceRef***	*FarePriceRef+*	0:1	Reference to a FARE PRICE from which this fare price is derived using a PRICING RULE.
«FK»	***a*** ***PricingRuleRef***	*PricingRuleRef+*	0:1	Reference to a PRICING RULE used to derive price.
«cntd»	b ***PricingRule***	*PricingRule*	0:1	PRICING RULE used to derive price.
	CanBeCumulative	*xsd:boolean*	0:1	Whether discount can be used cumulatively in combination with other discounts.
«FK»	***RoundingRef***	*RoundingRef*	0:1	Rounding to use on calculation.
	Ranking	*xsd:integer*	0:1	Relative ranking of price relative to other prices.

7.1.2 RuleStepResult (Subcomponent of FARE PRICE)

The ***RuleStepResult*** holds one or more intermediate steps relating to the calculation of a price from another price., for example the tax or a discount that has been applied.

UK→A RULE STEP RESUlT is only neede for a complex profile.

Table 6 – *RuleStepResult* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
«PK»	***id***	*RuleStepResultIdType*	1:1	Identifier of PRICE RULE STEP RESULT.
«atr»	***order***	*xsd:integer*	1:1	Order in which step was done.
«FK»	***FarePriceRef***	*FarePriceRef+*	0:1	Reference to a FARE PRICE from which this fare price is derived using a PRICING RULE
	Amount	*AmountType*	0:1	Price in a specified currency.
	Currency	*CurrencyType*	0:1	Currency ISO 4217 code (This in an optimization to allow PRICE UNITs to be omitted).
«FK»	***PriceUnitRef***	*PriceUnitRef*	0:1	Reference to a PRICE UNIT.
	Units	*xsd:decimal*	0:1	Amount in designated unit.
«FK»	***PriceUnitRef***	*PriceUnitRef*	0:1	Reference to a PRICE UNIT; may be a currency.
	RateUsed	*xsd:decimal*	*0:1*	Discount rate used.
	Adjustment-Amount	*CurrencyType*	0:1	Step calculation amount, in same currency as STEP RESULT Amount. (i.e. difference between Base Amount and result Amount. PRICE) +v1.1
	AdjustmentUnits	*xsd:decimal*	*0:1*	Step calculation Units, in same PRICE UNIT as STEP RESULT Amount.(i.e. difference between base Units and Result Units. +v1.1
«FK»	***PricingRuleRef***	*PricingRuleRef+*	0:1	Reference to a PRICING RULE used in calculation step to derive price.
«FK»	***RoundingRef***	*RoundingRef*	0:1	Reference to a ROUNDING method used in calculation step to derive price.
«FK»	***RoundingStep-Ref***	*RoundingStepRef*	0:1	Reference to a ROUNDING STEP used in calculation step to derive price.
	Narrative	*MultilingualString*	0:1	Textual explanation of calculation

7.1.3 PriceGroup

A grouping of prices, allowing the grouping of numerous possible consumption elements into a limited number of price references, or to apply grouped increases, in value or percentage. (“A price band”)

PRICE GROUPS provide a further rlevel of indirection describing rpices – thus a price can be given as a PARICE GROUP rather than an absolte value.

Table 7 – *PriceGroup* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*GroupOfEntities*	::>	PRICE GROUP inherits from GROUP OF ENTITies.
«PK»	***id***	*PriceGroupIdType*	1:1	Identifier of PRICE GROUP.
	StartDate	*xsd:date*	0:1	Start date for PRICE GROUP.
	EndDate	*xsd:date*	0:1	End date for PRICE GROUP.
«FK»	***RoundingRef***	*RoundingRef*	0:1	Rounding to use on calculation.
«FK»	***members***	*FarePrice* | *FarePriceRef+*	0:*	PRICEs in PRICE GROUP. Each price can represents a priceable combination that shares the common price.
«FK»	***FarePriceRef***	*FarePriceRef+*	0:1	Reference to a FARE PRICE to be used as the price for the PRICE GROUP.

7.2 Pricing Parameters

A PRICING RULE names a method of calculation that a consumer system must understand and interpret. There are two ctypes of common PRICING RULES that have specific parameters associated with them:

- A DISCOUNTING RULE specifies parameters relating to discounting; discounts may be specified as either a percentage (e.g. 10%) or an absolute amount (e.g. 5 GBP).

- A LIMITING RULE is a DISCOUNTING RULE with further parameters to set limits on the results, for example to set a minimum and maximum price.

More than one PRICING RULE may be applied successively to derive a price; PRICING RULESsmay be chained together. (e.g.Adut fare is distance GEOGRAPHIC INTERVAL PRICE → Child fare is 50% of adult fare → Final price is price without tax + Vat at 15%). Where a price is derived from another price, the intermediate derivation steps may be recorded using a RULE STEP RESULT. For example, a concessionary price might be calculated from a full fare by applying a discount, then deducting tax.

ROUNDING conditions may se specifed for use when computing a derived price.

7.2.1 PricingParameterSet

A set of reusable pricing Parameters directing the rounding of values that are the result of calculations.

Table 8 – *PricingParameterSet* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*DataManagedObject*	::>	PRICING PARAMETER SET inherits from DATA MANAGED OBJECT. See NeTEx Part1.
	id	*PricingParameterSet-IdType*	1:1	Identifier of PRICING PARAMETER SET.
	Name	*MultilingualString*	0:1	Name of PRICING PARAMETER SET.
«FK»	***PriceUnitRef***	*PriceUnitRef*	0:1	Reference to a default PRICE UNIT.
«cntd»	***priceUnits***	*PriceUnit*	0:*	Available PRICE UNITs.
«cntd»	***pricingRules***	*PricingRule*	0:1	PRICING RULEs available to use in pricing.
	AllowCumulative Discounts	*xsd:boolean*	0:1	Whether cumulative discounts are allowed.
«FK»	***RoundingRef***	*RoundingRef*	0:1	Reference to a default ROUNDING.
«cntd»	***roundings***	*Rounding*	0:1	ROUNDINGs available to use in pricing.
«FK»	***DayTypeRef***	*DayTypeRef*	0:1	Default FARE DAY.
«cntd»	***monthValidity-Offsets***	*MonthValidityOffset*	0:12	Day offsets for each month in year to use to decide activation date of certain products.
«cntd»	***pricingServices***	*PricingService*	0:*	PRICING SERVICEs available to use.

7.2.2 Rounding

Parameters directing the rounding of values that are the result of calculations.

Table 9 – *Rounding* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*DataManagedObject*	::>	ROUNDING inherits from DATA MANAGED OBJECT. See NeTEx Part1.
	id	*RoundingIdType*	1:1	Identifier of ROUNDING.
	Name	*MultilingualString*	0:1	Name of ROUNDING.
«enum»	***RoundingMethod***	*RoundingMethodEnum*	0:1	Method to use to *round: down, up, split, none.* See allowed values below.

				• *none; down; up; split* • *stepTable*
	Rounding-Modulus	*decimal*	0:1	Amount by which rounding is to be quantised, i.e. results should be quantised to nearest whole multiple of this value, for example, 0.10, 0.20, 0.30 cents, or 1.00 Euro, 1.6 Euro, etc.
«cntd»	***roundingSteps***	*RoundingStep*	0:*	Table of explicit ROUNDING STEPs.

7.2.3 PriceUnit

A unit to express prices: amount of currency, abstract fare unit, ticket unit or token etc.

Table 10 – *PriceUnit* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*TypeOfValue*	::>	PRICE UNIT inherits from TYPE OF VALUE.
«PK»	***id***	*PriceUnitIdType*	1:1	Identifier of PRICE UNIT.
	Precision	*xsd:integer*	0:1	Precision of PRICE UNIT.

7.2.4 PricingRule (Abstract in FXCP)

A named rule for compute one price from another price.

Table 11 – *PricingRule* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*DataManagedObject*	::>	PRICING RULE inherits from DATA MANAGED OBJECT.
«PK»	***id***	*PricingRuleIdType*	1:1	Identifier of PRICING RULE.
	Name	*MultilingualString*	0:1	Name of PRICING RULE.
	Description	*MultilingualString*	0:1	Description of PRICING RULE.
	MethodName	*xsd:NCNAME*	0:1	Calculation method associated with PRICING RULE.
«FK»	***TypeOfPricing-RuleRef***	*TypeOfPricing-RuleRef*	0:1	Classification of PRICING RULE. +v1.1
«FK»	***PricingRuleRef***	*PricingRuleRef+*	0:1	PRICING RULE to chain to from this one.
	Factor	*xsd:decimal*	0:1	Numeric factor associated with PRICING RULE.

	Currency	*CurrencyType*	0:1	Currency associated with PRICING RULE. +v1.1
«FK»	***PriceUnitRef***	*PriceUnitRef*	0:1	PRICE UNIT for PRICING RULE. +v1.1
	url	*xsd:anyURI*	0:1	URL associated with PRICING RULE.

7.2.5 DiscountingRule

Parameters of a rule for computing a discounted price from another price.

Table 12 – *DiscountingRule* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*PricingRule*	::>	DISCOUNTING RULE inherits from PRICING RULE.
«PK»	***id***	*DiscountingRuleIdType*	1:1	Identifier of DISCOUNTING RULE.
	Discount-AsPercentage	*PercentageType*	0:1	Discount of PRICE as a percentage.
	DiscountAsValue	*AmountType*	0:1	Discount of PRICE as a value.
	CanBe-Cumulative	*xsd:boolean*	0:1	Whether discount can be used cumulatively in combination with other discounts.

7.2.6 LimitingRule

Parameters of a rule for computing a FARE PRICE from another FARE PRICE, subject to minima or maxima.

Table 13 – *LimitingRule* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*DiscountingRule*	::>	LIMITING RULE from DISCOUNTING RULE.
«PK»	***id***	*LimitingRuleIdType*	1:1	Identifier of LIMITING RULE.
	MinimumPrice	*AmountType*	0:1	Minimum amount at which to cap discounted fare.
	MinimumPrice-AsPercentage	*PercentageType*	0:1	Minimum PRICE expressed as a percentage of the total price.
	MinimumPrice-AsMultiple	*PercentageType*	0:1	Minimum PRICE expressed as a multiple of a unit fare.
	MaximumPrice	*AmountType*	0:1	Maximum amount at which to cap discounted fare.
	MaximumPrice-AsPercentage	*PercentageType*	0:1	Maximum PRICE expressed as a percentage of the total price.

	MaximumPrice-AsMultiple	*PercentageType*	0:1	Maximum PRICE expressed as a multiple of a unit fare.
	MinimumLimitPrice	*AmountType*	0:1	Limiting amount below which resulting fare may not be sold.
	MinimumLimit-AsPercentage	*PercentageType*	0:1	Minimum limit expressed as a percentage of the total price.
	MaximumLimitPrice	*AmountType*	0:1	Limiting amount above which resulting fare may not be sold.
	MaximumLimit-AsPercentage	*PercentageType*	0:1	Maximum limit expressed as a percentage of the total price.

7.3 Prices for fare structure elements

An ENTITY which can have a price is a specialisation of PRICEABLE OBJECT; both individual structural elements of a TARIFF (DISTANCE MATRIX ELEMENT, GEOGRAPHCIAL INTERVAL, TIME INTERVAL, FARE STRUCTURE ELEMENT, etc.; product and product offer components (FARE PRODUCT, SALES OFFER PACKAGE, etc); and various other parameters (USAG PARAMETER FULFILMENT METHOD, etc) are PRICEABLE OBJECTS and may be assigne FARE PRICEs. A pricing algorithm will use these variously to compute an actual price for a specifIc set of choices.

There are different specialisations of FARE PRICE for different types of PRICEABLE OBJECT, for example a DISTANCE MATRIX ELEMENT PRICE, a FARE PRODUCT PRICE, etc., etc. For brevity, In the FXCP specification the separate are not described individually but are referred to simply as FARE PRICEs.

FARE PRICEs can be in any PRICE UNIT (currency or otherwise) and can have a start date.

UK☞ In the FXCP, all prices must be placed in a separate FARE FRAME form that of the fare desriptions.

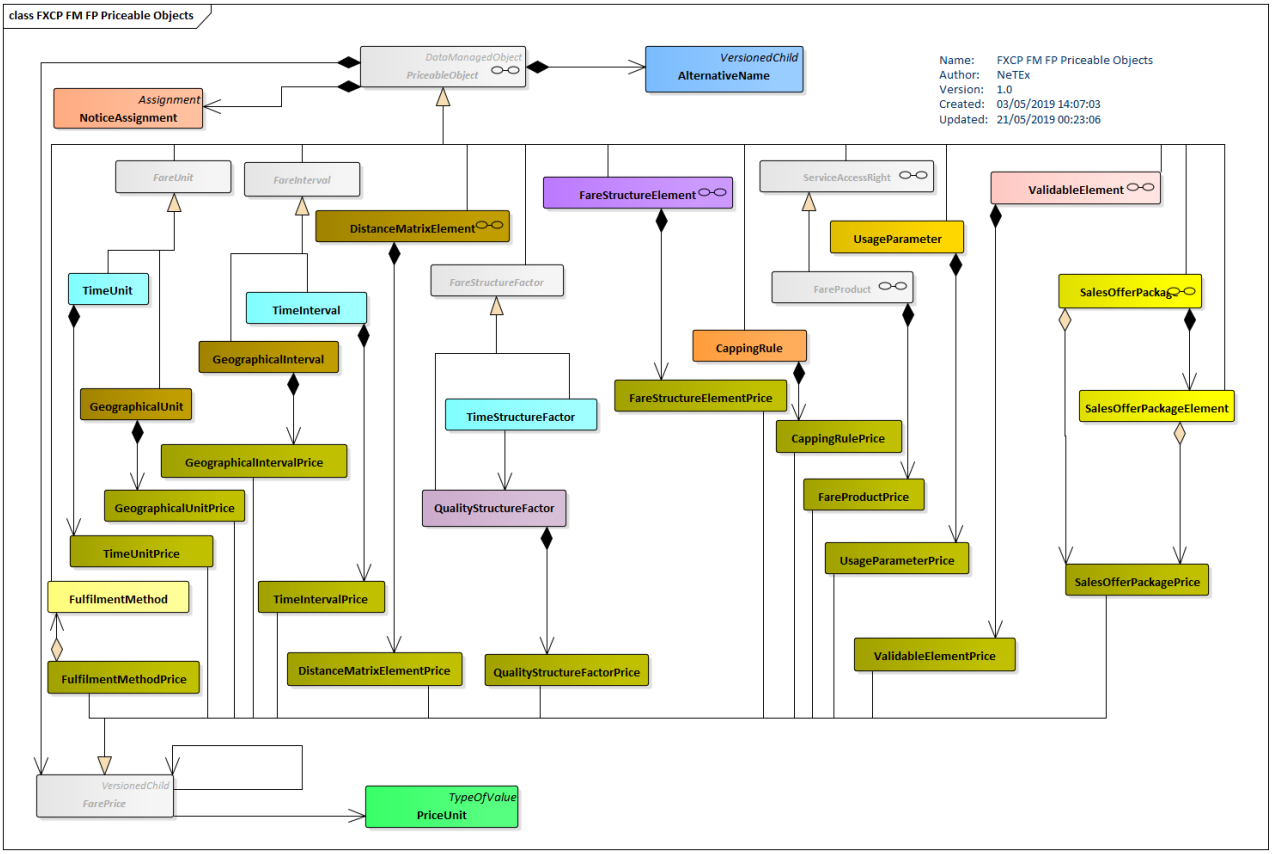


Figure 4 —Priceable Object (UML)

7.3.1 PriceableObject

An element which may have a FARE PRICE.

Table 14 – *PriceableObject* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*DataManagedObject*	::>	PRICEABLE OBJECT inherits from DATA MANAGED OBJECT.
«PK»	***id***	*PriceableObjectIdType*	1:1	Identifier of PRICEABLE OBJECT.
	Name	*MultilingualString*	0:1	Name of PRICEABLE OBJECT.
	Description	*MultilingualString*	0:1	Description of PRICEABLE OBJECT.
	Url	*xsd:AnyURI*	0:1	URL to web page with information about PRICEABLE OBJECT. +v1.1
«cntd»	***infoLinks***	*InfoLink*	0:*	Additional hyperlinks for +v1.1
«cntd»	***alternativeNames***	*AlternativeName*	0:*	ALTERNATIVE Name for element.
«cntd»	***notice-Assignments***	*NoticeAssignment*	0:*	NOTICE ASSIGNMENTs associated with the element.

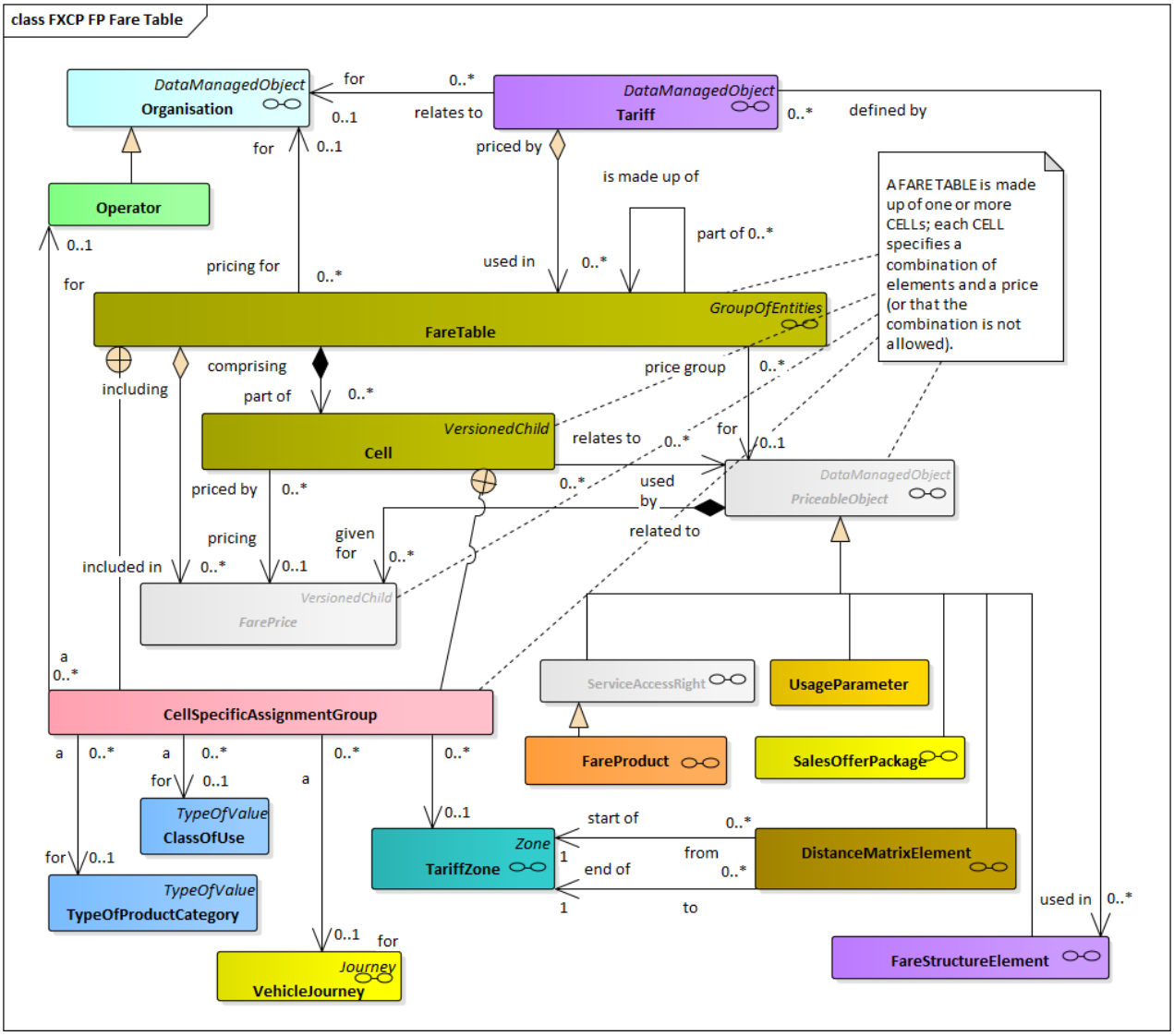
«FK»	***PricingService-Ref***	*PricingServiceRef*	0:1	PRICING SERVICE to use to fetch prices dynamically.
«FK»	***PricingRuleRef***	*PricingRuleRef+*	0:1	Default PRICING RULE to use to derive prices from this element.
«cntd»	***priceGroups***	*PriceGroup*	0:*	PRICE GROUPs associated with PRICEABLE OBJECT.
«cntd»	***fareTables***	*FareTable*	0:*	FARE TABLEs associated with PRICEABLE OBJECT.

7.4 Organising prices for exchange

Even a relatively simple tariff structure may have a large number of prices; depending not only on the size of the network, but also combinatorially on the number of different features in the tariff structure. Certan tariff structures, notably point-to-point fares, may have very large price matrices.

NeTEx uses FARETABLEs to organise fares into nested groups so that common properties of prices do not need to be repeated. FARE TABLEs allow any order to be chosen for the hierarchy of nesting used.

Each FARE TABLE contains one or more FARE TABLE CELLs. Each cell may hold a FARE PRICE for a specifc PRICEABLE OBJECT. It may also hold reference one or more PRICEABLE OBJECTs as well as other pricing factors that further describe the meaning of the price. (see CELL PRICE ASSIGNMENT below). A FARE TABLE may include other FARE TABLEs (but not include itself, either directy or indirectly).



7.4.1 FareTable

A FARE TABLE is a grouping of prices that may be associated with various combinations of fare elements such as the DISTANCE MATRIX ELEMENT, FARE STRUCTURE ELEMENT, GEOGRAPHICAL INTERVAL, TIME INTERVAL, USAGE PARAMETER, etc.

Table 15 – *FareTable* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceGroup*	::>	FARE TABLE inherits from PRICE GROUP.
«PK»	***id***	*FareTableIdType*	1:1	Identifier of FARE TABLE.
	StartDate	*xsd:date*	0:1	Start date for PRICE validity.
	EndDate	*xsd:date*	0:1	End date for PRICE validity.
«FK»	***RoundingRef***	*RoundingRef*	0:1	Rounding to use on calculation.

«FK»	***TypeOfFare-TableRef***	*TypeOfFareTableRef*	0:1	Classification of FARE TABLE apply.
«cntd»	***pricesFor***	*PriceableObjectRef+*	0:*	PRICEABLE OBJECT elements which may be given a price and so associated with this CELL.
«cntd»	***usedIn***	*Choice*	0:1	A fare element associated with the FARE TABLE.
«FK»	***a*** ***TariffRef***	*TariffRef*	1:*	TARIFF to which PRICEs of FARE TABLE apply.
«FK»	***b*** ***GroupOf-Distance-Matrix-ElementsRef***	*GroupOfDistanceMatrix-ElementsRef*	1:*	GROUP OF DISTANCE MATRIX ELEMENTs associated with a FARE TABLE.
«FK»	***c*** ***GroupOf-SalesOffer-PackagesRef***	*GroupOf-SalesOfferPackagesRef*	1:*	GROUP OF SALES OFFER PACKAGEs associated with a FARE TABLE.
«FK»	***OrganisationRef***	*(OrganisationRef)*	0:1	OPERATOR or AUTHORITY to which FARE PRICEs apply.
«cntd»	***limitations***	*UsageParameterRef+*	0:*	USAGE PARAMETER or PARAMETERs to which the CELL PRICE applies.
«cntd»	***specifics***	*As for Cell*	0:*	PARAMETERs to which the CELL PRICE applies.
«cntd»	***columns***	*FareTableColumnHeading*	0:*	Column headings to use when presenting table.
«cntd»	***rows***	*FareTableRowHeading*	0:*	Row headings to use when presenting table.
«cntd»	***includes***	*FareTable*	0:*	FARE TABLEs nested within this table. Can be recursive. +v1.1
	EmbargoUntil	*xsd:dateTime*	0:1	Prices must not be released until this date.
«cntd»	***prices***	*FarePrice*	0:*	An optimization – A TABLE may hold prices directy withouthe ue of cells.
«cntd»	***cells***	*Cell | CellInContext*	0:*	A tuple within a FARE TABLE that associates one or more fare entities with a price.
«cntd»	***notice-Assignments***	*NoticeAssignment*	0:*	NOTICEs that apply to whole FARE TABLE

7.4.2 Cell (Subcomponent of FareTable)

A unique individual combination of features within a FARE TABLE, used to associate a FARE PRICE with a fare element.

Table 16 – *Cell* – XML Element

Classifi-cation	Name	Type	Cardinality	Description

::>	::>	*VersionedChild*	::>	CELL inherits from VERSIONED CHILD
«PK»	***id***	*CellIdType*	1:1	Identifier of CELL.
	Name	*MultilingualString*	0:1	Name of CELL.
	Description	*MultilingualString*	0:1	Description of CELL.
	price	*Choice*	1:1	One of the following three
«cntd»	***a*** ***CellPrice***	*FarePriceStructure*	1:1	Fare Price held inline in CELL. See FARE PRICE for description.
«FK»	***b*** ***FarePriceRef***	*FarePriceRef+*	1:1	Reference to another FARE PRICE providing price for CELL
«FK»	***c*** ***Price-GroupRef***	*PriceGroupRef*	1:1	Reference to a FARE GROUP providing price for CELL via its lead price.
«cntd»	***Priceable-ObjectRef***	*PriceableObjectRef+*	0:*	Fare structure elements which may be given a price and so associated with this CELL.
«FK»	***GroupOf-DistanceMatrix-ElementsRef***	*GroupOfDistanceMatrix-ElementsRef*	0:1	Reference to a GROUP OF DISTANCE MATRIX ELEMENTS) associated with an individual CELL or FARE TABLE.
«FK»	***GroupOfLines-Ref***	*GroupOfLinesRef*	0:1	A GROUP OF LINEs for which the CELL provides a price.
«FK»	***LineRef***	*LineRef*	0:1	A LINE for which the CELL provides a price.
«FK»	***SiteRef***	*SiteRef*	0:1	A SITE for which the CELL provides a price.
«FK»	***TariffZoneRef***	*TariffZoneRef*	0:1	A TARIFF ZONE for which the CELL provides a price.
«FK»	***FareSectionRef***	*FareSectionRef*	0:1	A FARE SECTION for which CELL provides a price.
«enum»	***DirectionType***	*RelativeDirectionEnum*	0:1	For fares for DISTANCE MATRIX ELEMENTs, DIRECTION in which price applies. See Part1 for allowed values.
«enum»	***RoutingType***	*RoutingTypeEnum*	0:1	Whether fare is for direct (i.e. no changes required point-to-point fare) or indirect routing. See allowed values below.
«enum»	***FareClass***	*FareClassEnum*	0:1	A FARE CLASS for which the CELL provides a price. See Part1.
«FK»	***ClassOfUseRef***	*ClassOfUseRef*	0:1	A CLASS OF USE (Seat Class) for which the CELL provides a price.
«FK»	***FacilitySetRef***	*FacilitySetRef*	0:1	A FACILITY SET for which the CELL provides a price.

«FK»	***TypeOfProduct-CategoryRef***	*TypeOfProductCategoryRef*	0:1	A TYPE OF PRODUCT CATEGORY for which the CELL provides a price.
«FK»	***TypeOfService-Ref***	*TypeOfServiceRef*	0:1	A TYPE OF SERVICE for which the CELL provides a price.
«FK»	***ServiceJourney-Ref***	*ServiceJourneyRef*	0:1	A SERVICE JOURNEY for which the CELL provides a price.
«FK»	***TrainNumberRef***	*TrainNumberRef*	0:1	A TRAIN NUMBER for which the CELL provides a price.
«FK»	***GroupOfServicesRef***	*GroupOfServicesRef*	0:1	A GROUP OF SERVICEs for which the CELL provides a price.
«FK»	***TypeOfFare-ProductRef***	*TypeOfFareProductRef*	0:1	TYPE OF FARE PRODUCT for which the CELL provides a price.
«FK»	***Distribution-ChannelRef***	*DistributionChannelRef*	0:1	DISTRIBUTION CHANNEL for which the CELL provides a price.
«FK»	***GroupOf-Distribution-ChannelsRef***	*GroupOfDistribution-ChannelsRef*	0:1	GROUP OF DISTRIBUTION CHANNELs for which the CELL provides a price.
«enum»	***Payment-Methods***	*PaymentMethodEnum*	0:1	PaymentMethod standard value for which the CELL provides a price. See Part1.
«FK»	***TypeOfPayment-MethodRef***	*TypeOfPaymentMethodRef*	0:1	TYPE OF PAYMENT METHOD for which the CELL provides a price.
«FK»	***TypeOfTravel-DocumentRef***	*TypeOfTravelDocumentRef*	0:1	TYPE OF TRAVEL DOCUMENT for which the CELL provides a price.
«FK»	***ColumnRef***	*ColumnRef*	0:1	Reference to a column in the FARE TABLE to which this CELL should be assigned.
«FK»	***RowRef***	*RowRef*	0:1	Reference to a row in the FARE TABLE to which this CELL should be assigned.

7.4.3 Cell price assignment

Since prices may exist and be exchanged independently of the things they price, each price must be able to describe what it represents in terms of references to specific model elements.

Each CELL represents a FARE PRICE; the individual FARE PRICE may represent the combination of one or more PRICEABLE OBJECTs such as a FARE STRUCTURE ELEMENT, FARE PRODUCT, USAGE PARAMETER, DISTANCE MATRIX ELEMENT, SERIES CONSTRAINT, TIME INTERVAL, etc.

In a product definition, some of these elements may themselves have been defined as lists of choices of further pricing factors of a FARE STRUCTURE ELEMENT, such as TARIFF ZONEs, CLASSes OF USE, PRODUCT CATEGORies, etc.; there may be a separate price for each possible combination of these respective factors.

The CELL allows each combination of element to be specified directly along with an amount in currency or other PRICE UNIT.

The CELL can be considered as an optimisation of a VALIDITY PARAMETER ASSIGNMENT that states the selection of parameters that apply to an individual price.

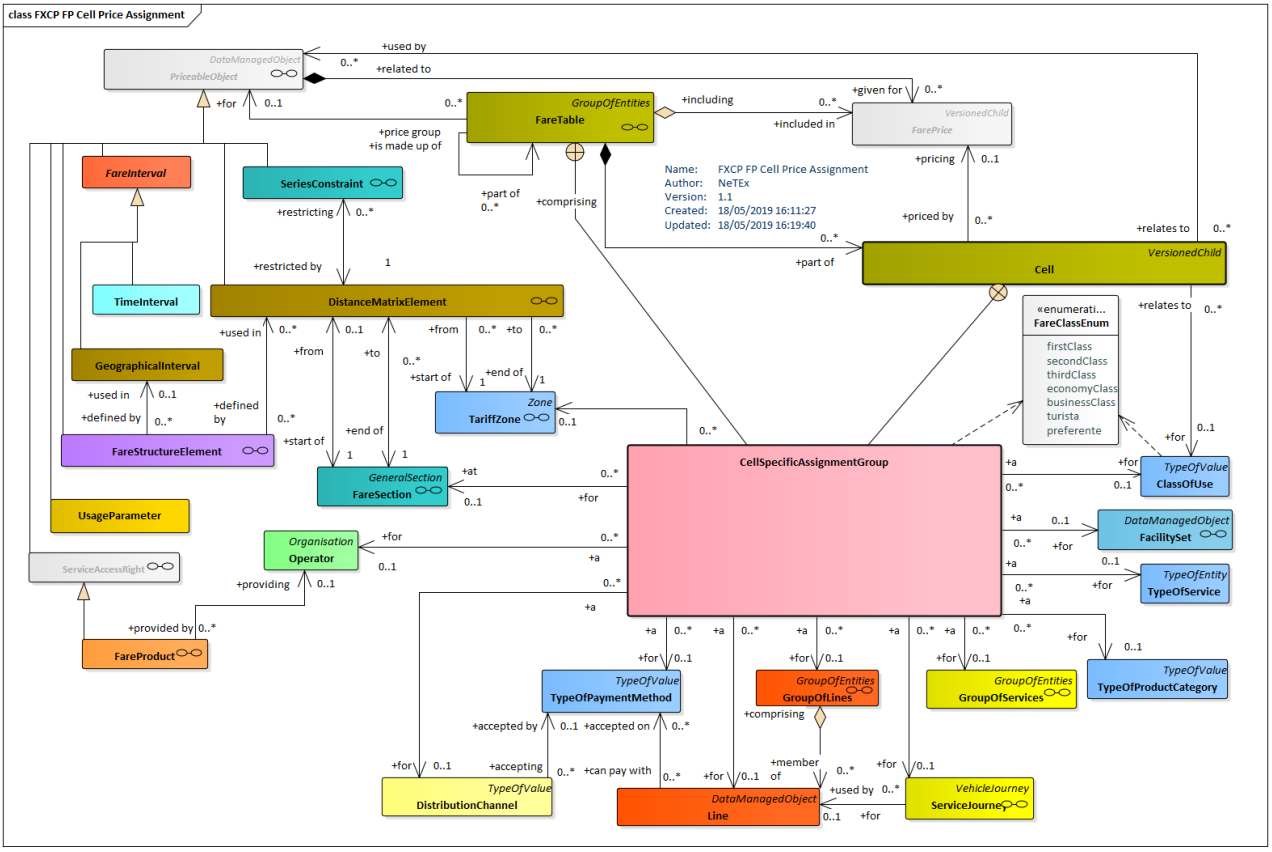


Figure 5 — Cell Price Assignment Model (UML)

7.4.4 Pricing factors and data set size

As noted in Part1, the most common tariff structures have prices corresponding to combinations of the following price factors:

Point-to-point Trip

- **DISTANCE MATRIX ELEMENTs** x USER PROFILE x (SALES OFFER PACKAGE).

Stage fare trip

- **GEOGRAPHICAL INTERVAL** x USER PROFILE x (SALES OFFER PACKAGE).

Zonal Fare, trip or pass

- **FARE ZONE x TIME INTERVAL** x USER PROFILE x (SALES OFFER PACKAGE).

The SALES OFFER PACKAGE implies a specific media (TYPE OF TRAVEL DOCUMENT and FAREPRODUCT trip, pass, etc)

In addition, a number of additional factors may also apply combinatorially. for example FARE DEMAND FACTOR (Peak/off peak uses), Number of units (e.g. for a Carnet FARE QUALITY FACTOR), PAYMENT METHOD (epayment may be cheaper – can be a FARE STRUCTURE ELEMENT), DISTRIBUTION CHANNEL (online may be cheaper), FULFILMENT METHOD (post may be more expensive).

But if we related the following rough Kiley orders of magnitude for the different basic fare pricing factors:

- DISTANCE MATRIX ELEMENTs; assuming prices are the same both ways if there are between n = 50 and a 1000 stops in the network, then there will be $(N^2-N)/2$. i.e. between ~1200 < ~500,000 O/D pairs.
- FARE ZONEs ;say between ~ 3 < ~50 zones.
- GEOGRAPHICAL INTERVALs; say between ~ 1 < ~ 10 fare stages.
- TIME INTERVALs say a pas is available for 1D, 2D, 3D,1W, 1M, 2M, 1Y) between ~ 1 < ~8 up to eight available time periods for a pass.
- USER PROFILEs (Adult, Child, Student, Senior, Disabled): ~ 2 < ~5 up to five different user types.
- SALE OFFER PACKAGEs (paper, smartcard, mobile app) ~ 1 < ~3 up to three media options.

Table 17 – *Price combinations for different fare structures*

	Min Bound	Prices	Max bound	Prices
Point-to-point Trip	1200 x 2 x 1	**~ 2400**	500000 x 5 x 3	**~ 7.5 million**
Stage fare trip	1 x 2 x 1	**~2**	10 x 3 x 5	**~ 150**
Zonal Fare, trip or pass	3 x 1 x 2 x 1	**~6**	50 x 8 x 5 x3	**~ 6000**

7.4.5 Pricing factors and fare table nesting

The above discussion indicates that rpcie data sets may be large

The hierarchy used to present prices to passengers is thefore arbitrary and depends on the marketing decisions of an operator. The presentation of prices may thus be organised by any of product, user type, zone /origin-destination, media, etc.

For example, consider the following set of prices giving point-to-point fare for two destinations..

Table 18 – *Example fare table data*

FARE PRICE	DISTANCE MATRIX ELEMENT	USER PROFILE	SALES OFFER PACKAGE		AMOUNT
			FARE PRODUCT	TYPE OF TRAVEL DOCUMENT	
001	A+B	Adult	Single Trip	Paper Ticket	10.00
002	A+B	Adult	Single Trip	Mobile APp	9.00
003	A+B	Child	Single Trip	Paper Ticket	5.00
004	A+B	Child	Single Trip	Mobile APp	4.50
005	A+C	Adult	Single Trip	Paper Ticket	20.00
006	A+C	Adult	Single Trip	Mobile APp	18.00
007	A+C	Child	Single Trip	Paper Ticket	10.00
008	A+C	Child	Single Trip	Mobile APp	9.00
009	A+B	Adult	Return Trip	Paper Ticket	18.00
010	A+B	Adult	Return Trip	Mobile APp	17.00
011	A+B	Child	Return Trip	Paper Ticket	9.00
012	A+B	Child	Return Trip	Mobile APp	8.00
013	A+C	Adult	Return Trip	Paper Ticket	36.00
014	A+C	Adult	Return Trip	Mobile APp	24.00
015	A+C	Child	Return Trip	Paper Ticket	18.00
016	A+C	Child	Return Trip	Mobile APp	16.00

A nesting according to the order of elements in the table above (that is, DISTANCE MATRIX ELEMENT, USER PROFILE, SALE OFFER PACKAGE) would be as follows:

FARE TABLE 1.

→DISTANCE MATRIX ELEMENT: *"A+B"*

→FARE TABLE 1.1

→USER PROFILE: *"Adult"*

➔FARE TABLE 1.1.1 *"Single trip".*

➔*SALES OFFER PACKAGE PRICE £*

→*SALES OFFER PACKAGE "Single trip, paper"*

➔*SALES OFFER PACKAGE PRICE £*

→*SALES OFFER PACKAGE "Single trip, mobile app"*

➔FARE TABLE 1.1.2 *"Return trip".*

➔*SALES OFFER PACKAGE PRICE £*

→*SALES OFFER PACKAGE "Return trip, paper"*

➔*SALES OFFER PACKAGE PRICE £*

→*SALES OFFER PACKAGE "Return trip, mobile app"*

➔FARE TABLE 1.2

→USER PROFILE: *"Child"*

➔FARE TABLE 1.2.1 *"Single trip".*

➔*SALES OFFER PACKAGE PRICE £*

→*SALES OFFER PACKAGE "Single trip, paper"*

➔*SALES OFFER PACKAGE PRICE £*

->SALES OFFER PACKAGE "Single trip, mobile app"

➔FARE TABLE 1.2.2 *"Return trip".*

➔*SALES OFFER PACKAGE PRICE £*

→*SALES OFFER PACKAGE "Return trip, paper"*

➔*SALES OFFER PACKAGE PRICE £*

→*SALES OFFER PACKAGE "Return trip, mobile app"*

etc

But other nestings are equally valid for presentation, for example

SALES OFFER PACKAGE → DESTINATION MATRIX ELEMENT → USER PROFILE ➔ USAGE PARAMETER PRICE

Or even

FARE PRODUCT → DESTINATION MATRIX ELEMENT → USER PROFILE → TYPE OF TRAVEL DOCUMENT ➔SALES OFFER PACKAGE PRICE

7.4.6 Fare table nesting rules

When creating FARE TABLEs for the FXCP, the following pricniples should be followed

a. FARE PRICEs should be nested in FARE TABLEs for clarity and to reduce data volumes

b. Each NESTING LAYER SHOULD correspond to one further pricing factor

c. The type of fare price used should be for that of lowest level element, For example if the lowest level is the USER PROFILE (a type of USAGE PARAMETER), such as 'Adult' or 'Child', then it should be a USAGE PARAMETER PRICE, if it is a TYPE OF TRAVEL DOCUMENT (as associated with a SALESS OFFER PACKAGE) it hould be a SALES OFFER PACKAGE PRICE, etc

d. Where the price is for a specific fare element such as a DISTANCE MATRIX ELEMENT, TIME INTERVAL, GEOGRAPHICAL INTERVAL etc, the Rlenet price should be embedded in line and must include a reference to the priced element.

e. Where the price is for an additional option out of several specified for a single FARE STRUCTURE ELEMENT (as say may be the case for a FARE ZONE or a CLASS OF USE, a referece to the specifc option should be), should be included in the CELL, for example: a FareZoneRef, or ClassOfUseRef, so that a consuming system can determine its meaning,

f. The preferred order for nesting tables is

SALES OFFER PACKAGE / {spatial Factor] / (TIME INTERVAL) / USER PROFILE / CLASS OF USE /

Where Spatial factor is either

(1) DISTANCE MATRIX ELEMENT or

(2) FARE STRUCTURE ELEMENT + ZONE

(3) GEOGRAPHiCAL INTERVAL

Table 19 – *Common fare priceing factors*

	Pricing factor	**Tariff element**	**FARE PRICE**	**Cell Assigment**
Point-to-point fare	*DISTANCE MATRIX ELEMENT*	*DISTANCE MATRIX ELEMENT*	*DISTANCE MATRIX ELEMENT PRICE*	***[DistanceMatrixElementRef)***
Zonal fare	*FARE ZONE*	*FARE STRUCTURE ELEMENT*	*FARE STRUCTURE ELEMENT PRICE*	***[FareStructureElementRef)*** ***FareZoneRef***
Different media	*TYPE OF TRAVEL DOCUMENT*	*SALES OFFER PACKAGE ELEMENT*	*SALES OFFER PACKAGE PRICE*	***(SalesOfferPackageRef)*** ***TypeOfTravelDocumentRef*** ***FareProductRef***
Pass	*TIME INTERVAL*	*TIME INTERVAL*	*TIME INTERVAL PRICE*	***(TimeIntervalRef)***
Stage fare	*GEOGRAPHICAL INTERVAL*	*GEOGRAPHICAL INTERVAL*	*GEOGRAPHICAL INTERVAL PRICE*	***(GeographicIntervalRef)***
Carnet	*FARE QUALITY FACTOR*	*FARE QUALITY FACTOR*	*FARE STRUCTURE FACTOR PRICE*	***(FareQualityFactorRef)***
Peak/OffPeak	*FARE DEMAND FACTOR*	*FARE DEMAND FACTOR*	*FARE STRUCTURE FACTOR PRICE*	***(FareDemandFactorRef)***
Class of Use	*CLASS OF USE*	*FARE STRUCTURE ELEMENT*	*FARE STRUCTURE ELEMENT PRICE*	***(SalesOfferPackageRef)*** ***ClassOfUsetRef***

Delivery options	*FULFILMENT METHOD*	*FULFILMENT METHOD*	*FULFILMENT METHOD PRICE*	
	SUPPLEMENT FARE PRODUCT	*SUPPLEMENT FARE PRODUCT*	*FARE PRODUCT PRICE*	***(SupplementFareProductRef)***

7.4.7 Additional pricing factors

In addition, a number of additional factors may also apply combinatorially to the pricing table. for example FARE DEMAND FACTORs (Peak/off peak times), NUMBER OF UNITs (e.g. for a Carnet), PAYMENT METHODs (epayment may be cheaper), DISTRIBUTION CHANNELs (online may be cheaper), FULFILMENT METHODs (post may be more expensive).

7.1 Presenting prices in tabular format

A FARE TABLEL may also include elements to describe how the price in the table are to be presented in tabular form. Each CELL may be assigned to a ROW and COLUMN, and each ROW and COLUMN may have a heading.

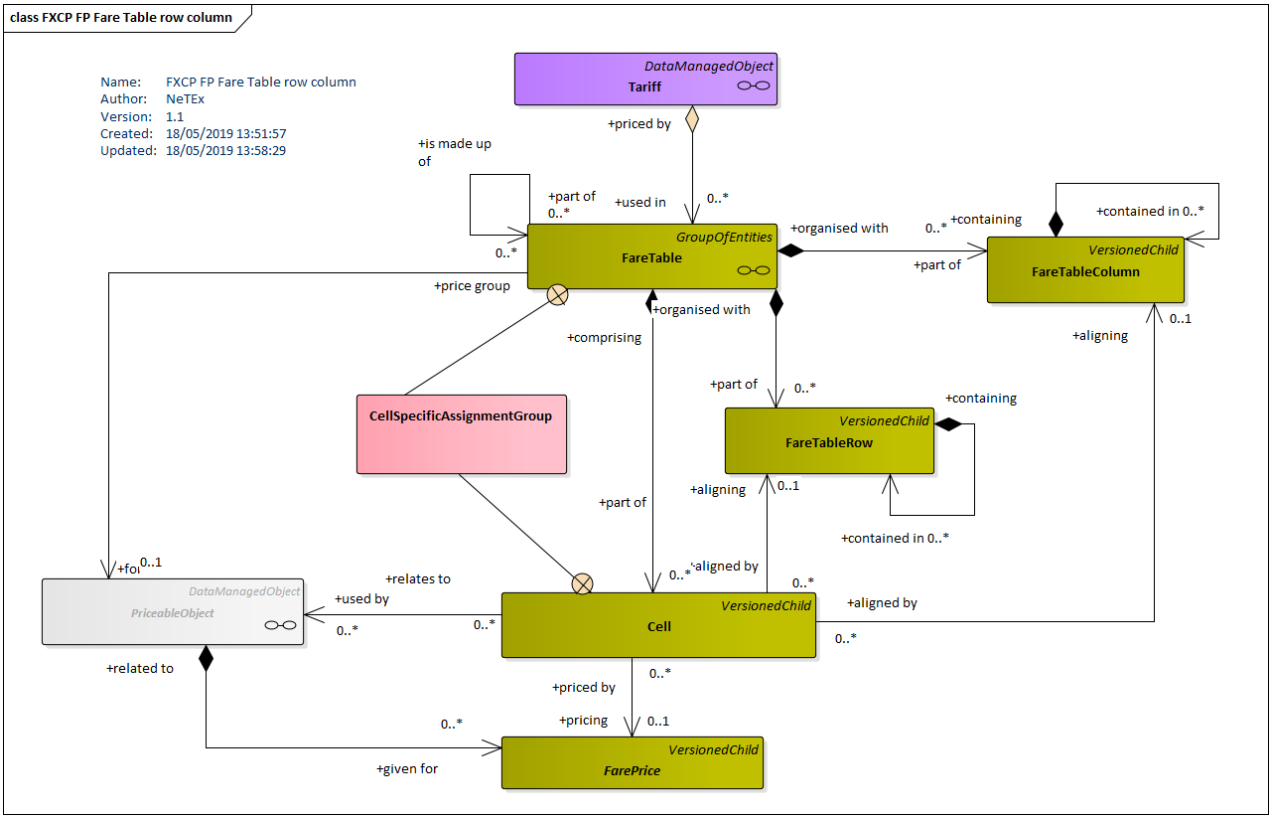


Figure 6 — Fare Table Row & Column Headings (UML)

7.1.1 FareTableColumn (Subcomponent of FareTable)

A Column heading for a FARE TABLE.

Table 20 – *Column* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*VersionedChild*	::>	FARE TABLE COLUMN inherits from VERSIONED CHILD
«PK»	***id***	*FareTableColumnIdType*	1:1	Identifier of FARE TABLE COLUMN.
	Name	*MultilingualString*	0:1	Name of FARE TABLE COLUMN.
	Description	*MultilingualString*	0:1	Description of FARE TABLE COLUMN.
«FK»	***FareTableRef***	*FareTableRef*	1:1	Reference to a FARE TABLE containing COLUMN
«cntd»	***notice-Assignments***	*NoticeAssignments*	0:*	NOTICEs that apply to whole FARE TABLE COLUMN.
«cntd»	***representing***	*(VersionOfObjectRef)*	0:*	ENTITIES that column represents. +v1.1
«cntd»	***columns***	*FareTable-ColumnHeading*	0:*	Nested FARE TABLE COLUMN headings to use when presenting table. Recursive. +v1.1

7.1.2 FareTableRow (Subcomponent of FareTable)

A Row heading for a FARE TABLE.

Table 21 – *Column* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*VersionedChild*	::>	FARE TABLE ROW inherits from VERSIONED CHILD.
«PK»	***id***	*FareTableRowIdType*	1:1	Identifier of FARE TABLE ROW.
	Name	*MultilingualString*	0:1	Name of FARE TABLE ROW.
	Description	*MultilingualString*	0:1	Description of FARE TABLE ROW.
«FK»	***FareTableRef***	*FareTableRef*	1:1	Reference to a FARE TABLE containing FARE TABLE ROW.
«cntd»	***notice-Assignments***	*NoticeAssignments*	0:*	NOTICEs that apply to whole FARE TABLE ROW.
«cntd»	***representing***	*(VersionOfObjectRef)*	0:*	ENTITIES that FARE TABLE ROW represents. +v1.1.

«cntd»	***rows***	*FareTableRowHeading*	0:*	Nested FARE TABLE ROW headings to use when presenting table. Recursive.

8 Fare Structures

8.1 Fare Structures

The FARE STRUCTURE ELEMENT MODEL describes the core elements – in particular, FARE STRUCTURE ELEMENT, FARE STRUCTURE ELEMENT IN SEQUENCE – of the fare structure. These can then be combined with other spatial, temporal and quality factors to specify the overall fare structure, as described later below.

A fare structure consists of generic quantitative rules for the limitation of access rights, allowing the calculation of prices. These rules are applied by a pricing engine to FARE STRUCTURE ELEMENTs, each providing parameters relevant to the calculation.

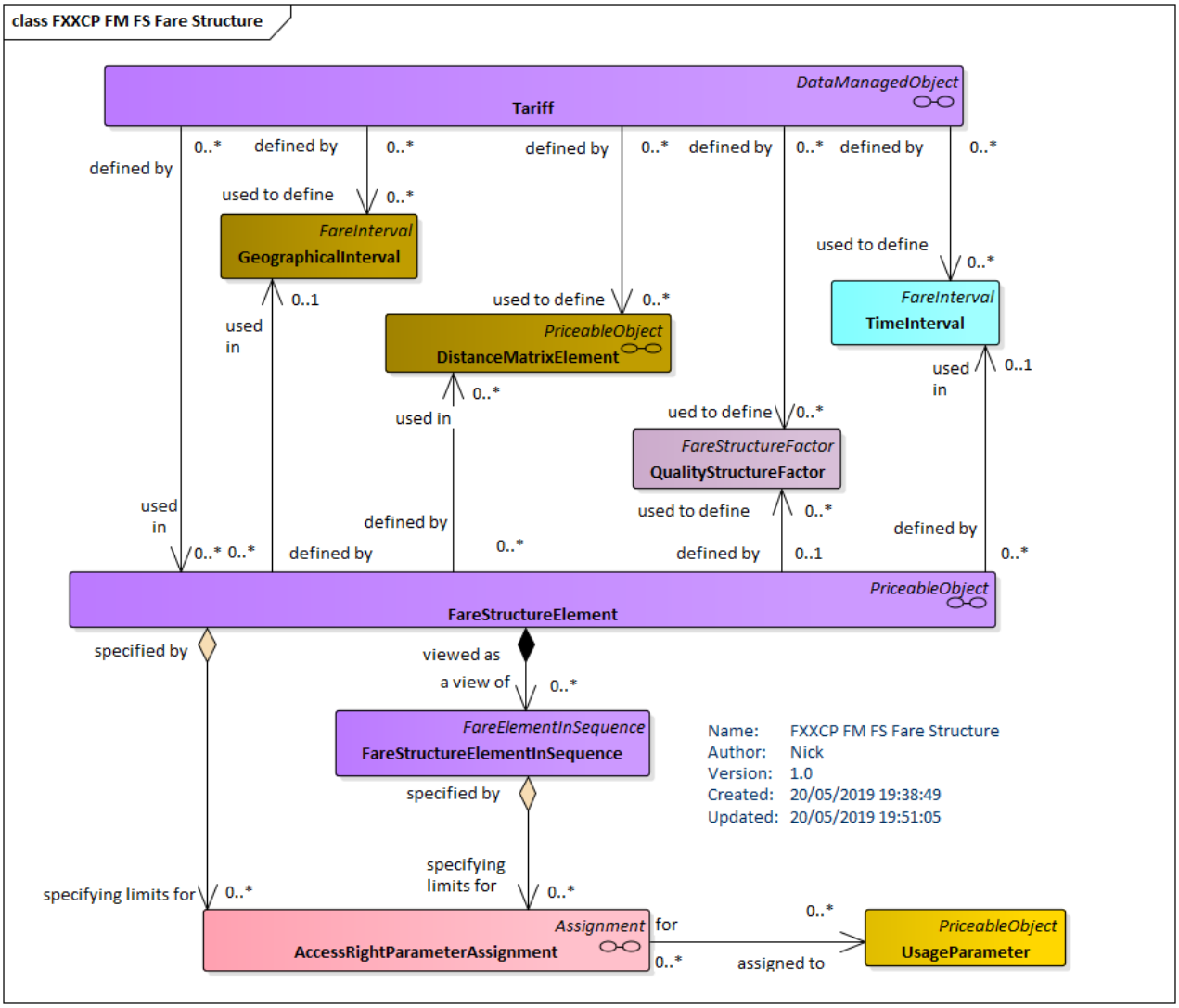
A FARE STRUCTURE ELEMENT is a service consumption right determined by a set of quantitative (spatial, temporal) rules (i.e. determined by fare structure parameters, such as zones, sections, hours, etc);

In some cases, a FARE STRUCTURE ELEMENT may involve several access rights that must be consumed in a particular order. This may be captured by a FARE STRUCTURE ELEMENT IN SEQUENCE.

A FARE STRUCTURE ELEMENT is a thus a sequence or a set of (one or several) of the most basic service elements, for all of which the values of the parameters characterizing it are of similar dimension.

A FARE STRUCTURE ELEMENT can be further characterised by specifying additional parameters by means of an ACCESS RIGHT PARAMETER ASSIGNMENT. See later chapter below

A set of distinct FARE STRUCTURE ELEMENTs are grouped as a TARIFF.



8.2 Common tariff elements

Regardless of their specific structure (point-to-point, zonal, stage, trip, pass, etc), all TARIFFs are described by a TARIFF made up of FARE STRUCTURE ELEMENTs and other parameters.

8.2.1 Tariff

A TARIFF describes all parameters composing a particular fare structure. When applying fare structure rules, an algorithm will choose the parameters (e.g. a TIME INTERVAL) according to the valid TARIFF.

In an implementation, constraints should be set to ensure that, for a given TARIFF, only one factor of each type (e.g. GEOGRAPHICAL STRUCTURE FACTOR) is attached to any valid FARE STRUCTURE ELEMENT.

Table 22 – Tariff – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*DataManagedObject*	::>	TARIFF inherits from DATA MANAGED OBJECT. See NeTEx Part1.

«PK»	***id***	*TariffIdType*	1:1	Identifier of TARIFF.
	Name	***MultilingualString***	0:1	Name of TARIFF.
«cntd»	***alternativeNames***	***AlternativeName***	0:*	Alternative names for TARIFF.
	Description	***MultilingualString***	0:1	Description of TARIFF.
«cntd»	***noticeAssignments***	***NoticeAssignment***	0:*	NOTICE ASSIGNMENTs for TARIFF.
«cntd»	***documentLinks***	***InfoLink***	0:*	Links for documents associated with TARIFF.
	PrivateCode	*PrivateCodeType*	0:1	Alternative identifier of an entity; can be used to associate with legacy systems.
«FK»	***OrganisationRef***	***(OrganisationRef)***	0:1	ORGANISATION to which TARIFF applies.
«FK»	***GroupOf-OrganisationsRef***	***GroupOf-OrganisationsRef***	0:1	GROUP OF ORGANISATIONs to which TARIFF applies.
«FK»	***LineRef***	***LineRef***	0:1	LINE to which TARIFF applies.
«FK»	***GroupOfLinesRef***	***GroupOfLinesRef***	0:1	GROUP OF LINEs to which TARIFF applies.
«FK»	***TypeOfTariffRef***	*TypeOfTariffRef*	0:1	Reference to a TYPE OF TARIFF.
«enum»	***TariffBasis***	***TariffBasisEnum***	0:1	Classification of how Tariff is priced. See allowed values below
	ReturnFareTwiceSingle	***xsd:boolean***	0:1	Whether the return ticket is the double as the fare for a single ticket.
«FK»	***GeographicalUnitRef***	***GeographicalUnitRef***	0:1	Reference to GEOGRAPHICAL UNIT for TARIFF.
«cntd»	***geographicalIntervals***	***GeographicalInterval***	0:*	GEOGRAPHICAL INTERVALs associated with TARIFF.
«cntd»	***geographical-StructureFactors***	***Geographical-StructureFactor***	0:*	GEOGRAPHICAL STRUCTURE FACTORs associated with TARIFF.
«FK»	***TimeUnitRef***	***TimeUnitRef***	0:1	Reference to TIME UNIT for TARIFF.
«cntd»	***timeIntervals***	***TimeInterval***	0:*	TIME INTERVALs associated with TARIFF.
«cntd»	***timeStructureFactors***	***TimeStructureFactor***	0:*	TIME STRUCTURE FACTORs associated with TARIFF.
«cntd»	***qualityStructureFactors***	***QualityStructureFactor***	0:*	QUALITY STRUCTURE FACTORs associated with TARIFF.
«cntd»	***fareStructureElements***	***FareStructureElement***	0:*	FARE STRUCTURE ELEMENTs associated with TARIFF.
«cntd»	***distanceMatrixElements***	***DistanceMatrix-Element***	0:*	DISTANCE MATRIX ELEMENTs associated with TARIFF.

«cntd»	***groupsOfDistanceMatrix Elements***	***GroupOfDistance-MatrixElements***	0:*	GROUPs OF DISTANCE MATRIX ELEMENTS associated with TARIFF.
«cntd»	***priceGroups***	***PriceGroup***	0:*	PRICE GROUPs for the TARIFF.
«cntd»	***fareTables***	***FareTable***	0:*	FARE TABLEs for the TARIFF.

8.2.2 FareStructureElement

A FARE STRUCTURE ELEMENT is a service consumption right determined by a set of quantitative (spatial, temporal) rules (i.e. determined by fare structure parameters, such as zones, sections, hours, etc); in effect each FARE STRUCTURE ELEMENT specifies a set of options affecting the pricing and use of a fare product.

In most cases, only one dimension, either a GEOGRAPHICAL, TIME TIME or QUALITY) STRUCTURE FACTOR is attached to each FARE STRUCTURE ELEMENT;. There may be multiple dimensions (e.g. space, time duration, time of trave, etc, so that by picking one of each a choice of product options is specifed for purchase.) In rare cases, different factors may apply to the same element, chosen by a rule depending on specific validity conditions. For example if fare prices depended on specific combinations of zone and durations of travel, rather than being priced separately for choice fo zone and duration.

Note: In the full Transmodel representation, which also models the operational control and checking of fares as passengers travel, a FARE STRUCTURE element is further considered to be a sequence or set of CONTROLLABLE ELEMENTs to which rules for limitation of access rights and calculation of prices (fare structure) are applied. Thus for example, a single trip on the a metro with barriers on entry and exit may be made up of several separate rides on different lines, each a CONTROLLABLE ELEMENT, but can be treated as a single VALIDABLE ELEMENT (indicating whether the user has the rights to travel in the specified ones and cne entry and/or exit) for fare definition purposes; and so can be represented as a FARE STRUCTURE ELEMENT offering a choice of just the permitted zone combinations.

In practice the parameters of a given FARE STRUCTURE ELEMENT need to be interpreted by a consumer of the data according to the tariff structure being used. A specific meaning can be indicated by means of the ***TariffBasis*** and the ***TypeOfFareStructureElement*** attributes.

UK☞ A ***TariffBasis*** must be indicated on a ***FareStructureElement***.

UK☞ A ***TypeOfFareStructureElemen t*** must be indicated on a ***FareStructureElement***

See later for the required values for Taruff Basis & TypeOfFareStructureElement a

Table 23 – *FareStructureElement* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	FARE STRUCTURE ELEMENT inherits from PRICEABLE OBJECT.
«PK»	***id***	*FareStructureElementIdType*	1:1	Identifier of FARE STRUCTURE ELEMENT.
«enum»	***TariffBasis***	*TariffBasisEnum*	0:1	TARIFF BASIS to be used for the element. See allowed values below.

					• *flat, distance; unitSection, zone, zoneToZone; pointToPoint; route; tour; group; discount; period; free; other* UK☞ A ***TariffBasis*** must be indicated
«FK»		***TypeOfFare-Structure-ElementRef***	*TypeOfFareStructureElement Ref*	0:1	Classifcation of FARE STRUCTURE ELEMENT. UK☞ A ***TypeOfFareStructureElement*** must be indicated
			CHOICE		
«FK»	***a***	***Geographical-IntervalRef***	*GeographicalIntervalRef*	0:1	Reference to GEOGRAPHICAL INTERVAL associated with FARE STRUCTURE ELEMENT.
«cntd»	***b***	***geographical-Intervals***	*GeographicalInterval* | *GeographicalIntervalRef*	0:*	GEOGRAPHICAL INTERVALs associated with FARE STRUCTURE ELEMENT.
«cntd»	***c***	***geographical-Structure-Factors***	*GeographicalStructureFactor* | *GeographicalStructure-FactorRef*	0:*	GEOGRAPHICAL STRUCTURE FACTORs associated with the FARE STRUCTURE ELEMENT.
			Choice		
«FK»	***a***	***TimeInterval-Ref***	*TimeIntervalRef*	0:1	Reference to TIME INTERVAL associated with FARE STRUCTURE ELEMENT.
«cntd»	***b***	***timeIntervals***	*TimeInterval* | *TimeIntervalRef*	0:*	TIME STRUCTURE INTERVALs associated with the FARE STRUCTURE ELEMENT.
«cntd»	***c***	***timeStructure-Factors***	*TimeStructureFactor* | *TimeStructureFactorRef*	0:*	TIME STRUCTURE FACTORs associated with the FARE STRUCTURE ELEMENT.
			CHOICE		
«FK»	***a***	***Quality-Structure-FactorRef***	*QualityStructureFactor Ref*	0:1	Reference to QUALITY STRUCTURE FACTOR associated with FARE STRUCTURE ELEMENT.
«cntd»	***b***	***quality-Structure-Factors***	*QualityStructureFactor* | *QualityStructureFactor*	0:*	QUALITY STRUCTURE FACTORs associated with the FARE STRUCTURE ELEMENT.
			Choice		
«FK»	***a***	***Distance-Matrix-ElementRef***	*DistanceMatrixElementRef*	0:1	Reference to DISTANCE MATRIX ELEMENT associated with FARE STRUCTURE ELEMENT.
«FK»	***b***	***distanceMatrix Elements***	*DistanceMatrixElement* | *DistanceMatrixElementRef*	0:*	DISTANCE MATRIX ELEMENTs associated with FARE STRUCTURE ELEMENT.
«FK»	***c***	***GroupOf-Distance-***	*GroupOfDistanceMatrix-ElementsRef*	0:1	Reference to GROUP OF DISTANCE MATRIX ELEMENTs associated with FARE STRUCTURE ELEMENT.

		Matrix-ElementsRef			
«cntd»	***d***	***GroupOf-Distance-Matrix-Elements***	*GroupOfDistanceMatrix-Elements*	0:1	GROUP OF DISTANCE MATRIX ELEMENTs associated with FARE STRUCTURE ELEMENT.
«cntd»	***fareStructure-ElementsIn-Sequence***		*FareStructureElement-InSequence | Controllable-ElementInSequence*	0:*	Child FARE STRUCTURE ELEMENTs in SEQUENCE making up the FARE STRUCTURE ELEMENT.
			CHOICE		Either multiple parameters wrapped in a tag, or a single parameter (an optimisation).
«cntd»	***a***	***validity-Parameter-Assignments***	*AccessRightParameter-Assignment*	0:*	GENERIC PARAMETER ASSIGNMENTs associated with the FARE STRUCTURE ELEMENT.
«cntd»	***b***	***Generic-Parameter-Assignment***	*GenericParameter-Assignment*	0:1	A single GENERIC PARAMETER ASSIGNMENT associated with the FARE STRUCTURE ELEMENT.
«cntd»	***c***	***Generic-Parameter-AssignmentIn Context***	*GenericParameter-Assignment*	0:1	A single GENERIC PARAMETER ASSIGNMENT associated with the FARE STRUCTURE ELEMENT. No ID needs to be given – will be inferred from the assignment values. (OPTIMISATION).
«cntd»	***prices***		*FareStructureElementPrice*	0:*	Prices for the FARE STRUCTURE ELEMENT.

8.2.3 FareElementInSequence – (Abstract)

An abstract framework element representing nan element that is a one of sequence of ELEMENT, including its possible order in the sequenc.

Specialsied as FARE ESTRCUTURE ELEMENT IN SEQUENCE and CONTROLLABLE ELEMENT IN SEQUENCE.).

Table 24 – *FareElementInSequence* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*VersionedChild*	::>	FARE ELEMENT IN SEQUENCE inherits from VERSIONED CHILD. See NeTEx Part1.
«PK»	***id***	*FareElementInSequenceIdType*	1:1	Identifier of FARE ELEMENT IN SEQUENCE.
«PK»	***order***	*xsd:positiveInteger*	0:1	Order of element within SEQUENCE.
	Name	*MultilingualString*	0:1	Name of FARE ELEMENT IN SEQUENCE.
	Description	*MultilingualString*	0:1	Description of FARE ELEMENT IN SEQUENCE.
	IsFirstInSequence	*xsd:boolean*	0:1	Whether element is the first in the sequence.

	IsLastInSequence	*xsd:boolean*	0:1	Whether element is the last in the sequence.
	Access-NumberIsLimited	*xsd:boolean*	0:1	Whether access number is limited. +v1.1
	MinimumAccess	*xsd:nonNegativeInteger*	0:1	Minimum number of accesses. +v1.1
	MaximumAccess	*xsd:nonNegativeInteger*	0:1	Maximum number of accesses. +v1.1
	AccessNumber	*xsd:nonNegativeInteger*	0:1	Access number in sequence.

8.2.4 FareStructureElementInSequence [ADVANCED PROFILE ONLY]

A FARE STRUCTURE ELEMENT as a part of a VALIDABLE ELEMENT, including its possible order in the sequence of FARE STRUCTURE ELEMENTs forming that VALIDABLE ELEMENT, and its possible quantitative limitation.

Note: FARE STRUCTURE ELEMENTs IN SEQUENCE are only needed for certain types of more complex fare where access righst must be consumed in a certain order to achieve a partiucalr price..

UK→ An ex a zonal fare for the City centre with atage fare for the oen outide of it.

Table 25 – *FareStructureElementInSequence* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*FareElementInSequence*	::>	FARE STRUCTURE ELEMENT IN SEQUENCE inherits from FARE ELEMENT IN SEQUENCE.
«PK»	***id***	*FareStructureElement-InSequenceIdType*	1:1	Identifier of FARE STRUCTURE ELEMENT IN SEQUENCE.
«FK»	***FareStructure-ElementRef***	*FareStructureElementRef*	0:1	Reference to a FARE STRUCTURE ELEMENT.
«FK»	***Validable-ElementRef***	*ValidableElementRef*	0:1	Reference to a VALIDABLE ELEMENT.
«cntd»	***validityParameter-Assignments***	*ValidityParameterAssignment*	0:*	VALIDITY PARAMETER ASSIGNMENTs associated with the ELEMENT IN SEQUENCE.

8.3 Using Fare Structure elements to define a tariff

A NeTEx fare structure is based on quantitative rules that describe the access rights regulating the consumption of transport services in terms of their spatial (GEOGRAPHICAL), temporal (TIME) and other (QUALITY) aspects.

Most fare structures (other than flat fares) are fundamentally space-based, or more precisely, distance-based, for example being based on intervals, graduated distance, origin/destination pairs, or specific zones. Some of these types may be combined together. Some fare structures also have a temporal omponent, for example the price of a season pass typically depnds on its duration.

The various fare structure elements are grouped as a TARIFF. In practice, only certain types of TARIFFs, i.e. ways of combining of FARE STRUCTURE ELEMENTS) are found, as described in FXCP Part1. For example:

Spatial

- Point-to-Point or Zone-to-Zone
- Zonal.
- Fare Stage.

Temporal

- Specific use: Single, Return
- Timed Use.
- Multiple use (Carnet)
- Day pass.
- Period Pass.

In the NeTEx specification the fare structure elements are presented all together and so the model, though powerful, is somewhat difficult to understand. Here, for clarity, we present in turn just the elements needed for specifc types of fare structures that are found in the FXCP

Note that NeTEx also has capabilities to describe other more complex fare structuress (for eexample that depend or routing (See SERIES CONSTRAINT in the NeTEx document). These are outside of the scope of the FXCP.

8.4 Point-to-point fare structure

To describe a Point-to-point (P2P) or zone-to-zone (Z2Z) fare in its simplest form, a DISTANCE MATRIX element is used. Each DISTANCE MATRIX ELEMENT represents the access rights to travel between two stops or zones, and may have one or more DISTANCE MATRIX ELEMENT PRICEs associated directly with it in a designated PRICE UNIT.

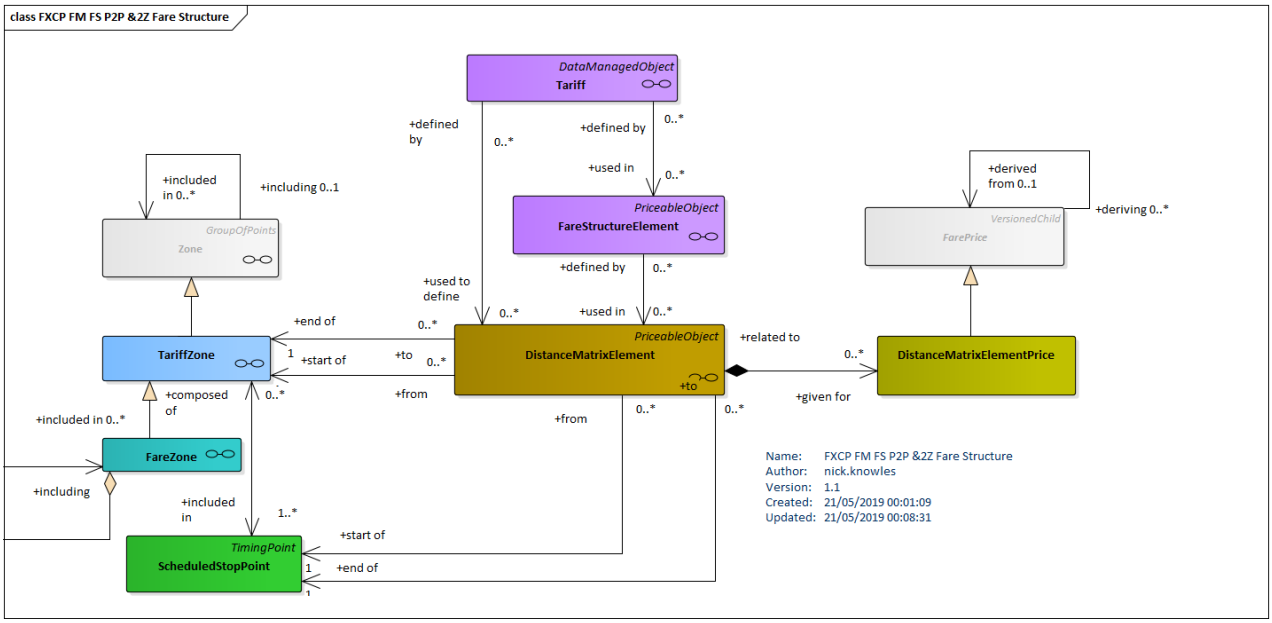


Figure 7 — Point-to-point Fare structure (UML)

The TARIFF is thus in effect a set of DISTANCE MATRIX elements, comprising a classic “fare triangle”

Outward (Absolute Fare Price)

Ask Av					
Bath Pl	£0.40				
Cam Sq	£0.50	£0.40			
Dee St	£0.75	£0.75	£0.50		
Ely Rd	£1.00	£1.00	£0.75	£0.40	
	Ask Av	Bath Pl	Cam Sq	Dee St	Ely Rd

Table 1-2 Example Triangular Fare Table with Absolute Prices

Figure 8 — Example: Distance Matrix Element – Triangular Fare table with absolute Prices (EXM)

8.4.1 DistanceMatrix Element

Each DISTANCE MATRIX ELEMENT represents the fare between an origin and a destination pair; either two SCHEDULED STOP POINTs or two TARIFF ZONEs, or two FARE SECTIONs. A GROUP OF DISTANCE MATRIX ELEMENTs specifies a set of DISTANCE MATRIX ELEMENTs, allowing a common set of prices for between different origin-destination pairs if required.

Table 26 – *DistanceMatrixElement* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	DISTANCE MATRIX ELEMENT inherits from PRICEABLE OBJECT**.**
«PK»	***id***	*DistanceMatrix-ElementIdType*	1:1	Identifier of a DISTANCE MATRIX ELEMENT.
	Name	*MultilingualString*	0:1	Name of DISTANCE MATRIX ELEMENT.
	Distance	***DistanceType***	0:1	Distance between origin and destination of a DISTANCE MATRIX ELEMENT.
	RelativeRanking	***xsd:integer***	0:1	Relative preference assigned to this element if there are multiple entries between two points.
	IsDirect	***xsd:boolean***	0:1	Whether journey is direct or requires changes.
	InverseAllowed	***xsd:boolean***	0:1	Whether an inverse element in the opposite direction with the same prices may be assumed – optimisation to reduce data volumes.
		Choice	1:1	Origin of DISTANCE MATRIX ELEMENT
«FK»	***a*** ***StartStopPointRef***	*ScheduledStopPointRef*	0:1	Start SCHEDULED STOP POINT at which a DISTANCE MATRIX ELEMENT begins.
«FV»	***b*** ***StartStopPointView***	*ScheduledStopPoint-View*	0:1	Details of origin SCHEDULED STOP POINT.
«FK»	***c*** ***StartTariffZoneRef***	*TariffZoneRef*	0:1	Start TARIFF ZONE at which a DISTANCE MATRIX ELEMENT begins.
«FV»	***d*** ***StartTariffZoneView***	*TariffZoneView*	0:1	Details of origin TARIFF ZONE.
«FK»	***e*** ***StartFareSectionRef***	*FareSectionRef*	0:1	Start FARE SECTION at which a DISTANCE MATRIX ELEMENT begins.
«FK»	***f*** ***StartFarePoint-InPatternRef***	*FarePointInPatternRef*	0:1	Start FARE POINT IN PATTERN at which a DISTANCE MATRIX ELEMENT begins. (Handles case of repeated visits)
		Choice	1:1	Destination of DISTANCE MATRIX ELEMENT.
«FK»	***a*** ***EndStopPointRef***	*ScheduledStopPointRef*	0:1	End SCHEDULED STOP POINT at which a DISTANCE MATRIX ELEMENT ends.

«FV»	***b***	***EndStopPointView***	*ScheduledStopPoint-View*	0:1	Details of destination SCHEDULED STOP POINT
«FK»	***c***	***EndTariffZoneRef***	*TariffZoneRef*	0:1	Final TARIFF ZONE at which a DISTANCE MATRIX ELEMENT ends.
«FV»	***d***	***EndTariffZoneView***	*TariffZoneView*	0:1	Details of origin TARIFF ZONE.
«FK»	***e***	***EndFareSectionRef***	*FareSectionRef*	0:1	End FARE SECTION at which a DISTANCE MATRIX ELEMENT ends.
«FK»	***f***	***EndFarePoint-InPatternRef***	*FarePointInPatternRef*	0:1	End FARE POINT IN PATTERN at which a DISTANCE MATRIX ELEMENT ends. (Handles case of repeated visits).
«cntd»	***seriesConstraints***		*SeriesConstraintRef*	0:*	SERIES CONSTRAINTs associated with this DISTANCE MATRIX ELEMENT.
«cntd»	***structureFactors***		*GeographicalStructure FactorRef*	0:*	STRUCTURE FACTORs associated with this DISTANCE MATRIX ELEMENT.
«cntd»	***tariffs***		*TariffRef*	0:*	TARIFFs for the DISTANCE MATRIX ELEMENT.
FK	***FareTableRef***		*FareTableRef+*	0:1	Primary FARE TABLE for the DISTANCE MATRIX ELEMENT.
«cntd»	***fareTables***		*FareTableRef*	0:*	FARE TABLEs for the DISTANCE MATRIX ELEMENT.

8.4.2 GroupOfDistanceMatrixElements

A grouping of DISTANCE MATRIX ELEMENTs. May be used to provide reusable Origin / Destination pairs.

Table 27 – *GroupOfDistanceMatrixElements* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*GroupOfEntities*	::>	GROUP of DISTANCE MATRIX ELEMENTs inherits from GROUP OF ENTITies.
«PK»	***id***	*GroupOfDistance-MatrixElementsIdType*	1:1	Identifier of GROUP of DISTANCE MATRIX ELEMENTS.
	UseToExclude	*xsd:boolean*	0:1	Whether contents of Group should be used to exclude (true) from a larger list. The default value is '*false* (i.e. "include")
«cntd»	***priceGroups***	*PriceGroup*	0:*	PRICE GROUPs for the GROUP OF DISTANCE MATRIX ELEMENTs.
«cntd»	***fareTables***	*FareTable*	0:*	FARE TABLEs for the GROUP OF DISTANCE MATRIX ELEMENTs.

	Distance	*DistanceType*	0:1	Distance between origins and destinations of a GROUP OF DISTANCE MATRIX ELEMENTs.
«cntd»	***structureFactors***	*GeographicalStructure-FactorRef*	0:*	References to GEOGRAPHICAL STRUCTURE FACTORs.
«cntd»	***notice-Assignments***	*NoticeAsssignment*	0:*	NOTICE ASSIGNMENTs for GROUP OF DISTANCE MATRIX ELEMENTs.
«cntd»	***members***	*DistanceMatrixElements*	0:*	References to members of the GROUP OF DISTANCE MATRIX ELEMENTs.
«cntd»	***prices***	*DistanceMatrixElementPrice*	0:*	Prices for the GROUP OF DISTANCE MATRIX ELEMENTs.

8.1 Geographical interval fare structures

In many cases, the values used for applying the fare structure rules will be derived from the description of the actual elements consumed when making a trip. This may be done in different ways

- **Actual distance:** For a true “kilometre distance” fare, the length of a trip in km will be derived from the JOURNEY PATTERN description (using the length of the LINKs composing the JOURNEY PATTERN).

- **Zone-to-zone:** Some fare structure systems will use arbitrary fare distances between the origin and the destination of a FARE STRUCTURE ELEMENT. This is typically the case when a zone-matrix fare system is used. Some TARIFF ZONEs (usually a few) are defined and a specific fare distance parameter is defined for each possible origin/destination pair of TARIFF ZONEs. Such parameter values are likely to differ from an exact calculation based on the covered distance. These values are stored in as DISTANCE MATRIX ELEMENTs. In the simplest form, as introduced in the previous section, the resulting price is given directly for each element. (so the distance need not be exposed to the passenger at all). In a more elaborated form, a GEOGRAPHICAL UNIT with a UNIT price is associated with eeach DISTANCE MATRIX ELMENT and is used to compute a price from the element’s distance. In other words the allocation of prices may be as ***arbitrary amounts*** or a ***distance function***

- **Point-to-point:** In a similar way to a zone-to-zone tariff, the fare distances between SCHEDULED STOP POINTs may not necessariiy be taken from the actual trip distance, but be stored as specific values for each possible trip. In such a case, a DISTANCE MATRIX ELEMENT will store the chosen distance value between each origin/destination pair of SCHEDULED STOP POINTs and a corresponding price may be allocated or computed using a GEOGRAPHICAL UNIT PRICE.

- **Unit zone or section distance:** Many graduated fare structures will use a count of TARIFF ZONEs or FARE SECTIONs, such that the fare depends on the number of ones or sections consumed (rather than any specific zone or section); thus the GEOGRAPHICAL UNIT is a zone or section. A projection of the actual TARIFF ZONEs or FARE SECTIONs on the JOURNEY PATTERN needed to make trip by a passenger will allow a pricing engine to derive the number of zones or sections crossed during the trip.

- ***Geographical interval fare***, a price is associated with two more intervals each applying to a range of distances; thus the pricing is stepped and independent of any particular stop or zone. To price a

journey a distance between an origin and a destination, taken from a DISTANCE MATRIX ELEMENT (or computed directly from the underlying SERVICE PATTERN) is used to lookup the appropriate interval price that applies to use.

Note that it is possible to present any distance based fare as a Point-to-point fare by using the distances and unitis to computing an origin/destination price.

8.1.1 Simple Geographic Intervals

In a simple interval distance, fare, a price is associated with one more GEOGRAPHICAL INTERVALs, each applying to a range of distances (so it can be progressive, getting cheaper for longer distances). To price a journey a distance (which may be stated in arbitray units as well as actual physical distances) is used to lookup the appropriate GEOGRAPHICAL INTERVAL to use.

The most basic usage is for a Unit Zone tariffs, where there is a unit cost per zone, regardless of which zone is used. In this case the pricing is not progressive, i.e. does not get cheaper if more ones are consumed.

The TARIFF thus includes a set of GEOGRAPHICAL INTERVALs.

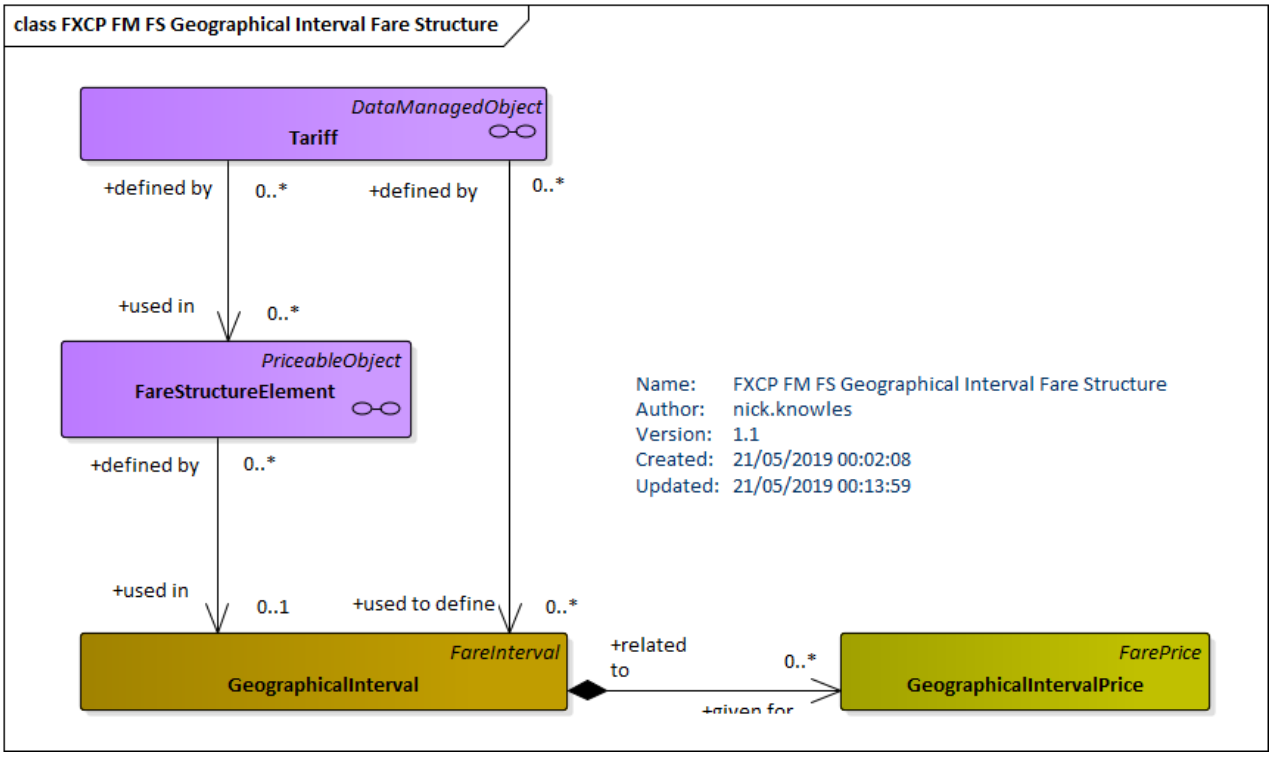


Figure 9 — Simple Interval Distance Fare Structure (UML)

8.1.2 Geographic factors

The simple spaced-based fare structures described above may be combined in more complex structures.

In most cases of fare structures using GEOGRAPHICAL INTERVALs, the fare will be flat within the range of each interval, which means that the fare is the same all along the interval. However, the fares may vary with each interval, depending on a graduation based on a GEOGRAPHICAL UNIT. Such a unit is not

necessarily the same as the unit describing the interval. For instance, the fares may be graduated, the price per km differing according to the number of zones crossed (e.g. to allow lower prices for long trips).

Similarly, a graduated fare structure may be influenced by the type of trip, as regards the geography of the network. If the fare is based on the number of fare sections crossed, it may vary, for instance, depending on whether the trip is from a suburb to the city centre or between two suburbs. This structure will associate GEOGRAPHICAL INTERVALs (fare sections) and DISTANCE MATRIX ELEMENTs (using a set of TARIFF ZONEs, e.g. “centre” and “suburbs”).

The entity GEOGRAPHICAL STRUCTURE FACTOR allows the combinination of two simple structures in a complex factor. It is identified by a GEOGRAPHICAL UNIT, describing the used graduation unit, and by either a GEOGRAPHICAL INTERVAL or a DISTANCE MATRIX ELEMENT.

In an implementations, GEOGRAPHICAL STRUCTURE FACTORs would probably be associated in sets related to one fare calculation rule, in order to allow an algorithm to choose the appropriate rule.

A GEOGRAPHICAL STRUCTURE FACTOR is thus used for more elaborate interval fares, each associaties a GEOGRAPHICAL UNIT PRICE (e.g price per kilometer) with a GEOGRAPHICAL INTERVAL. As for a simple interval, this may be used with a distance to arrive at a price.

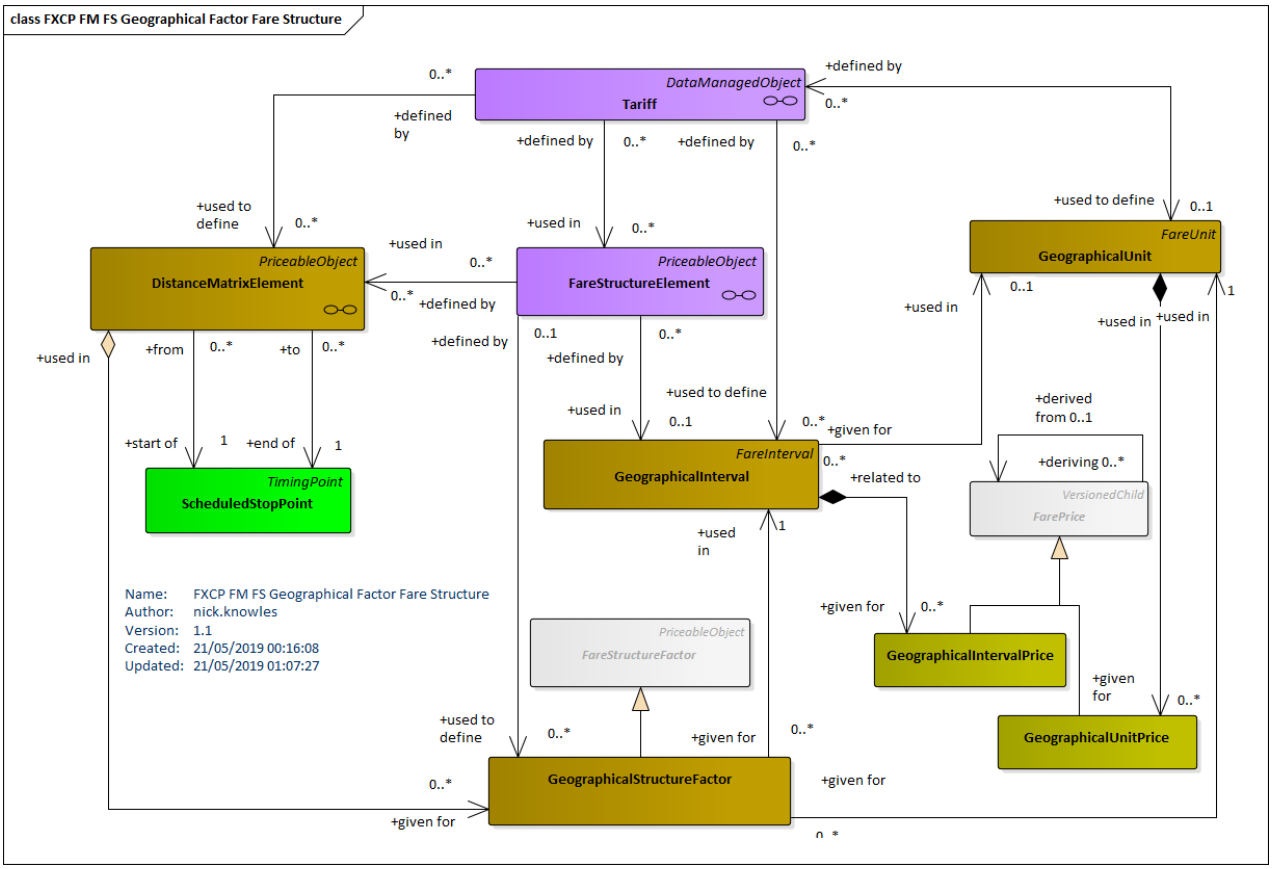


Figure 10 — Simple Interval Distance Fare Structure

8.1.3 Zonal fares

In a Zonal tariff, a price is assigned to each zone on an arbitrary basis. Each zone or combination of zones is defined as a FARE ZONE. A NETWORK may compromise a number of ZONE. A FARE STRUCTURE ELEMENT will assign a list of zones as it parameters, one of which may be selected when the product is purchased. In order to be able to associate a separate price with each zone, a DISTANCE MATRIX ELEMENT is used with the start and end zone the same.

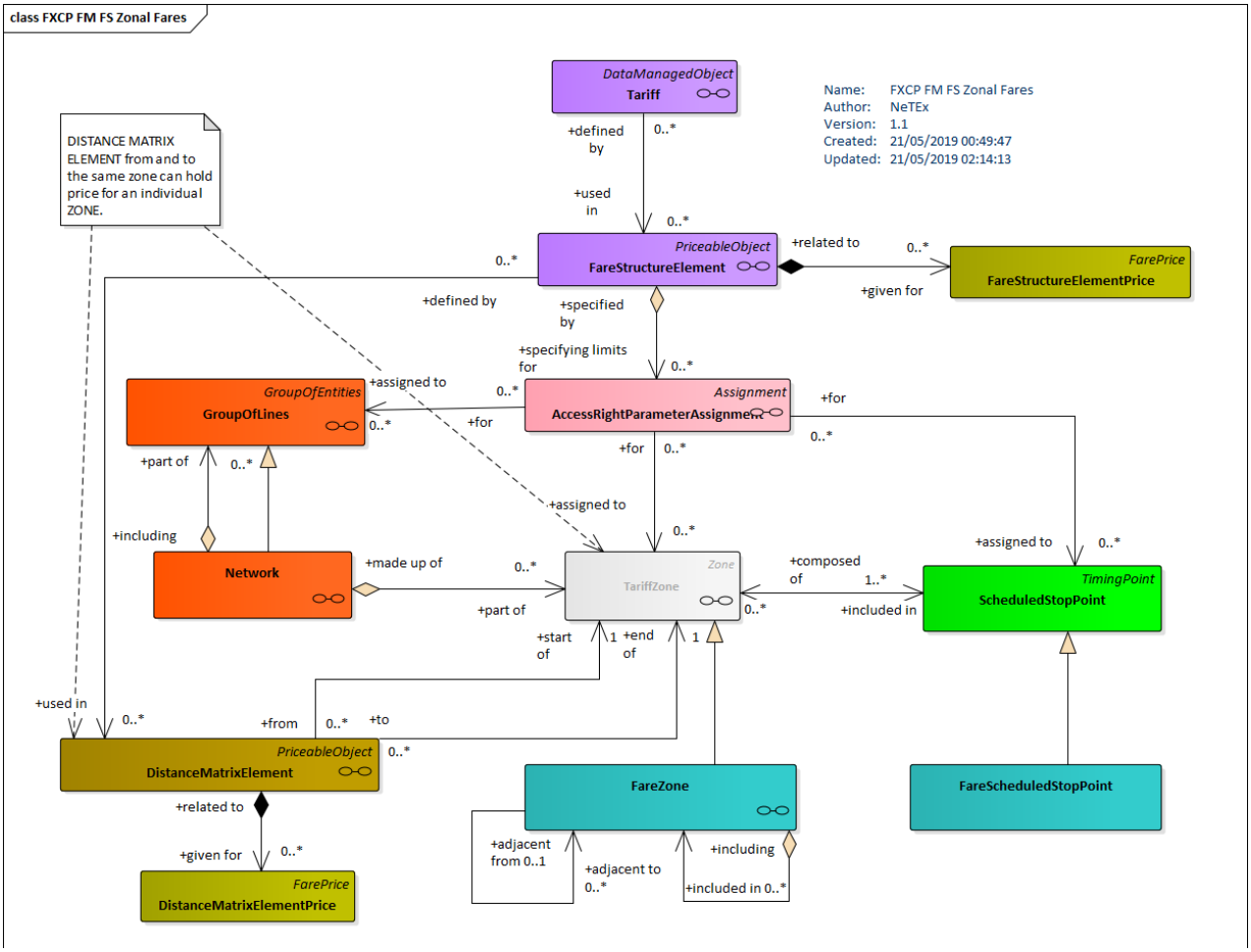


Figure 11 — Zonal Fare Structure

8.1.4 FareInterval (Abstract)

An interval-based aspect of the fare structure.

Table 28 – *FareInterval* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	FARE INTERVAL inherits from PRICEABLE OBJECT.

«PK»	***id***	*FareIntervalIdType*	1:1	Identifier of FARE INTERVAL.

8.1.5 GeographicalInterval

A geographical interval specifies theaccess rights for the FARE STRUCTURE ELEMENTs within the range of this interval: "*20-5 km", "4-6 zones*", etc.

Each GEOGRAPHICAL INTERVAL will store the minimum and the maximum value describing the corresponding distance interval, on which a certain fare will be applied.

Table 29 – *GeographicalInterval* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*FareInterval*	::>	GEOGRAPHICAL INTERVAL inherits from FARE INTERVAL.
«PK»	***id***	*GeographicalInterval-IdType*	1:1	Identifier of GEOGRAPHICAL INTERVAL.
	Start-Geographical-Value	*xsd:decimal*	0:1	Start value for GEOGRAPHICAL INTERVAL.
	End-Geographical-Value	*xsd:decimal*	0:1	End value for GEOGRAPHICAL INTERVAL.
	NumberOfUnits	*xsd:integer*	0:1	Number of units in GEOGRAPHICAL INTERVAL.
«enum»	***IntervalType***	*IntervalTypeEnum*	0:1	Classification of interval type. See allowed values below. • *stop* • *tariffZone* • *distance* • *section* • *coupon* • *other*
«FK»	***Geographical-UnitRef***	*GeographicalUnitRef*	0:1	GEOGRAPHICAL UNIT for interval.
«cntd»	***prices***	*GeographicalIntervalPrice*	0:*	Prices for the GEOGRAPHIC INTERVAL.

8.1.5.1.1 FareUnit (Abtract)

A unit associated with a FARE STRUCTURE FACTOR.

Table 30 – *FareUnit* – Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	FARE UNIT inherits from PRICEABLE OBJECT.
«PK»	***id***	*FareUnitIdType*	1:1	Identifier of FARE UNIT.
	nameOfClassOfUnit	*NameOfClass*	0:1	Type of Class used for zone; ***DistanceType***, etc e.g. ***TariffZone***. This is metadata to facilitate programming.

8.1.6 GeographicalUnit

A unit for calculating geographical graduated fares.

Table 31 – *GeographicalUnit* – Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*FareUnit*	::>	GEOGRAPHICAL UNIT inherits from FARE UNIT.
«PK»	***id***	*GeographicalUnitIdType*	1:1	Identifier of GEOGRAPHICAL UNIT.
	Distance	*DistanceType*	0:1	If distance-based unit, length of unit.
«cntd»	***prices***	*GeographicalUnitPrice*	0:*	Prices associated with GEOGRAPHICAL UNIT

8.1.7 FareStructureFactor (Abstract)

A factor influencing access rights definition or calculation of prices (abstract framework element).

Table 32 – *FareStructureFactor* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	FARE STRUCTURE FACTOR. inherits from PRICEABLE OBJECT.
«PK»	***id***	*FareStructureFactorIdType*	1:1	Identifier of FARE STRUCTURE FACTOR.
	PrivateCode	*PrivateCodeStructure*	0:1	External code associated with factor. +v1.1
	Factor	*xsd:anyType*	0:1	Arbitrary values associated with factor.

«PK»	***TypeOfFare-Structure-FactorRef***	*TypeOfFareStructure-FactorRef*	1:1	Reference to a classification of the FARE STRUCTURE FACTOR.

8.1.8 GeographicalStructureFactor

–

The value of a GEOGRAPHICAL INTERVAL or a DISTANCE MATRIX ELEMENT expressed by a GEOGRAPHICAL UNIT.

Geographical fare structures can be used with many different types of units. For example:

- True Distance based fares – e.g. Kilometres.
- Fares based on the number of zones traversed.
- Fares based on the number of fare stages traversed.

Table 33 – *GeographicalStructureFactor* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*FareStructureFactor*	::>	GEOGRAPHICAL STRUCTURE FACTOR inherits from FARE STRUCTURE FACTOR.
«PK»	***id***	*GeographicalStructure-FactorRef*	1:1	Identifier of GEOGRAPHICAL STRUCTURE FACTOR.
«FK»	***TariffRef***	*TariffRef*	0:1	Reference to a TARIFF. UK☞Should be embedded within a TARIFF.
«FK»	***DistanceMatrix-ElementRef***	*DistanceMatrix-ElementRef*	0:1	Reference to a DISTANCE MATRIX ELEMENT.
«FK»	***Geographical-IntervalRef***	*Geographical-IntervalIdType*	0:1	Reference to a GEOGRAPHICAL INTERVAL.
«FK»	***Geographical-UnitRef***	*GeographicalUnitRef*	0:1	Reference to GEOGRAPHICAL UNIT.
	NumberOfUnits	*NumberOfUnits*	0:1	Quantity of units.
	AmountFactor	*xsd:decimal*	0.1	Arbitrary amount factor associated with GEOGRAPHICAL STRUCTURE FACTOR.

8.1 Time interval fare structure

The time-based fare structures are described in a similar way to the space-based structures. A TIME INTERVAL describes intervals of time (0-1 hour, 1-3 hours, etc.) during which a certain fare is applied to

FARE STRUCTURE ELEMENTs. A graduated time-based structure will be defined using a TIME UNIT (e.g. days, hours or minutes).

TIME INTERVALS and TIME UNIT may be combined into TIME STRUCTURE FACTORs. This allows for instance to specify a fare per hour spent, which varies depending on the range of days spent.

TIME INTERVALs are used to define day and season passes,

Note: The concept of TIME INTERVAL should be carefully distinguished from that of a USAGE VALIDITY PERIOD;

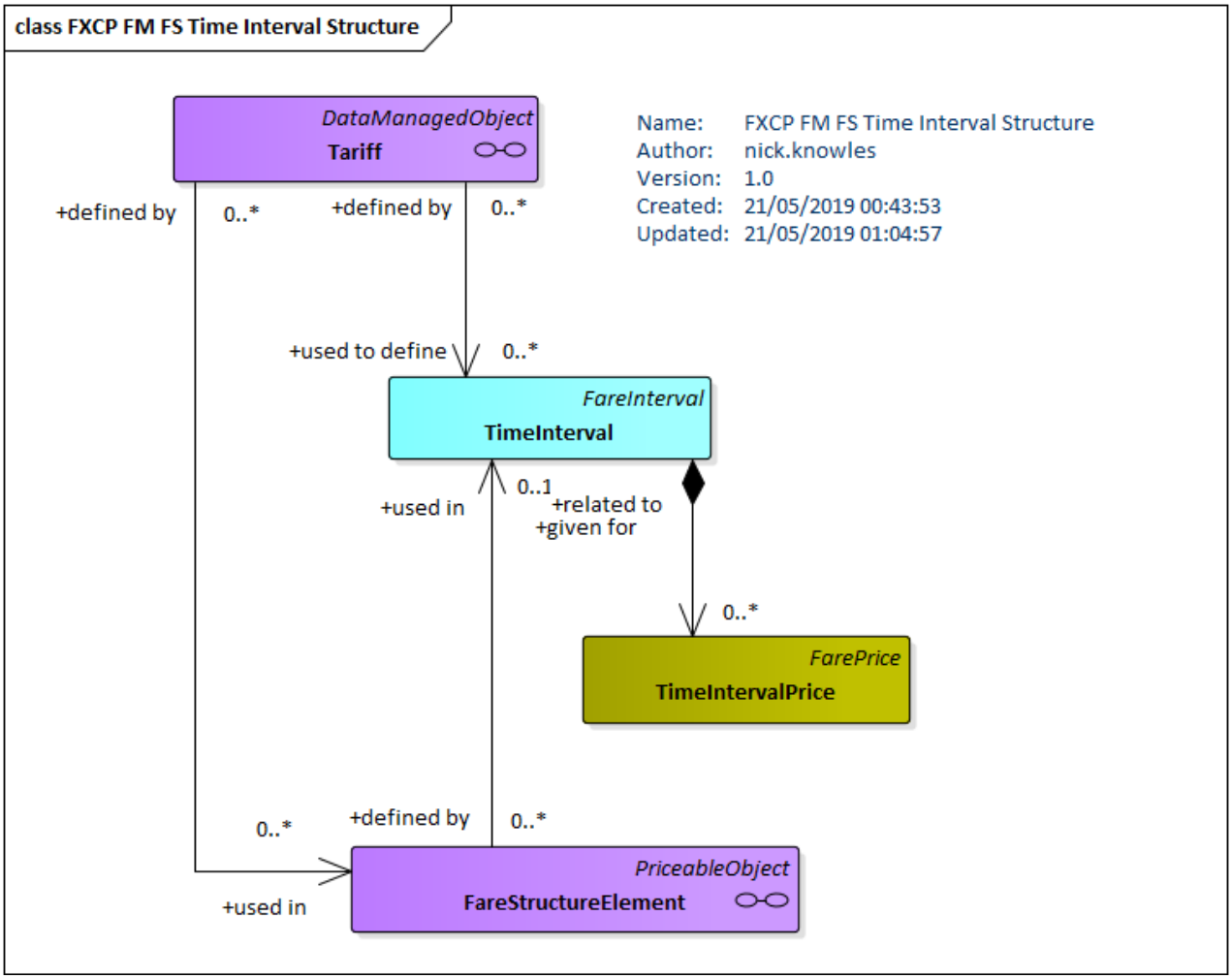


Figure 12 — Time Interval Fare Structure (UML)

8.1.1 TimeInterval

A time-based interval specifying access rights for the FARE STRUCTURE ELEMENTs within the range of this interval: “0-1 hours,” “1-3 days”, etc.

UK☞For the FXC, any ***TimeInterval*** instances should be nested within a ***Tariff***.

Table 34 – *TimeInterval* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*FareInterval*	::>	TIME INTERVAL inherits from FARE INTERVAL.
«PK»	***id***	*TimeIntervalIdType*	1:1	Identifier of TIME INTERVAL.
	StartTime	*xsd:time*	0:1	Start of TIME INTERVAL.
	EndTime	*xsd:time*	0:1	End of TIME INTERVAL.
	DayOffset	*DayOffsetType*	0:1	Day offset of end time from start time.
	Duration	*xsd:duration*	0:1	Interval expressed as duration.
	Minimum-Duration	*xsd:duration*	0:1	Minimum Duration for TIME INTERVAL. +v1.1
«cntd»	***prices***	*TimeIntervalPrice*	0:*	Prices for the TIME INTERVAL.
«cntd»	***timeStructure-Factors***	*TimeStructureFactor*	0:*	TIME STRUCTURE FACTORs using the TIME INTERVAL.

8.1.2 TimeUnit

A unit for calculating time-based graduated fares.

UK☞For the FXC, any ***TimeUnit*** instances should be nested within a ***Tariff***.

Table 35 – *TimeUnit* – Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*FareUnit*	::>	TIME UNIT inherits from FARE UNIT.
«PK»	***id***	*TimeUnitIdType*	1:1	Identifier of TIME UNIT.
	Type	*xsd:NCName*	0:1	Name of XML class associated with unit e.g. gday, gMonth. This is metadata.
	Duration	*xsd:duration*	0:1	Duration associated with unit, e.g. P1D, PT1S.
	prices	*TimeUnitPrice*	0:*	Prices associated with TIME UNIT.

8.1.3 TimeStructureFactor [ADVANCED PROFILE ONLY]

The value of a TIME INTERVAL expressed by a TIME UNIT.

A TIME STRUCTURE FACTOR PROVIDES a more elaborate form of TIME INTERVAL – it can be in any arbitrary unit – e.g. Scholastic term, and can also be combined with a QUALITY STRUCTURE FACTOR.

UK☞For the FXC, any ***TimeStructureFactor*** instances should be nested within a ***Tariff***.

Table 36 – *TimeStructureFactor* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*FareStructureFactor*	::>	TIME STRUCTURE FACTOR inherits from FARE STRUCTURE FACTOR.
«PK»	***id***	*TimeStructureFactor-IdType*	1:1	Identifier of TIME STRUCTURE FACTOR.
«FK	***TariffRef***	*TariffRef*	0:1	Reference to TARIFF associated with TIME STRUCTURE FACTOR.
«FK»	***TimeIntervalRef***	*TimeIntervalRef*	0:1	Reference to TIME INTERVAL associated with factor.
«FK»	***TimeUnitRef***	*TimeUnitRef*	0:1	Reference to TIME UNIT associated with factor.
«FK»	***QualityStructure-FactorRef***	*QualityStructure-FactorRef*	0:*	QUALITY FACTOR associated with the TIME STRUCTURE FACTOR.

8.2 Quality fare structure

QUALITY FARE STRUCTURE can be used to define arbitrary fare structure qualities**.**

A particular use is to specify the number of units (of trips or passes) for a carnet that is available in different multiples.

Two specialisations can be used for specific aspects: A FARE DEMAND FACTOR defines a ‘time band’ for travel, e.g. *peak* or *off-peak*, and a FARE QUOTA FACTOR defines a limited allocation of seats available at a particular price (The latter is not in scope for the FXCP).

A FARE DEMAND FACTOR specifies a named period for travelling during which specific tariff rates may apply. The standard NeTEx VALIDITY CONDITION elements (See NeTEx Part1) can be used to specify the day types and timebands of the period. In large networks this furthermore may have a complex definition whereby the start and end are not uniform over the whole network but vary from stop to stop. This can be represented by the START TIME AT STOP element.

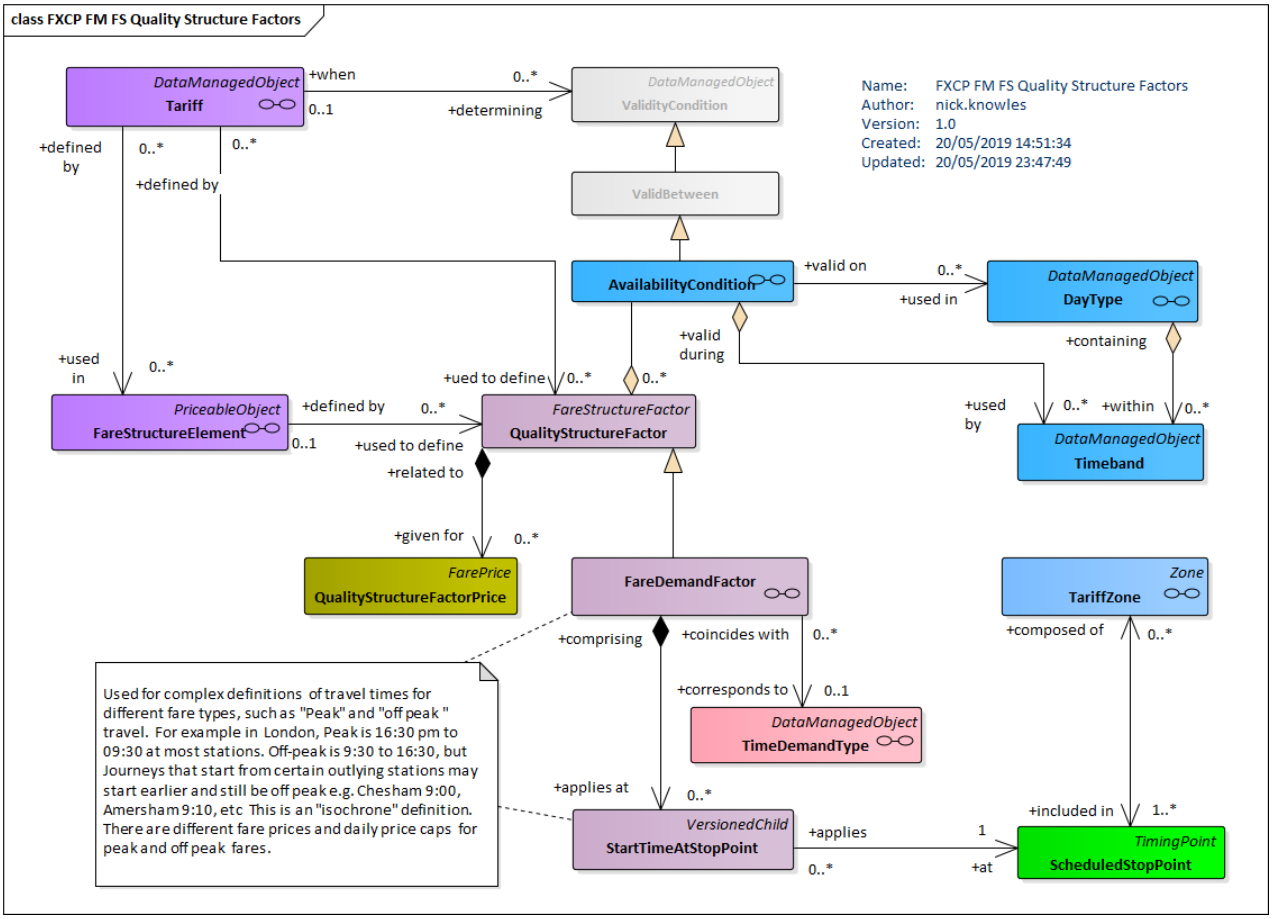


Figure 13 — Quality Fare Structure – Conceptual MODEL (UML)

8.2.1 QualityStructureFactor

A factor influencing access rights definition or calculation of prices, based on the quality: traffic congestion threshold, early/late reservation etc.

UK☞For the FXC, any ***QualityStructureFactors*** instances should be nested within a ***Tariff***.

Table 37 – *QualityStructureFactor* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*FareStructureFactor*	::>	QUALITY STRUCTURE FACTOR inherits from FARE STRUCTURE FACTOR.
«PK»	***id***	*QualityStructure-FactorIdType*	1:1	Identifier of QUALITY STRUCTURE FACTOR.
	Factor	*xsd:anyType*	0:1	General Factor amount.
	Value	*xsd:anyType*	0:1	Quantitative quality value.
	prices	*QualityStructureFactor-Price*	0:*	Price for QUALITY STRUCTURE FACTOR.

8.2.2 FareDemandFactor

A FARE DEMAND FACTOR is a specalisation of QUALITY STRUCTURE FACTOR and is named set of parameters defining a period of travel with a given price, for example; "*peak", "off-peak", "super off-peak",* etc.

UK☞For the FXC, any ***FareDemandFactor*** instances should be nested within a ***Tariff***.

Table 38 – *FareDemandFactor* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*QualityStructureFactor*	::>	FARE DEMAND FACTOR inherits from QUALITY STRUCTURE FACTOR.
«PK»	***id***	*FareDemandFactorIdType*	1:1	Identifier of a FARE DEMAND FACTOR.
«enum»	***FareDemand-Type***	*FareDemandTypeEnum*	0:1	TIME DEMAND TYPE corresponding to FARE DEMAND FACTOR. See allowed values below. • *peak ;middle; offPeak; superOffPeak; night; specialEvent*
«FK»	***TimeDemand-TypeRef***	*TimeDemandTypeRef*	0:1	TIME DEMAND TYPE corresponding to FARE DEMAND FACTOR. See NeTEx Part2.
«enum»	***StopUse-Constraint***	*StopUseConstraintEnum*	0:1	Nature of constraint on uses of stop. See allowed values. +v1.1. • *arriving; departing; passingThrough;night*
«cntd»	***startTimesAt-StopPoints***	*StartTimeAtStopPoint*	0:*	Start times at SCHEDULED STOP POINTs for FARE DEMAND TYPE.

8.2.3 StartTimeAtStopPoint (Subcomonent of FareDemandFactor)

A time at which a fare time band (time band peak, off peak) is deemed to begin for trips starting at a particular station.

Table 39 – *StartTimeAtStopPoint* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*VersionedChild*	::>	START TIME AT STOP POINT inherits from VERSIONED CHILD. See NeTEx Part1.
«PK»	***id***	*StartTimeAtStop-PointIdType*	1:1	Identifier of START TIME AT STOP POINT
«FK»	***FareDemand-FactorRef***	*FareDemandFactorRef*	0:1	FARE DEMAND FACTOR for which start time applies.

«FK»	***ScheduledStop-PointRef***	*ScheduledStopPointRef*	1:1	SCHEDULED STOP POINT at which time band start applies.
	StartTime	*xsd:time*	0:1	Time at which time band starts at station.
	EndTime	*xsd:time*	0:1	Time at which time band ends at station.
	DayOffset	*DayOffsetType*	0:1	Day offset of end time from start time. Zero is same day.

8.3 Validable Elements

The control system of a Public Transport organisation is organised in order to regularly "validate" the consumption of access rights, i.e. to check that the passengers have the right ticket for the transport on which they are travelling. The validation process is aimed at specifying that an access right is valid, has been consumed and that this consumption was allowed. It uses the results of one or several consecutive controls.

Such a validated access right may include several components for which the fare structure is different. For instance, a fare product may include a discount for travellers using a car park and then public transport. If the fare structure of these two components is different (e.g. flat fares for public transport and price based on duration of stay for car parking), they will be described by two different FARE STRUCTURE ELEMENTs. The discount is granted only when the validation process recognises that both have been consumed in sequence.

Therefore, a VALIDABLE ELEMENT is defined as a sequence or a set of FARE STRUCTURE ELEMENTs, to be consumed as a whole (or validated in one go) i.e. it is not foreseen to use the different elements of the sequence separately in the sense that if one of the elements is consumed separately, then the whole access right is considered as consumed.

Examples of VALIDABLE ELEMENTs are the following:

- A **simple** FARE STRUCTURE ELEMENT to be validated in itself (e.g. a point-to-point trip on a rail network). In such a case, the VALIDABLE ELEMENT will be identical to the FARE STRUCTURE ELEMENT;

- **Chained** FARE STRUCTURE ELEMENTs of which the successive consumption allows a discount, as in the park and ride above example. Such a discount may be applied with a discounted joint ticket, or by a discount on the latest consumed element, or by a discount to both elements with a post-payment system;

- **Composite** access rights (e.g. trips or rides) where the fare structure changes during consumption, for instance on a train link composed of two sections, each operated by an operator applying a different fare structure to that the other.

In other words, the VALIDABLE ELEMENT provides a functional grouping (e.g. "*Metro trip", "rail trip" "rail return trip")* with which to relate fine grained access-right components to a FARE PRODUCT.

A VALIDABLE ELEMENT can be limited to a particular scope (e.g. MODE, OPERATOR, LINE etc) that is more specific than that of the Tariff / FareStructure elements on which it is based. via an associated VALIDITY PARAMETER ASSIGNMENT.

VALIDABLE ELEMENTs are used to indicate the consumption rights of a PREASSIGNED FARE PRODUCT or AMOUNT OF PRICE UNIT product and/or the allowed discount rights (USAGE DISCOUNT RIGHT)

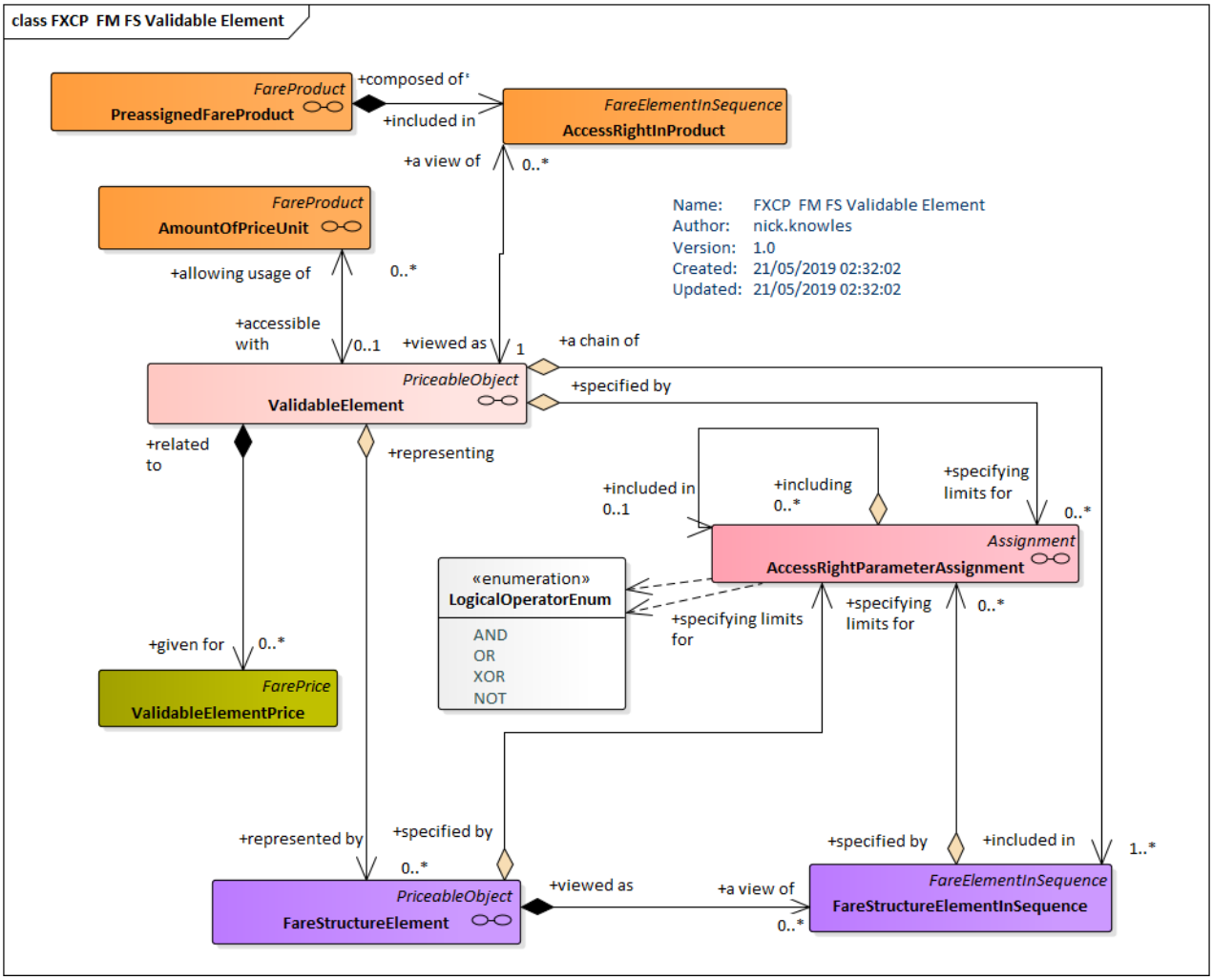


Figure 14 — Validable Element (UML)

8.3.1 ValidableElement

A sequence or set of FARE STRUCTURE ELEMENTs, grouped together to be validated in one go.

Table 40 – *ValidableElement* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	VALIDABLE ELEMENT inherits from PRICEABLE OBJECT**.**
«PK»	***id***	*ValidableElementIdType*	1:1	Identifier of VALIDABLE ELEMENT.
XGRP	***ValidableElement-StructureGroup***	***xmlGroup***	1:1	Structure elements making up VALIDABLE ELEMENT.

XGRP	***ValidableElement-ProductGroup***	***xmlGroup***	1:1	Product elements making up VALIDABLE ELEMENT.
«cntd»	***fareStructure-Elements***	*FareStructureElement*	0:*	FARE STRUCTURE ELEMENTs making up VALIDABLE ELEMENT.
«cntd»	***elementsInSequence***	*FareStructureElement-InSequence*	0:*	FARE STRUCTURE ELEMENTs IN SEQUENCE making up VALIDABLE ELEMENT.
«cntd»	***accessRights-InProduct***	*AccessRightInProduct*	0:*	ACCESS RIGHT IN PRODUCT making up VALIDABLE ELEMENT.
«cntd»	***discountRights***	*FareProductRef+*	0:*	Discount rights in Product making up VALIDABLE ELEMENT.
«cntd»	***amountOfPriceUnit***s	*AmountOfPriceUnitRef*	0:*	AMOUNTs OF PRICE UNIT making up VALIDABLE ELEMENT.
«cntd»	***thirdPartyProducts***	*ThirdPartyProductRef*	0:*	THIRD PARTY PRODUCTs for VALIDABLE ELEMENT.
«cntd»	***validityParameter-Assignments***	*ValidityParameter-Assignment*	0:*	VALIDITY PARAMETER ASSIGNMENTs for VALIDABLE ELEMENT.
*«cntd»	***prices***	*ValidableElementPrice*	0:*	VALIDABLE ELEMENT PRICEs for element.

9 Fare Products

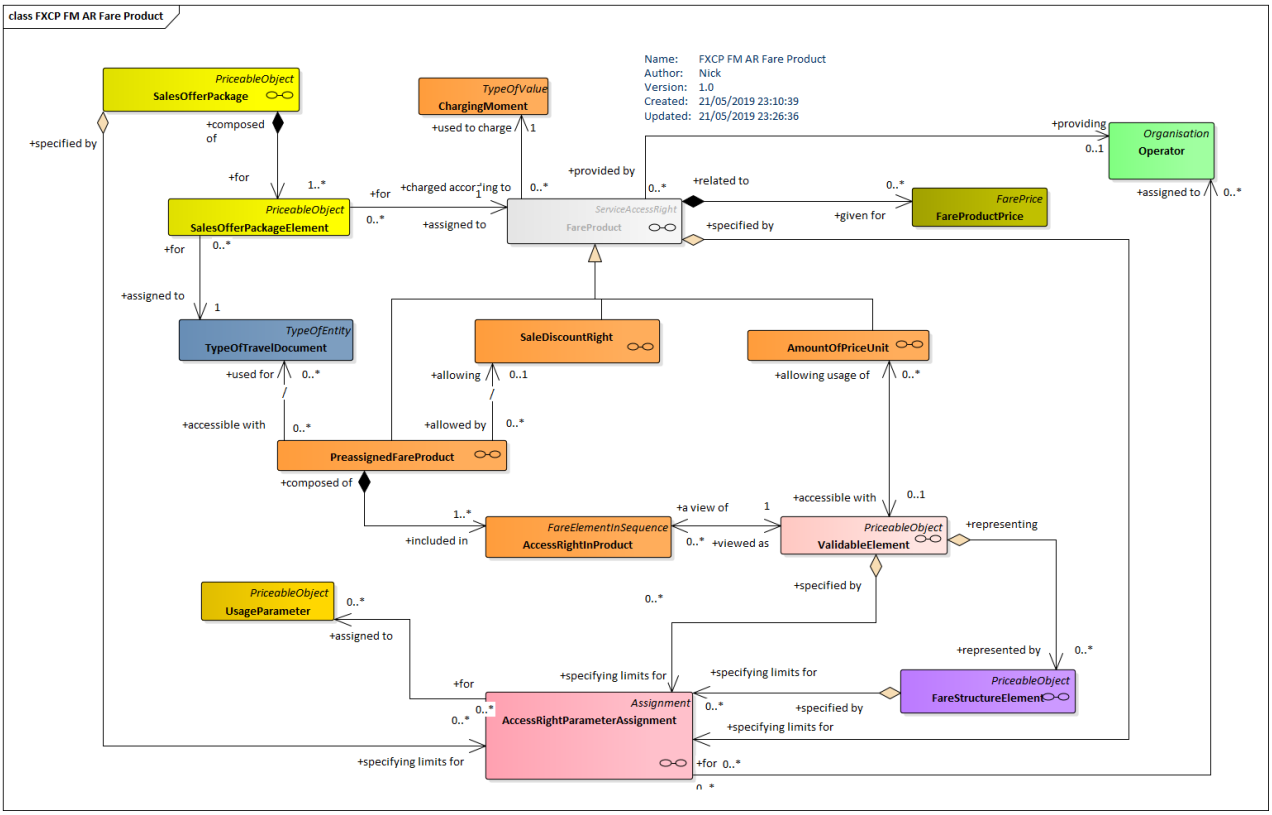
9.1 Fare Product

A FARE PRODUCT is a marketable element made available to the public. It can be purchased and enables the owner to consume public transport or other services under specific conditions. FARE PRODUCT itself is abstract; it has a number of different specialisations, each representing a different sort of FARE PRODUCT. For example specified access rights to travel (PRE-ASSIGNED FARE PRODUCT). The different specialisations are described later below.

A FARE PRODUCT is immaterial, that is, it is independent of any physical representation but can be materialised on various TRAVEL DOCUMENTs by means of a SALES OFFER PACKAGE. The same FARE PRODUCT might have different materialisations on different media, for instance, a “monthly pass” FARE PRODUCT may be variously incorporated on a specific paper ticket or stored on an electronic card.

The same FARE PRODUCT can be used in one or more SALES OFFER PACKAGEs (see later) to described a marketable product that the user can actually buy materialised onto a TYPE OF TRAVEL DOCUMENT, for example a metro trip might be available as both a paper ticket and as a smartcard transaction.

A FARE PRODUCT is specific to a particular CHARGING MOMENT, which is a combination of: payment method (pre-payment or post-payment and account location (account stored on a TRAVEL DOCUMENT or in a central account). The CHARGING MOMENT is significant in particular for distinguishing Pay as You GO and capped products where payment is not a simple prepayment. The same access rights when presented to the public (i.e. when they become FARE PRODUCTs) may differ, for instance, the “access right to the metro network” may be advertised as two products: one as prepaid (materialised as a simple ticket), another as post-paid (materialised on an electronic card).



- **Figure 15 — UK FXCP – Fare Product Overview (UML)**

The most classical FARE PRODUCTs are combinations of specified access rights (single ticket, commuter week ticket, monthly pass, etc.). Such a PRE-ASSIGNED FARE PRODUCT is defined as a FARE PRODUCT consisting of one or several VALIDABLE ELEMENTs.

Typical examples of PRE-ASSIGNED FARE PRODUCTs are the following:

- any VALIDABLE ELEMENT that is directly marketable, e.g. access right granted by a single ticket, access right granted by a park and ride discount ticket, etc. In such a case, the PRE-ASSIGNED FARE PRODUCT is identical to the VALIDABLE ELEMENT;

- a week card allowing one or two specified trips for each day of the week, each trip being defined as a VALIDABLE ELEMENT that should be consumed in one go during a specified time band of the considered day;

- a monthly pass allowing the unlimited consumption of several specified trips, each being defined as a VALIDABLE ELEMENT, for example travel within a specified zone.

The VALIDABLE ELEMENT V

- A given FARE PRODUCT (and subsequent SALES OFFER PACKAGEs) may comprise a number of different values for each feature of the fare structure. For example, a FARE PRODUCT for a set of point-to-point journeys (each represented by a DISTANCE MATRIX ELEMENT) might include parameters for *first class, second class, and for peak* or *off-peak*); each allowed for different USER PROFILEs such as *adult, child, senior* and *student – and* every separate selectable combination having a separate price. Thus, there is not normally a separate FARE PRODUCT for each combination of features that a user may buy and it is possible to represent a large set of offerings by a single FARE PRODUCT.

- The user's actual purchase will be described by a TRAVEL SPECIFICATION which indicates which specific features have been selected, for example *an adult single second class ticket between Lille and Valenciennes*.

9.1.1 ServiceAccessRight (Abstract)

A SERVICE ACCESS RIGHT is an immaterial marketable element (access rights, discount rights etc) that may be specialised to make various types of product.

Table 41 – *ServiceAccessRight* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	SERVICE ACCESS RIGHT inherits from PRICEABLE OBJECT.
«PK»	***id***	*ServiceAccessRightIdType*	1:1	Identifier of SERVICE ACCESS RIGHT.
«AK»	***PrivateCode***	*PrivateCodeType*	0:1	Alternative identifier of an entity; can be used to associate with legacy systems.
	InfoUrl	*xsd:anyURI*	0:1	Link for product information.

«cntd»	***documentLinks***	*InfoLink*	0:*	InfoLinks for external links. For PFDs, etc =V1.1

9.1.2 FareProduct (Abstract)

An immaterial marketable element (access rights, discount rights etc), specific to a CHARGING MOMENT.

Table 42 – *FareProduct* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	FARE PRODUCT inherits from SERVICE ACCESS RIGHT.
«PK»	***id***	*FareProductIdType*	0:1	Identifier of FARE PRODUCT.
«FK»	***Charging-MomentRef***	*ChargingMomentRef*	0:1	Reference to a CHARGING MOMENT for product +v1.1.
«enum»	***Charging-MomentType***	*Charging-MomentTypeEnum*	0:1	Enumeration of standardised Charging moment values. See allowed values. _v1.1. • *beforeTravel* • *onStartOfTravel* • *beforeEndOfTravel* • *onStartThenAdjustAtEndOfTravel* • *onStartThenAdjustAtEndOfFareDay* • *onStartThenAdjustAtEndOfChargePeriod* • *atEndOfTravel* • *atEndOfFareDay* • *atEndOfChargePeriod* • *free* • *anyTime* • *other*
«FK»	***typesOfFare-ProductRef***	*TypeOfFareProductRef*	0:*	Classifications of FARE PRODUCT. (made *:* in v1.1)
«FK»	***Transport-OrganisationRef***	*(TransportOrganisationRef) OperatorRef | AuthrityRef*	0:1	OPERATOR or AUTHORITY in charge of the FARE PRODUCT.
«cntd»	***ConditionSummary***	*ConditionSummary*	0:1	Summary description of conditions on FARE PRODUCT.

«FK»	***BaseFare-ProductRef***	***FareProductRef+***	0:1	Another FARE PRODUCT which this product extends. Will assume all properties of base product unless specifically overridden.
«cntd»	***validityParameter-Assignments***	***AccessRightParameter-Assignment***	0:*	VALIDITY PARAMETER ASSIGNMENTs relating to FARE PRODUCT.
«cntd»	***validableElements***	***ValidableElement***	0:*	VALIDABLE ELEMENTs for FAR PRODUCT.
«cntd»	***accessRights-InProduct***	***AccessRightInProduct***	0:*	ACCESS RIGHTs in PRODUCT for FAR PRODUCT.
«cntd»	***tariffs***	***TariffRef***	0:*	TARIFFs used by FARE PRODUCT.
«cntd»	***prices***	***FareProductPrice***	0:*	FARE PRODUCT PRICEs in PRICE GROUP.

9.1.3 AccessRightInProduct (Subcomponent of FareProduct)

ACCESS RIGHT in PRODUCT links a FARE PRODuCT to a VALIDABLE ELEMENT to specify the access righst of the product.

Table 43 – *AccessRightInProduct* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*FareElementInSequence*	::>	ACCESS RIGHT IN PRODUCT inherits from FARE ELEMENT IN SEQUENCE.
«PK»	***id***	*AccessRightInProduct-IdType*	1:1	Identifier of ACCESS RIGHT IN PRODUCT.
«FK»	***Validable-ElementRef***	*ValidableElementRef*	0:1	Reference to a VALIDABLE ELEMENT for which access rights are specified.
«FK»	***Preassigned-FareProducRef***	*PreassignedFareProducRef*	0:1	Reference to a PRE ASSIGNED FARE PRODUCT for which access rights are specified.

9.1.4 ChargingMoment

A classification of FARE PRODUCTs according to the CHARGING MOMENT and the account location: pre-payment with cancellation (throw-away), pre-payment with debit on a value card, pre-payment without consumption registration (pass), post-payment etc.

The classical examples of CHARGING MOMENT are the following:

- pre-payment with cancellation (throw-away tickets);
- pre-payment with debit on a TRAVEL DOCUMENT (value card);

- pre-payment without registration of the consumption (unlimited pass);
- post-payment (electronic card with central account and monthly debiting);
- free of charge.

These main categories may be subdivided according to the operator specific requirements.

Table 44 – *ChargingMoment* – Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*TypeOfValue*	::>	TYPE OF CHARGING MOMENT inherits from TYPE OF VALUE. See NeTEx Part1.
«PK»	***id***	*ChargingMomentIdType*	1:1	Identifier of TYPE OF CHARGING MOMENT.

9.1.5 ConditionSummary (Subcomponent of FareProduct)

A summary of the properties of a FARE PRODUCT or PACKAGE that can be used to generate passenger information.

Table 45 – *ConditionSummary* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
«enum»	***FareStructure-Type***	*FareStructureTypeEnum*	1:1	Classification of fare type. • *networkFlatFare; lineFlatFare; zonalFare; zoneToZoneFare; zoneSequenceFare; pointToPointFare; stageFare* • *cappedZonalFare; cappedFlatFare* • *store; other*
«enum»	***TariffBasis***	*TariffBasisEnum*	0:1	Basis for Tariff. • *flat; distance; route; zoneToZone; pointToPoint; tour; group; discount; other*
	HasNotices	*xsd:boolean*	0:1	Whether there are notices associated with the product.
	ProvidesCard	*xsd:boolean*	0:1	Whether a card is provided with the product.
	GoesOnCard	*xsd:boolean*	0:1	Whether the product goes on a card.
	IsPersonal	*xsd:boolean*	0:1	Whether the product is a sold anonymously or to an identified person.

	RequiresPhoto	*xsd:boolean*	0:1	Whether use of the product requires a photo to be provided.
	MustCarry	*xsd:boolean*	0:1	Whether use of the card must be carried in order to use product.
	Requires-Account	*xsd:boolean*	0:1	Whether the product requires the user to register for an account for billing. +v1.1
	IsSupplement	*xsd:boolean*	0:1	Whether the package is a supplement to another product
	Requires-Entitlement	*xsd:boolean*	0:1	Whether the product requires entitlement to other products.
	Gives-Entitlement	*xsd:boolean*	0:1	Whether the product grants entitlements to other products.
«enum»	***HasOperator-Restrictions***	*Operator RestrictionEnum*	0:1	Limitations as to which OPERATOR's services may be used. See allowed values below. • *anyTrain* • *restricted* • *specifiedOperatorOnly*
	HasTravelTime-Restrictions	*xsd:boolean*	0:1	Whether limitations apply as to when travel may take place.
	HasRoute-Restrictions	*xsd:boolean*	0:1	Whether limitations apply as to the route that may be used.
«enum»	***HasTrain-Restrictions***	*TrainRestrictionEnum*	0:1	Limitations as to which trains may be used. See allowed values below. • anyTrain • restricted • specifiedTrainOnly • specifiedTrainsOnly • specifiedTrainAndConnections
	HasZone-Restrictions	*xsd:boolean*	0:1	Whether limitations apply as to the area in which travel may take place.
	CanBreak-Journey	*xsd:boolean*	0:1	Whether the user is allowed to break journey, i.e. leave transport network, at an intermediate point.
	ReturnTripsOnly	*xsd:boolean*	0:1	Whether must buy a return trip.
	CanChange-Class	*xsd:boolean*	0:1	Whether user can change class

	IsRefundable	*xsd:boolean*	0:1	Whether the ticket is refundable
	IsExchangable	*xsd:boolean*	0:1	Whether the ticket is exchangeable
	HasExchange-Fee	*xsd:boolean*	0:1	Whether there is a fee for exchanges.
	HasDiscounted-Fares	*xsd:boolean*	0:1	Whether discounted Fares are allowed.
	AllowAdditional-Discounts	*xsd:boolean*	0:1	Whether more than one discount may be applied, e.g. Child + Companion.
	Allow-Companion-Discount	*xsd:boolean*	0:1	Whether there is a companion discount.
	HasMinimum-Price	*xsd:boolean*	0:1	Whether there is a minimum price when combining elements.
	Requires-PositiveBalance	*xsd:boolean*	0:1	Whether the product requires a positive stored balance to be used.
	PenaltyWIthout-Ticket	*xsd:boolean*	0:1	Whether there is a penalty for travelling without a ticket, i.e. tickets cannot be bought on-board. +v1.1
	AvailableOn-Subscription	*xsd:boolean*	0:1	Whether the product is available on subscription. +v1.1
	HasPurchase-Conditions	*xsd:boolean*	0:1	Whether purchase conditions apply to the sale of the product, e.g. when must be bought or who may purchase.
	HasDynamic-Pricing	*xsd:boolean*	0:1	Whether product has dynamic pricing.
	Requires-Reservation	*xsd:boolean*	0:1	Whether a Reservation is required.
	HasReservation-Fee	*xsd:boolean*	0:1	Whether there is a fee for Reservations.
	HasQuota	*xsd:boolean*	0:1	Whether limited quota for the offer or it can be sold in unlimited numbers.

9.2 Types of Fare Product

FARE PRODUCT itself is abstract – it is specialised to make a number of concrete fare types.

There are four fundamental types of FARE PRODUCTs that are found most commonly;

— PRE-ASSIGNED FARE PRODUCT is a marketable combination of specified VALIDABLE ELEMENTs. It is the most common FARE PRODUCT in public transport (materialised e.g. as single ticket, monthly pass etc.);

- AMOUNT OF PRICE UNIT is a FARE PRODUCT expressed by a specified number of PRICE UNITs (currency unit, token, etc.). It is not pre-assigned, which means that it gives the right to consume any VALIDABLE ELEMENT from a specified list. The main types of AMOUNT OF PRICE UNIT are value cards or electronic purses, which are debited for each transaction. In some cases, single tickets should be considered as AMOUNT OF PRICE unit, when it is required to punch a variable number of tickets according to the length of the intended trip;

- SALE DISCOUNT RIGHT is a FARE PRODUCT allowing its holder to benefit from discounts when purchasing specific SALES OFFER PACKAGEs. Train companies for instance usually propose such discounts (e.g. 30 % discount card);

- SUPPLEMENT PRODUCT: An ancillary product, such as a seat class upgrade or a meal, that can only be purchased in addition to another product.

Two further types of FARE PRODUCTs are used in: complex products

- USAGE DISCOUNT RIGHT is a FARE PRODUCT allowing its holder to benefit from discounts when consuming specified VALIDABLE ELEMENTs. For instance, such a product grants to its holder a discount when consuming park and ride sequences, whereas parking or PT rides consumed alone are charged at the normal fare. This kind of discount is particularly meaningful with post-payment methods.

- CAPPED DISCOUNT RIGHT a refinement of a SALE DISCOUNT RIGHT used for advanced electronic pay as you go fares, where once a certain amount of consumption has been achieved within a certain interval, a cap (as specified by one or more CAPPING RULES) is applied, for example limiting the daily use to no more than the cost of a day pass.

In addition, two other types of non-travel “product”, can be declared and referenced:

- an ENTITLEMENT PRODUCT: may also be used to represent non-transport related qualifications such as disability cards, military cards or pensioner passes that are pre-requisites for the purchase or consumption of travel products.

- a THIRD-PARTY PRODUCT: A FARE PRODUCT that is marketed together with a Public Transport FARE PRODUCT. It is a product not fully described by the system. Out of scope of the FXCP.

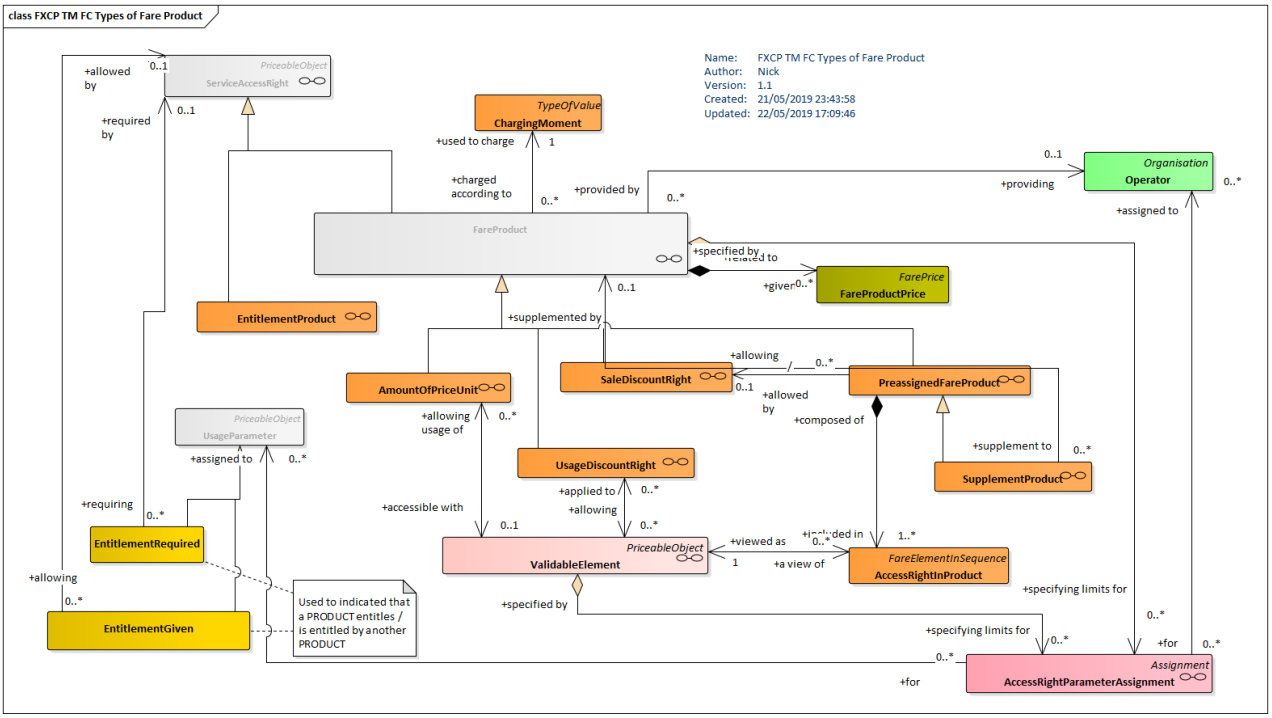


Figure 16 — Types of Fare Product (UML)

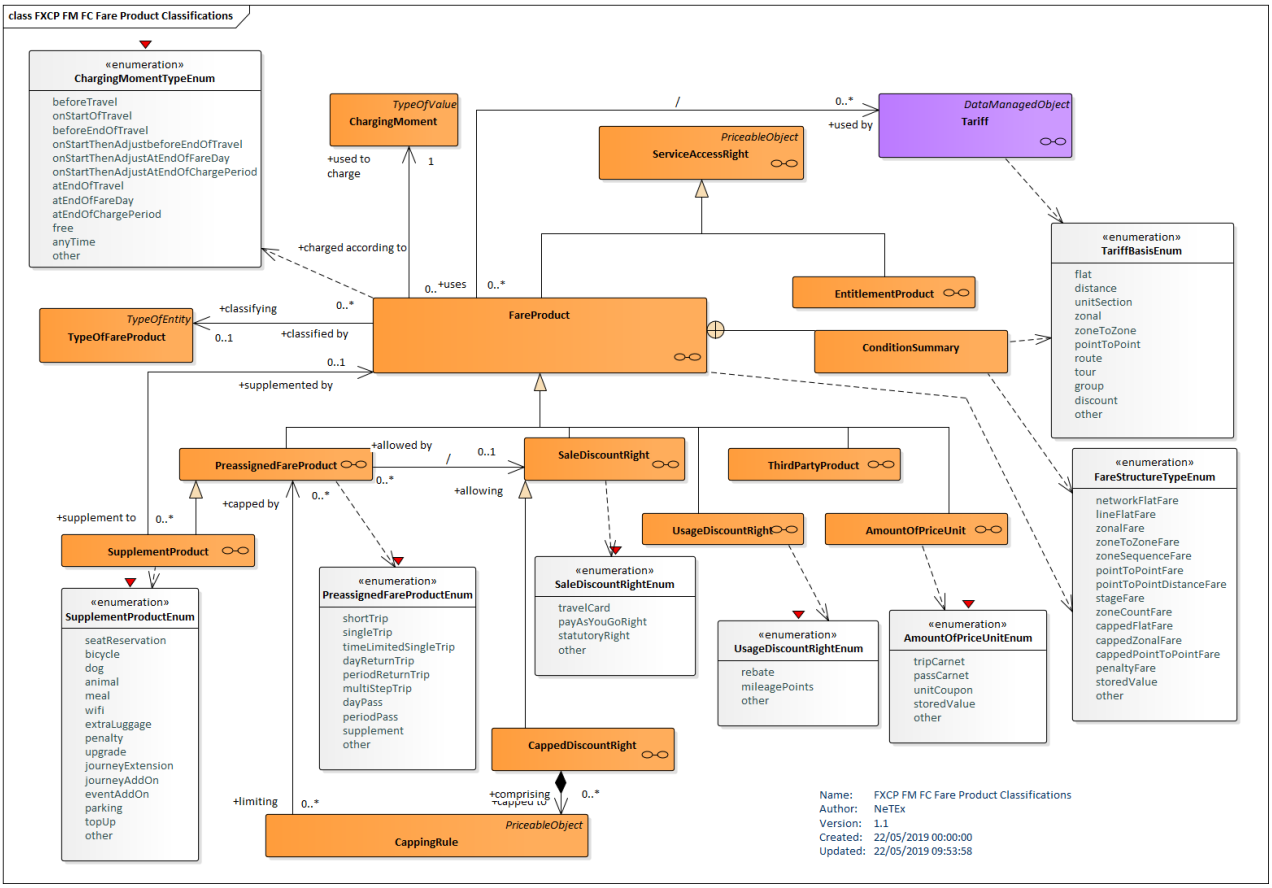


Figure 17 — Types of Fare Product - Classifications (UML)

9.2.1 PreassignedFareProduct

A FARE PRODUCT consisting of one or several VALIDABLE ELEMENTs, specific to a CHARGING MOMENT.

Table 46 – *PreassignedFareProduct* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*FareProduct*	::>	PREASSIGNED FARE PRODUCT inherits from FARE PRODUCT.
«PK»	***id***	*Preassigned-FareProductIdType*	1:1	Identifier of PREASSIGNED FARE PRODUCT.
«enum»	***ProductType***	*PreassignedFareProduct-Enum*	1:1	Classification of PREASSIGNED FARE PRODUCT. See allowed values. +v1.1 • *singleTrip; ShortTrip; timeLimitedSingleTrip* • *dayReturnTrip; periodReturnTrip* • *multistepTrip* • *dayPass; periodPass* • *supplement* • *other*

9.2.2 SupplementProduct

An additional FARE PRODUCT that may be used to describe additional purchases entitled by another product.

A SUPPLEMENT PRODUCT is usually constrained by some or all of the parameters of the supplemented product, e.g. same service, same route, etc. For example, a *PlusBus* ticket can only be bought for the origin or destination of a trip, or a first-class upgrade must be for the same trip as the original second-class ticket.

It may be part of passenger information to indicate which supplements are available:

- A SUPPLEMENT PRODUCT can indicate one or more prerequisite PREASSIGNED FARE PRODUCTs. Further details about the dependency can be specified using an ENTITLEMENT REQUIRED parameter. The ENTITLEMENT CONSTRAINT parameter can place restrictions on the supplement's parameters to align the with the base product.

- A PREASSIGNED FARE PRODUCT that has supplements may use an ENTITLEMENTs GIVEN usage parameter to declare the other products that are supplements for it.

Table 47 – *SupplementProduct* – XML Element

Classifi-cation	Name		Type	Cardinality	Description
::>	::>		*PreassignedFareProduct*	::>	SUPPLEMENT PRODUCT inherits from PREASSIGNED FARE PRODUCT.
«PK»	***id***		*SupplementProductIdType*	1:1	Identifier of SUPPLEMENT PRODUCT.
«enum»	***Supplement-ProductType***		*SupplementProduct-TypeEnum*	0:1	Classification of SUPPLEMENT PRODUCT. See allowed values. +v1.1 • *bcycle; dog; animal* • *meal; wifi* • *extraLuggage* • *upgrade; journeyExtension; journeyAddOn; eventAddOn* • *topUp* • *parking* • *other*
	Choice				
«FK»	*a*	***SupplementTo FareProduct-Ref***	*FareProductRef+*	0:1	Reference to base PRE ASSIGNED FARE PRODUCT OFFER for which this is a supplement.
«cntd»	*b*	***SupplementTo***	*FareProductRef+*	0:*	Reference to base PRE ASSIGNED FARE PRODUCT OFFER for which this is a supplement.

9.2.3 AmountOfPriceUnit

A FARE PRODUCT consisting of a stored value of PRICE UNITs: an amount of money on an electronic purse, amount of units on a value card etc.

Table 48 – *AmountOfPriceUnit* – XML Element

Classifi-cation	Name	Type	Card in-ality	Description
::>	::>	*FareProduct*	::>	AMOUNT OF PRICE UNIT inherits from FARE PRODUCT.
«PK»	***id***	*AmountOfPriceUnitIdType*	1:1	Identifier of AMOUNT OF PRICE UNIT.
«enum»	***ProductType***	*AmountOfPriceUnitEnum*	1:1	Classification of AMOUNT OF PRICE UNIT. See allowed values. +v1.1

				• *tripCarnet; passCarnet* • *unitCoupon; storedValue; other*
«FK»	***PriceUnitRef***	*PriceUnitRef*	0:1	Reference to a PRICE UNIT.
	Amount	*xsd:decimal*	0:1	Number of units.

9.2.4 UsageDiscountRight

A FARE PRODUCT allowing a customer to benefit from discounts when consuming VALIDABLE ELEMENTs.

Table 49 – *UsageDiscountRight* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*FareProduct*	::>	USAGE DISCOUNT RIGHT inherits from FARE PRODUCT.
«PK»	***id***	*UsageDiscounRightIdType*	1:1	Identifier of USAGE DISCOUNT RIGHT.
«enum»	***ProductType***	*UsageDiscountRightEnum*	1:1	Classification of USAGE DISCOUNT RIGHT. See allowed values. +v1.1 • *mileagePoints* • *usageRebate* • *other*

9.2.5 SaleDiscountRight

A FARE PRODUCT allowing a customer to benefit from discounts when purchasing SALES OFFER PACKAGEs.

Table 50 – *SaleDiscountRight* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*FareProduct*	::>	SALE DISCOUNT RIGHT inherits from FARE PRODUCT.
«PK»	***id***	*SaleDiscountRightIdType*	1:1	Identifier of SALE DISCOUNT RIGHT.
«enum»	***ProductType***	*SaleDiscountRightEnum*	1:1	Classification of SALE DISCOUNT RIGHT. See allowed values. +v1.1 • *travelCard* • *payAsYouGoRight*

				• *other*

9.3 Pay as you go fare and capping

Account based electronic fare systems enable an effective way of simplying the choice of fares for the passenger – capping. With capping, if users nerd not decide in advance whether they should buy a period pass but simply make their trips.

A CAPPED DISCOUNT PRODUCT is a specialisation of a SALES DISCOUNT RIGH and can be used to represent a pay as you go fare product, such that once a certain amount of consumption has been achieved within a certain interval, a cap (as specified by one or more CAPPING RULEs) is applied, for example limiting the daily use to no more than the cost of a day pass, or weekly use to no more than a week pass.

The CAPPED DISCOUNT RIGHT does not of itself give access rights; merely the right to purchase other products at a discount. The usage is controlled by recording the VALIDABLE ELEMENTs of the other products purchased (usually trips) against the account of the passenger and then performing an overall calculation for the customer at the end of the period. PAYG products are characterised by a different CHARGIMG MOMENT from classical prodcuts; the customer may be charged some of the amount atstrat of travel with an adjustment later, or billing may even be deferred entirely to the end of period.

The same CAPPED DISCOUNT PRODUCT may set different caps for different VALIDABLE ELEMENTs, for exampelf or different modes (a metro trip, bus trip, river trip, etc.), each specified by a different CAPPING RULE – as say is the case for TfL's OYSTER profuct

In some cases, the start of the capping period is fixed (e.g. Monday, 1st of the moth etc) in other cases it is variable. This can be specified using attributes on a USAGE VALIDITY PERIOD parameter.

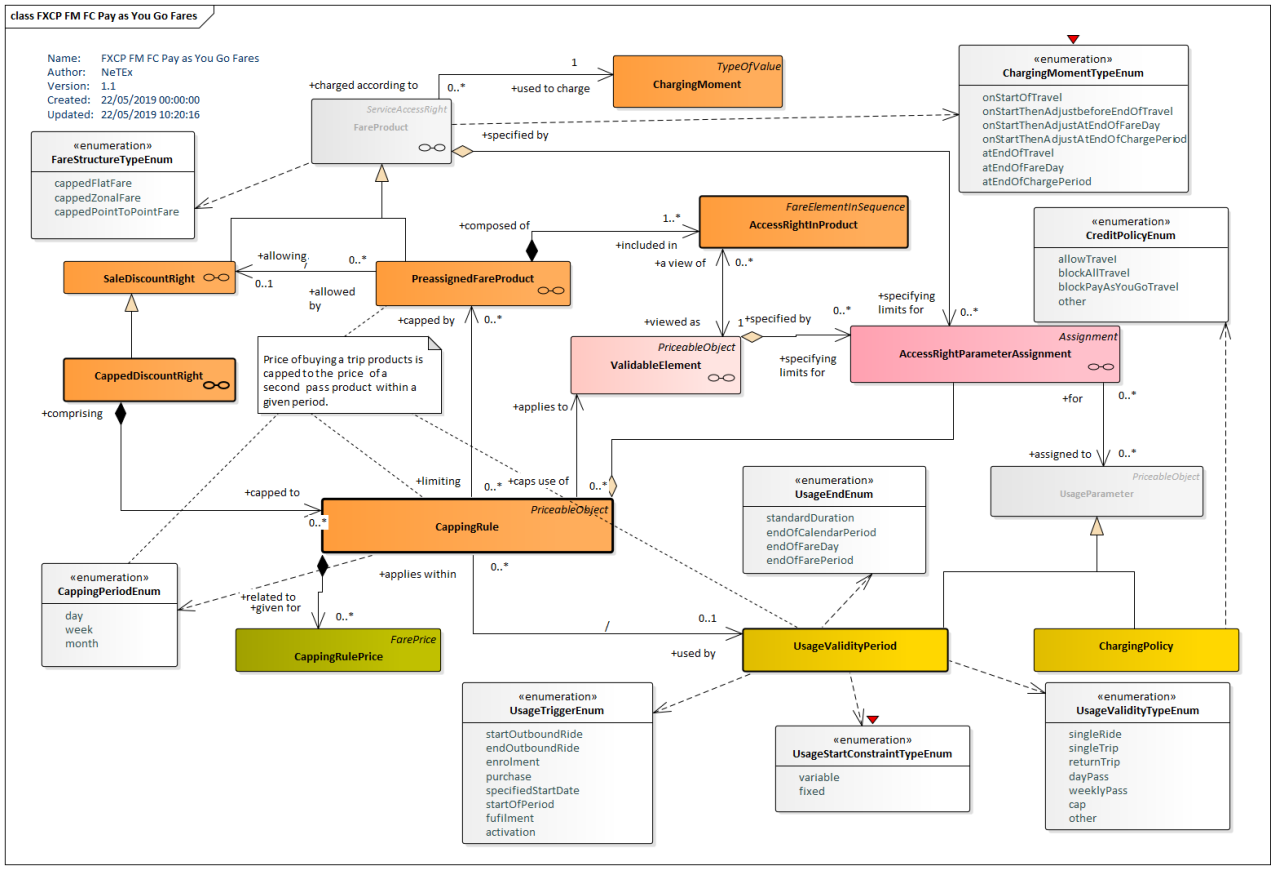


Figure 18 — Pay as You Go Fare Products (UML)

In practice, only certain combinations of tariff and product type are found in common use, with some types being more common on specific modes. NeTEx allows arbitrary user defined classifications to be made using a TYPE OF FARE PRODUCT ELEMENT. It also provides a number of enumerated values for the most common product types.

The following figure shows the enumerated values for each specialisation of FARE PRODUCT.

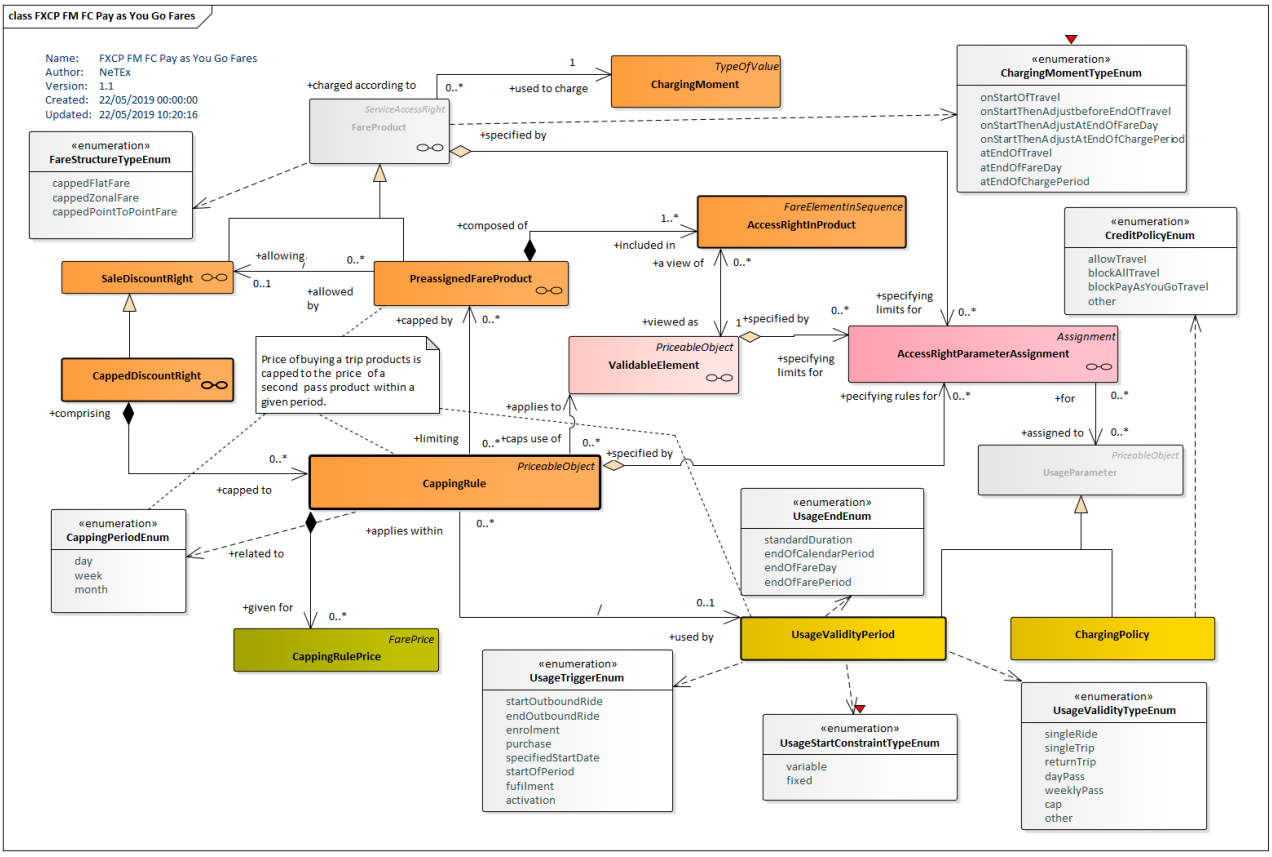


Figure 19 — Fare Product Classification (UML)

9.3.1 CappedDiscountRight [ADVANCED PROFILE ONLY]

A specialisation of SALE DISCOUNT RIGHT where the discount is expressed as a capping limit for a given time interval. For example, the London Oyster card fare, which charges for each journey at a reduced price until travel equivalent to a day pass has been consumed.

Table 51 – *CappedDiscountRight* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*SaleDiscountRight*	::>	CAPPED DISCOUNT RIGHT inherits from SALE DISCOUNT RIGHT.
«PK»	***id***	*CappedDiscountRight-IdType*	1:1	Identifier of CAPPED DISCOUNT RIGHT.
«cntd»	***cappingRules***	*CappingRule*	0:*	A set of parameters set a price cap on a product.

9.3.2 CappingRule (Subcomponent of CappedDiscountRight)

A capping limit for a given time interval, where the capping is expressed by another product. For example, the London Oyster card fare, which charges for each journey at a reduced price until travel equivalent to a day pass for the mode of travel has been consumed. A CAPPING RULE is a PRICEABLE OBJECT and may have

USAGE PARAMETERS such as a USAGE VALIDITY PERIOD to specify how long the capping period is and a CHARGING POLICY to specify rules about travelling under credit.

CAPPING may also be based on simply on distance.

Table 52 – *CappingRule* – XML Element

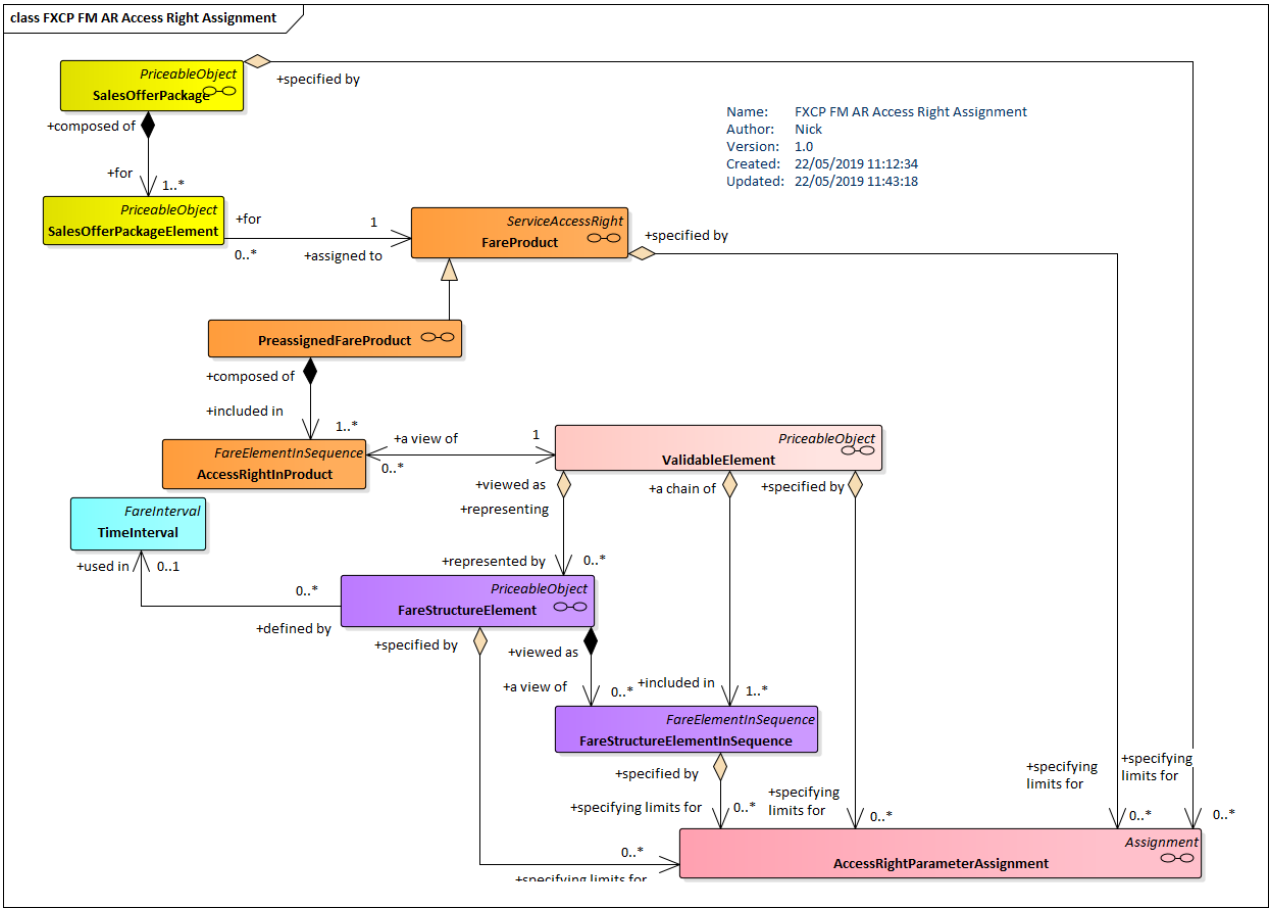
Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	CAPPING RULE inherits from PRICEABLE OBJECT.
«PK»	***id***	*CappingRuleIdType*	1:1	Identifier of CAPPING RULE.
«cntd»	***Maximum-Distance***	*LengthType*	0:*	Capping distance if distance-based cap.
«enum»	***CappingPeriod***	*CappingPeriodEnum*	0:1	Period over which capping applies, e.g. daily. See allowed values below. A quantitative value can be set with a USAGE VALIDITY PERIOD, along with a more detailed definition of the start and end times. • *day; week; month*
«FK»	***CappedDiscount-RightRef***	*CappedDiscount-RightRef*	0:1	CAPPED DISCOUNT RIGHT for which this rule applies.
«FK»	***PreassignedFare ProductRef***	*PreassignedFare-ProductRef*	0:1	PREASSIGNED FARE PRODUCT whose prices set cap the for this product. Usually a Pass
«FK»	***Validable-ElementRef***	*ValidableElementRef*	0:1	VALIDABLE ELEMENT of anotherproduct, usually a single trip, for which capping applies.
«cntd»	***validityParamete Assignments***	*ValidityParameterAssignment+*	0:*	VALIDITY PARAMETER ASSIGNMENTS for this rule.
«cntd»	***prices***	*CappIngRulePrice*	0:*	Capping FARE PRICEs for this rule.

9.4 Validity parameters and their assignment

Apart from the quantitative parameters used in the fare structure. such as time intervals and distance, other parameters may be used by a fare system in order to limit the validity of particular access rights. For example, which OPERATORs accept a fare product, on which LINEs may it be used, what CLASSES OF USE are available?

NeTEx provide a general purpose mechanism for stating how NeTEx elements may be used as parameters to limit or scope various aspects of fare definition; the ACCESS RIGHT PARAMETER ASSIGNMENT.

Parameter assignmentss may be made of a number of different NeTE elements, including a FARE STRUCTURE ELEMENT, DISTANCE MATRIX ELEMENT, GROUP OF DISTANCE MATRIX ELEMENTS, FARE PRODUCT, SALES OFFER PACKAGE, VALIDABLE ELEMENT, or CONTROLLABLE ELEMENT.



- **Figure 20 — UK FXCP – Access ight Parameter Assignments**

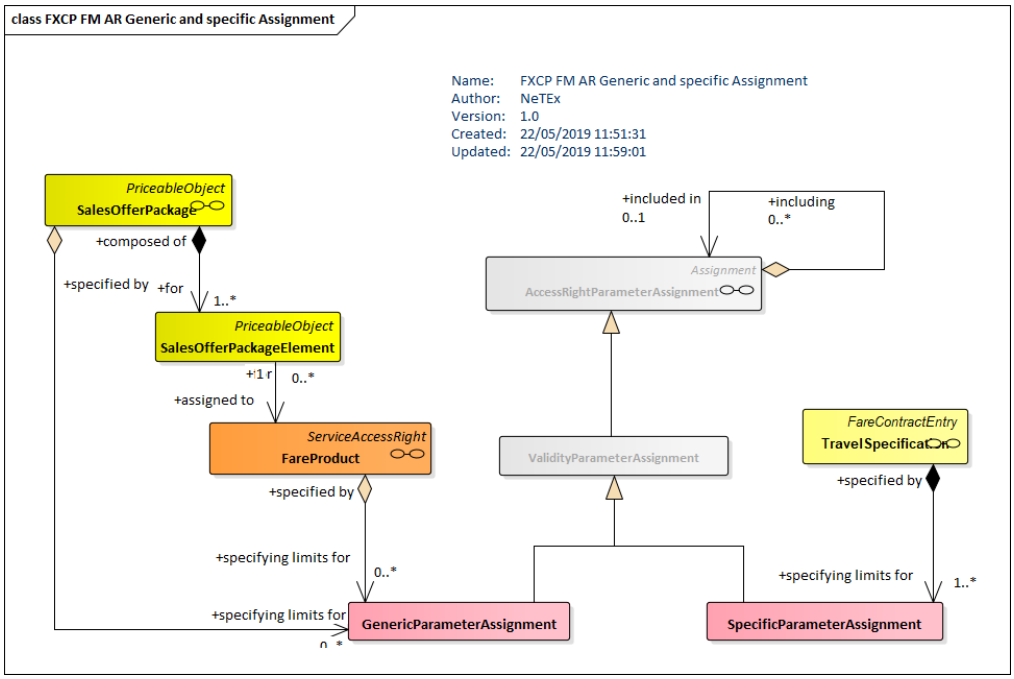
9.4.1 Generic and specific assignments

Parameter assignment can be used both to define the sets of alternative possibilities right making up a fare structure, and to describe the actual choices made by a passenger when they select specific access rights out of the set of theoretical possibilities in order to specify the actual access rights that will be consumed by a particular trip.

The processes that consist of assigning a fare parameter to either a theoretical or consumed access right are very similar. The assignment of such parameters to an element of the fare system is therefore described using a generic entity ACCESS RIGHT PARAMETER ASSIGNMENT, each of which may assign one or more elements as parameters. It has two specializations:

- A GENERIC PARAMETER ASSIGNMENT, which attaches a fixed parameter to a certain class of rights, denoting it as being theoretically allowed (possibly with multiple alternatives) within a given fare product and

- A SPECIFIC PARAMETER ASSIGNMENT, which assigns a limiting parameter to a particular right, within a certain fare structure, thus representing the choice of a specific set of parameters for consumption on an individual trip. (Note that SPECIFIC PARAMETER ASSIGNMENTs are out of scope of the FXCP, which only covers what is offered, not what is purchased).



- **Figure 21 — UK FXCP Generic and specific Parameter Assignments**

9.4.2 Using parameter assignments – basic use

In most cases the use of ACCESS RIGHT PARAMETER ASSIGNMENT is simple - they simply reference the NeTEx elements that are to be specified as restricting the validity. There are however a large number of different NeTEx element types that can be referenced as parameters, so these are organised into functionally related groups.

More than one element may be referenced as a parameter by a single assignment. The default interpretation is that all the values are logically ANDed together, but other types of ***LogicalOperator*** may be used (OR, XOR).

It should be remembered that a GENERIC PARAMETER ASSIGNMENT is presenting the possible list of of theoretical choices that a SPECIFIC PARAMETER ASSIGNMENT can choose from. Some parameters are themselves lists, for example GROUP OF LINEs, or GROUP OF OPERATOR), so in certain complex cases, i.e. where there is a list of lists a GENERIC PARAMETER ASSIGNMENT may need to indicate whether a SPECIFIC PARAMETER ASSIGNMENT may choose any or all of the members of a list. This can be specified by a ***SetSelectionOperator***.

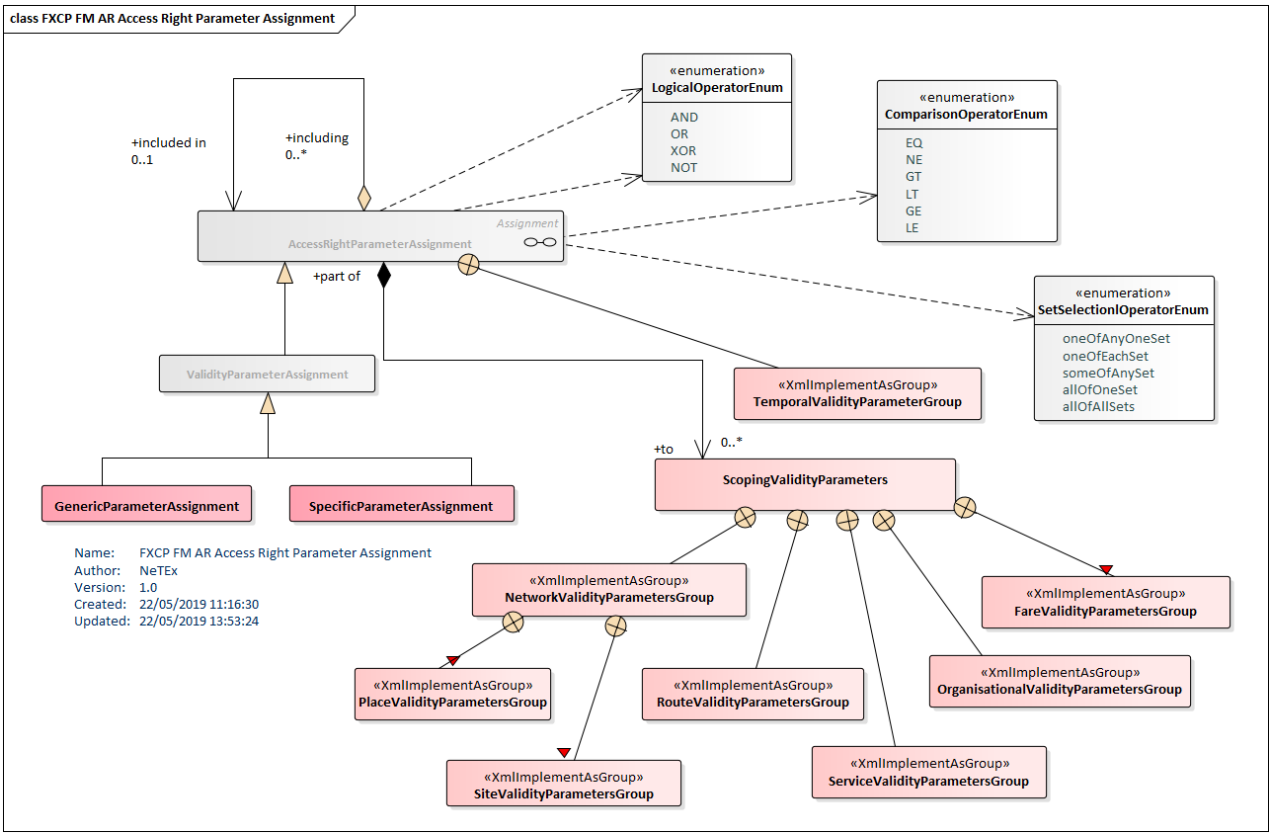


Figure 22 — UK FXCP – Combining Access r ight Parameter Assignments (UML)

The following figure shows some examples of validity parameters that are commonly assigned with a ACCESS RIGHT PARAMETER ASSIGNMENT to define products.0

UK☞ The parameters ashown re with the scope of the basic profile.

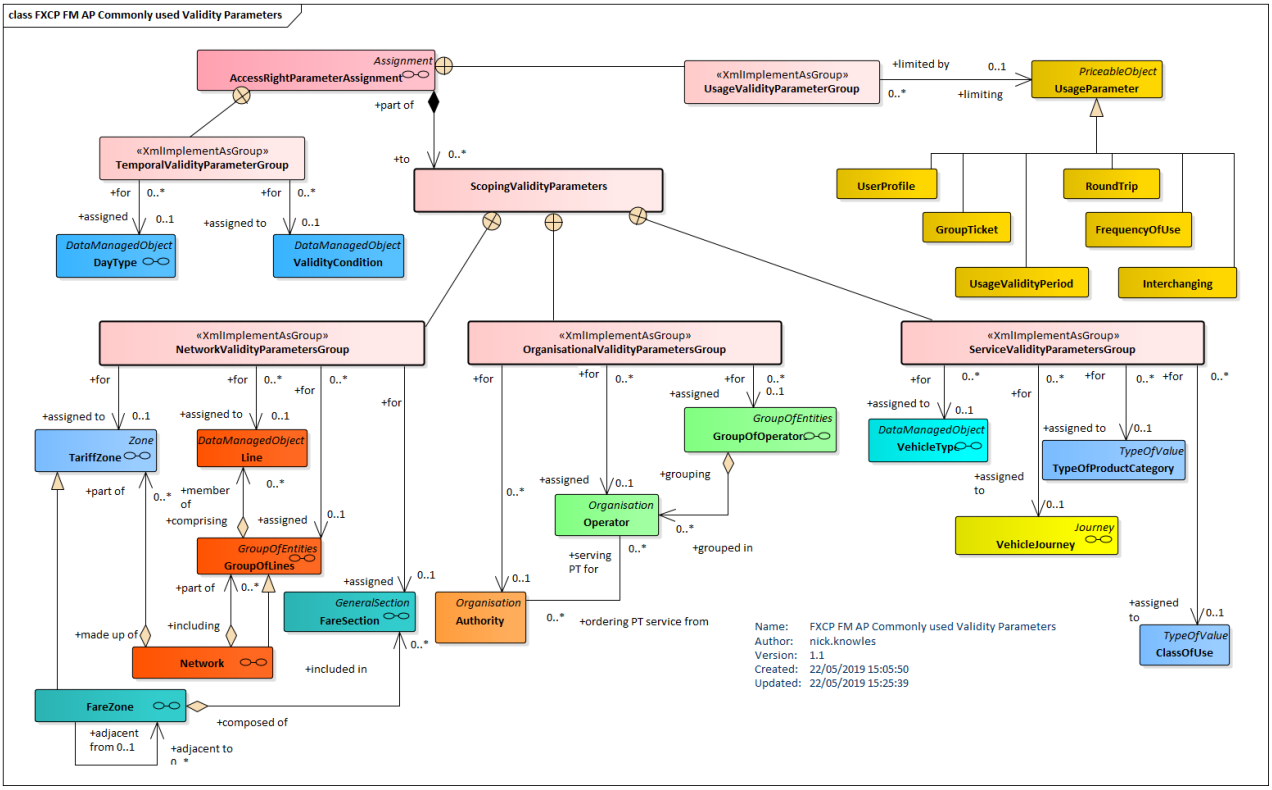


Figure 23 — UK FXCP - Commonly used Validity Parameters (UML)

9.4.3 Using parameter assignments – advanced use

More elaborate access right limitation rules can be specified

(1) By building ***compound conditions***, that include one or more ACCESS RIGHT PARAMETER ASSIGNMENTs within another assignment, the way the individual assignments should be combined together is indicated by by a ***TypeOfGrouping*** Logical operator (AND, OR OR) on the enclosing assignment.

(2) By using a ***ComparisonOperator*** to compare o the values of an element.

An ACCESS RIGHT PARAMETER ASSIGNMENT typically compares a parameter value to a characteristic of the related object. The A***ssignmentType*** attribute uses a ***ComparisonOperator*** that allows for such a comparison. There are different types of possible comparisons, specified by the ***ComparisonOperator***, ('GT', 'EQ', 'LT', etc)., e.g.:

- 'EQ': limits the assignment to be stricty the same as the identity of the reference of the parameter, e.g. the access right is limited to services provided by the specified OPERATOR, or the consumption must occur only on LINE "27". This is the defaut interpreration and covers tha majority of cases.

- 'NE': limits the assignment to exclude the given reference, e.g. in order to represent the rule 'the access right is valid on all bus network LINEs except for LINE 278 and LINE 66' or 'the access right to zone 4 is not valid between "2 a.m. – 4 a.m.'

- 'GE:' is greater than or equal to some inherent value of the reference of the parameter, e.g. in order to indicate that the consumption has to end after "11.00 p.m." a 'GE' reference to a ***Timeband*** with

an ***EndTime*** of 23:00, could be used. For such a comparison to be meaningful, the referenced parameter must generally have some inherent primary attribute with a monotonic range., or a subcomponent that is ordered. For an example of the latter case, consider a VEHICLE JOURNEY following a specific SERVICE PATTERN. To indicate that consumption must start only after a give stop it would be meaningful to specify a compound condition that ANDs a reference to the overall SERVICE JOURNEY with a reference using a 'GE' ***LogicalOperator*** to a specific SCHEDULED STOP POINT in the JOURNEY PATTERN.

- 'LE' is equal or smaller than some inherent value of the reference of the parameter, e.g.For example to indicate that the consumption has to end before "11.00 p.m.". a reference to a ***Timeband*** with an ***EndTime*** of 23:00, could be used.

UK☞ The UK basic profile uses only the 'EQ' logical operator.

9.4.4 Assigning access right parameters

There are many different tyes of parameter that can be selected to express the many and various conditions found in the definitions of fare products.

Note that many of the condituons are only needed for the compelx sales and after sales conditions attaching to prioducts; a such they are relevant for passenger information but are not needed to describe the basic availability and prices of fares.

The validity parameters are considered as being of two main types:

- TEMPORAL VALIDITY PARAMETERS, reflecting temporal limitations and
- SCOPING VALIDITY PARAMETERS, reflecting spatial and consumption limitations.

The SCOPING PARAMETERS in their turn may be further grouped as follows:

- ORGANISATIONAL VALIDITY PARAMETERS
- NETWORK VALIDITY PARAMETERS
  - SITE VALIDITY PARAMETERS
  - PLACE VALIDITY PARAMETERS
- ROUTING VALIDITY PARAMETERS
- SERVICE VALIDITY PARAMETERS
  - SEATING VALIDITY PARAMETERS
- FARE VALIDITY PARAMETERS.
  - TARIFF VALIDITY PARAMETERS.
  - PRODUCT VALIDITY PARAMETERS.
  - DISTRIBUTION VALIDITY PARAMETERS.

9.4.5 Access right parameters: Temporal

The temporal validity parameters of an ACCESS RIGHT PARAMETER ASSIGNMENT which can be used to restrict when an assignment applies.:

- The DAY TYPE or OPERATING DAY on which the assignment applies.
- The TIMEBANDs during which the assignment applies.

- The OPERATING PERIODs during which the assignment applies.
- The VALIDITY CONDITION or AVAILABILITY CONDITION restricting the assignment.

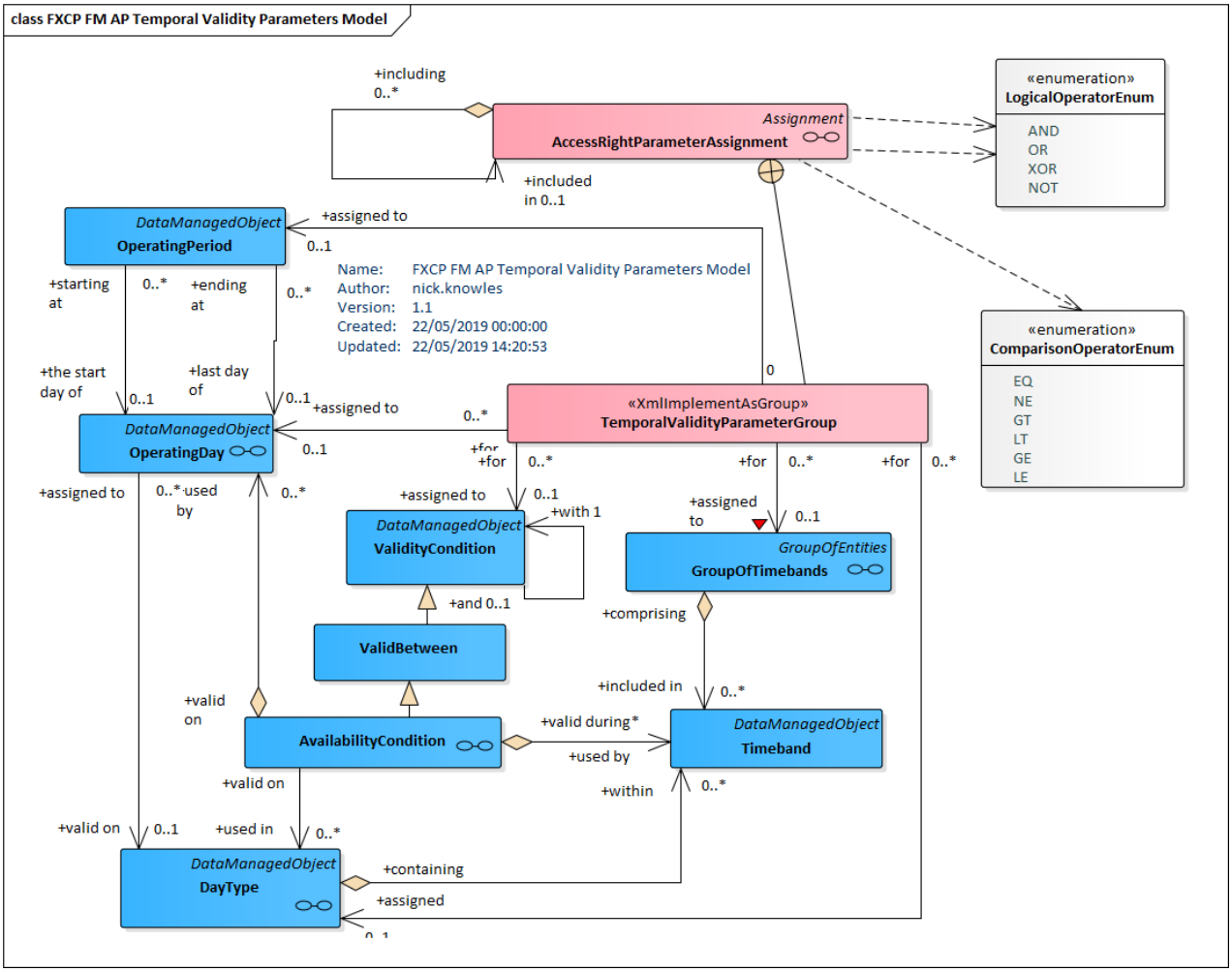


Figure 24 — Access Right Parameters: Temporal Validity Parameters (UML)

Error! Reference source not found.

9.4.6 Access right parameters: Network & service

Network scoping parameters cover network and services and can include:

PLACE VALIDITY PARAMETERS

- The ADDRESS to which the assignment applies.
- The TOPOGRAPHIC PLACE to which the assignment applies.

SITE VALIDITY PARAMETERS

- The STOP PLACE, PARKING or POINT OF INTEREST to which the assignment applies.

NETWORK VALIDITY PARAMETERS

- The SCHEDULED STOP POINT to which the assignment applies.
- The TARIFF ZONE to which the assignment applies.
- The LINE or GROUP OF LINEs to which the assignment applies.
- The TYPE OF LINE to which the assignment applies.
- The ERIES CONSTRAINT to which the assignment applies.

ORGANISATION VALIDITY PARAMETERS

- The OPERATOR, AUTHORITY or GROUP OF AUTHORITies to which the assignment applies.
- The TARIFF ZONE to which the assignment applies.
- The LINE or GROUP OF LINEsZONE to which the assignment applies.

SERVICE VALIDITY PARAMETERS

- The SERVICE JOURNEY GROUP OF SERVICEs, or TRAIN NUMBER to which the assignment applies.
- The TYOE OF ERVICE or TYPE OF PRODUCT CATEGORY to which the assignment applies.
- The TOPOGRAPHIC PLACE to which the assignment applies.

SEATING VALIDITY PARAMETERS

- The PASENGER SEAT to which the assignment applies.

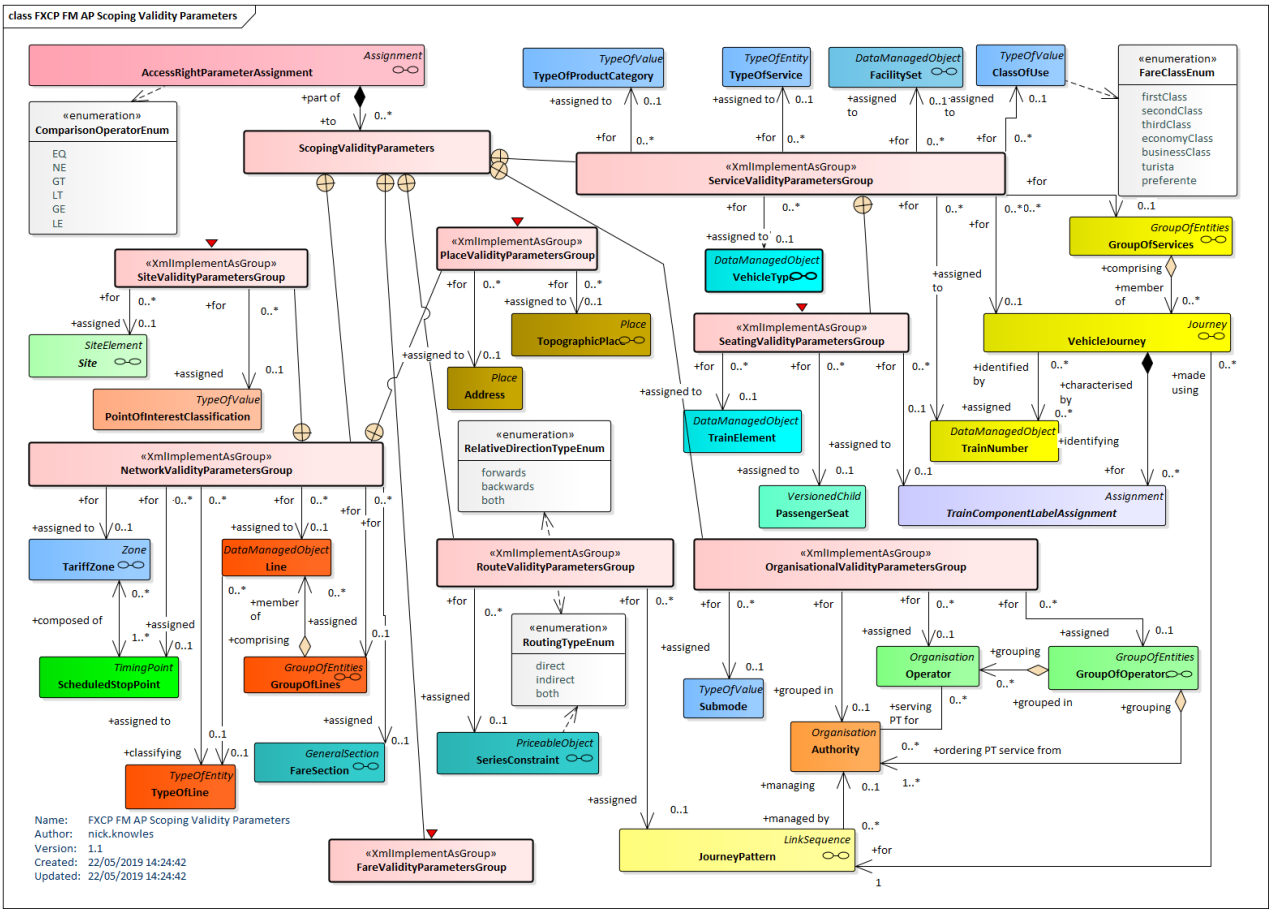


Figure 25 — Network Validity Parameters – (UML)

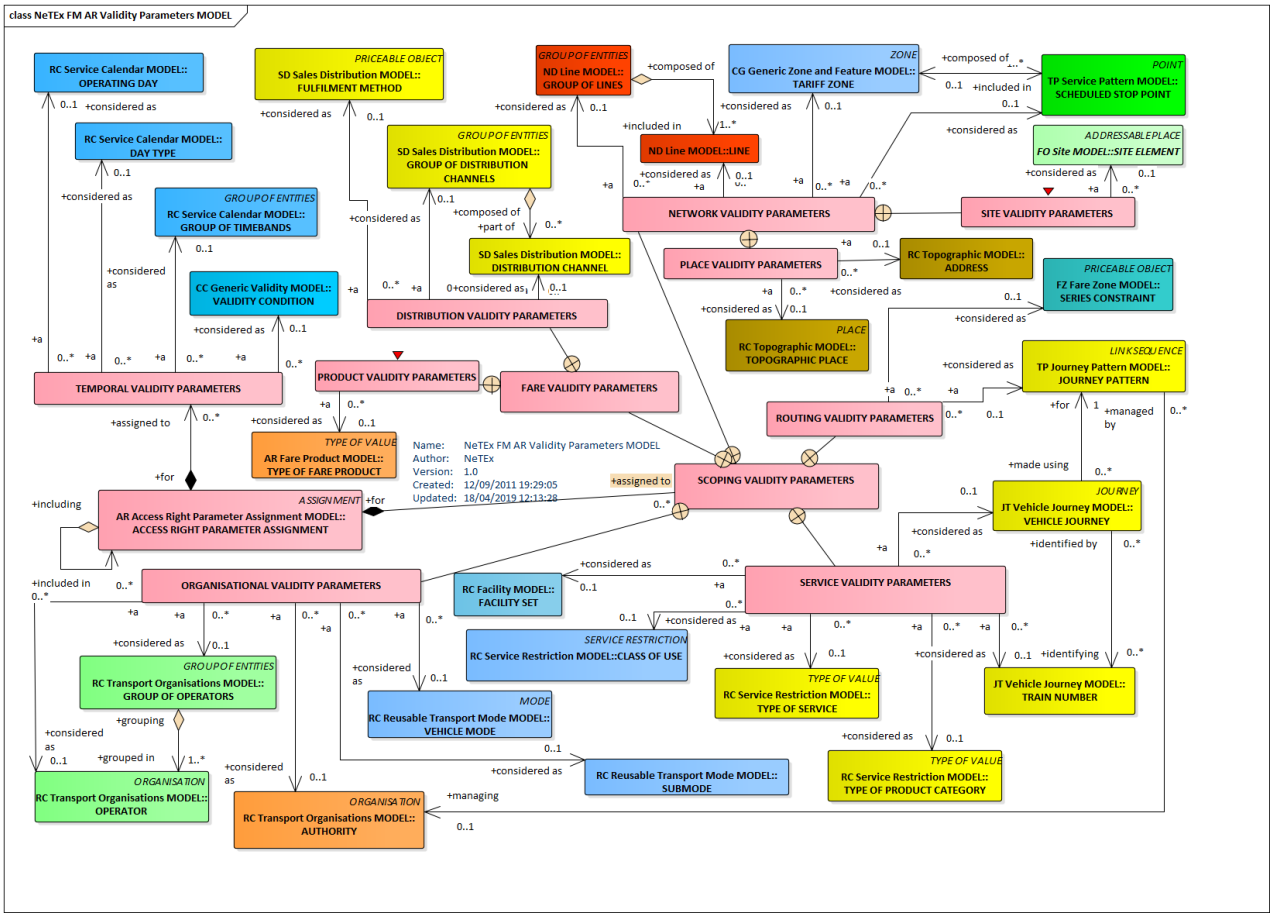


Figure 26 — Network Validity Parameters – (UML)

9.4.7 Access right parameters: Fare validity

Fare scoping parameters cover fare elements – other than the elemenst to which the assignments are made (FARE PRODUCT, SALESOFFER PACKE, VALIDABLE Element, etcetc) and can include:

USAGE VALIDITY PARAMETERS

- Any of the NeTEx USAGE PARAMETERs which the assignment applies.

TARIFF VALIDITY PARAMETERS

- Classifiers of TARRIFs such as TYPE OF TARIFF, TYPE OF FARE STRUCTURE ELEMENT, to which the assignment applies.

PRODUCT VALIDITY PARAMETERS

- Classifiers of FARE PRODUCTs, such as TYPE OF FARE PRODUCT, CHARGING MOMENT, TYPE OF CONCESSION, to which the assignment applies.

SALESS OFFER VALIDITY PARAMETERS

- TYPEs of TRAVEL DOCUMENT to which the assignment applies.
- Classifiers of SALES OFFER PACKGEs, such as TYPE OF SALES OFFER PACKGE to which the assignment applies.

DISTRIBUTION VALIDITY PARAMETERS

- DISTRIBUTION CHANNELs and GROUPs of DISTRINUTION CHANNELs to which the assignment applies.
- FULFILMENT METHODs to which the assignment applies.

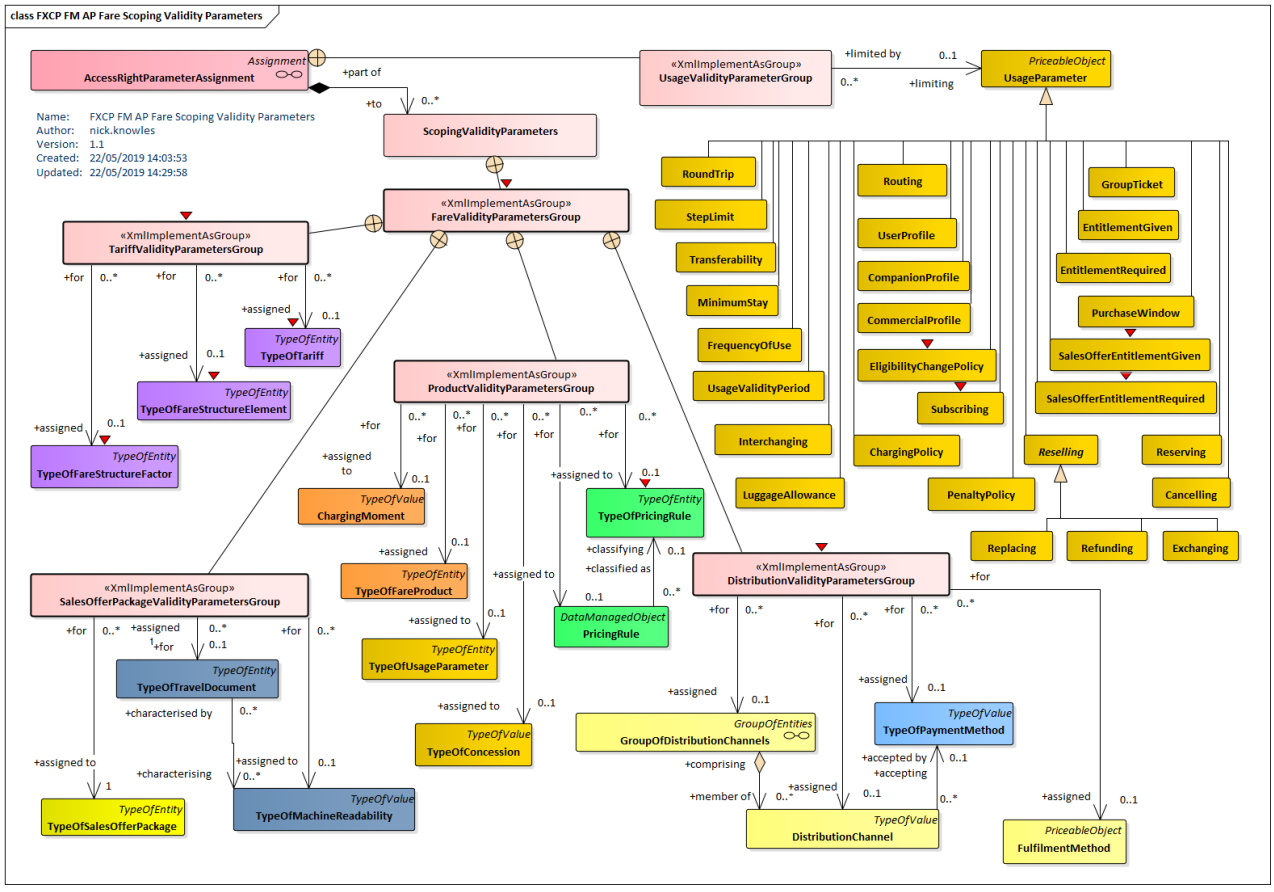


Figure 27 — Access Right Parameters: Fare Scoping Validity Parameters (UML)

9.5 Access Right Parameters

9.5.1 AccessRightParameterAssignment (Abstract)

The assignment of a fare collection parameter (referring to geography, time, quality or usage) to an element of a fare system (access right, validated access, control mean, etc.).

Table 53 – *AccessRightParameterAssignment* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*Assignment*	::>	ACCESS RIGHT PARAMETER ASSIGNMENT inherits from ASSIGNMENT.
«PK»	***id***	*AccessRight-Parameter-AssignmentIdType*	1:1	Identifier of ACCESS RIGHT PARAMETER ASSIGNMENT.
	IsAllowed	*xsd:boolean*	0:1	Whether the specified assignments are allowed (true) or not (false).
«FK»	***TypeOfAssignmentRef***	*TypeOAccessRight-AssignmentRef*	0:1	Classification of ACCESS RIGHT PARAMETER ASSIGNMENT.
«enum»	***ChargingBasis***	*ChargingBasisEnum*	0:1	Whether the specified assignment is for charged access, discounted access or free access. See allowed values below. • *free; discounted; normal; any*
«FK»	***ValidableElementRef***	*ValidableElementRef*	0:1	VALIDABLE ELEMENT to which assignment is made.
«FK»	***ControllableElementRef***	*Controllable-ElementRef*	0:1	CONTROLLABLE ELEMENT to which assignment is made.
«FK»	***FareProductRef***	*FareProductRef+*	0:1	FARE PRODUCT to which assignment is made.
«FK»	***TariffRef***	*TariffRef*	0:1	TARIFF to which assignment is made.
«FK»	***FareStructureElementRef***	*FareStructure-ElementRef*	0:1	FARE STRUCTURE ELEMENT to which assignment is made.
«FK»	***FareStructureElement-InSequenceRef***	*FareStructure-Element-InSequenceRef*	0:1	FARE STRUCTURE ELEMENT IN SEQUENCE to which assignment is made.
«FK»	***DistanceMatrixElement-Ref***	*DistanceMatrixRef*	0:1	DISTANCE MATRIX ELEMENT to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***Distance-MatrixInverseRef***	*DistanceMatrixRef*	0:1	DISTANCE MATRIX ELEMENT to which ACCESS RIGHT PARAMETER is assigned; reference is I inverse sense to that of element.
«FK»	***DistanceMatrixInverse-View***	*DistanceMatrixView*	0:1	VIEW of DISTANCE MATRIX ELEMENT to which ACCESS RIGHT PARAMETER is assigned. View includes details of origin and destination
«FK»	***SalesOfferPackageRef***	*SalesOffer-PackageRef*	0:1	SALES OFFER PACKAGE to which assignment is made.

«FK»	***GroupOfDistanceMatrix-ElementsRef***	***GroupOf-DistanceMatrix-ElementsRef***	0:1	GROUP OF DISTANCE MATRIX ELEMENTs to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***GroupOfSales-OfferPackages-Ref***	*GroupOfSalesOffer-PackagesRef*	0:1	GROUP OF SALES OFFER PACKAGEs to which assignment is made.
«enum»	***Limitations-GroupingType***	*BooleanOperator-Enum*	0:1	Logical operator for combining USAGE PARAMETERs elements. The default is 'AND'. 'OR' and 'XOR' should only be used if parameters are all of the same type.
«enum»	***LimitationsSetSelection-Type***	*SetOperatorEnum*	0:1	Where one or more parameter is a group containing multiple elements, (GROUP OF xxx), set operator for distinguishing between whole set and item interpretation of elements which are sets of elements. See allowed values below.
«FK»	***limitations***	*UsageParameterRef* +	0:*	References to USAGE PARAMETERs defining limitations made by ACCESS RIGHT PARAMETER ASSIGNMENT.
«enum»	**ValidityParameter-AssignmentType**	*Comparison-OperatorEnum*	0:1	Comparison operator for matching validity parameter values. See allowed values below.
XGRP	***ScopingVaidity-Parameters***	***ScopingVaidity-Parameters***	1:1	Time related properties assigned by ACCESS RIGHT PARAMETER ASSIGNMENT.
«enum»	***ValidityParameter-GroupingType***	*BooleanOperator-Enum*	0:1	Logical operator for combining network validity parameters, e.g. 'AND', 'OR', 'XOR'. See allowed values below.
«enum»	***ValiditySetSelection-Type***	*SetOperatorEnum*	0:1	Where one or more parameter is a group containing multiple elements, (GROUP OF xxx), set operator for distinguishing between whole set and item interpretation of elements which are sets of elements. oneOfEachSet someOfAnySet allOfOneSet allOfAllSets
«cntd»	***temporalValidity-Parameters***	***TemporalValidity-ParametersGroup***	0:*	Temporal validity parameters assigned by ACCESS RIGHT PARAMETER ASSIGNMENT.
«cntd»	***validityParameters***	***LimitingValidity-ParametersGroup***	0:*	Validity parameters assigned by ACCESS RIGHT PARAMETER ASSIGNMENT.
«FK»	***DayTypeRef***	***ValidityConditionRef***	0:1	DAY TYPE to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***GroupOfTimebandsRef***	*GroupOfTimebandsRef*	0:1	GROUP OF TIME BANDs to which ACCESS RIGHT PARAMETER is assigned.

«FK»	***OperatingDayRef***	*OperatingDayRef*	0:1	OPERATING DAY to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***OperatingPeriodRef***	*OperatingPeriod-Ref*	0:1	OPERATING PERIOD to which ACCESS RIGHT PARAMETER is assigned. +v1.1
«FK»	***ValidityConditionRef***	*ValidityConditionRef*	0:1	VALIDITY CONDITION to which ACCESS RIGHT PARAMETER is assigned.
«enum»	***IncludesGroupingType***	*BooleanOperatorEnum*	0:1	Logical operator for combining included elements. The default is 'OR'. . AND; OR; XOR; NOT
«cntd»	***includes***	***AccessRight-Parameter-Assignment+***	0:*	ACCESS RIGHT PARAMETER ASSIGNMENTs making up a composite ACCESS RIGHT PARAMETER ASSIGNMENT.

9.5.2 ValidityParameterAssignment (Abstract)

An ACCESS RIGHT PARAMETER ASSIGNMENT relating a fare collection parameter to a theoretical FARE PRODUCT (or one of its components) or a SALES OFFER PACKAGE.

A specialisation of ACCESS RIGHT PARAMETER ASSIGNMENT.

Table 54 – *ValidityParameterAssignment* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*AccessRight-ParameterAssignment*	::>	VALIDITY PARAMETER ASSIGNMENT inherits from ACCESS RIGHT PARAMETER ASSIGNMENT.
«PK»	***id***	*ValidityParameter-AssignmentIdType*	1:1	Identifier of VALIDITY PARAMETER ASSIGNMENT.
«FK»	***QualityStructure-FactorRef***	*QualityStructure-FactorRef*	0:1	Reference to a QUALITY STRUCTURE FACTOR to which the ACCESS RIGHT PARAMETER ASSIGNMENT applies.

9.5.3 GenericParameterAssignment

A VALIDITY PARAMETER ASSIGNMENT specifying generic access rights for a class of products (e.g. a time band limit - 7 to 10 a.m. - for trips made with a student pass). May include alternatives from which a purchaser selects.

Table 55 – *GenericParameterAssignment* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*ValidityParameter-Assignment*	::>	GENERIC PARAMETER ASSIGNMENT inherits from VALIDITY PARAMETER ASSIGNMENTs

«PK»	***id***	*GenericParameter-AssignmentIdType*	1:1	Identifier of GENERIC PARAMETER ASSIGNMENT.

9.5.4 ScopingValidityParameters (Subcomponent of GenericParameterAssignment)

The Scoping Validity Parameters allows one or more validity parameters to be assigned. The many different possible parameters are organized into five groups. (Organisation, Network, Route, Service, Product) Multiple values are combined using the logical operator (AND, OR) specified by the ***ValidityParameterGroupingType***. AND is the default. For example LINE "22" and SCHEDULED STOP POINT "4563" means that the assignment applies specifically to stop "4563" of LINE "22".

Table 56 – ScopingValidityParameters – XML Element

Classifi-cation	Name	Type	Cardinality	Description
XGRP	***OrganisationValidity-ParametersGroup***	***xmlGroup***	1:1	ORGANISATION related validity parameters for assignment.
XGRP	***NetworkValidity-ParametersGroup***	***xmlGroup***	1:1	NETWORK related validity parameters for assignment.
XGRP	***RouteValidity-ParametersGroup***	***xmlGroup***	1:1	ROUTE related validity parameters for assignment.
XGRP	***ServiceValidity-ParametersGroup***	***xmlGroup***	1:1	SERVICE related validity parameters for assignment.
XGRP	***ProductValidity-ParametersGroup***	***xmlGroup***	1:1	PRODUCT related validity parameters for assignment.

9.5.5 OrganisationValidity-ParametersGroup (Subcomponent of GenericParameterAssignment)

The ***OrganisationValidityParametersGroup*** specifies validity parameters defining general access rights for MODE and ORGANISATION for an ACCESS RIGHT PARAMETER ASSIGNMENT.

Table 57 – *OrganisationValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardin-ality	Description
«enum»	***VehicleModes***	*TransportModeEnum*	0:*	TRANSPORT MODEs to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1 for allowed values. See NeTEx Part1.
«enum»	***Transport-Submodel***	*TransportSubmodel-Enum*	0:1	TRANSPORT SUBMODE to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1 for allowed values. See NeTEx Part1.
«FK»	***GroupOf-OperatorsRef***	*GroupOfOperatorsRef*	0:1	GROUP OF OPERATORs to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.

			CHOICE		
	a	***AllOperators-Ref***	*EmtyType*	0:1	ALL OPERATORS apply to ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
«FK»	b	***OperatorRef***	*OperatorRef*	0:1	OPERATOR to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
			CHOICE		
	a	***AllAuthorities Ref***	*EmptyType*	0:1	ALL AUTHORITIies apply to ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
«FK»	b	***AuthorityRef***	*AuthorityRef*	0:1	AUTHORITY to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.

9.5.6 NetworkValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***NetworkValidityParametersGroup*** specifies validity parameters defining access rights to network elements such as LINE, TARIFF ZONE and SCHEDULED STOP POINT for an ACCESS RIGHT PARAMETER ASSIGNMENT.

Table 58 – *NetworkValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardin-ality	Description
«FK»	***GroupOfLinesRef***	*GroupOfLinesRef*	0:1	GROUP OF LINEs to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
«FK»	***LineRef***	*LineRef*	0:1	LINE to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
«FK»	***TypeOfLineRef***	*TypeOfLineRef*	0:1	TYPE OF LINE to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
«FK»	***TariffZoneRef***	*TariffZoneRef*	0:1	TARIFF ZONE to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
«FK»	***FareZoneRef***	*FareZoneRef*	0:1	FARE ZONE to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***FareSectionRef***	*FareSectionRef*	0:1	FARE SECTION to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***Scheduled-StopPointRef***	*ScheduledStopPointRef*	0:1	SCHEDULED STOP POINT to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
XGRP	***PlaceValidity-ParameterGroup***	**xmlGroup**	1:1	PLACE validity parameters for assignment.
XGRP	***SiteValidity-ParameterGroup***	**xmlGroup**	1:1	SITE validity parameters for assignment.

9.5.7 PlaceValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***PlaceValidityParametersGroup*** specifies validity parameters defining use of PLACE elements for an ACCESS RIGHT PARAMETER ASSIGNMENT. For flexible and private travel modes, the travel may be between an ADDRESS or a TOPOGRAPHIC PLACE.

Table 59 – *PlaceValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardin-ality	Description
«enum»	***PlaceUse***	*PlaceUseENum*	0:1	Use of ADDRESS or TOPOGRAPHIC PLACE. See allowed values below.+v1.1 • startAt; endAt; via; restrictTo; other
«FK»	***Topographic-PlaceRef***	*TopographicPlaceRef*	0:1	TOPOGRAPHIC PLACE to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1. +v1.1
«FK»	***AddressRef***	*PostalAddressRef* | *RoadAddressRef*	0:1	ADDRESS to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1. +v1.1

9.5.8 SiteValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***SiteValidityParametersGroup*** specifies validity parameters defining access rights to SITE elements for an ACCESS RIGHT PARAMETER ASSIGNMENT. SITEs can be used for example to associate fare structure elements with POINTs OF INTEREST as for a travel product that also allows entry to museums and other tourist attractions, or to all SITEs of a given type of point interest using a POINT OF INTEREST CLASSIFICATION.

Table 60 – *SiteValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardinality	Description
«FK»	***SiteElementRef***	*SiteElementRef*	0:1	SITE ELEMENT to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.
«FK»	***PointOfInterest-Classification-ElementRef***	*PointOfInterest-ClassificationElementRef*	0:1	POINT OF INTEREST CLASSIFICATION to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1.

9.5.9 RouteValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The RouteValidityParametersGroup specifies validity parameters defining access rights to particular routes (as in effect specified by DISTANCE MATRIX and SERIES CONSTRAINT elements) for an ACCESS RIGHT PARAMETER ASSIGNMENT.

Table 61 – *RouteValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardinality	Description
«enum»	***RoutingType***	*RoutingTypeEnum*	1:1	Type of routing to which assignment applies. See allowed values earlier under FARE ZONE model.
«enum»	***Directions***	*RelativeDirectioeEnum*	0:1	Directions in which assignment applies. See NeTEx Part1.
«FK»	***SeriesConstraint Ref***	*SeriesConstraintRef*	0:1	SERIES CONSTRAINT to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***ServiceJourney-PatternRef***	*ServiceJourney-PatternRef*	0:1	SERVICE JOURNEY PATTERN to which ACCESS RIGHT PARAMETER is assigned.

9.5.10 ServiceValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***ServiceValidityParametersGroup*** specifies validity parameters defining access rights to particular services or types of service for an ACCESS RIGHT PARAMETER ASSIGNMENT.

Table 62 – *ServiceValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardinality	Description
«FK»	***ClassOfUseRef***	*ClassOfUseRef*	1:1	Reference to a CLASS OF USE (Seat Class).
«enum»	***FareClass***	*FareClassEnum*	0:1	FARE CLASS to which ACCESS RIGHT PARAMETER is assigned. See NeTEx Part1 for allowed values.
«FK»	***FacilitySetRef***	*FacilitySetRef*	0:1	FACILITY SET provided or available for fare.
«FK»	***TypeOfProduct-CategoryRef***	*TypeOfProduct-CategoryRef*	0:1	Type of PRODUCT CATEGORY to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***Service-JourneyRef***	*ServiceJourneyRef*	0:1	VEHICLE JOURNEY to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***TrainNumberRef***	*TrainNumberRef*	0:1	TRAIN NUMBER to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***GroupOfServices Ref***	*GroupOfServicesRef*	0:1	GROUP OF SERVICEs to which ACCESS RIGHT PARAMETER is assigned.
«FK»	***VehicleTypeRef***	*VehicleTypeRef*	0:1	VEHICLE TYPE to which assignment is made.
«FK»	***TypeOf-ServiceRef***	*TypeOfServiceRef*	0:1	TYPE OF SERVICE to which assignment is made, for example whether the assignment is a night train.

9.5.11 SeatingValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***SeatingValidityParametersGroup*** specifies conditions on seating for an ACCESS RIGHT PARAMETER ASSIGNMENT. For example, whether a purchase applies to a particular carriage or seat.

Table 63 – *SeatingValidityParametersGroup* – Group

Classification	Name	Type	Cardinality	Description
«FK»	***TrainElementRef***	*TrainElementRef*	0:1	Reference to a TRAIN ELEMENT to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TrainComponentLabel-AssignmentRef***	*TrainComponentLabel-AssignmentlRef*	0:1	Reference to a TRAIN COMPONENT LABEL ASSIGNMENT to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***PassengerSeat-Ref***	*PassengerSeatRef*	0:1	Reference to a PASSENGER SEAT to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.

9.5.12 TariffValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***TariffValidityParametersGroup*** specifies conditions on based on tariff structure elements for an ACCESS RIGHT PARAMETER ASSIGNMENT. For example, where a condition applies to a specific FARE STRUCTURE ELEMENT.

Table 64 – *TariffValidityParametersGroup* – Group

Classification	Name	Type	Cardinality	Description
«FK»	***TypeOfFare-StructureFactorRef***	*TypeOfFare-StructureFactorRef*	0:1	Reference to a TYPE OF FARE STRUCTURE FACTOR to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOfFare-Structure-ElementRef***	*TypeOfFare-StructureElementRef*	0:1	Reference to a TYPE OF FARE STRUCTURE ELEMENT to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOfTariffRef***	*TypeOfTariffRef*	0:1	Reference to a TYPE OF TARIFF to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.

9.5.13 ProductValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***ProductValidityParametersGroup*** specifies conditions on purchase or fulfilment for an ACCESS RIGHT PARAMETER ASSIGNMENT. For example, where a ticket may be purchased or collected, or whether a commercial condition such as refunding is restricted with a particular DISTRIBUTION CHANNEL.

Table 65 – *ProductValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardinality	Description
«FK»	***PricingRuleRef***	*PricingRuleRef+*	0:1	Reference to a PRICING RULE to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOfPricing-RuleRef***	*TypeOfPricingRuleRef*	0:1	Reference to a TYPE OF PRICING RULE to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOfFare-ProductRef***	*TypeOfFareProductRef*	0:1	Reference to a TYPE OF FARE PRODUCT to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOfUsage-ParameterRef***	*TypeOfUsageParameterRef*	0:1	Reference to a TYPE OF USAGE PARAMETER to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***ChargingMoment Ref***	*ChargingMomentRef*	0:1	Reference to a CHARGING MOMENT to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOf-ConcessiontRef***	*TypeOfConcessionRef*	0:1	Reference to a TYPE OF CONCESSION to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.

9.5.14 SalesOfferValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***SalesOfferValidityParametersGroup*** specifies conditions on SALESS OFFER PACKAGE properties for an ACCESS RIGHT PARAMETER ASSIGNMENT. For example, where a ticket may be purchased or collected, or whether a commercial condition such as refunding is restricted with a particular DISTRIBUTION CHANNEL.

Table 66 – *SalesOfferValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardinality	Description
«FK»	***TypeOfSales-OfferPackageRef***	*TypeOfSales-OfferPackageRef*	0:1	Reference to a TYPE OF SALES OFER to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOfTravel-DocumentRef***	*TypeOfTravelDocumentRef*	0:1	Reference to a TYPE OF TRAVEL DOCUMENT to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOMachine-ReadabilityRef***	*TypeOfMachine-ReadabilityRef*	0:1	Reference to a TYPE OF MACHINE READABILITY to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.

9.5.15 DistributionValidityParametersGroup (Subcomponent of GenericParameterAssignment)

The ***DistributionValidityParametersGroup*** specifies conditions on purchase or fulfilment for an ACCESS RIGHT PARAMETER ASSIGNMENT relation to distribution. For example, where a ticket may be purchased or collected, or how it may be paid for.

Table 67 – *DistributionValidityParametersGroup* – Group

Classifi-cation	Name	Type	Cardinality	Description
«FK»	***Distribution-ChannelRef***	*FareStructureElement-Ref*	0:1	Reference to a DISTRIBUTION CHANNEL to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***GroupOf-Distribution-ChannelsRef***	*GroupOfDistribution-ChannelsRef*	0:1	Reference to a GROUP OF DISTRIBUTION CHANNELs to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***Fulfilment-MethodRef***	*FareStructureElement-Ref*	0:1	Reference to a FULFILMENT METHOD to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.
«FK»	***TypeOPayment-MethodRef***	*TypeOPayment-MethodRef*	0:1	Reference to a TYPE OF PAYMENT METHOD to which the ACCESS RIGHT PARAMETER ASSIGNMENTs applies.

9.6 Usage Parameters Overview

The validity of an access right (or of a marketable combination) may be limited by parameters related to who may cosume them (user profile, group ticket, etc.) or how they may be consumed (frequency of use, interchanging, transferability, etc.). Such parameters express in general additional rules to those expressed by the fare structure CONTROLLABLE ELEMENTs or FARE STRUCTURE ELEMENTs. Such parameters are described by the generic entity USAGE PARAMETER.

USAGE PARAMETERS may also describe pre-sale and after sales commercial conditions, such, transferability, refunding, exchanging etc.

The Usage parameters can be grouped into a number of broad categories; travel, eligibility, after-sales, etc

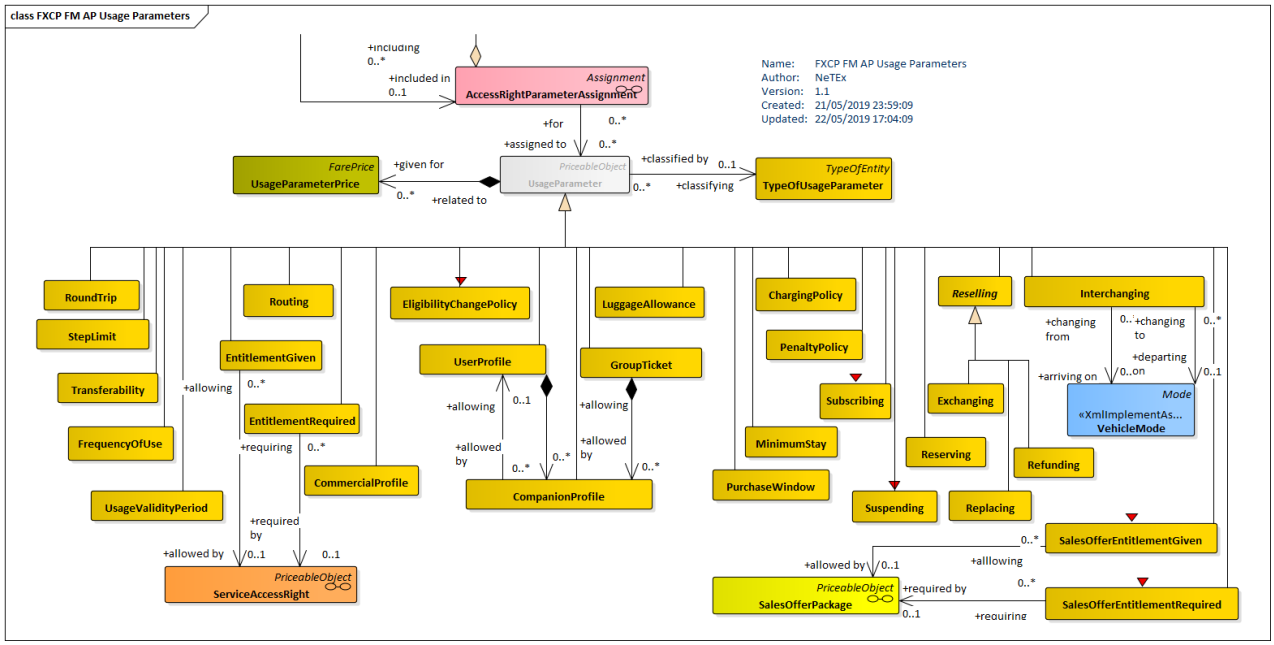


Figure 28 —Usage Parameters –(UML)

9.6.1 Usage parameter overview: Travel

Travel USAGE PARAMETERs specify limitations on travel such as.

Basic Fare Profile

- ROUND TRIP expressing the properties relating to single or return trip use of an access right.
- USAGE VALIDITY PERIOD describes a broad time limitation of access rights, especially passes. It may include a ‘standard duration' of validity (1-day, 1 month…), time limitations (‘start date’ and ‘end date’, ‘start time’ and ‘end time’), or a combination of both;
- FREQUENCY OF USE describes the limitation of an access right, depending on frequency of use during a VALIDITY PERIOD. For instance, a product is offered at a special fare if it is used more than 50 times in a month;
- INTERCHANGING expressing the limitations on making changes within a trip;

Advanced Fare Profile

- STEP LIMIT, a geographical parameter limiting the access rights by counts of stops, sections or zones;
- ROUTING, expressing the properties Limitations the limitations on routing of an access right.
- MINIMUM STAY, expressing the details of any minimum stay at the destination required to use the product;

9.6.2 Usage parameter overview: Eligibility

Eligibility: USAGE PARAMETERs specify limitations on who may buy or use prducts.

Basic Fare Profile

- USER PROFILE, which describes the social profile of a customer. It is generally used to allow discounts based on age groups (e.g. under 18), gender, profession, social status (e.g. student, retired, unemployed), etc.

- COMPANION PROFILE, indicating the number and characteristics of persons entitled to travel in a group or as companions to another USER PROFILE.

- GROUP TICKET describes the number and characteristics of persons possibly entitled to travel in addition to the holder of an access right.

Advanced Fare Profile

- RESIDENTIAL QUALIFICATION, categorising the users depending on their commercial relations with the operator (frequency of use, amount of purchase etc.), often used for allowing discounts.

- COMMERCIAL PROFILE, which is used to describe customer categories depending on their commercial relations with the operator (frequent traveller, amount of purchase by a company, etc.). It is generally used to allow discounts.

9.6.3 Usage parameter overview: Entitlement

Entitlement USAGE PARAMETERs specify limitations on other product rights given or required by a product.

Basic Fare Profile

- ENTITLEMENT REQUIRED, indicating whether an ENTITLEMENT PRODUCT is required to use access right;

- ENTITLEMENT GIVEN, indicating whether a specific access right represents an ENTITLEMENT PRODUCT.

Advanced fare profile

- ENTITLEMENT CONSTRAINT:Where a product gives rights to another product, the dependent product may be constrained to particular properties of the prerequisite product. For example, a rail ticket might entitle the user to buy a local bus day pass at either end of the rail journey at a reduced rate; the allowed zones to purchased for the dependent product are restricted to the choices of origin and destination station made in the prerequisite product, and the day must be the same day of travel (or days of travel if it is a period return on different days).Such relative constraints can be expressed on an entitlement entity using an ENTITLEMENT CONSTRAINT. Other examples might include a requirement to use the same media (TYPE OF TRAVEL DOCUMENT), to be the same type of user (i.e. USER PROFILE), or to use the same OPERATOR.

- Note that a SUPPLEMENT PRODUCT for a trip such as a seat reservation is normally assumed to be constrained to the same values as for the prerequisite product trip.

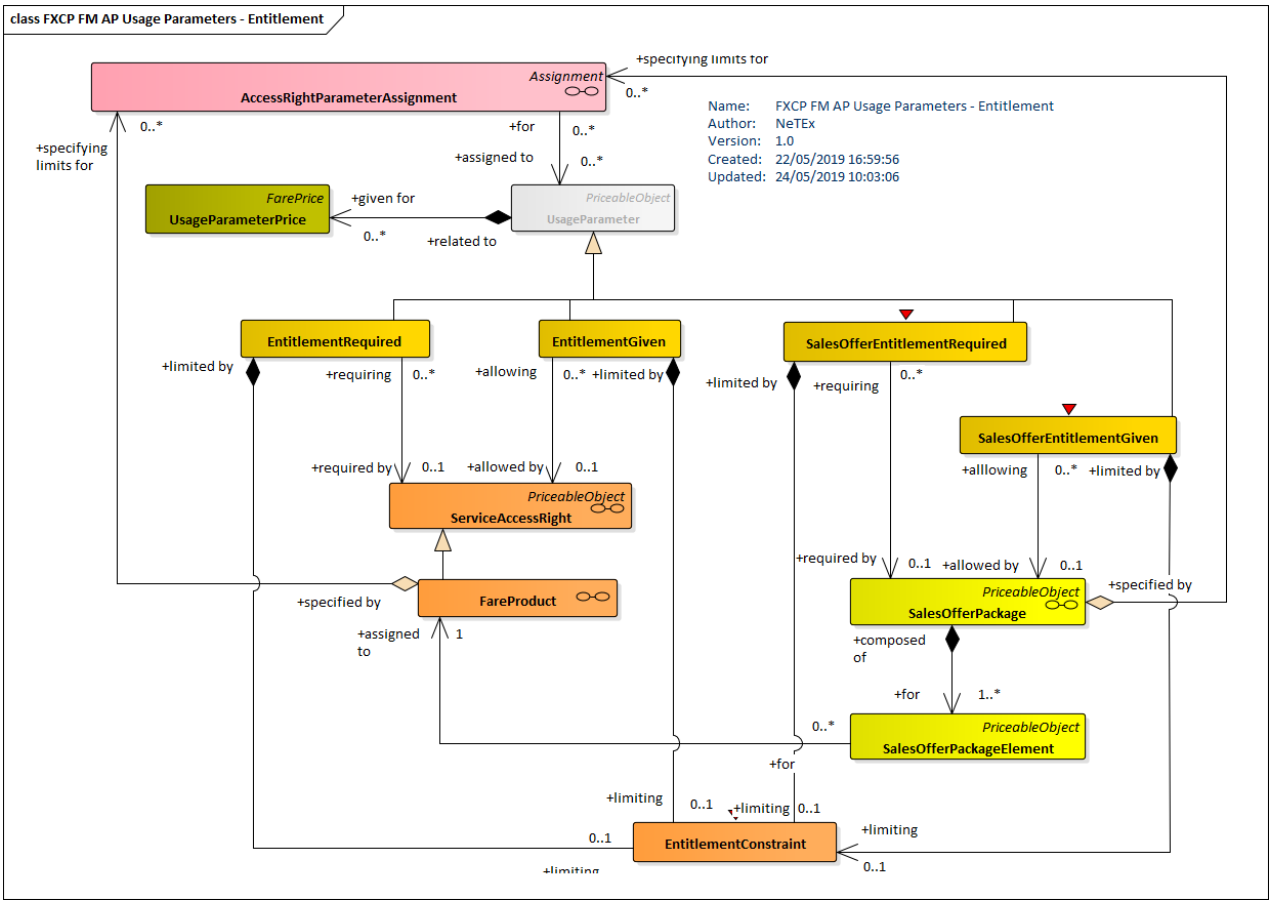


Figure 29 —Usage parameter overview: Product Entitlement (UML)

9.6.4 Usage parameter overview: Luggage

The LUGGAGE ALLOWANCE parameter specifies limitations on taking luggage.

9.6.5 Usage parameter overview: Booking

Booking USAGE PARAMETERs specify limitations on booking transactions such as PURCHASE WINDOW, TRANSFERABILITY, RESERVING, EXCHANGING, REFUNDING.

Basic Fare Profile

- TRANSFERABILITY describes the right to transfer an access right to other persons than the original customer (number and characteristics of persons entitled to consume).
- PURCHASE WINDOW, indicating the period in which the product must be purchased.

Advanced fare profile

- RESERVING indicating whether the access right requires reservation.
- CANCELLING indicating whether and how the a booking may be cancelled.

- BOOKING ARRANGEMENTS indicating how a booking can be made.

9.6.6 Usage parameter overview: After-sales

After-sales USAGE PARAMETERs describe commercial after sales conditions on products.

Basic Fare Profile

- The TRANSFERABILITY parameter specifies limitations on transferring a ticket to someone else.

Advanced fare profile

- The REPLACING parameter specifies whether the product can be replaced if lost or stolen.
- The REFUNDING parameter specifies limitations on refunds for a product and other resale properties.
- The EXCHANGING parameter specifies limitations on exchanging tickets for other tickets.
- The SUSPENDING parameter specifies conditions governing temporary suspension of a FARE PRODUCT, (i.e. period pass or subscription).

9.6.7 Usage parameter overview: Charging

Charging USAGE PARAMETERs describe commercial conditions relating to charging for products.

Advanced Fare Profile

- The CHARGING POLICY parameter specifies limitations on how a product may be charged. May be used to specify a minimum and maxim credit level.
- The PENALTY POLICY parameter specifies rules relating to penalty fares that may be incurred.
- The SUBSCRIBING parameter specifies rules relating to products bought on subscription, that is an agreement to make regular payments over a specified period in return for a discounted price.

9.6.8 Prices for usage parameters

Although all USAGE PARAMETERs have a PRICE the price has a different purpose in different cases.

Table 68 – *USAGE PARAMETERs* – Meaning of prices

Group	Usage Parameter	Comment on Price
Travel	ROUND TRIP	Pricing of single or return trip.
	USAGE VALIDITY PERIOD	Pricing for a trip of this length.
	FREQUENCY OF USE	Pricing for a product subject to this frequency of use constraint, if any
	INTERCHANGING	Price of making an interchange, if any
	MINIMUM STAY	Price for a minimum stay.

	STEP LIMIT	Pricing for a trip with the specified number of steps.
	ROUTING	Pricing for a route with these restrictions.
Eligibility	USER PROFILE	Price for a user of this type, if any
	COMMERCIAL PROFILE	Pricing for the commercial offer.
	GROUP TICKET	Pricing for a group ticket of this type.
	COMPANION PROFILE	Pricing for taking a companion along, if any.
	RESIDENTIAL QUALIFICATION	Pricing for someone who meets this residential criterion, if any.
Entitlement	ENTITLEMENT REQUIRED	Pricing for use for required product, if any
	ENTITLEMENT GIVEN,	Discount that gives to other product, if any
Luggage	LUGGAGE ALLOWANCE	Price of luggage carriage of the specified type, if any
Booking	PURCHASE WINDOW	Price of a ticket bought within the specified window, if any
	TRANSFERABILITY	Price of transferarig a ticket to someone else, if any
	EXCHANGING	Fee for exchanging ticket, if any
	REFUNDING	Fee for refunding ticket, if any.
	REPLACING	Fee for replacing a lost ticket, if any.
	RESERVING	Fee for reserving a ticket, if any.
Charging	CHARGING POLICY	Limits of credit associated with product.
	PENALTY POLICY	Fees for use deemed to incur penalty.
	SUBSCRIBING	Fee for setting up a subscription.
	SUSPENDING	Fee for suspending a perod pass or subscription.

9.7 Usage parameters: Eligibility

Eligibility user parameters state who may use a given product.

9.7.1 UsageParameter (Abstract)

A parameter used to specify conditions on the use of a SALES OFFER PACKAGE or a FARE PRODUCT.

There are a number different specialisations for different pruposes.

Table 69 – *UsageParameter* – XML Element

Classifi-cation	Name	Type	Cardin ality	Description
::>	::>	*PriceableObject*	::>	USAGE PARAMETER inherits from PRICEABLE OBJECT***.***
«PK»	***id***	*UsageParameterIdType*	1:1	Identifier of USAGE PARAMETER.
	Url	*xsd:anyUri*	0:1	Url associated with parameter.
«FK»	***TypeOf-UsageParameter-Ref***	*TypeOfUsageParameterRef*	0:1	Type of USAGE PARAMETER.
«cntd»	***fareTables***	*FareTable*	0:*	FARE TABLEs for the USAGE PARAMETER.
«cntd»	***prices***	*UsageParameterPrice*	0:*	USAGE PARAMETER PRICEs for the USAGE PARAMETER.

9.7.2 UserProfile

The social profile of a passenger, based on age group, education, profession, social status, sex etc., often used for allowing discounts: 18-40 years old, graduates, drivers, unemployed, women etc.

UK☞ User profiles should be classified with a ***UserType***. A set of predefined UK user types is included in the FXCP meta data, e.f.' fxc:adult', 'fxc:child'. If an operator has different age or qualifaction criteria, then they will need to specify additional user types.

Table 70 – *UserProfile* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*UsageParameter*	::>	USER PROFILE inherits from USAGE PARAMETER.
«PK»	***id***	*UserProfileIdType*	1:1	Identifier of USER PROFILE.
«FK»	***BaseUserProfile-Ref***	*UserProfileIdType*	0:1	Base USER PROFILE which this profile refines.
«FK»	***TypeOf-ConcessionRef***	*TypeOfConcessionRef*	0:1	Classification by type of concession.
«enum»	***UserType***	*UserTypeEnum*	0:1	Classification of user type. • *anyone; adult; child; infant; senior; schoolPupil; student; youngPerson; disabled; disabledCompanion; employee; military; jobSeeker; guideDog; animal;*
	MinimumAge	*xsd:integer*	0:1	Minimum age for membership of USER PROFILE.

	MaximumAge	*xsd:integer*	0:1	Maximum age for membership of USER PROFILE.
	MonthDayOn-WhichAge-Applies	*xsd:gmonthDay*	0:1	Day / Month on which age applies. if any.
	MinimumHeight	*LengthType*	0:1	Minimum height for membership of USER PROFILE. For example, to restrict access for health and safety reasons.
	MaximumHeight	*LengthType*	0:1	Maximum weight for membership of USER PROFILE. This may be relevant for example for judging large dogs, or a limit on children.
	LocalResident	*xsd:boolean*	0:1	Whether user must be local resident. The default value is '*true*'.
«cntd»	***resides***	*ResidentialQualification*	0:*	RESIDENTIAL QUALIFICATIONs for USER PROFILE – if more than one, these will be logically ORed together.
«enum»	***Gender-Limitation***	*GenderLimitationList*	0:1	Gender required by USER PROFILE. Relevant for single sex accommodation products.
«enum»	***ProofRequired***	*ProofOfIdentityEnum*	0:*	Proof required for type of user. See allowed values below. • *noneRequired; passport; drivingLicence; birthCertificate; membershipCard; studentCard; identityDocument; creditCard; medicalDocument; letterWIthAddress; measurement; emailAccount; mobileDevice; other;*
«enum»	***DiscountBasis***	*DiscountBasisEnum*	0:1	Nature of discount for this type of user. See earlier for allowed values.
«cntd»	***companion-Profiles***	*CompanionProfile*	0:*	COMPANION PROFILEs describing users who may travel with user.

9.7.3 CompanionProfile

The COMPANION PROFILE specifies the number and characteristics of persons entitled to travel in addition to the holder of an access right, for example children, wheelchair carer, etc.

It can be used to create a precise specification of a group,; for example that a family must include at least one adult or a maximum of two adults and between one and five children,

Table 71n – *CompanionProfile* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	COMPANION PROFILE inherits from USAGE PARAMETER.

«PK»	***id***	*GroupTicketUserIdType*	1:1	Identifier of COMPANION PROFILE.
	ParentRef	*UsageParameterRef+*	0:1	Parent USER PROFILE for whom this specifies an allowed companion type.
«FK»	***UserProfileRef***	*UserProfileRef*	0:1	Reference USER PROFILE defining a category of people eligible to be a companion.
«enum»	***Companion-Relationship***	*CompanionRelationship-Enum*	0:1	Required relationship of companion to eligible user. See allowed values below. +v1.1. • *anyone; parent; grandparent; child; grandchild; family; spouse; partner; dependent; colleague; pupil; teacher; carer*
	MinimumNumberOf-Persons	*xsd:integer*	0:1	Minimum number of persons overall allowed of this type.
	MaximumNumberOf-Persons	*xsd:integer*	0:1	Maximum number of persons overall allowed of this type.
«enum»	***DiscountBasis***	*DiscountBasisEnum*	0:1	Nature of discount for this type of user. See allowed values earlier.

9.7.4 GroupTicket

The number and characteristics of persons entitled to travel in addition to the holder of an access right.

Table 72 – *GroupTicket* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*UsageParameter*	::>	GROUP TICKET inherits from USAGE PARAMETER**.**
«PK»	***id***	*GroupTicketIdType*	1:1	Identifier of GROUP TICKET.
«FK»	***TypeOf-ConcessionRef***	*TypeOfConcessionRef*		Type of concession to which this group applies.
	MinimumNumberOf-Persons	*NumberOfPersons*	0:1	Minimum number of persons overall allowed on GROUP TICKET.
	MaximumNumber-OfPersons	*NumberOfPersons*	0:1	Maximum number of persons overall allowed on GROUP TICKET.
	MinimumNumberOf-CardHolders	*NumberOfPersons*	0:1	Minimum number of card holders required to qualify for this GROUP TICKET.
«cntd»	***companionProfiles***	*CompanionProfile*	0:*	COMPANION OR GROUP allowed in each USER PROFILE category.

«enum»	***PricingBasis***	*PerBasisEnum*	0:1	Basis on which pricing is done - per whole group or per member. See allowed values below. — *none; free; discountForAll; discountForFirstMemberOfGroup; discountForSecondAndSubsequentMembersOfGroup; stepDiscount*
	MaximumPersons-Free	*NumberOfPassengers*	0:1	Number of persons allowed free on ticket.
	MaximumPersons-Discounted	*NumberOfPassengers*	0:1	Maximum number of persons for which a group discount is allowed.
	DiscountOnly-ForFirstPerson	*xsd:boolean*	0:1	Whether there is only a discount for the first person in the group.
	MinimumNumberOfCardHolders	*NumberOfPassengers*	0:1	Minimum number of persons in the group who must hold a qualifying railcard for the discount to be granted.
	OneForNPersons	*NumberOfPassengers*	0:1	Whether discount is on a one-for-n basis. Intermediate numbers are rounded down.
	GroupSizeChanges	*GroupSizeChanges-Enum*	0:1	Possibilities for changing the number of people in the group. See allowed values below. •
«enum»	***JointCheckIn***	*GroupCheckInEnum*	0:1	Whether joint check in is required. See allowed values below. • *none; required; allowed*
«enum»	***Ticketing***	*GroupTicketingEnum*	0:1	Nature of tickets issued for group. See allowed values +v1.1 • *allOnOneTicket; separateTickets* • *ticketWithCoupons; other*
«enum»	***GroupBooking-Facility***	*GroupBookingEnum*	0:1	Type of Group Booking allowed. See NeTEx Part1.

9.7.5 ResidentialQualification [ADVANCED PROFILE ONLY]

The RESIDENTIAL QUALIFICATION element describes a requirement to live in a certain area.

Table 73 – *ResidentialQualification* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*VersionedChild*	::>	RESIDENTIAL QUALIFICATION inherits from VERSIONED CHILD. See NeTEx Part1.

«PK»	***id***	*ResidentialQualification-IdType*	1:1	Identifier of RESIDENTIAL QUALIFICATION.
	Name	*MultilingualString*	0:1	Name of RESIDENTIAL QUALIFICATION.
	Description	*MultilingualString*	0:1	Description of RESIDENTIAL QUALIFICATION.
«FK»	***ParentRef***	*UsageParameterRef+*	0:1	Parent USER PROFILE for whom this specifies a RESIDENTIAL QUALIFICATION.
	MustReside	*xsd:boolean*	0:1	Whether the user must or must not reside in specified TOPOGRAPHIC PLACE.
«FK»	***Topographical-PlaceRef***	*TopographicalPlaceRef*	0:1	TOPOGRAPHIC PLACE for which residency rule applies. See NeTEx Part1.
«enum»	***ResidenceType***	*ResidenceTypeEnum*	0:1	Classification of type of residence required, • work; *study; exchange; born; nonResident.*
	Minimum-Duration	*xsd:duration*	0:1	Minimum period of residency needed to qualify.

9.7.6 CommercialProfile [ADVANCED PROFILE ONLY]

A category of users depending on their commercial relations with the operator (frequency of use, amount of purchase etc.), often used for allowing discounts.

Table 74 – *CommercialProfile* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	COMMERCIAL PROFILE inherits from USAGE PARAMETER.
«PK»	***id***	*CommercialProfileIdType*	1:1	Identifier of COMMERCIAL PROFILE.
«FK»	***TypeOf-ConcessionRef***	*TypeOfConcessionRef*	0:1	Reference to a TYPE OF CONCESSION.
	Consumption-Amount	*xsd:anyType*	0:1	Consumption amount associated with COMMERCIAL PROFILE.
	Consumption-Units	*xsd:anyType*	0:1	Units for Consumption amount associated with COMMERCIAL PROFILE.
	GeneralGroupOf EntitiesRef	*GeneralGroupOf-EntitiesRef*	0:1	GROUP OF ORGANISATIONs or other entities associated with the COMMERCIAL PROFILE.

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9.1 Usage parameters: Travel

Travel usage parameters describe limits on travel.

9.1.1 RoundTrip

Properties relating to single or return trip use of an access right.

It can be used to mark a product as single, return, hort trip etc, or to mark the separate VALIDABLE elements of a return journey as outwards, back etc.

If there is a standard discount for a return trip (e.g. 20%), then the discounted price can be attached to the ***ReturnTrip*** parameter as a ***UsageParameterPrice***

Table 75 – *RoundTrip* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	ROUND TRIP inherits from USAGE PARAMETER.
«PK»	***id***	*RoundTripIdType*	1:1	Identifier of ROUND TRIP.
	TripType	*xsd:boolean*	0:1	Whether return trip is allowed. • *single;* • *return; returnOut; returnBack; returnOnly* • *multiple*
	Double-SingleFare	*xsd:boolean*	0:1	Whether fare for return trip is single fare doubled.
	ShortTrip	*xsd:boolean*	0:1	Whether trip is classified as a short trip for fares.
	IsRequired	*xsd:boolean*	0:1	Whether return trip is required.

9.1.2 FrequencyOfUse

The limits of usage frequency for a FARE PRODUCT (or one of its components) or a SALES OFFER PACKAGE during a specific VALIDITY PERIOD. There may be different tariffs depending on how often the right is consumed during the period.

Table 76 – *FrequencyOfUse* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	FREQUENCY OF USE inherits from USAGE PARAMETER.
«PK»	***id***	*FrequencyOfUseIdType*	1:1	Identifier of FREQUENCY OF USE.

«enum»	***Frequency-OfUseType***	*FrequencyOfUseEnum*	0:1	Type of Frequency of Use. See allowed values below. • *none; single; limited; unlimited; twiceADay*
	Minimal-Frequency	*xsd:integer*	0:1	Minimum number of times can be used.
	Maximal-Frequency	*xsd:integer*	0:1	Maximum number of times can be used.
	Frequency-Interval	*xsd:duration*	0:1	Interval within which frequency is measured. If absent forever.
«FK»	***TimeIntervalRef***	*TimeIntervalRef*	0:1	Interval within which frequency is measured. - as reference to arbitrary time interval.
«enum»	***DiscountBasis***	*DiscountBasisEnum*	0:1	Nature of discount for number of journeys. See allowed values below. • *none; free; discount*

9.1.3 Interchanging

Limitations on making changes within a trip.

Table 77 – *Interchanging* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	INTERCHANGING inherits from USAGE PARAMETER.
«PK»	***id***	*InterchangingIdType*	1:1	Identifier of INTERCHANGING.
	CanInterchange	*xsd:boolean*	0:1	Whether an interchange can be made.
«enum»	***FromMode***	*VehicleModeEnum*	0:1	TRANSPORT MODE from which user is interchanging. See NeTEx Part1 for allowed values.
«enum»	***ToMode***	*VehicleModeEnum*	0:1	TRANSPORT MODE to which user is interchanging. See NeTEx Part1 for allowed values.
	Maximum-NumberOf-Changes	*xsd:integer*	0:1	Maximum number of transfers that can be made on a trip.
	MaximumTime-ToMakeA-Transfer	*xsd:duration*	0:1	Maximum time allowed to make a transfer.
	CanBreak-Journey	*xsd:boolean*	0:1	Whether the journey can be broken at an interchange point.

	CrossBorder	*xsd:boolean*	0:1	Whether the interchange is across a border.
«enum»	***RegisterBreakOfJourney***	*RegisterBreakOfJourney-Enum*	0:*	Whether the Journey can be interrupted, i.e. leave stop point and return. See allowed values below. +v1.1 • *none* • *markByStaff; markByValidator; markByMobileApp; other*

9.1.4 StepLimit

Geographical parameter limiting the access rights by counts of stops, sections or zones.

Table 78 – *StepLimit* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	STEP LIMIT inherits from USAGE PARAMETER.
«PK»	***id***	*StepLimitIdType*	1:1	Identifier of STEP LIMIT parameter.
	Restricted	*xsd:boolean*	0:1	Whether restricted to a number of stops.
«enum»	***StepUnits***	*StepUnitEnum*	0:`	Units in which steps are counted. • *stops; stopsIncludingPassThroughStops* • *sections; zones; networks; operators* • *countries*
	Minimum-NumberOfSteps	*xsd:integer*	0:1	Minimum number of steps allowed.
	Maximum-NumberOfSteps	*xsd:integer*	0:1	Maximum number of steps allowed.
	Maximum-NumberOfTrips	*xsd:integer*	0:1	Maximum number of trips allowed.

9.1.5 UsageValidityPeriod

A time limitation for validity of a FARE PRODUCT or a SALES OFFER PACKAGE. It may be composed of a standard duration (e.g. 3 days, 1 month) and/or fixed start/end dates and times.

Table 79 – *UsageValidityPeriod* – XML Element

Classifi-cation	Name	Type	Cardinality	Description

::>	::>	*UsageParameter*	::>	USAGE VALIDITY PERIOD inherits from USAGE PARAMETER.
«PK»	***id***	*UsageValidityPeriodIdType*	1:1	Identifier of USAGE VALIDITY PERIOD.
«enum»	***ValidityType***	*ValidityTypeEnum*	0:*	Type of USAGE VALIDITY PERIOD. See allowed values below. • *singleRide; singleTrip; returnTrip; carnet* • *dayPass; weeklyPass; weekendPass; monthlyPass; annualPass; seasonTicket* • *profileMembership; subscription; openEnded* • *other*
«enum»	***UsageTrigger***	*UsageTriggerEnum*	0:1	Trigger event that starts validity period. See allowed values below. • *startOfPeriod; startOutboundRide; endOutboundRide; startReturnRide* • *enrolment; reservation; purchase; activation; fulfilment* • *specifiedStartDate; dayOffsetBeforeCalendarPeriod*
«enum»	***UsageEnd***	*UsageEndEnum*	0:1	Classification of when the end of the Usage validity period occurs. May be a specified period (Standard Duration) or an event, e.g. end of trip. See allowed values below. • *standardDuration;* • *endOfCalendarPeriod; endOfRide; endOfTrip; endOfFareDay; endOfFarePeriod; productExpiry; deregistration; profileExpiry; other;*
	Standard-Duration	*xsd:duration*	0:1	Duration of VALIDITY PERIOD after departure. or validation
«enum»	***ActivationMeans***	*ActivationMeansEnum*	0:1	Means of activatiing start of period. See allowed values below. +v1.1 • *noneRequired; checkIn; useOfValidator; useOfMobileDevice; automaticByTime; automaticByProximity; other;*
	StartDate	*xsd:date*	0:1	Start date for VALIDITY PERIOD.
	StartTime	*xsd:time*	0:1	Start time for VALIDITY PERIOD.

	EndDate	*xsd:date*	0:1	End date for VALIDITY PERIOD.
	EndTime	*xsd:time*	0:1	End time for VALIDITY PERIOD.
XGRP	***UsageValidity-PeriodStart-ConstraintGroup***	***xmlGroup***	0:1	Elements controlling the allowed start of period. See below.
«enum»	***UsageStart-ConstraintType***	*UsageStartConstraintEnum*	0:1	Whether start type of trip or pass is variable or fixed. See allowed values below. +v1.1 • *variable; fixed; fixedWindow* • *noTravelWithinTimeband*
«cntd»	***startOnlyOn***	*DayType*	0:*	If ***UsageStartConstraintType*** is "fixedWindow", Dayes of week or month (specified as a DayType) on which usage of a period pass may start.
	Maximum-ServicesBefore	*xsd:nonNegativeInteger*	0:1	If ***UsageStartConstraintType*** is "fixedWindow", maximum number of services before the booked train that may also be used. +v1.1
	FlexiblePeriod-Before	*xsd:duration*	0:1	If UsageStartConstraintType is "fixedWindow", maximum period before the booked train during which other trains may also be caught. +v1.1
	Maximum-ServicesAfter	*xsd:nonNegativeInteger*	0:1	If UsageStartConstraintType is "fixedWindow", maximum number of services after the booked train that may also be used. +v1.1
	FlexiblePeriod-After	*xsd:duration*	0:1	If UsageStartConstraintType is "fixedWindow", maximum period after the booked train during which other trains may also be caught. +v1.1
«enum»	***BlackoutUse***	*BlackoutStartEnum*	0:1	When start of travel restriction applies. See allowed values below. • *noTravelWithinPeriod* • *mayCompleteIfStartedBefore* • *noTravelWithinTimeband*

9.1.6 Routing [ADVANCED PROFILE ONLY]

Limitations on routing of an access right.

Table 80 – *Routing* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*UsageParameter*	::>	ROUTING inherits from USAGE PARAMETER.

«PK»	***id***	*RoutingIdType*	1:1	Identifier of ROUTING.
	Return-RouteIdentical	*xsd:boolean*	0:1	Whether return route must be same as outbound route.
	ForwardsOnly	*xsd:boolean*	0:1	Whether passenger may only take routes that proceed in a single direction. (They may not use product to achieve a return trip for the cost of a single trip).
	IsRestricted	*xsd:boolean*	0:1	Whether only allowed on certain routes or series.
	CrossBorder	*xsd:boolean*	0:1	Whether the routing is across a border.

9.2 Usage parameters: Entitlement

Entitlement usage parameters describe prerequisite and dependent products.

9.2.1 EntitlementRequired [ADVANCED PROFILE ONLY]

Receiving of entitlement from another FARE PRODUCT.

Table 81 – *EntitlementRequired* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	ENTITLEMENT REQUIRED inherits from USAGE PARAMETER.
«PK»	***id***	*EntitlementRequired-IdType*	1:1	Identifier of ENTITLEMENT REQUIRED.
«FK»	***ServiceAccess-RightRef***	*ServiceAccessRightRef*	0:1	Entitlement comes from the referenced FARE PRODUCT.
	Minimum-Qualification-Period	*xsd:duration*	0:1	Minimum period that required product must be held in order to be eligible.
	Entitlement-Constraint	*EntitlementConstraint*	0:1	Constraints on related product or offer. +v1.1

9.2.2 EntitlementGiven [ADVANCED PROFILE ONLY]

Granting of entitlement to another FARE PRODUCT.

Table 82 – *EntitlementGiven* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	ENTITLEMENT GIVEN inherits from USAGE PARAMETER.

«PK»	***id***	*EntitlementGivenIdType*	1:1	Identifier of ENTITLEMENT GIVEN.
«FK»	***ServiceAccess-RightRef***	*ServiceAccessRightRef*	0:1	Entitlement comes from the referenced FARE PRODUCT.
	Minimum-Qualification-Period	*xsd:duration*	0:1	Minimum period that product must be held for entitlement to be granted.
	Entitlement-Constraint	*EntitlementConstraint*	0:1	Constraints on related product or offer. +v1.1
«enum»	***EntitlementType***	*EntitlementTypeEnum*	0:1	Type of entitlement. See allowed values below. • *use; purchase; none*

9.2.3 LuggageAllowance [ADVANCED PROFILE ONLY]

The number and characteristics (weight, volume) of luggage that a holder of an access right is entitled to carry.

Table 83 – *LuggageAllowance* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	LUGGAGE ALLOWANCE inherits from USAGE PARAMETER.
«PK»	***id***	*LuggageAllowance-IdType*	1:1	Identifier of LUGGAGE ALLOWANCE.
«enum»	***BaggageUseType***	*BaggageUseEnum*	0:1	Use of baggage covered by the allowance. See allowed values below. • *carryOn; checkIn; oversizeCheckIn*
«enum»	***BaggageType***	*LuggageUseEnum*	0:1	Type of baggage covered by the allowance. See allowed values below. • *handbag; handLuggage; smallSuitcase; suitcase; trunk; oversizeItem; bicycle; sportingEquipment; skis; musicalInstrument; pushChair; motorizedWheelchair; largeMotorizedWheelchair; wheelchair; smallAnimal; animal; game; motorcycle; other;*
«enum»	***Luggage-AllowanceType***	*LuggageAllowanceEnum*	0:1	Classification of allowance type. See allowed values below. • *none; unlimited; single; limited*
	Maximum-NumberOfItems	*xsd:nonNegativeInteger*	0:1	Number of bags allowed.
	MaximumBagHeight	*LengthType*	0:1	Maximum bag height.
	MaximumBagWidth	*LengthType*	0:1	Maximum bag width.
	MaximumBagDepth	*LengthType*	0:1	Maximum bag depth.
	MaximumBagWeight	*WeightType*	0:1	Maximum bag weight.
	TotalWeight	*WeightType*	0:1	Total Weight limit of LUGGAGE ALLOWANCE.
«enum»	***Luggage-ChargingBasis***	*LuggageCharging-BasisEnum*	0:1	Basis on which luggage is charged. See allowed values below. • *free; chargedByItem; chargedByWeight; other*

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9.3 Usage parameters: Booking

9.3.1 Transferability

The number and characteristics of persons entitled to use the public transport service instead of the original customer.

Table 84 – *Transferability* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	TRANSFERABILITY inherits from USAGE PARAMETER.
«PK»	***id***	*TransferabilityIdType*	1:1	Identifier of TRANSFERABILITY.
	CanTransfer	*xsd:boolean*	0:1	Whether ticket can be transferred to someone else.
	Maximum-NumberOf-Named-Transferees	*NumberOfPassengers*	0:1	Where a product can be used by a limited number of named users, maximum number of users allowed.
	HasTransferFee	*xsd:boolean*	0:1	Whether there is a charge for making a transfer.
«enum»	***SharedUsage***	*SharedUsageEnum*	0:1	Indicates the nature of the permitted sharing, if any, of products that can be shared, e.g. Trips from a multi-trip carnet. See allowed values +v1.1 • *singleUser* • *concurrent Users* • *concurrentDesignatedUsers*

9.3.2 PurchaseWindow

Period in which the product must be purchased.

Table 85 – *PurchaseWindow* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*UsageParameter*	::>	PURCHASE WINDOW inherits from USAGE PARAMETER.
«PK»	***id***	*PurchaseWindowIdType*	1:1	Identifier of PURCHASE WINDOW.
«enum»	***PurchaseAction***	*PurchaseActionEnum*	0:1	Action governed by Purchase Window. The default value is '*purchase*'. See allowed values below. +v1.1

				• *purchase; orderWithoutPayment; reserve; payForPreviousOrder; subscribe; payInstallment; other*
«enum»	***PurchaseWhen***	*PurchaseWhenEnum*	0:1	When purchase may be made. See Part1 for allowed values. • *advanceOnly; untilPreviousDay; dayOfTravelOnly; advanceAndDayOfTravel; timeOfTravelOnly; subscriptionChargeMoment; other*
	LatestTime	*xsd:duration*	0:1	Latest time on specified last day when ticket can be purchased.
	MinimumPeriod-BeforeDeparture	*xsd:duration*	0:1	Minimum duration before departure that ticket may be purchased.
«FK»	***MinimumPeriod-IntervalRef***	*TimeIntervalRef*	0:1	Minimum period before departure that purchase must be made - as arbitrary interval.
	MaximumPeriod-BeforeDeparture	*xsd:duration*	0:1	Maximum duration before departure that ticket may be purchased.
«FK»	***MaximumPeriod-IntervalRef***	*TimeIntervalRef*	0:1	Maximum period before departure that purchase must be made - as arbitrary interval.
«enum»	***PurchaseMoment***	*PurchaseMomentEnum*	0:1	Permitted moments of purchase. See Part1 for allowed values. +v1.1

9.3.3 Reserving [ADVANCED PROFILE ONLY]

Indicating whether the access right requires reservation and any limitations on making and changing reservations.

Table 86 – *Reserving* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	RESERVING inherits from USAGE PARAMETER.
«PK»	***id***	*ReservingIdType*	1:1	Identifier of RESERVING.
«enum»	***Reserving-Requirements***	*ServiceReservation-FacilityEnum*	0:*	Nature of reservations required. See NeTEx Part1 for allowed values.
	Minimum-NumberToReserve	*NumberOfPassengers*	0:1	Minimum number of persons allowed on a reservation.

	MaximumNumber-ToReserve	*NumberOfPassengers*	0:1	Minimum number of persons allowed on a reservation.
	MustReserve-Whole-Compartment.	*xsd:boolean*	0:1	Whether a whole compartment must be reserved.
«enum»	***Reservation-ChargeType***	*Reservation-ChargeTypeEnum*	0:1	Nature of reservation fee. See allowed values below • *noFee; fee; singleFeeForReturnTrip; feeForEachDirection; feeForEachLeg*
«enum»	***FeeBasis***	*PerBasisEnum*	0:1	Basis on which refund is made. See allowed values below. • *perOffer; perPerson*
	HasFree-Connecting-Reservations	*xsd:boolean*	0:1	Whether connecting reservations are all free or not.
	NumberOfFree-Connecting-Reservations	*xsd:integer*	0:1	Number of free connecting reservations allowed.
	IsFeeRefundable	*xsd:boolean*	0:1	Whether reservation fees is refundable. +v1.1
«cntd»	***Booking-Arrangements***	*BookingArrangements*	0:1	Booking arrangements. See Part1 Service Restrictions Model.
«enum»	***SeatAllocation-Method***	*SeatAllocationMethod-Enum*	0:1	Method for allocating seat. See allowed values. • *autoAssignment; seatMap; openSeating*
	Reservation-ExpiryPeriod	*xsd:duration*	0:1	Period after which reservation without payment will expire if not paid for. +v1.1

9.3.4 Cancelling [ADVANCED PROFILE ONLY]

Requirements for cancelling a booking.

Table 87 – *Cancelling* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	CANCELLING inherits from USAGE PARAMETER.
«PK»	***id***	*CancellingIdType*	1:1	Identifier of CANCELLING element.
	Booking-Arrangements	*BookingArrangements*	0:1	Arrangements for cancelling a booking. See Part1 Service restrictions Model

9.3.5 BookingArrangements [ADVANCED PROFILE ONLY]

Information about booking to make a cancellation or other change. See also Part1 for details.

Table 88 – *BookingArrangements* Group– XML Element

Classification	Name	Type	Cardinality	Description
	BookingContact	*Contact*	0:1	Contact for Booking.
«enum»	***BookingMethods***	*BookingMethodEnum*	0:*	Booking method for FLEXIBLE LINE.
«enum»	***BookingAccess***	*BookingAccessEnum*	0:1	Who can make a booking. See Part1.
«enum»	***BookWhen***	*PurchaseWhenEnum*	0:1	When Booking can be made. See Part1
«enum»	***BuyWhen***	*PurchaseMomentEnum*	0:*	When purchase can be made. See Part1.
	LatestBooking-Time	*xsd:time*	0:1	Latest time in day that booking can be made.
	MinimumBooking Period	*xsd:duration*	0:1	Minimum interval in advance of departure day or time that service may be ordered.
	BookingUrl	*xsd:anyURI*	0:1	URL for booking.
	BookingNote	*MultilingualString*	0:1	Note about booking the FLEXIBLE LINE.

9.4 Usage parameters: After-sales [

9.4.1 Reselling (Abstract)]

Common resale conditions (i.e. for exchange or refund) attaching to the product.

Table 89 – *Reselling* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	RESELLING inherits from USAGE PARAMETER.
«PK»	***id***	*ResellingIdType*	1:1	Identifier of RESELLING.
«enum»	***Allowed***	*ResellTypeEnum*	0:1	Whether exchange or refund is allowed. See allowed values be • *none; partial; fulll.*
	CanChangeClass	*xsd:boolean*	0:1	Whether user can change class. ;
	UnusedTicketsOnly	*xsd:boolean*	0:1	Whether it is possible to exchange partially used tickets.
	OnlyAtCertain-DistributionPoints	*xsd:boolean*	0:1	Whether distribution is restricted to certain points.

«enum»	***ResellWhen***	*ResellWhenEnum*	0:1	Event marking when the is exchangeable status of the ticket changes. See allowed values below. • *never; withinPurchaseGracePeriod; beforeStartOfValidityPeriod; afterStartOfValidityPariod; afterEndOfValidityParid; beforeFirstUse; afterFirstUse; beforeValidation; afterValidation*
		CHOICE		From when refund/exchange can be made
	a ***Exchangeable-FromAnyTime***	*EmptyType*	0:1	Can be exchanged or refunded from any point after purchase.
	b ***Exchangable-FromDuration***	*xsd:duration*	0:1	Duration to start of period before (negative) or after (positive) the trigger point, (i.e. either Start Of Validity or First Use) after which ticket may be exchanged or refunded.
	c ***Exchangable-FromPercentUse***	*xsd:decimal*	0:1	Can be exchanged once a certain percentage of duration or use has been achieved. +v1.1
«FK»	**Exchangeable-FromIntervalRef**	*TimeIntervalRef*	0:1	TimeInterval determining period from which exchange can be made relative to trigger point.
		CHOICE		Until when refund/exchange can be made
	a ***Exchangeable-UntilAnyTime***	*EmptyType*	0:1	Can be exchanged or refunded up until any point after purchase.
	Exchangable-UntilDuration	*xsd:duration*	0:1	Duration to end of period before (negative) or after (positive) the trigger point (i.e. either Start Of Validity or First Use) after which ticket may be exchanged or refunded.
	Exchangable-UntilPercentUse	*xsd:decimal*	0:1	Can be exchanged until a certain percentage of duration or use has been achieved. +v1.1
«FK»	**Exchangeable-UntilIntervalRef**	*TimeIntervalRef*	0:1	TimeInterval determining period up until which exchange can be made relative to trigger point.
«enum»	**EffectiveFrom**	*EffectiveFromEnum*		Constraint on when change can be made see allowed values. +v1.1 • *never; nextInterval; nextInstallment; anyTime; other*
	NotificationPeriod	*xsd:duration*	0:1	Notice period needed before action is effective. +v1.1
	HasFee	*xsd:boolean*	0:1	Whether these is a fee for a refund or exchange.
«enum»	***RefundBasis***	*PerBasisEnum*	0:1	Basis on which refund is made. See allowed values below.

«enum»	***PaymentMethods***	*PaymentMethodEnum*	0:*	PAYMENT METHODs that may be used for transaction. See Part1 RC service Restriction model. +v1.1
«ctd»	***TypeOfPaymentMethod***	*TypeOfPaymentMethod*	0:*	PAYMENT METHODs that may be used for transaction. +v1.1

9.4.2 Exchanging [ADVANCED PROFILE ONLY]

Whether and how access rights may be exchanged for other access rights.

Table 90 – *Exchanging* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*Reselling*	::>	EXCHANGING inherits from RESELLING.
«PK»	***id***	*ExchangingIdType*	1:1	Identifier of EXCHANGING.
	NumberOf-Exchanges-Allowed	*xsd:integer*	0:1	Number of times a ticket may be exchanged.
«enum»	***ToFareClass***	*FareClassEnum*	0:1	Fare class to which can be exchanged. See NeTEx Part1. (From class would be expression as the Seat class on an ACCESS RIGHT PARAMETER ASSIGNMENT.)
«FK»	***ToClass-OfUseRef***	*ClassOfUseRef*	0:1	CLASS OF USE class to which can be exchanged.
«enum»	***ExchangableTo***	*ExchangableToEnum*	0:1	Type of exchange allowed. The default is '*anyProduct*', i.e. to any other fare. See allowed values below. • *anyProduct;* • *sameProductSameDay; sameProductLongerJourney; sameProductShorterJourney;sameProductAnyDay* • *upgradeToStandardFare; upgradeToSpecifiedFare; downgradeToSpecifiedFare; equivalentProduct* • *changeGroupSize; other*

9.4.3 Refunding [ADVANCED PROFILE ONLY]

Whether and how the product may be refunded.

Table 91 – *Refunding* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*Reselling*	::>	REFUNDING inherits from RESELLING.
«PK»	***id***	*RefundingIdType*	1:1	Identifier of REFUNDING.
«enum»	***RefundType***	*RefundTypeEnum*	0:1	Classification of REFUNDING. See allowed values below. • *unused; delay; cancellation* • *partialJourney; earlyTermination* • *changeOfGroupSize; other*
«enum»	***RefundPolicy***	*RefundPolicyEnum*	0:*	Reasons for giving refunds. See allowed values. +v1.1 • *any; illness; death; maternity; redundancy; changeOfEmployment; changeOfResidence ;* • *none; other*
«enum»	***PartialRefund-Basis***	*PartialRefundBasisEnum*	0:*	Basis on which partial refunds of period passes etc are calculated. See allowed values. +v1.1 • *unusedDays; unusedWeeks; unusedMonths; unusedSemesters; other*
«enum»	***PaymentMethod***	*PaymentMethodEnum*	0:*	DEPRECATED – Use ***PaymentMethods*** on RESELLING higher in hierarchy

9.4.4 Replacing [ADVANCED PROFILE ONLY]

Whether and how access rights may be replaced if lost or stolen.

Table 92 – *Replacing* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*Reselling*	::>	REPLACING inherits from RESELLING.
«PK»	***id***	*ReplacingIdType*	1:1	Identifier of REPLACING.

9.4.5 Suspending [ADVANCED PROFILE ONLY]

Conditions governing temporary suspension of a FARE PRODUCT, (i.e. period pass or subscription).

Table 93 – *Suspending* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	SUSPENDING inherits from USAGE PARAMETER.
«PK»	***id***	*SuspendingIdType*	1:1	Identifier of USAGE VALIDITY PERIOD.
«enum»	***SuspensionPolicy***	*SuspensionPolicyEnum*	0:*	Allowed policies for suspending term of product. • *none* • *forCertifiedIllness* • *forParentalLeave* • *forHoliday* • *forAnyReason* • *weeklyPass* • *weekendPass* • *monthlyPass* • *seasonTicket* • *profileMembership* • *openEnded* • *other*
	QualificationPeriod	*duration*	0:1	Minimum duration that must have occurred before a suspension is allowed.
	QualificationPercent	*decimal*	0:1	Minimum proportion of term that must have occurred before a suspension is allowed.
	MinimumSuspension-Period	*duration*	0:1	Minimum duration allowed for a suspension.
	Maximum-SuspensionPeriod	*duration*	0:1	Maximum duration allowed for a suspension.
	MaximumNumberOf-SuspensionsPerTerm	*nonNegativeInteger*	0:1	Maximum duration allowed for a suspension. with the term of the fare product or subscription.

9.5 Usage parameters: Charging

9.5.1 ChargingPolicy [ADVANCED PROFILE ONLY]

Policy regarding different aspects of charging such as credit limits.

Table 94 – *ChargingPolicy* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	CHARGING POLICY inherits from USAGE PARAMETER.
«PK»	***id***	*ChargingPolicyIdType*	1:1	Identifier of CHARGING POLICY.
«enum»	***CreditPolicy***	*CreditPolicyEnumeration*	0:1	Policy for traveling on credit – See allowed values below. • *allowTravel; blockPayAsYouGoTravel; blockAllTravel; other*
"	***ExpireAfter-Period***	*xsd:duration*	0:1	Any expiry period on collecting a rebate or adjustment.
	PaymentGrace-Period	*xsd:duration*	0:1	Period after purchase by which time payment must be settled. +v1.1
«enum»	***BillingPolicy***	*TravelBillingPolicy-Enumeration*	0:1	Policy for billing frequency – See Allowed values below. +v1.1 • *billAsYouGo; billOnThreshold; billAtFareDayEnd; billAtPeriodEnd*

9.5.2 PenaltyPolicy [ADVANCED PROFILE ONLY]

Policy regarding different aspects of penalty charges, for example repeated entry at the same station, no ticket etc.

Table 95 – PenaltyPolicy – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	PENALTY POLICY inherits from USAGE PARAMETER.
«PK»	***id***	*PenaltyPolicyIdType*	1:1	Identifier of PENALTY POLICY.
«enum»	***PenaltyPolicyType***	*PenaltyPolicyEnum*	0:1	Classification of Penalty Policy. See below.

				• *noTicket; noCheckIn; noCheckOut; noValidation; other*
«enum»	***SameStation-EntryPolicy***	*SameStation-EntryPolicyEnum*	0:1	Policy for allowing re-entry at the same station within a certain time. See below. • *blocked; newFare; maximumFare; allowed*
	MinimumTime-BeforeRentry	*xsd:duration*	0:1	Minimum time before can re-enter at the same station before incurring penalty.
	Maximum-NumberOfFail-ToCheckOutEvents	*xsd:duration*	0:1	Limit on the number of fail-to-checkout events allowed before suspension. +v1.1

9.5.3 Subscribing [ADVANCED PROFILE ONLY]

Parameters governing subscription to a product allowing payment at regular intervals.

Classification	Name	Type	Cardinality	Description
::>	::>	*UsageParameter*	::>	SUBSCRIBING inherits from USAGE PARAMETER.
«PK»	***id***	*SubscribingIdType*	1:1	Identifier of SUBSCRIBING.
«enum»	***Subscription-TermType***	*SubscriptionTermTypeEnum*	0:1	Types of subscription term allowed. See allowed values below. • *fixed; variable; openEnded*
	Minimum-Subscription-Period	*duration*	0:1	Minimum duration allowed for a subscription.
	Maximum-Subscription-Period	*duration*	0:1	Maximum duration allowed for a subscription.
«enum»	***Subscription-RenewalPolicy***	*SubscriptionRenewalPolicy-Enum*	0:1	Policy on renewing subscription. See allowed values below. • *automatic; manual; automaticOnConfirmation; none; other*
«cntd»	***possible-Installment-Intervals***	*TimeIntervalRef*	0:*	Allowed billing Intervals for payment in installment.r

«enum»	***Installment-PaymentMethods***	*PaymentMethodsEnum*	0:1	Allowed means of payment of installations as standard value. See allowed values.
«cntd»	***installment-PaymentMethods***	*TypeOfPaymentMethod*	0:*	Allowed means of payment of installations as TYPE OF PAYMENT METHOD.

10 Sales Description

The Sale Description model describes how FareProducts are made available for sale.

10.1 Ticket Media

The TYPE OF TRAVEL DOCUMENT MODEL indicates the available materialisations of products as tickets on media.

The TRAVEL DOCUMENT entity describes an individual physical support satisfying a TYPE OF TRAVEL DOCUMENT, which may be loaded with various contents: sold FARE PRODUCTs, results of VALIDATION ENTRies, CUSTOMER identification, etc.

TRAVEL DOCUMENTs are usually allocated to customers on the occasion of a SALE TRANSACTION.

TRAVEL DOCUMENTs are classified by a TYPE OF TRAVEL DOCUMENT, which expresses:

their general characteristics (type of medium, types of compatible fare products, etc.);

their local functional characteristics, specific to the operator or the authority (specific fare products stored on this type, type of retailer, etc.).

The classical general TYPEs OF TRAVEL DOCUMENTs include the following:

- single-use throw-away ticket, giving the right to consume only one VALIDABLE ELEMENT (e.g. one trip);
- throw-away ticket unit, for which the access right is granted by using a certain number of throw-away units (generally by punching them together in a validator);
- value card, debited by a certain amount for each consumption of VALIDABLE ELEMENTs;
- reloadable electronic purse, allowing access to the PT network; debited by each purchase.
- PT credit card, with post-payment on a central account;
- document attesting the right to benefit from a discount;

etc.

The following figure shows the physical model for TYPE OF TRAVEL DOCUMENTs.

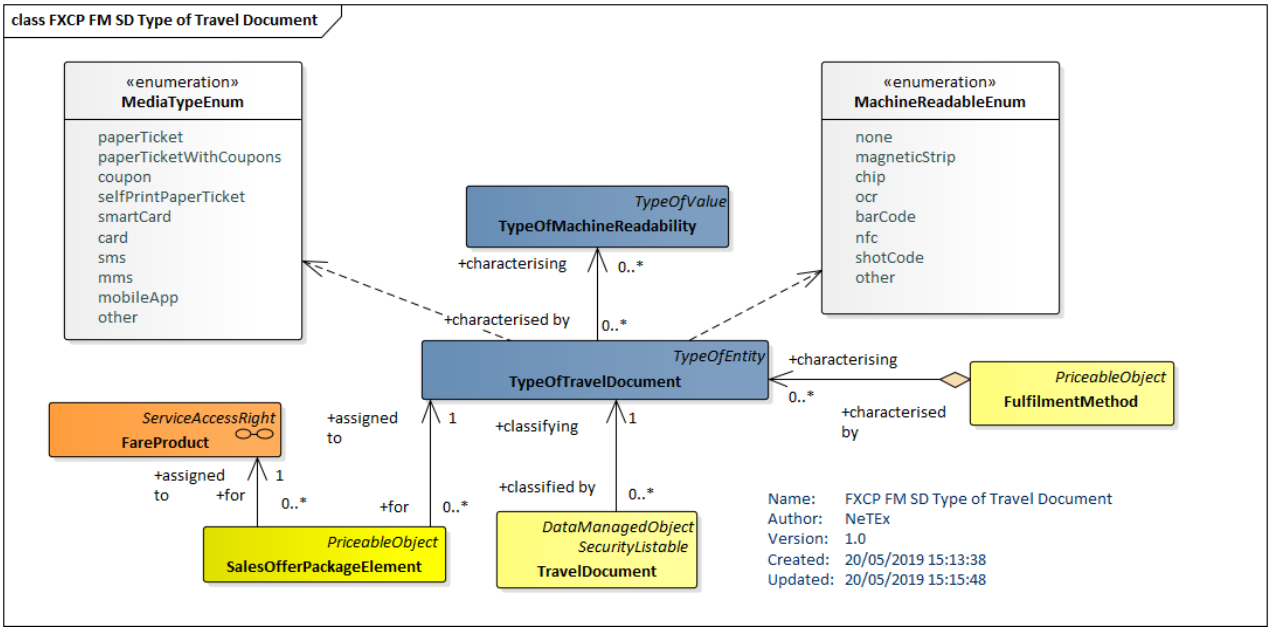


Figure 30 — Type of Travel Document (UML)

10.1.1 TypeOfTravelDocument

A classification of TRAVEL DOCUMENTs expressing their general function and local functional characteristics specific to the operator. Types of TRAVEL DOCUMENTs like e.g. throw-away ticket, throw-away ticket unit, value card, electronic purse allowing access, public transport credit card, etc. may be used to define these categories.

Table 96 – *TypeOfTravelDocument* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*TypeOfValue*	::>	TYPE OF TRAVEL DOCUMENT inherits from TYPE OF VALUE. See NeTEx Part1.
«PK»	***id***	*TypeOfTravel-DocumentIdType*	1:1	Identifier of TYPE OF TRAVEL DOCUMENT.
	IsCard	*xsd:boolean*	0:1	Whether the TRAVEL DOCUMENT is materialised as a card.
	IsSmartCard	*xsd:boolean*	0:1	Whether the TRAVEL DOCUMENT is materialised on a smart card or mobile device.
	HasPhoto	*xsd:boolean*	0:1	Whether the TRAVEL DOCUMENT has a photo.
«enum»	***MediaType***	*MediaTypeEnum*	0:1	Classification of the TRAVEL DOCUMENT by Media type. See allowed values below. • *paperTicket; paperTicketWithCoupons; coupon;*

				• *mobileApp ; selfPrintPaperTicket* • *smartCard; card*
«enum»	***Machine-Readable***	*MachineReadableEnum*	0:1	Classification of the TRAVEL DOCUMENT by Machine Readable mechanism standard values. See allowed values below. • *none* • *magneticStrip; chip; ocr; barCode; shotcode; nfc* • *other*
«cntd»	***typesOfMachine Readabilities***	*TypeOfMachine-ReadabilityRef*	0:*	Classification of the TRAVEL DOCUMENT by TYPE OF MACHINE READABILITY.
«cntd»	***alternativeNames***	*AlternativeName*	0:*	ALTERNATIVE NAMEs for element.

10.2 Sales Offers

A FARE SALES OFFER PACKAGE represents a products marketed to the user and available to purchase.

The FARE PRODUCTs are associated with TYPES OF TRAVEL DOCUMENTs in order to form packages suitable for selling to a customer. A SALES OFFER PACKAGE is defined as a package to be sold as a whole, consisting of one or more SALES OFFER PACKAGE ELEMENTs, each of which associates a specific FARE PRODUCT with a specific TYPE OF TRAVEL DOCUMENT

The user's actual purchase will be described by a TRAVEL SPECIFICATION associated with a CUSTOM CUSTOMER PURCHASE PACKAGE. The TRAVEL SPECIFICATION indicates which specific features of the SALES OFFER PACKAGE have been selected, for example the SALE PACKAGE might include a first class return, first class single, second class single, etc, of which only one of which will be selected in a TRAVEL SPECIFICATION.

The FXCP (is not concerned with sales data (Although it can be representedin NETEX) - nor is the EPIP - so SALES TRASACTIONS, TRAVEL SPECIDCATIONs and CUSTOMER PURCHASE PACKAGEs are all out of scope of the FXCP.

In most cases, a SALES OFFER PACKAGE will only consist of one FARE PRODUCT on one TRAVEL DOCUMENT, but more complex combinations are possible. For instance, a USAGE DISCOUNT RIGHT with its own TRAVEL DOCUMENT may be packaged with an AMOUNT OF PRICE UNIT on an electronic purse.

A SALES OFFER PACKAGE may be further characterised by VALIDITY PARAMETER ASSIGNMENTs.

A SALES OFFER PACKAGE may also indicate the DISTRIBUTION CHANNEL and FULFILMENT METHODs which a customer may use to buy a product. A DISTRIBUTION ASSIGNMENT assign the specific channels to a product.

Quite often there are a number of similar variants of SALES OFFER PACKAGES with many common properties. The GROUP OF SALES OFFER PACKAGEs an be used to specify such common properties: Any

property specified on a GROUP OF SALES OFFER PACKAGES applies to all the SALES OFFER PACKAGES in the group.

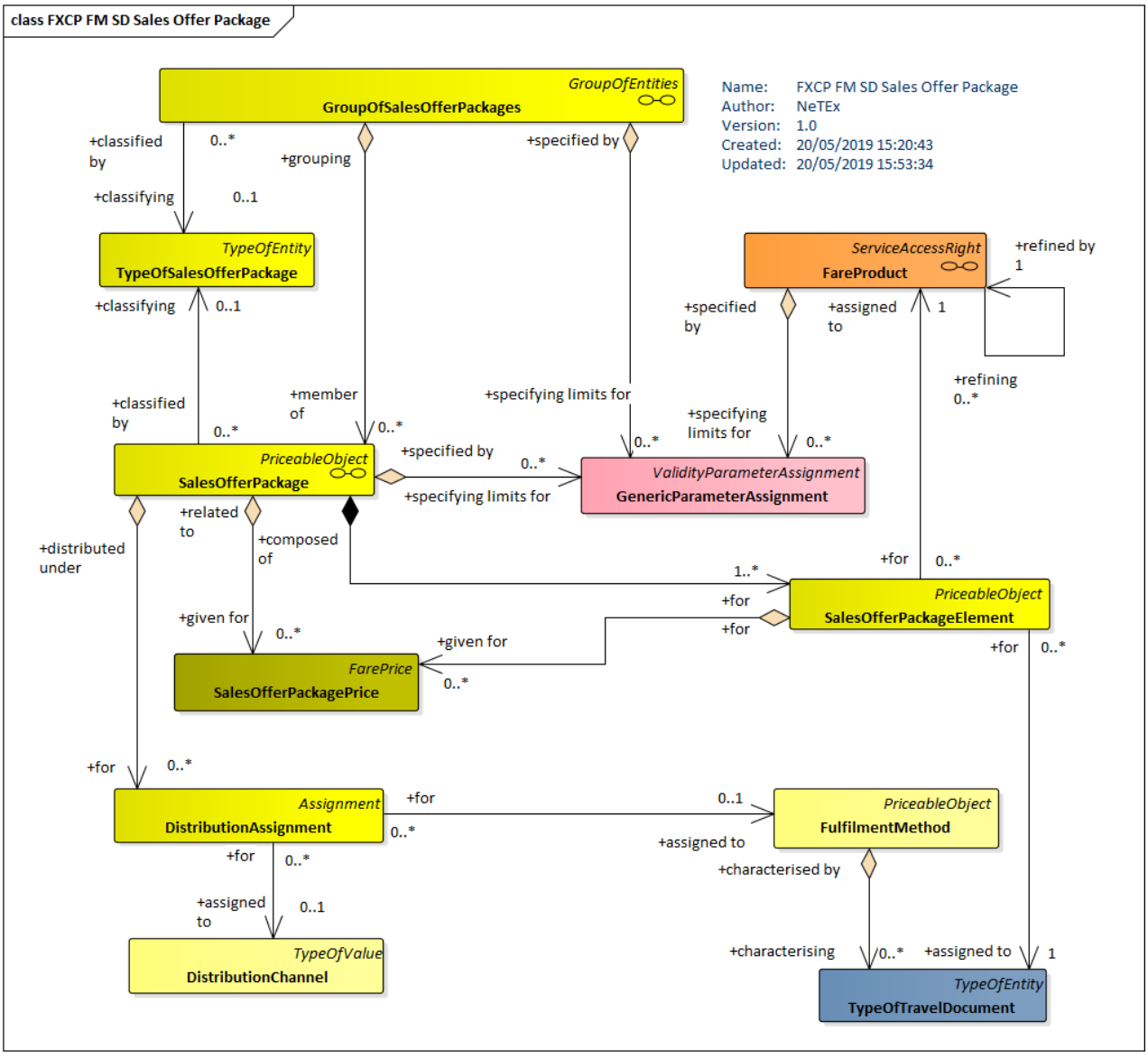


Figure 31 — UK FXCP - Sales Offer Package & Distribution (UML)

10.2.1 SalesOfferPackage

A package to be sold as a whole, consisting of one or several FARE PRODUCTs materialised thanks to one or several TRAVEL DOCUMENTs. The FARE PRODUCTs may be either directly attached to the TRAVEL DOCUMENTs, or may be reloadable on the TRAVEL DOCUMENTs.

Table 97 – *SalesOfferPackage* – XML Element

Classifi-cation	Name	Type	Card in-ality	Description
::>	::>	*PriceableObject*	::>	SALES OFFER PACKAGE inherits from PRICEABLE OBJECT.
«PK»	***id***	*SalesOfferPackageIdType*	1:1	Identifier of a SALES OFFER PACKAGE.
«AK»	***PrivateCode***	*PrivateCodeType*	0:1	Alternative identifier of an entity. can be used to associate with legacy systems.
«FK»	***TypeOfSales-OfferPackageRef***	*TypeOfSalesOfferPackageRef*	0:1	Type of SALES OFFER PACKAGE.
«cntd»	***Condition-Summary***	*ConditionSummary*	0:1	Summary description of conditions of a SALES OFFER PACKAGE that can be used to provide passenger information.
«cntd»	***validity-Parameter-Assignments***	*GenericAccessRightParameter-Assignment*	0:*	GENERIC PARAMETER ASSIGNMENTs (i.e. ACCESS RIGHT PARAMETER ASSIGNMENTs) associated with the SALES OFFER PACKAGE.
«cntd»	***distribution-Assignments***	*DistributionAssignment*	0:*	DISTRIBUTION ASSIGNMENTs for the SALES OFFER PACKAGE.
«FK»	***RoundingRef***	*RoundingRef*	0:1	Rounding to use on calculation
«cntd»	***prices***	*SalesOfferPackagePrice*	0:*	SALES OFFER PACKAGE PRICEs associated with the FARE
«cntd»	***salesOffer-Package-Elements***	*SalesOfferPackageElement*	0:*	SALES OFFER PACKAGE ELEMENTs associated with the SALES OFFER PACKAGE.
«cntd»	***groupsOfSales-OfferPackages***	*GroupOfSalesOffer-PackagesRef*	0:*	GROUPs OF SALES OFFER PACKAGEs with which this SALES OFFER PACKAGE shares common properties.
«cntd»	***salesOffer-Package-Substitutions***	*SalesOfferPackageSubstitution*	0:*	Allowed SALES OFFER PACKAGE SUBSTITUTIONs for the SALES OFFER PACKAGE.
«FK»	***TypeOfSales-OfferPackageRef***	*TypeOfSalesOfferPackageRef*	0:1	Type of SALES OFFER PACKAGE.
«cntd»	***Condition-Summary***	*ConditionSummary*	0:1	Summary description of conditions of a SALES OFFER PACKAGE that can be used to provide passenger information.
«cntd»	***validity-Parameter-Assignments***	*GenericAccessRightParameter-Assignment*	0:*	GENERIC PARAMETER ASSIGNMENTs (i.e. ACCESS RIGHT PARAMETER ASSIGNMENTs) associated with the SALES OFFER PACKAGE.

10.2.2 SalesOfferPackageElement (Subcomponent of SalesOfferPackage)

The assignment of a FARE PRODUCT to a TYPE OF TRAVEL DOCUMENT in order to define a SALES OFFER PACKAGE, realised as a fixed assignment (printing, magnetic storage etc.) or by the possibility for the FARE PRODUCT to be loaded onto the TYPE OF TRAVEL DOCUMENT.

Table 98 – *SalesOfferPackageElement* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*PriceableObject*	::>	SALES OFFER PACKAGE ELEMENT inherits from PRICEABLE OBJECT.
«PK»	***id***	*SalesOfferPackage-ElementIdType*	1:1	Identifier of SALES OFFER PACKAGE ELEMENT.
	Requires-Validation	*xsd:boolean*	0:1	Whether element requires validation before it can be used.
«cntd»	***Condition-Summary***	*ConditionSummary*	0:1	Summary description of SALES OFFER PACKAGE properties.
«FK»	***SalesOffer-PackageRef***	*SalesOfferPackageRef*	1:1	Reference to a SALES OFFER PACKAGE of which this is part. If not given by containing context must be specified.
«FK»	***TypeOfTravel-DocumenRef***	*TypeOfTravel-DocumentRef*	0:1	Reference to a TYPE OF TRAVEL DOCUMENT.
«FK»	***FareProductRef***	*FareProductRef+*	0:1	FARE PRODUCT associated with this SALES OFFER PACKAGE.
«cntd»	***validity-Parameter-Assignments***	*GenericParameter-Assignment*	0:*	GENERIC PARAMETER ASSIGNMENTs associated with the SALES OFFER PACKAGE ELEMENT.
«cntd»	***prices***	*SalesOfferPackagePrice*	0:*	SALES OFFER PACKAGE PRICEs associated with the SALES OFFER PACKAGE ELEMENT.

10.2.3 GroupOfSalesOfferPackages [ADVANCED PROFILE ONLY]

Quite often there are a number of variants of SALES OFFER PACKAGES. The GROUP OFf SALES OFFER PACKAGEs.can be used to specify common properties

Table 99 – *GroupOfSalesOfferPackages* – XML Element

Classification	Name	Type	Cardinality	Description

::>	::>	*GroupOfEntities*	::>	GROUP of SALES OFFER PACKAGEs inherits from GROUP OF ENTITIES. See NeTEx Part1.
«PK»	***id***	*GroupOfSalesOffer-PackagesIdType*	1:1	Identifier of GROUP of SALES OFFER PACKAGEs.
«cntd»	***alternativeNames***	*AlternativeName*	0:*	ALTERNATIVE NAMEs for GROUP of SALES OFFER PACKAGEs.
«cntd»	***notice-Assignments***	*NoticeAssignment*	0:*	NOTICE ASSIGNMENTs for GROUP of SALES OFFER PACKAGEs.
«FK»	***PricingService-Ref***	*PricingServiceRef*	0:1	PRICING SERVICE to use to fetch prices dynamically.
«FK»	***PricingRuleRef***	*PricingRuleRef+*	0:1	Default PRICING RULE to use to derive prices from this element.
«cntd»	***priceGroups***	*PriceGroup*	0:*	PRICE GROUPs associated with this element.
«cntd»	***fareTables***	*FareTable*	0:*	FARE TABLEs associated with this element.
«FK»	***TypeOfSales-OfferPackageRef***	*TypeOfSalesOffer-PackageRef*	0:1	Type of SALES OFFER PACKAGE.
«cntd»	***Condition-Summary***	*ConditionSummary*	0:1	Summary description of conditions of a SALES OFFER PACKAGE that can be used to provide passenger information.
«cntd»	***validity-Parameter-Assignments***	*GenericAccess-RightParameter-Assignment*	0:*	GENERIC PARAMETER ASSIGNMENTs (i.e. ACCESS RIGHT PARAMETER ASSIGNMENTs) associated with the SALES OFFER PACKAGE.
«cntd»	***members***	*SalesOfferPackageRef*	0:*	References to members of GROUP of SALES OFFER PACKAGEs. See above.

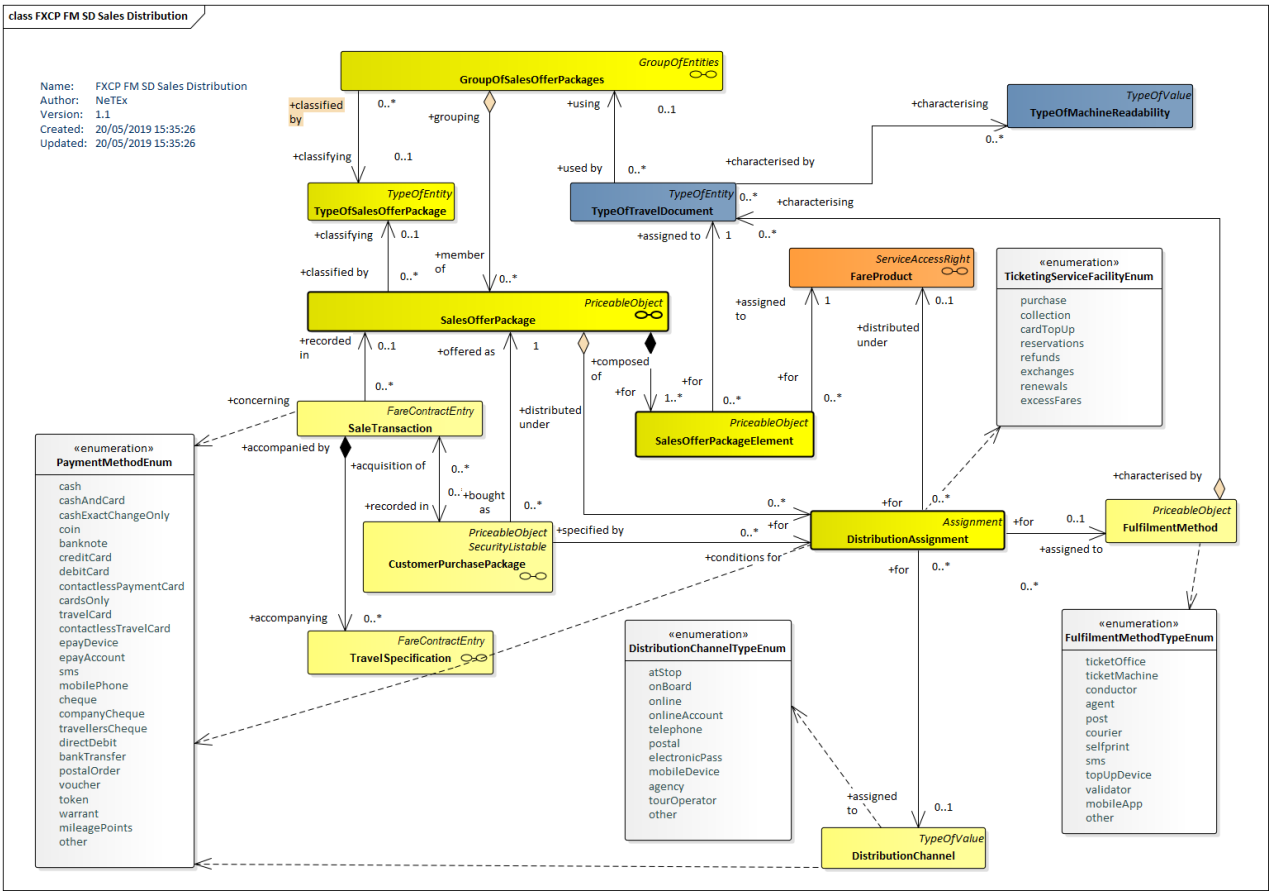
10.3 Fare Sales Distribution

Passenger information may need to include information on where particular products may be purchased for example over the counter, on-line, from self-service ticket machines, etc., as well as how they may be paid for, and how they may be collected.

SALES OFFER PACKAGEs can be restricted to specific DISTRIBUTION CHANNELs or GROUPs OF DISTRIBUTION CHANNELs using a DISTRIBUTION ASSIGNMENT.

Often only certain combinations of DISTRIBUTION CHANNEL and FULFILMENT METHOD are allowed, e.g. on-board cash paper ticket, or online to a mobile app. Certain FULFILMENT METHODS may have additional prices associated with them.

NeTEx provides number of standardised fixed value for channels and methods


class FXCP FM SD Sales Distribution
Name: FXCP FM SD Sales Distribution
Author: NeTEx
Version: 1.1
Created: 20/05/2019 15:35:26
Updated: 20/05/2019 15:35:26
GroupOfEntities
GroupOfSalesOfferPackages
TypeOfValue
TypeOfMachineReadability
TypeOfEntity
TypeOfSalesOfferPackage
TypeOfEntity
TypeOfTravelDocument
ServiceAccessRight
FareProduct
«enumeration»
TicketingServiceFacilityEnum
purchase
collection
cardTopUp
reservations
refunds
exchanges
renewals
excessFares
PriceableObject
SalesOfferPackage
PriceableObject
SalesOfferPackageElement
FareContractEntry
SaleTransaction
«enumeration»
PaymentMethodEnum
cash
cashAndCard
cashExactChangeOnly
coin
banknote
creditCard
debitCard
contactlessPaymentCard
cardsOnly
travelCard
contactlessTravelCard
epayDevice
epayAccount
sms
mobilePhone
cheque
companyCheque
travellersCheque
directDebit
bankTransfer
postalOrder
voucher
token
warrant
mileagePoints
other
PriceableObject
SecurityListable
CustomerPurchasePackage
Assignment
DistributionAssignment
PriceableObject
FulfilmentMethod
FareContractEntry
TravelSpecification
«enumeration»
DistributionChannelTypeEnum
atStop
onBoard
online
onlineAccount
telephone
postal
electronicPass
mobileDevice
agency
tourOperator
other
«enumeration»
FulfilmentMethodTypeEnum
ticketOffice
ticketMachine
conductor
agent
post
courier
selfprint
sms
topUpDevice
validator
mobileApp
other
TypeOfValue
DistributionChannel
+classified by
+grouping
+using
+characterising
+classifying
+used by
+characterised by
+member of
+assigned to
+distributed under
+recorded in
+offered as
+composed of
+for
+concerning
+accompanied by
+acquisition of
+bought as
+specified by
+conditions for
+accompanying
+characterised by

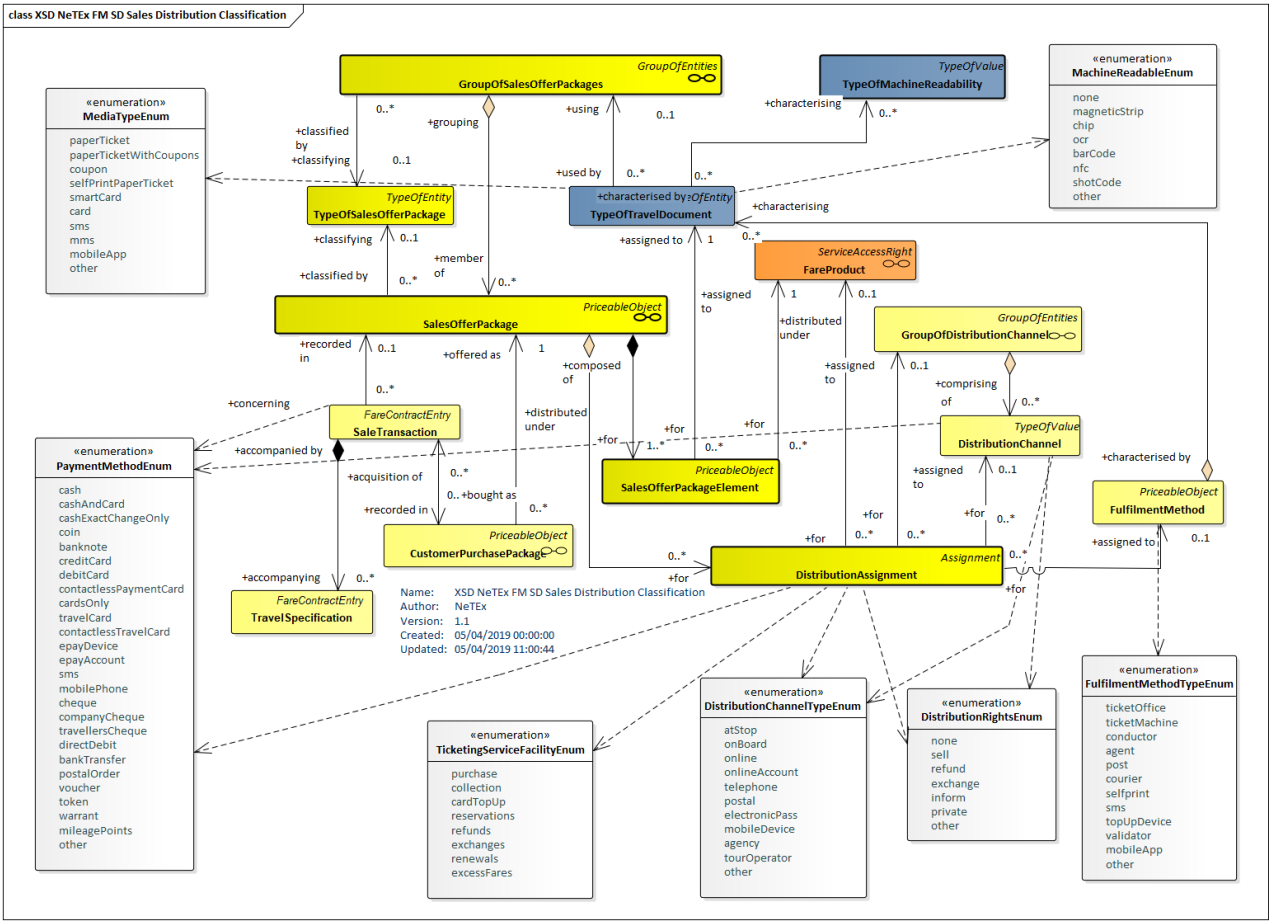


Figure 32 — Sales Distribution (UML)

10.3.1 DistributionAssignment Subcomponent of SalesOfferPackage)

An assignment of the COUNTRY and/or DISTRIBUTION CHANNEL through which a product may or may not be distributed.

Table 100 – *DistributionAssignment* – XML Element

Classification	Name	Type	Cardinality	Description
::>	::>	*Assignment*	::>	DISTRIBUTION ASSIGNMENT inherits from ASSIGNMENT.
«PK»	***id***	*DistributionAssignmentIdType*	1:1	Identifier of a DISTRIBUTION ASSIGNMENT.
«FK»	***ServiceAccess-RightRef***	*ServiceAccessRightRef*	0:1	SERVICE ACCESS RIGHT (FARE PRODUCT) for which this specifies the DISTRIBUTION ASSIGNMENT.
«FK»	***SalesOffer-PackageRef***	*SalesOfferPackageRef*	0:1	SALES OFFER PACKAGE for which this specifies the DISTRIBUTION ASSIGNMENT.

«FK»	***GroupOfSales-OfferPackages-Ref***		*GroupOfSalesOffer-PackagesRef*	0:1	GROUP OF SALES OFFER PACKAGEs for which this specifies the DISTRIBUTION ASSIGNMENT.
	Distribution-Rights		***xmlGroup***	0:1	Distribution rights associated with this DISTRIBUTION ASSIGNMENT. See below.
			CHOICE		Country in which distribution may take place.
	a	***AllCountries Ref***	*AllCountriesRef*	0:1	Distribution may be made in all countries.
«FK»	***b***	***CountryRef***	*CountryRef*	0:1	COUNTRY in which distribution can be made as described by this DISTRIBUTION ASSIGNMENT.
	AllowedIn-Country		*xsd:boolean*	0:1	Whether distribution is allowed or forbidden in the specified country.
«FK»	***Topographic-PlaceRef***		*TopographicPlaceRef*	0:1	TOPOGRAPHIC PLACE for which this specifies the DISTRIBUTION ASSIGNMENT.
			CHOICE		Channel by which distribution can be made.
	a	***All-Distribution-ChannelsRef***	*AllDistribution-ChannelsRef*	0:1	Distribution may be made through all channels.
«FK»	***b***	***Distribution-ChannelRef***	*DistributionChannelRef*	0:1	DISTRIBUTION CHANNEL for which this specifies the DISTRIBUTION ASSIGNMENT.
«FK»	***c***	***GroupOf-Distribution-ChannelsRef***	*GroupOfDistribution-ChannelsRef*	0:1	GROUP OF DISTRIBUTION CHANNELs for which this specifies the DISTRIBUTION ASSIGNMENT.
«enum»	***Distribution-ChannelType***		*DistributionChannel-TypeEnum*	0:1	Type of DISTRIBUTION CHANNEL. See earlier.
	AllowedIn-Channel		*xsd:boolean*	0:1	Whether distribution is allowed or forbidden by the specified DISTRIBUTION CHANNEL.
	RestrictedTo-Channel		*xsd:boolean*	0:1	Whether distribution is restricted to only the specified DISTRIBUTION CHANNELs.
	Mandatory-Product		*xsd:boolean*	0:1	Whether product is mandatory.
	InitialCarrier		*xsd:boolean*	0:1	Distribution by carrier of first leg of trip.
	TransitCarrier		*xsd:boolean*	0:1	Distribution by carrier of middle of trip.
	FinalCarrier		*xsd:boolean*	0:1	Distribution by carrier of final leg of trip.
			Choice		Organisation who may distribute.

«FK»	***a***	***All-Organisations Ref***	*AllOrganisationsRef*	0:1	All ORGANISATIONs may distribute.
«FK»	***b***	***Organisation Ref***	*(OrganisationRef)*	0:1	ORGANISATION for which this specifies the DISTRIBUTION ASSIGNMENT.
«FK»	***Responsibility-SetRef***		*ResponsibilitySetRef*	0:1	RESPONSIBILITY SET describing the DISTRIBUTION ASSIGNMENT.
«enum»	***Ticketing-ServiceFacility***		*TicketingService-FacilityEnum*	0:*	List of TICKETING SERVICE FACILITies, e.g. purchase, collection. top up. See Part1
«enum»	***PaymentMethods***		*PaymentMethodEnum*	0:*	Payment method supported on this distribution. See Part1
	Requires-Registration		*xsd:boolean*	0:1	Whether distribution requires the customer to register a personal identity either online or otherwise.
«FK»	***Fulfilment-MethodRef***		*FulfilmentMethodRef*	0:1	FULFILMENT METHOD to be used with this DISTRIBUTION CONDITION.
	notice-Assignments		*NoticeAssignment*	0:*	NOTICE ASSIGNMENTs associated with this DISTRIBUTION ASSIGNMENT.

10.3.2 DistributionChannel

A type of outlet for selling a product.

Table 101 – *DistributionChannel* – XML Element

Classifi-cation	Name	Type	Cardinality	Description
::>	::>	*TypeOfValue*	::>	DISTRIBUTION CHANNEL inherits from TYPE OF VALUE. See NeTEx Part1.
«PK»	***id***	*DistributionChannelIdType*	1:1	Identifier of a DISTRIBUTION CHANNEL.
«cntd»	***alternativeNames***	*AlternativeName*	0:*	Alternative names for DISTRIBUTION CHANNEL.
«enum»	***Distribution-ChannelType***	*DistributionChannel-TypeEnum*	0:1	Type of DISTRIBUTION CHANNEL. See below for allowed values. • *onBoard; online; onlineAccount; telephone; electronicPass; mobileDevice* • *agency; tourOperator;* other
	IsObligatory	*xsd:boolean*	0:1	Whether the option to use the channel is obligatory, that is, must be allowed.

	RequiresEmail-Address	*xsd:boolean*	0:1	Whether to use the channel requires an email address.
«FK»	***OrganisationRef***	*(OrganisationRef)*	0:1	ORGANISATION associated with channel.
«enum»	***PaymentMethods***	*PaymentMethodEnum*	0:*	Payment methods supported on this distribution. See NeTEx Part1 for allowed values.
«cntd»	***typesOfPayment Method***	*TypeOfPaymentMethodRef*	0:*	PAYMENT METHOD – open type. +v 1.1
«enum»	***Distribution-Rights***	*DistributionRightsEnum*	0:1	Default distribution rights for the DISTRIBUTION CHANNEL. • none; ;sell; refund; exchange' inform; private; other
«cntd»	***distribution-Points***	*PointRef+*	0:*	Points to which distribution is restricted, if any. For example, that a ticket can only be bought at a specific station.
«FK»	***Distribution-GroupRef***	*GroupOfEntitiesRef*	0:1	GROUP OF ENTITies, e.g. places, organisations or other entities (E.g. on-board specific journeys or services places) to which distribution is restricted, if any. For example, that a ticket can only be bought at a specific station.

10.3.3 FulfilmentMethod

The means by which the ticket is delivered to the Customer. e.g. online, collection, etc.

Table 102 – *FulfilmentMethod* – XML Element

Classifi-cation	Name	Type	Cardin-ality	Description
::>	::>	*PriceableObject*	::>	FULFILMENT METHOD inherits from PRICEABLE OBJECT.
«PK»	***id***	*FulfillmentMethodIdType*	1:1	Identifier of FULFILMENT METHOD.
«enum»	***Fulfilment-MethodType***	*FulfilmentMethod-TypeEnum*	0:1	Type of FULFILMENT METHOD. See allowed values below. • ticketOffice; *ticketMachine; conductor;* • *agent; post; courier* • *selfprint; sms; topUpDevice; mobileApp* • *validator; other*

	RequiresCard	*xsd:boolean*	0:1	Whether collecting ticket requires credit card used to purchase.
	Requires-Booking-Reference	*xsd:boolean*	0:1	Whether collecting ticket requires booking reference.
«cntd»	***typesOf-Document***	*TypeOfTravel-DocumentRef*	0:*	Reference to TYPEs OF TRAVEL DOCUMENT allowed by method.
«cntd»	***prices***	*FulfilmentMethodPrice*	0:*	FULFILMENT METHOD PRICEs associated with the FULFILMENT METHOD.

11 FXCP Frames for fares

NeTEx uses VERSION FRAMEs (see Part1) as a mechanism for grouping related instances of fare data into a single package for exchange.

The NeTEx schema uses an additional specific Frame – the ***FareFrame*** to hold the elements of a fare.

FARE FRAMEs have additional default value that are not used by other types of Frame.

The FXCP profile makes three different selections of fare frame elements, nested in a particular way.

11.1 FareFrame contents: UK_PI_FARE_NETWORK

The 'UK_PI_FARE_NETWORK ***FareFrame*** has a subset of data elements for defining the fare related Network Elements.

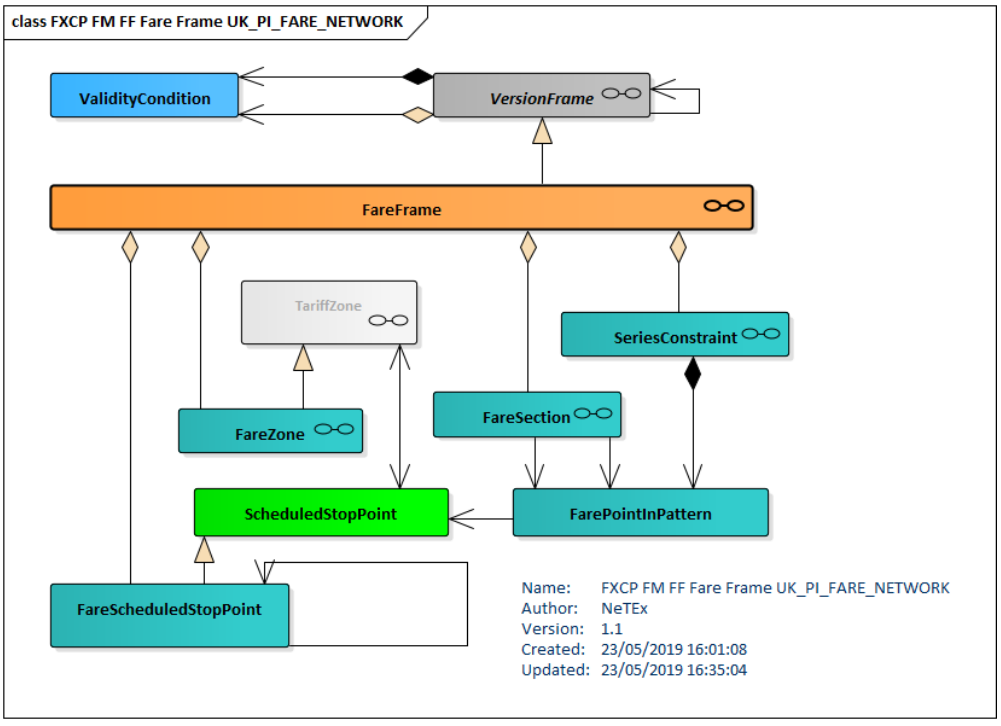


Figure 33 — Fare Frame Contents – UK_PI_FARE_NETWORK (UML)

11.1 FareFrame contents: UK_PI_FARE_PRODUCT

The ‘UK_PI_FARE_PRODUCT ***FareFrame*** has a subset of data elements for defining the TARIFF, FARE PRODUCT and SALES OFFER PACKAGE elements.

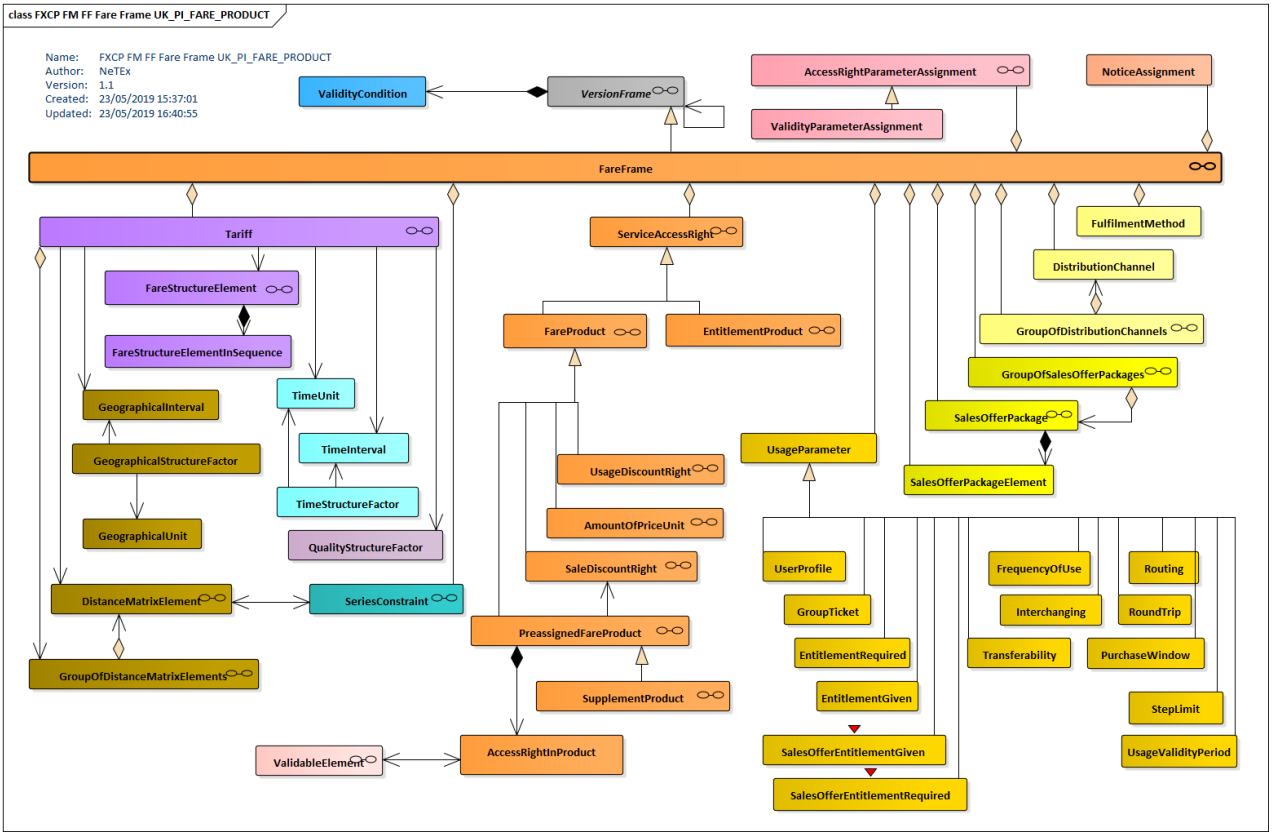


Figure 34 — Fare Frame Contents – UK_PI_FARE_PRODUCT (UML)

11.1 FareFrame contents: UK_PI_FARE_PRICE

The ‘UK_PI_FARE_PRICE ***FareFrame*** has a subset of data elements for defining the fare prices and price parameters

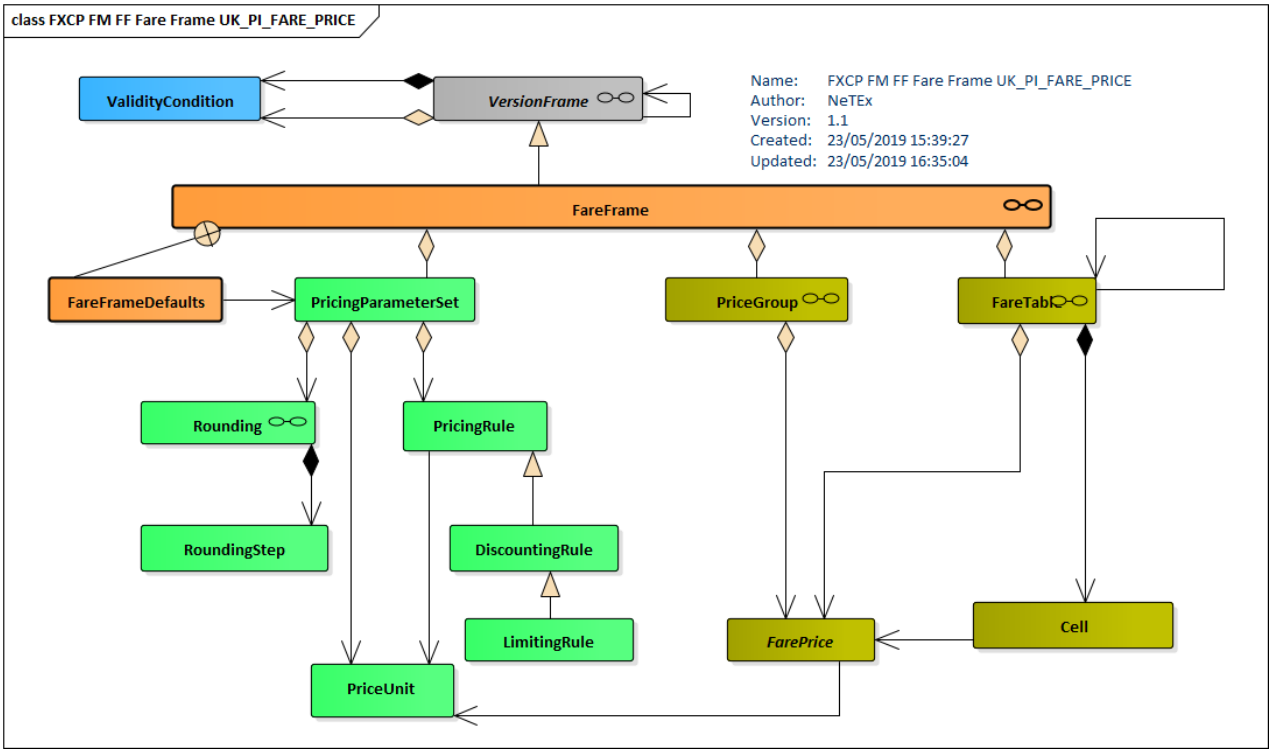


Figure 35 — Fare Frame Contents – UK_PI_FARE_PRICE (UML)

11.2 Nesting of frames

A COMPOSITE FRAME is used to group one or more other FRAME types.

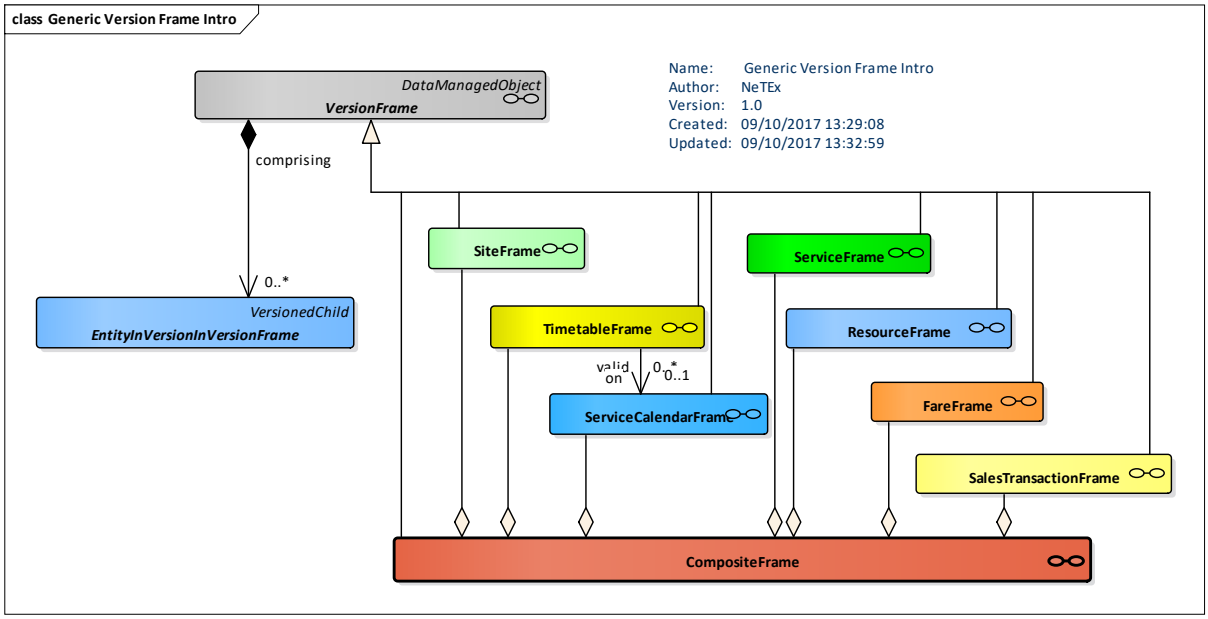


Figure 36 — Fare Frame Contents – UK_PI_FARE_PRICE (UML)

11.3 FareDefaultsGroup — (Subcomponent of FareFrame)

The set of default values for pricing etc., to be used for elements in a frame if not explicitly specified on individual elements.

Table 103 – *FareFrame / FareDefaults* – XML Element

Classification	Name	Type	Cardinality	Description
«enum»	***Mode***	*VehicleModeEnum*	0:1	Default vehicle MODE for FARE FRAME. See Part1.
«FK»	***Transport-OrganisationRef***	*(TransportOrganisationRef) OperatorRef | AuthorityRef*	0:1	Default TRANSPORT ORGANISATION for FARE FRAME. See Part1.
«FK»	***Pricing-ParameterSet***	*PricingParameterSet*	0:1	PRICING PARAMETER SET associated with FARE FRAME. See later.

12 Common rules

This section sets out common rule for the fare profile (FXCP-FM).

The fare profile follows all the same rules as to versions, identifiers, responsibilities, PublicationDelivery Headers, et., etc., as in the base FXCP-NT profile – see the Part2 document for details.

The FXCP-FM adds several further TYPEs OF FRAME for different types of ***FareFrame***, see below.

It also sets out rules for the organisation of data within each ***FareFrame***, see below

12.1 Codespaces and identifiers for fare data

The use of codespaces and identifiers on fare data is the same as that for timetable data, that is, the fare data itself will generally be assigned to the provider's (i.e. operator's) codespace, and use their identifier system, but will reference data from national data sets such as operator codes (NOC), stops (NaPTAN) places (NPTG) and *PlusBus* tariff zones (NPTG).

The identifiers of fare data elements must be stable and unique within their codespace.

The identifiers for tariff zones may in particular need to be shared by many operators; a single organisation should be assigned responsibility for issuing the identifiers for a Network.

Note: a recommended convention for naming DISTANCE MATRIX ELEMENTS is to use a '+' to connect the identifiers of the origin and destination zone or stops. For example

```
<DistanceMatrixElement version="1.0" id="myb:4400CY0037+4400CY0038">
                <Name>Alpha+Beta</Name>
                <StartStopPointRef version="naptStop:any" ref="naptStop:4400CY0037"/>
                <EndStopPointRef version="naptStop:any" ref="naptStop:4400CY0038"/>
</DistanceMatrixElement>
```

```
<DistanceMatrixElement version="1.0" id="myb:Zone1+Zone3>
                <Name>Alpha+Beta</Name>
                <StartTariffZoneRef version="any" ref="myb:Zone1"/>
                <EndTariffZoneRef version="any" ref="myb:Zone3"/>
</DistanceMatrixElement>
```

12.2 Identifiers for version frames containing fare data

Exactly the same principles may be used for the identiffiers of version frames containing fare data as those described for other types of data in the profile – see the Part2 FXCP-NT for details..

To recap -The structure of a FXCP VERSION FRAME identifier is:

[country-code] : [local-code] : [NeTEx-frame-type] _ [fxcp-type] : [frame-topic]

12.3 Names for documents containing Fare data

Exactly the same principles may be used for the names of documents containing fare data as those described for other types of data in the FXCP- in the profile – see the Part2 FXCP-NT for details.

Thus: The structure of the file name for a FXCP conformant document is:

[prefix] - [fxcp-version] _ [country-code] _ [provider-code] _ [profile-type] _ [doc-topic] _[creation-date]

Example file names:

FX-PI-01_UK_METR_LINE-FARE _L01_20160302.xml

FX-PI-01_UK_FEBR_NETWORK-FARE_WOE-060+086+110_20230909.xml

FX-PI-01_UK_DFT_STOP-FARE_NPTG-Plusbus-UK_20150705.xml

12.4 Available types of frame

UK☞ All frames in an FXCP conformant XML document containing UK fare data must be assigned to one of the standard UK FXCP-FN **TypeOfFrame** types. The available frame types are given below.

12.4.1 FXCP-NT Basic Profile frames

The following TYPEs OF FRAME from the base profile FXCP-NT are available for use in the FXCP to describe stop and network data that is referenced by the fare definitions – see the Part2 FXCP-NT for details.

Ancillary data:

- *UK_PI_COMMON*
- *UK_PI_CALENDAR*

Payload data:

- *UK_PI_STOP*
- *UK_PI_NETWORK*
- *UK_PI_TIMETABLE*

Composites:

- *UK_PI_LINE_OFFER*
- *UK_PI_NETWORK_OFFER*
- *UK_PI_STOP_OFFER*

A further TYPE OF FRAME can be used to declare FXCP specific metadata for validating the other frame types.

- *UK_PI_METADATA*

12.4.2 FXCP-FM Fare Profile frames

The following additional frames are defined in the FXCP specifically to hold fare data of different types:

Payload:

- *UK_PI_FARE_NETWORK*
- *UK_PI_FARE_PRODUCT*
- *UK_PI_FARE_PRICE*

Composite:

- *UK_PI_LINE_FARE_OFFER*
- *UK_PI_NETWORK_FARE_OFFER*
- *UK_PI_STOP_FARE_OFFER*

The following tables summarise the content of each TYPE OF FRAME.

12.4.3 Classes for SPECIFIC FARE FRAMEs

The following notation is used:

	Unless nesting is indicated by an arrow, elements are contained directly in their frame type.
➔	Subelement is a component of preceding composite element: it must be embedded in-line within wrapper tags as per the NeTEx schema. (additional arrows indicated additional subcomponent levels).
→	Subelement is an independent element referenced by another element: In the FXCP and the EPIP it should be nested within the referencing element that it annotates.
*	Parent is generic – the subelement may be nested within more than one type of element (If no parent is indicated, element is nested directly within a FRAME.
()	Classes in brackets are abstract
	The most important “payload” entities for FXCP in each frame are highlighted in pink.

++	Elements in the UK FXC profile but not in the EPIP are marked with a ++
'epip'	Epip_metadata namespace =http:/nete-cen.eu/epip

12.4.3.1 UK_PI_FARE_NETWORK

Table 1 — TypeOfFrame: *UK_PI_FARE_NETWORK*

Name	XML Type	Content XML Classes & Nesting	TM Entities & Composition
id	*TypeOfFrameIdType*	'fxc:*UK_PI_FARE_NETWORK*'	TYPE OF FRAME
FrameClassRef	*NameOfClass*	***FareFrame***	FARE FRAME
classes	*ClassInContextRef*	***FareScheduledStopPoint***	FARE SCHEDULED STOP POINT
		TariffZone ***FareZone*** →***FareSection*** →→***PointOnSection***	TARIFF ZONE FARE ZONE FARE SECTION POINT ON SECTION
		SeriesConstraint →***FarePointInPattern***	SERIES CONSTRAINT →FARE POINT IN PATTERN
Data Scope: PAYLOAD	A ***ServiceFrame*** instance conforming to '*UK_PI_NETWORK*' shall contain schedule data for only a single LINE.		
UK Data use	• When exchanging timetable data from TransXChange, usd to define the FARE SCHEDULED STOP POINTs, FARE ZONEs. • When exchanging fare data used to define the LINEs and VEHICLE JOURNEYs corresponding to the TransXChange entities.		

12.4.3.2 UK_PI_FARE_PRODUCT

Table 2 — TypeOfFrame: *UK_PI_FARE_PRODUCTK*

Name	XML Type	Content XML Classes & Nesting	TM Entities & Composition
id	*TypeOfFrameIdType*	'fxc:*UK_PI_FARE_PRODUCT*'	TYPE OF FRAME
FrameClassRef	*NameOfClass*	***FareFrame***	FARE FRAME
classes	*ClassInContextRef*	***Tariff*** →***GeographicalInterval*** →***TimeInterval*** →***DistanceMatriElement*** →***GroupOfDistanceMatrixElements*** →***QualityFareStructureFactor***	***TARIFF*** ***GEOGRAPHICAL INTERVAL*** ***TIME INTERVAL*** ***DISTANCE MATRIX ELEMENT*** GROUP OF DISTANCE MATRIX ELEMENTS QUALITY FARE STRUCTURE FACTOR

		→FareDemandFactor	FARE DEMAND FACTOR
		→FareStructureElement	FARE STRUCTURE ELEMENT
		→→GenericParameterAssignment	→GENERIC PARAMETER ASSIGNMENT
		→→|UserProfile |CompanionProfile ***→→|GroupTicket*** ***→→|RoundTrip | Interchanging*** ***→→|Frequency| StepLimit*** ***→→|UsageValidityPeriod*** ***→→|Transferability*** ***→→|PurchaseWIndow***	USER PROFILE | COMPANION PROFILE | GROUP TICKET | ROUND TRIP | INTERCHANGING | FREQUENCY | STEP LIMIT USAGE VALIDITY PERIOD | TRANSFERABILITY | PURCHASE WINDOW
		PreassIgnedFareProduct ***AmountOfPriceUnit*** ***SalesDiscountRight*** ***SupplementProduct*** ***→AccessRightInProduct*** ***→ValidableElement*** ***→→GenericParameterAssignment***	PREASSIGNED FARE PRODUCT AMOUNT OF PRICE UNIT SALES DISCOUNT RIGHT SUPPLEMENTPRODUCT →ACCESS RIGHT IN PRODUCT VALIDABLE ELEMENT →GENERIC PARAMETER ASSIGNMENT
		TypeOfTravelDocument	TYPE OF TRAVEL DOCUMENT
		SalesOfferPackage ***→SalesOfferPackageElement*** ***→DistributionAssignment***	SALES OFFER PACKAGE →SALES OFFER PACKAGE ELEMENT →DISTRIBUTION ASSIGNMENT
		GroupOfSalesOfferPackages ***→SalesOfferPackageElement*** ***→DistributionAssignment***	GROUP OF SALES OFFER PACKAGEs →SALES OFFER PACKAGE ELEMENT DISTRIBUTION ASSIGNMENT
		TypeOfTravelDocument	TYPE OF TRAVEL DOCUMENT
		DistributionChannele	DISTRIBUTION CHANNEL
		FulfilmentMethod	FULFILMENT METHOD
Data Scope: PAYLOAD	A ***FareeFrame*** instance conforming to '*UK_PI_FARE_PRODUCT*' shall contain product data for a single LINE.or NETWORK		
UK Data use	• When exchanging fare for FareXChange, used to define the TARIFFs, FARE PRODUCTs and SALEs OFFER PACKAGEs for a LINE or NETWORK.		

12.4.3.3 UK_PI_FARE_PRICE

Table 3 — TypeOfFrame: *UK_PI_FARE_PRICE*

Name	XML Type	Content XML Classes & Nesting	TM Entities & Composition
id	*TypeOfFrameIdType*	'fxc:*UK_PI_FARE_PRICE*	TYPE OF FRAME
FrameClassRef	*NameOfClass*	***FareFrame***	FARE FRAME
classes	*ClassInContextRefP*	***PricingParameterSet***	PRICING PARAMETER SET

		➔***PricingRule***	➔PRICING RULE
		➔***DiscountingRule***	➔DISCOUNTING RULE
		➔***LimitingRule***	➔LIMITING RULE
		➔***PriceUnit***	➔PRICE UNIT
		➔***Rounding***	➔ROUNDING
		FareTable	FARE TABLE
		➔***FareColumn***	➔FARE COLUMN
		➔***FareRow***	➔FARE ROW
		➔***Cell***	➔CELL
		➔***FarePrice***	→FARE PRICE
		➔***{FareTable}***	➔{FARE TABLE}
		PriceGroup	PRICE GROUP
		➔***FarePrice***	→FARE PRICE
Data Scope: PAYLOAD	A ***FareFrame*** instance conforming to *'UK_PI_FARE PRICE'* shall contain price data for a corresponding FARE_PRODUCT ***FareFrame***.		
UK Data use	• When exchanging fare for FareXChange, used to define the FARE PRICEs for a TARIFF.		

12.4.4 Classes for COMPOSITE FARE FRAMEs

12.4.4.1 UK_PI_LINE_FARE_OFFER

Table 4 — *TypeOfFrame for* *UK_PI_LINE_FARE_OFFER - ("FXCP-FL")*

Name	Type		Content XML Classes & Nesting	TM Entities & Composition
id	*TypeOfFrameIdType*		*'fxc:UK_PI_LINE_OFFER'*	TYPE OF FRAME
FrameClassRef	*NameOfClass*		***CompositeFrame***	COMPOSITE FRAME
includes	*TypeOfFrameRef*	*1:1*	• *'fxc:UK_PI_COMMON'*	TYPE OF FRAME (RESOURCE FRAME)
		0:1	• *'fxc:UK_PI_STOP'*	TYPE OF FRAME (SITE FRAME)
		1:1	• *'fxc:UK_PI_NETWORK'*	TYPE OF FRAME (SERVICE FRAME)
		1:1	• *fxc:UK_PF_FARE_NETWORK'*	TYPE OF FRAME (FARE FRAME)
		*1:**	• *'fxc:UK_PF_FARE_PRODUCT'*	TYPE OF FRAME (FARE FRAME)
		*1:**	• *'fxc:UK_PF_FARE PRICE'*	TYPE OF FRAME (FARE FRAME)

		0:1	• *'fxc:UK_PI_CALENDAR'*	TYPE OF FRAME (SERVICE CALENDAR FRAME
Data Scope: CONTAINER	A ***CompositeFrame*** instance conforming to '*UK_PI_FARE_OFFER'* shall contain fare data for only a single LINE.			

12.4.4.2 UK_PI_NETWORK_FARE_OFFER

Table 5 — *TypeOfFrame for* *UK_PI_NETWORK_FARE_OFFER* - *("FXCP-FN")*

Name	Type		Content XML Classes & Nesting	TM Entities & Composition
id	*TypeOfFrameIdType*		*'fxc:UK_PI_NETWORK_FARE_OFFER'*	TYPE OF FRAME
FrameClassRef	*NameOfClass*		***CompositeFrame***	COMPOSITE FRAME
includes	*TypeOfFrameRef*	*1:1*	• *'fxc:UK_PI_COMMON'*	TYPE OF FRAME (RESOURCE FRAME)
		0:1	• *fxc:UK_PI_STOP'*	TYPE OF FRAME (SITE FRAME)
		1:1	• *'fxc:UK_PI_NETWORK'*	TYPE OF FRAME (SERVICE FRAME)
		*1:**	• *'fxc:UK_PF_FARE_NETWORK'*	TYPE OF FRAME (FARE FRAME)
		*1:**	• *'fxc:UK_PF_FARE_PRODUCT'*	TYPE OF FRAME (FARE FRAME)
		*1:**	• *fxc:UK_PF_FARE_PRICE'*	TYPE OF FRAME (FARE FRAME)
		0:1	• *'fxcp:UK_PI_CALENDAR'*	TYPE OF FRAME (SERVICE CALENDAR FRAME
Data Scope: CONTAINER	A ***CompositeFrame*** instance conforming to '*UK_PI_FARE_NETWORK OFFER'* shall contain fare data for a NETWORK or part of a NETWORK (E.g. a GROUP OF LINEs).			

12.4.4.3 UK_PI_STOP_FARE_OFFER

Table 6 — TypeOfFrame for* *UK_PI_FARE STOP_OFFER* – *("FXCP-FS")

Name	Type		Content XML Classes & Nesting	TM Entities & Composition
id	*TypeOfFrameIdType*		*'fxc:UK_PI_STOP_FARE_OFFER'*	TYPE OF FRAME
FrameClassRef	*NameOfClass*		***CompositeFrame***	COMPOSITE FRAME
includes	*TypeOfFrameRef*	*1:1*	• *'fxc:UK_PI_COMMON'*	TYPE OF FRAME (RESOURCE FRAME)
		0:1	• *'fxc:UK_PI_STOP'*	TYPE OF FRAME (SITE FRAME)
		1:1	• *fxc:UK_PI_NETWORK'*	TYPE OF FRAME (SERVICE FRAME)
		*1:**	• *'fxc:UK_PF_FARE NETWORK'*	TYPE OF FRAME (FARE FRAME)

Data Scope: CONTAINER	A ***CompositeFrame*** instance conforming to '*UK_PI_STOP_FARE_OFFER*' shall contain dat about the network for defining fares data for an operator or an area.

12.1 Permitted combinations of tariff elements

12.1.1 Likely combinations of tariff types and products

As discussed in the Prat1 introduction, not all types of tariff structure are relevant for all the posible product types. Furthermore certain possible combinations are not used in UK local bus fares. The following table shows the likely combinations of tariff types trip, multi-trip and pass products, using the NeTEx TariffType and FareProduct enumerated values as classifiers..

Key

- NFB – Possible to define in NeTEx, but not found in UK buses.
- LGP – Found in long distance products (coach, rail etc), but not local bus.
- () – Applied through by another parameter
- n/a – not applicable.

Table 104 – Tariff types *forr* Trip, Multitrip and Pass products

	Fare Product			
	Trip	**Multi-trip**	**Pass**	**Supplement**
				✚
				
FareProduct TariffType	***PreassignedFareProduct***	***AmountOfPriceUnit***	***Preassigned-FareProduct***	***SupplementProduct***
flat 	*singleTrip*	*tripCarnet* *passCarnet*	*NFB*	*supplement*
pointToPoint 	*shortTrip,* *singleTrip,* *timeLimitedSingleTrip,* *dayReturnTrip,* *periodReturnTrip*	*tripCarnet*	*periodPass (LGP)*	*Bicycle, etc* *journeyExtension,* *journeyAddon,*
zoneToZone 	*singleTrip. dayReturnTrip*	*tripCarnet*	*n/a*	*n/a*

zonal 	*singleTrip, timeLimitedSingleTrip*	*passCarnet*	*dayPass, periodPass,*	*animal, topup, parking etc*
unitSection 	*singleTrip*	*unitCoupon*	*n/a*	*n/a*

12.1.2 Likely combinations of products and tariff structure elements

Not all tariff structure elements are relevant for all product types and only certain USAGE PARAMETERs are relevant as pricing factors their own right. The following table shows which parameters are relevant for UK bus Trip, multi-trip and Pass products.

Key

- NFB – Possible to define in NeTEx, but not found in UK buses.
- LGP – Found in long distance products (coach, rail etc), but not local bus.
- () – Applied through by another parameter
- n/a – not applicable.

Table 105 – Network & *Tariff elements* – For Trip, Multitrip and Pass products

	Trip	**Multi-trip**	**Pass**	**Use as pricing factor?**
FareProduct **Fare structure element**	***Preassigned-FareProduct***	***AmountOf-PriceUnit***	***Preassigned-FareProduct***	
TariffZone	Zonal, zoneToZone	Yes	dayPass, periodPass	(DistanceMatrixElement)
FareSection / Stage	Stage fare	n/a	n/a	(GeographicInterval)
DistanceMatrixElement	pointToPoint zoneToZone	tripCarnet passCarnet	LGP periodPass	Yes
GeographicInterval	unitSection	Stored Unit	NFB	Yes
TimeInterval	timeLimitedFare	passCarnet	dayPass, periodPass	Yes
FareQualityFactor	NFB	tripCarnet passCarnet	NFB	Yes

FareDemandFactor	pointToPoint zoneToZone	tripCarnet passCarnet	Yes	(SalesOfferPackage)

12.1.3 Likely combinations of products and usage parameters

Not all USAGE PARAMETERS are relevant for all product types and only certain USAGE PARAMETERs are relevant as pricing factors in their own right. The following table shows which parameters are relevant for UK bus Trip, multi-trip and Pass products.

Key

- NFB – Possible to define in NeTEx, but not found in UK buses.
- LGP – Found in long distance products (coach, rail etc), but not local bus.
- () – Applied through another parameter.
- n/a – not applicable.

Table 106 – *USAGE PARAMETERs* – For Trip, Multi-trip and Pass products

Usage Parameter	Trip	Multi-trip	Pass	Use as pricing factor?	FXCP scope
UserProfile	Yes	Yes	Yes	Yes	Basic
CompanionProfile	Yes	Yes	Yes	(UserProfile)	Basic
GroupTicket	Single, return	NFB	Yes	Yes	Basic
ResidentialQualification	(UserProfile)	NFB	(UserProfile)	(UserProfile)	Advanced
CommercialProfile	All	NFB	All	Yes	Advanced
RoundTrip	Single, Return, out, back	Single/ Return	Day	(ValidableElement)	Basic
FrequencyOfUse	n/a	n/a	NFB	No	Basic
Interchanging	Yes	NFB	**n/a**	NFB	Basic
UsageValidityPeriod	Use by	Use by	Start by	No	Basic
StepLimit	Single	NFB	**n/a**	No	Advanced
Routing	LGP	LGP	LGP	LGP	Advanced
EntitlementRequired	Yes	Yes	Yes	No	Advanced

EntitlementGiven	No	No	Yes	No	Advanced
EntitlementConstraint	Yes	n/a	Yes	No	Extra
LuggageAllowance	LGP	LGP	**n/a**	(SupplementProduct)	Advanced
Transferability	Yes	Yes	Yes	No	Basic
PurchaseWindow	LGP	LGP	Yes	(SalesOfferPackage)	Basic
Reserving	LGP	LGP	**n/a**	LGP	Advanced
Cancelling	LGP	LGP	**n/a**	No	Advanced
BookingArrangements	(Flexible transport)	NFB	**n/a**	No	Advanced
Exchanging	LGP	LGP	Yes	No	Advanced
Refunding	LGP	LGP	Yes	No	Advanced
Replacing	LGP	LGP	Yes	No	Advanced
Suspending	**n/a**	**n/a**	NFB	No	Advanced
ChargingPolicy	Yes	**n/a**	**n/a**	No	Advanced
PenaltyPolicy	Yes	**n/a**	**n/a**	No	Advanced
Subscribing	**n/a**	**n/a**	Yes	(SalesOfferPackage)	Advanced

Table 107 – *USAGE PARAMETERs* – SALES DISCOUNT RIGHT

Usage Parameter	Sales Discount Right	Pricing Factor	FXCP scope
UserProfile	All	Yes	Basic
ResidentialQualification	(UserProfile)	(UserProfile)	Advanced
EntitlementRequired	Yes	n/a	Advanced
EntitlementGiven	Yes	n/a	Advanced
Replacing	Yes	n/a	Advanced

12.2 Organisation of fare data

The FXCP sets out a specific structure of organising data within FXCP document in order to facilitate implementation. See also example below.

12.2.1 Use of frames

Data should be assigned to one of the specified types of FXCP frame, each classified with a ***TypeOfFrame***, as described above, and indicating the prerequisite frames.

1. Basic profile frames as described in Part2 (FXCP-NT) should be used to define any prerequisite data elements such as OPERATORs, BRANDING and RESPONSIBILITY SETs (in a ***ResourceFrame*** of type UK_PI_COMMON), SCHEDULED STOP POINTs PLACEs (in a ***ServiceFrame*** of type UK_PI_NETWORK) etc.

2. Fare network data elements, such as a FARE ZONES, FARE SECTIONs, etc (which may be shared between multiple products) should be placed in a separate ***FareFrame*** of type UK_PI_FARE_NETWORK. The frame should declare any prerequisite UK_PI_NETWORK frames upon which it depends.

3. Elements to define a single product in particular TARIFFs, FARE PRODUCTS, and SALES OFFER PACKAGEs should be placed in a separate ***FareFrame*** of type UK_PI_FARE_PRODUCT. The frame should declare any prerequisite UK_PI_FARE_NETWORK frames upon which it depends.

4. Prices for the SALES OFFER PACKAGE should be placed in a separate ***FareFrame*** of type UK_PI_FARE_PRICE; there should be a PRICE FRAME corresponding to each PRODUCT frame giving the prices for the PRODUCTs. The frame should declare the prerequisite UK_PI_FARE_PRODUCT frame for which it states the prices.

12.2.2 Organisation of fare product definitions

A UK_PI_FARE_PRODUCT frame should group together the elements needed to define a single fare product or set of closely related products (e.g. a trip, a pass, a carnet), along with the ***SalesOfferPackage*** instances that define how they are marketed. A product frame should contain.

- A ***Tariff***, embedding ***FareStructureElement, DistanceMatrixElement, TimeInterval, GeographicInterval,*** and ***FareQualityFactor i***nstances.

- One or more ***FareProduct*** instances:

- One or more ***SalesOfferPackage*** instances, referencing the fare products defined in the frame.

There is usually just one ***Tariff*** per product, and one or more ***SalesOfferPackage*** per fare product.

Furthermore:

- ***UsageParameter*** instances should be grouped within ***FareStructureElement*** instances in a ***Tariff*** (and not be contained directly in the ***FareFrame***). If necessary, a ***FareStructureElement*** may reference a ***UsageParameter*** of another ***Tariff.***

- ***ValidableElement*** instances should be nested within a ***FareProduct*** (and not be contained directly in the ***FareFrame***). If necessary, a ***FareProduct*** may reference a ***ValidableElement*** of another ***FareProduct.***

- Each ***FareProduct*** should be categorised with a ***ProductType*** and a ***TariffStructureType.***

12.2.3 Fare table nesting rules

When creating FARE TABLEs for the FXCP, the following principles should be followed

g. FARE PRICEs should be nested in FARE TABLEs for clarity and to reduce data volumes.

h. Each NESTING LAYER SHOULD correspond to one further pricing factor

i. The type of fare price used should be for that of lowest level element, For example if the lowest level is the USER PROFILE (a type of USAGE PARAMETER), such as 'Adult' or 'Child', then it should be a USAGE PARAMETER PRICE, if it is a TYPE OF TRAVEL DOCUMENT (as associated with a SALES OFFER PACKAGE) it should be a SALES OFFER PACKAGE PRICE, etc

j. Where the price is for a specific fare element such as a DISTANCE MATRIX ELEMENT, TIME INTERVAL, GEOGRAPHICAL INTERVAL etc, the relevant price should be embedded in line and must include a reference to the priced element.

k. Where the price is for an additional option out of several specified for a single FARE STRUCTURE ELEMENT (as say may be the case for a FARE ZONE or a CLASS OF USE, a reference to the specific option should be included in the CELL, for example: a ***FareZoneRef***, or ***ClassOfUseRef***, so that a consuming system can determine its meaning.

l. The preferred order for nesting tables is

   SALES OFFER PACKAGE / {spatial Factor] / (TIME INTERVAL) / USER PROFILE / CLASS OF USE /

   Where Spatial factor is either

   (1) DISTANCE MATRIX ELEMENT or

   (2) FARE STRUCTURE ELEMENT + ZONE

   (3) GEOGRAPHICAL INTERVAL

Table 108 – *Common fare pricing factors*

	Pricing factor	Tariff element	FARE PRICE	Cell Assignment
Point-to-point fare	*DISTANCE MATRIX ELEMENT*	*DISTANCE MATRIX ELEMENT*	*DISTANCE MATRIX ELEMENT PRICE*	***[DistanceMatrixElementRef)***
Zonal fare	*FARE ZONE*	*FARE STRUCTURE ELEMENT*	*FARE STRUCTURE ELEMENT PRICE*	***[FareStructureElementRef)*** ***FareZoneRef***
Different media	*TYPE OF TRAVEL DOCUMENT*	*SALES OFFER PACKAGE ELEMENT*	*SALES OFFER PACKAGE PRICE*	***(SalesOfferPackageRef)*** ***TypeOfTravelDocumentRef***

				FareProductRef
Pass	*TIME INTERVAL*	*TIME INTERVAL*	*TIME INTERVAL PRICE*	***(TimeIntervalRef)***
Stage fare	*GEOGRAPHICAL INTERVAL*	*GEOGRAPHICAL INTERVAL*	*GEOGRAPHICAL INTERVAL PRICE*	***(GeographicIntervalRef)***
Carnet	*FARE QUALITY FACTOR*	*FARE QUALITY FACTOR*	*FARE STRUCTURE FACTOR PRICE*	***(FareQualityFactorRef)***
Peak/OffPeak	*FARE DEMAND FACTOR*	*FARE DEMAND FACTOR*	*FARE STRUCTURE FACTOR PRICE*	***(FareDemandFactorRef)***
Class of Use	*CLASS OF USE*	*FARE STRUCTURE ELEMENT*	*FARE STRUCTURE ELEMENT PRICE*	***(SalesOfferPackageRef)*** ***ClassOfUsetRef***
Delivery options	*FULFILMENT METHOD*	*FULFILMENT METHOD*	*FULFILMENT METHOD PRICE*	
	SUPPLEMENT FARE PRODUCT	*SUPPLEMENT FARE PRODUCT*	*FARE PRODUCT PRICE*	***(SupplementFareProductRef)***

12.3 Classification of fare elements

Data elements should be classified with the NeTEx built in enumerated values and in some cases also the appropriate FXCP ***TypeOfValue***.

12.3.1 Classifications of Tariffs

Each FXCP Tariff should be categorised with a ***TariffBasis*** and a ***TypeOfTariff*** fxc :value

Each FXCP ***FareStructureElement*** should be classified with a ***TypeOfFareStructureElement*** fxc:value

Each FXCP ***AccessRightAssignments*** should be classified with a ***TypeOfAccessRightAssignment***

Classifications of FareProduct

Each FXCP FARE PRODUCT should be categorised with a ***ProductType*** values

- Each ***FareStructureElement*** should be categorised with one of the 'fxc TypeOfFareStructureElement' values.
- A ***TypeOfFareStructureElement*** can be used to further indicate to a consumer system the meaning of particular fare structure elements.
- Each ***ValidityParameterAssignments*** should be categorised with one of the 'fxc:***TypeOfAccessRightAssignment'*** values.

Table 109 – *Classifications of FareStructureElements*

Tariff aspect	***FareStructureElement*** contents or references	***TypeOfFareStructure-ElementRef***	***TariffBasis***
Point-to-point fare	***DistanceMatrixElement***	*'fxc:access'*	*pointToPoint*
Zone-to-zone fare	***DistanceMatrixElement***	*'fxc:access'*	*pointToPoint*
Zonal fare	***TariffZone***	*'fxc:access'*	*zoneToZone*
Stage/Section fare	***GeographicalInterval, GeographicalStructureFactor***	*'fxc:access'*	*unitSection*
Flat fare	***Network, Groupof Lines, Line***	*'fxc:access'*	*flat*
Period pass	***TimeInterval, TimeStructureFactor***	*'fxc: durations*	*period*
Peak/offpeak, etc	***FareDemandFactor***	*'fxc:access_when'*	
Carnet	***QualityStructureFactor***	*'fxc: carnet_units*	*pointToPoint, zoneTone, zone*
	Operator, Authority, GroupOfOperators	*'fxc: accepted_by*	
Quota	***FareQuotaFactor***	*'fxc: quotas'*	*pointToPoint*
User Type	***UserProfile***	*'fxc: carnet_units'*	*other*
Group Ticket	***GroupTicket***	*'fxc: groups'*	
Discount Rights	***EntitlementGiven***	*'fxc: entitles'*	*other*
Discount Rights	***EntitlementRequiredn***	*'fxc: prerequisites'*	*other*
Validity	***FareStructureElementInSequence***	*'fxc: steps'*	*other*

Validity	***RoundTrip, StepLimit, Frequency, Transferring, Interchanging, ValidityPeriod, etc***	*'fxc: travel_conditions'*	*other*
Commercial	***PurchaseWindow, Transferability, Refunding, Exchanging, Replacing, etc***	*'fxc: sales_conditions'*	*other*
Avalability	***FareQuotaFactor***	*'fxc: quotas*	*other*

Only certain combinations of ***FareStructureElement*** and ***TypeOfAccessRightAssignment*** **are meaningful.**

Table 110 – ***Classifications of FareStructureElements and TypeOfAccessRightAssignment***

TypeOfFare-StructureElement	**Description**	***TypeOfAccessRigh-tAssignment***	De`scription
fxc:eligibility	Eligibility to purchase	*fxc:eligible*	Eligible for a product or discount
fxc:groups	Available Group	*fxc:can_access*	Grants access rights to use or travel on
fxc:access	Access rights	*fxc:can_access*	Grants access rights to use or travel on
fxc:access	Access rights	*fxc:cannot_access*	Revokes access rights to use or travel on
fxc:access	Access rights	*fxc:must_access*	Requires access rights to use or travel on
fxc:accepted_by	Accepted by operator	*fxc:can_access*	Grants access rights to use or travel on
fxc:access_when	Fare demand :peak /off peak etc access rights to use or travel during some period	*fxc:can_access_when*	Grants access rights to use or travel during some period
fxc:durations	Available Time intervals	*fxc:can_purchase_as*	Available duration of travel
fxc:intervals	Available Geographical intervals	*fxc:can_purchase_as*	Available interval
fxc:carnet_units	Available units for purchase	*fxc:can_purchase_as*	Gives right to purchase
fxc:quotas	Available Quotas	*fxc:quota_applies*	Quota applies

fxc:media	Condition oin Media	*fxc:can_use_with_type-_of_travel_document*	Right defines tye travel document condition
fxc:steps	Steps in sequence	*fxc:condition_of_use*	
fxc:validity	Validity	*fxc:validity_chaining*	
fxc:travel_conditions	Condition on use	*fxc:use_before*	Takes properties from group package
fxc:travel_conditions	Condition on use	*fxc:condition_of_use*	Defines a condition or restriction on use
fxc:travel_conditions	Condition on use	*fxc:penalties*	Penalties for misuuse
fxc:sale_conditions	Defines a condition or restriction on purchase	*fxc:condition_of_sale*	Defines a condition or restriction on purchase
Fxc:booking	Condition for reservation	*fxc:reservation_condition*	Indicates need for reservation
fxc:sale_conditions	Defines a condition or restriction on purchase	*fxc:can_purchase_as*	Purchasable item
fxc:sale_conditions	Defines a condition or restriction on purchase	*fxc:can_purchase_when*	Specifies when a purchase can be made
fxc:sale_conditions	Defines a condition or restriction on purchase	*fxc:distribution_channel_restriction*	Constrains availability for distribution by a channel
fxc:sale_conditions	Defines a condition or restriction on purchase	*fxc:can_use_to_pay_for*	Gives ability to purchase automatically using
fxc:sale_conditions	Defines a condition or restriction on purchase	*fxc:promotion_applies*	Promotion applies
fxc:outlets	Specifies where a purchase can be made	*fxc:can_purchase_where*	Specifies where a purchase can be made
fxc:payment_schedules	Payment Schedules	*fxc:payment_schedules*	Specifies nature ofs ubcription
fxc:prerequisites	Defines required entitlements	*fxc:prerequisites*	Requires right to other products
fxc:entitles	Defines rights to other products	*fxc:gives_entitlement*	Gives right to other products

12.4 Example XML: Code organisation for a simple fare product.

The following example encodes a simple point-to-point tariff for a line with just three stops, Alpha, Beta and Gamma, along with a fare product, scales offer package and prices. The elements are organised into frames and nested as required by the FXCP.

Table 111 – *Example Price matrix for Mybus line 1*

Alpha		
£1.60	**Beta**	
£2.40	£1.80	**Gamma**

12.4.1 Example XML: UK_PI_LINE_FARE_OFFER CompositeFrame

The following XML fragment shows the top levels of a COMPOSITE FRAME of type UK_PI_LINE_FARE_OFFER that contains all the other frames. The frames may be in any order.

A frame also allows us to set defaults for the frame contents such as a default currency for financial amounts.

```
<CompositeFrame version="1.0" id="epd:UK:myb:CompositeFrame_UK_PI_LINE_FARE_OFFER:Trip@Line_3"
dataSourceRef="myb:Mybus" responsibilitySetRef="myb:tariffs">
    <ValidBetween>
        <FromDate>2019-01-01T00:00:00</FromDate>
        <ToDate>2020-12-31T12:00:00</ToDate>
    </ValidBetween>
    <Name>Mybus 1 0 - Fares Example</Name>
    <Description>This is a basic example of point to point fares for e</Description>
    <TypeOfFrameRef ref="fxc:UK:DFT:TypeOfFrame_UK_PI_LINE_FARE_OFFER:FXCP"
versionRef="fxc:v1.0"/>
    <!-====== CODESPACEs ==== -->
    <codespaces>
        <CodespaceRef ref="fxc_metadata"/>
        <CodespaceRef ref="noc_data"/>
        <CodespaceRef ref="naptStop_data"/>
        <CodespaceRef ref="myb_data"/>
    </codespaces>
    <FrameDefaults>
        <DefaultCodespaceRef ref="myb_data"/>
        <DefaultDataSourceRef ref="myb:Mybus" version="1.0"/>
        <DefaultCurrency>GBP</DefaultCurrency>
    </FrameDefaults>
    <frames>
        <!-==== FARE PAYLOAD ==== -->
        <ServiceFrame version="1.0" id="epd:UK:myb:ServiceFrame_UK_PI_NETWORK:Line_3:myb"
                dataSourceRef="myb:Mybus" responsibilitySetRef="myb:tariffs">
        :::: FRAME CONTENTS::::::
        </ServiceFrame>
        <FareFrame version="1.0" id="epd:UK:myb:FareFrame_UK_PI_FARE_PRODUCT:Trip@Line_3:myb"
                dataSourceRef="myb:Mybus" responsibilitySetRef="myb:tariffs">
        :::: FRAME CONTENTS::::::
        </FareFrame>
        <FareFrame version="1.0" id="epd:UK:myb:FareFrame_UK_PI_FARE_PRICE:Trip@Line_3:myb"
                dataSourceRef="myb:Mybus" responsibilitySetRef="myb:tariffs">
        :::: FRAME CONTENTS::::::
        </FareFrame>
                <!-==== OPERATOR COMMON RESOURCES==== -->
        <ResourceFrame version="1.0" id="epd:UK:MYBUS:ResourceFrame_UK_PI_COMMON:MYBUS:myb"
                    dataSourceRef="myb:Mybus" responsibilitySetRef="myb:network_data">
            <Name>Mybus Operator specific  common resources</Name>
```

```
            <TypeOfFrameRef ref="fxc:UK:DFT:TypeOfFrame_UK_PI_COMMON:FXCP" versionRef="fxc:v1.0"/>
        :::: FRAME CONTENTS::::::
        </ResourceFrame>
    </frames>
</CompositeFrame>
```

12.4.2 Example XML: UK_PI_COMMON ResourceFrame

The following XML fragment shows a definition of a RESOURCE FRAME of type UK_PI_COMMON that provides common details about the OPERATOR, RESPONSIBILITY SET DATA SOURCE etc for all the other frames. The same frame contents will probably suffice for all data sets supplied by the OPERATOR.

A NOC code is used to udentfiy the operator.

Note that in this and other examples the ‘myb:’ prefix could be omitted as it is the defaut codespace for the fram.

```
<ResourceFrame version="1.0" id="epd:UK:MYBUS:ResourceFrame UK PI COMMON:MYBUS:myb"
        dataSourceRef="myb:Mybus" responsibilitySetRef="myb:network_data">
    <Name>Mybus Operator specific  common resources</Name>
    <TypeOfFrameRef ref="fxc:UK:DFT:TypeOfFrame_UK_PI_COMMON:FXCP" versionRef="fxc:v1.0"/>
    <codespaces>
        <Codespace id="myb_data">
            <Xmlns>myb</Xmlns>
            <XmlnsUrl>http://www.mybus.co.uk/</XmlnsUrl>
            <Description>Mybus data</Description>
        </Codespace>
    </codespaces>
    <dataSources>
        <DataSource id="myb:Mybus" version="1.0">
            <Email>feedback@mybus.co.uk</Email>
        </DataSource>
    </dataSources>
    <responsibilitySets>
        <ResponsibilitySet version="1.0" id="myb:tariffs">
            <Name>Operator Tariffs</Name>
            <roles>
                <ResponsibilityRoleAssignment version="1.0" id="myb:tariff_data@creates">
                    <DataRoleType>creates</DataRoleType>
                    <StakeholderRoleType>FareManagement</StakeholderRoleType>
                    <ResponsibleOrganisationRef ref="noc:MYBUS"
                            version="1.0">Mybus</ResponsibleOrganisationRef>
                </ResponsibilityRoleAssignment>
            </roles>
        </ResponsibilitySet>
    </responsibilitySets>
                <!--==== CODE VALUES  ==== -->
    <typesOfValue>
        <Branding version="1.0" id="myb:Mybus@brand">
            <Name>Mybus</Name>
            <Url>https://www.Mybus.co.uk/static/images/colorways/Mybus/logo.png</Url>
        </Branding>
    </typesOfValue>
    <organisations>
        <!-- ==== ORGANISATIONS ==== -->
        <Operator version="1.0" id="noc:MYBUS">
            <PublicCode>MYBU</PublicCode>
            <PrivateCode type="nocn">nocn:987122</PrivateCode>
            <Name>Mybus</Name>
            <ShortName>Mybus</ShortName>
            <TradingName>Mybus Ltd</TradingName>
            <ContactDetails>
                <Phone>01283 449191</Phone>
            </ContactDetails>
            <OrganisationType>operator</OrganisationType>
            <Address>
                <Street>The Close</Street>
                <Town>Barchester</Town>
                <PostCode>BT10 9XA</PostCode>
                <PostalRegion>Barsetshire</PostalRegion>
            </Address>
```

```
            <PrimaryMode>bus</PrimaryMode>
        </Operator>
    /organisations>
</ResourceFrame>
```

12.4.3 Example XML: UK_PI_ NETWORK ServiceFrame

The following XML fragment shows a definition of a SERVICE FRAME of type UK_PI_COMMON that defines the LINE and three SCHEDULED STOP POINTs for the *Mybus Line 3* tariff. The stop definitions have NaPTAN identifiers and and content, including external references to TOPOGRAPHIC PLACEs corresponding to ***NptgLocality*** instances.

```
<ServiceFrame version="1.0" id="epd:UK:myb:ServiceFrame_UK_PI_NETWORK:Line_3:myb"
        dataSourceRef="myb:Mybus" responsibilitySetRef="myb:tariffs">
    <Name>Netwrok elements for Mybus Line 3</Name>
    <TypeOfFrameRef ref="fxc:UK:DFT:TypeOfFrame_UK_PI_NETWORK:FXCP" versionRef="fxc:v1.0"/>
    <codespaces>
        <CodespaceRef ref="naptStop_data"/>
    </codespaces>
    <prerequisites>
        <ResourceFrameRef version="1.0"
                ref="epd:UK:MYBUS:ResourceFrame_UK_PI_COMMON:MYBUS:myb"/>
    </prerequisites>
    <!--==== LINEs ==== -->
    <lines>
        <Line version="1.0" id="myb:Line_3">
            <Name>Mybus 3</Name>
            <Description>Alpha - -Gamma</Description>
            <PublicCode>3</PublicCode>
            <PrivateCode type="noc_data">METR_1</PrivateCode>
            <OperatorRef version="1.0" ref="noc:MYBUS">137122</OperatorRef>
            <LineType>local</LineType>
            <PaymentMethods>cash</PaymentMethods>
        </Line>
    </lines>
    <!--==== STOP POINTs ==== -->
    <scheduledStopPoints>
        <ScheduledStopPoint version="naptStop:any" id="naptStop:4400CY0037">
            <Name>Alpha</Name>
            <TopographicPlaceView>
                <TopographicPlaceRef versionRef="nptg:any" ref="nptgLocality:E0056633"/>
                <Name>Barchester</Name>
                <QualifierName>Barsetshire</QualifierName>
            </TopographicPlaceView>
        </ScheduledStopPoint>
        <ScheduledStopPoint version="naptStop:any" id="naptStop:4400CY0038">
            <Name>Beta</Name>
            <TopographicPlaceRef versionRef="nptg:any" ref="nptgLocality:E0056633"/>
        </ScheduledStopPoint>
        <ScheduledStopPoint version="naptStop:any" id="naptStop:4400CY0039">
            <Name>Gama</Name>
            <TopographicPlaceRef versionRef="nptg:any" ref="nptgLocality:E0056633"/>
        </ScheduledStopPoint>
    </scheduledStopPoints>
</ServiceFrame>
```

12.4.4 Example XML: UK_PI_FARE_PRODUCT FareFrame

The following XML fragment shows a definition of a SERVICE FRAME of type UK_PI_FARE_PRODUCT that provides the TARIFF, FARE PRODUCT and SALE OFFER PACKAGEs and SCHEDULED STOP POINTs for the *MyBus Line 3* tariff.

The service frame from above is declared as a prerequisite.

```
<FareFrame version="1.0" id="epd:UK:myb:FareFrame_UK_PI_FARE_PRODUCT:Trip@Line_3:myb"
        <dataSourceRef="myb:Mybus" responsibilitySetRef="myb:tariffs">
    <Name>Mybus 1</Name>
    <TypeOfFrameRef ref="fxc:UK:DFT:TypeOfFrame_UK_PI_FARE_PRODUCT:FXCP"
        <versionRef="fxc:v1.0"/>
    <prerequisites>
        <ServiceFrameRef version="1.0"
                ref="epd:UK:myb:ServiceFrame_UK_PI_NETWORK:Line_3:myb"/>
```

```
        </prerequisites>
        <!--==== Fare Structure ==== -->
        <tariffs>
            <Tariff version="1.0" id="myb:Tariff@single@Line_3">
            ::::: TARIFF DEFINITION
            </Tariff>
        </tariffs>
        <!--==== Fare Product ==== -->
        <fareProducts>
            <PreassignedFareProduct version="1.0" id="myb:Trip@single">
            ::::: FARE PRODUCT DEFINITIONs
            </PreassignedFareProduct>
            <!--==== Other Products ==== -->
        </fareProducts>
        <!--==== Sales Packages==== -->
        <salesOfferPackages>
            <SalesOfferPackage version="1.0" id="myb:Trip@single-SOP@p-ticket">
            ::::: SALES OFFFPACKAGE DEFINITIONs
        </SalesOfferPackage>
        </salesOfferPackages>
    </FareFrame>
```

12.4.4.1 Example XML: Tariff in a UK_PI_PRODUCT frame

The following XML fragment shows a definition of a TARIFF for the *Mybus Line3* example.

The TARIFF defines three different FARE STRUCTURE ELEMENTs.

a) **Access rights** (classified as *'fxc:access'* with a ***TypeOfFareStructureElementRef*** element), defined with a list of DISTANCE MATRIX ELEMENTs, one for each possible stop combination.

b) **Eligibility** (classified as *'fxc:eligibility'* with a ***TypeOfFareStructureElementRef*** element), defined with a list of USER PROFILE usage parameter; in this case just 'adult'

c) **Travel** (classified as *'fxc:travel_conditions'* with a ***TypeOfFareStructureElementRef*** element), restricted to a single trip with no interchanging with a ROUND TRIP and INTERCHANGIING usage parameters.

defines a VALDIABLE ELEMENT to specif its ACCESS RIGHTS IN PRODUCT. The VALIDABLE ELEMENT references the FARE STRUCTURE ELEMENTs defined by the TARIFF on which the product is based.

The DISTANCE MATRIX ELEMENTs reference the three NaPTAN stops defined above .

```
<Tariff version="1.0" id="myb:Tariff@single@Line_3">
    <validityConditions>
        <ValidBetween>
            <FromDate>2017-01-01T00:00:00Z</FromDate>
            <ToDate>2018-01-01T00:00:00Z</ToDate>
        </ValidBetween>
    </validityConditions>
    <Name>Mybus Line 3 - Single  Fares</Name>
    <OperatorRef version="1.0" ref="noc:MYBUS">137122</OperatorRef>
    <LineRef version="1.0" ref="myb:Line_3"/>
    <fareStructureElements>
        <FareStructureElement version="1.0" id="myb:Tariff@single@access">
            <Name>O/d pairs for Line 3</Name>
            <TypeOfFareStructureElementRef versionRef="fxc:v1.0" ref="fxc:access"/>
            <!--Here we encode the actual fare triangle elements
                    Alpha
                    160 Beta
                    240 180 Gamma -->
            <distanceMatrixElements>
                <DistanceMatrixElement version="1.0" id="myb:4400CY0037+4400CY0038">
                    <Name>Alpha+Beta</Name>
                    <StartStopPointRef version="naptStop:any" ref="naptStop:4400CY0037"/>
                    <EndStopPointRef version="naptStop:any" ref="naptStop:4400CY0038"/>
```

```
                </DistanceMatrixElement>
                <DistanceMatrixElement version="1.0" id="myb:4400CY0037+4400CY0039">
                    <Name>Alpha+Gamma</Name>
                    <StartStopPointRef version="naptStop:any" ref="naptStop:4400CY0037"/>
                    <EndStopPointRef version="naptStop:any" ref="naptStop:4400CY0039"/>
                </DistanceMatrixElement>
                <DistanceMatrixElement version="1.0" id="myb:4400CY0038+4400CY0039">
                    <Name>Beta+Gamma</Name>
                    <StartStopPointRef version="naptStop:any" ref="naptStop:4400CY0038"/>
                    <EndStopPointRef version="naptStop:any" ref="naptStop:4400CY0039"/>
                </DistanceMatrixElement>
            </distanceMatrixElements>
            <GenericParameterAssignment version="1.0" order="01" id="myb:Tariff@single@access">
                <TypeOfAccessRightAssignmentRef versionRef="fxc:v1.0" ref="fxc:can_access"/>
                <ValidityParameterAssignmentType>EQ</ValidityParameterAssignmentType>
                <validityParameters>
                    <LineRef version="1.0" ref="myb:Line_3"/>
                </validityParameters>
            </GenericParameterAssignment>
        </FareStructureElement>
        <FareStructureElement id="myb:Tariff@single@eligibility" version="1.0">
            <Name>eligible user types</Name>
            <TypeOfFareStructureElementRef versionRef="fxc:v1.0" ref="fxc:eligibility"/>
            <GenericParameterAssignment order="1"
                    id="myb:Tariff@single@eligibility" version="1.0">
                <TypeOfAccessRightAssignmentRef versionRef="fxc:v1.0" ref="fxc:eligible"/>
                <LimitationGroupingType>XOR</LimitationGroupingType>
                <limitations>
                    <UserProfile version="1.0" id="myb:adult">
                        <Name>Adult</Name>
                    </UserProfile>
                </limitations>
            </GenericParameterAssignment>
        </FareStructureElement>
        <FareStructureElement id="myb:Tariff@single@conditions_of_travel" version="1.0">
            <Name>COnditions on travel</Name>
            <TypeOfFareStructureElementRef versionRef="fxc:v1.0" ref="fxc:travel_conditions"/>
            <GenericParameterAssignment version="1.0" order="1"
                    id="myb:Tariff@single@travel_conditions">
                <Name>Conditions of travel</Name>
                <TypeOfAccessRightAssignmentRef versionRef="fxc:v1.0" ref="fxc:condition_of_use"/>
                <LimitationGroupingType>AND</LimitationGroupingType>
                <limitations>
                    <RoundTrip version="1.0" id="myb:Trip@travel@condition@direction">
                        <TripType>single</TripType>
                    </RoundTrip>
                    <Interchanging version="1.0" id="myb:Trip@single@NoTransfers">
                        <MaximumNumberOfInterchanges>0</MaximumNumberOfInterchanges>
                    </Interchanging>
                </limitations>
            </GenericParameterAssignment>
        </FareStructureElement>
    </fareStructureElements>
</Tariff>
```

12.4.4.2 Example XML: Fare product in a UK_PI_PRODUCT frame

The following XML fragment shows a definition of a FARE PRODUCT for the *Mybus Line3* example.

The PREASSIGNED FARE PRODUCT defines a VALDIABLE ELEMENT to specif its ACCESS RIGHTS IN PRODUCT. The VALIDABLE ELEMENT references the FARE STRUCTURE ELEMENTs defined by the TARIFF on which the product is based.

```
<PreassignedFareProduct version="1.0" id="myb:Trip@single">
    <Name> Single Ticket</Name>
    <ChargingMomentRef versionRef="fxc:v1.0" ref="fxc:prepayment"/>
    <ChargingMomentType>beforeTravel</ChargingMomentType>
    <TypeOfFareProductRef versionRef="fxc:v1.0" ref="fxc:standard_product@trip@single"/>
    <OperatorRef version="1.0" ref="noc:MYBUS">137122</OperatorRef>
    <ConditionSummary>
        <FareStructureType>pointToPointFare</FareStructureType>
        <TariffBasis>pointToPoint</TariffBasis>
```

```
    </ConditionSummary>
    <!-====== VALIDABLE ELEMENTs ==== -->
    <validableElements>
        <ValidableElement version="1.0" id="myb:Trip@single@travel">
            <Name>Single  ride</Name>
            <fareStructureElements>
                <FareStructureElementRef version="1.0" ref="myb:Tariff@single@access"/>
                <FareStructureElementRef version="1.0" ref="myb:Tariff@single@eligibility"/>
                <FareStructureElementRef version="1.0"
                        ref="myb:Tariff@single@conditions_of_travel"/>
            </fareStructureElements>
        </ValidableElement>
    </validableElements>
    <!-===== ACCESS RIGHTs ===== -->
    <accessRightsInProduct>
        <AccessRightInProduct version="1.0" id="myb:Trip@single" order="1">
            <ValidableElementRef version="1.0" ref="myb:Trip@single@travel"/>
        </AccessRightInProduct>
    </accessRightsInProduct>
    <ProductType>singleTrip</ProductType>
</PreassignedFareProduct>
```

12.4.4.3 Example XML: Sales offer package in a UK_PI_PRODUCT frame

The following XML fragment shows a definition of a SALES OFFER PACKAGE for the *Mybus Line3* example. It references the PREASSIGNED FARE PRODUCT defined above as well a a TYPE O FTRAVEL DOCUMENT specifying the type of media.

```
<SalesOfferPackage version="1.0" id="myb:Trip@single-SOP@p-ticket">
    <BrandingRef version="1.0" ref="myb:Mybus@brand"/>
    <Name>Mybus Cash</Name>
    <TypeOfSalesOfferPackageRef versionRef="fxc:v1.0" ref="fxc:standard_product@operator"/>
    <distributionAssignments>
        <DistributionAssignment version="1.0" id="myb:Trip@single-SOP@p-ticket@onBoard" order="2">
            <Name>Onboard</Name>
            <Description>Pay for  ticket  onboard</Description>
            <DistributionChannelRef versionRef="fxc:v1.0" ref="fxc:on_board"/>
            <DistributionChannelType>onBoard</DistributionChannelType>
            <TicketingServiceFacilityList>purchase</TicketingServiceFacilityList>
            <PaymentMethods>cashAndCard</PaymentMethods>
            <FulfilmentMethodRef ref="fxc:collect_on_board" versionRef="fxc:v1.0"/>
        </DistributionAssignment>
    </distributionAssignments>
    <salesOfferPackageElements>
        <SalesOfferPackageElement version="1.0" id="myb:Trip@single-SOP@p-ticket" order="1">
            <TypeOfTravelDocumentRef versionRef="fxc:v1.0" ref="fxc:printed_ticket"/>
            <PreassignedFareProductRef version="1.0" ref="myb:Trip@single"/>
        </SalesOfferPackageElement>
    </salesOfferPackageElements>
</SalesOfferPackage>
```

12.4.5 Example XML: UK_PI_FARE_PRICE FareFrame

The following XML fragment shows a definition of a FARE FRAME of type UK_PI_FARE_PRICE that gives the three FARE PRiCEs for the DISTANCE MATRIX ELEMENTs defined in the previous example. The prices are listed simply in a FARE TABLE without any consideration for presentation.

Note that FARE TABLEs can also be used to provide more elaborate organisation with guidance for presentation by placing prices in CELLs and assigning tehm to ROWs and COLUMNs.

```
    <FareFrame version="1.0" id="epd:UK:myb:FareFrame_UK_PI_FARE_PRICE:Trip@Line_3:myb"
            dataSourceRef="myb:Mybus" responsibilitySetRef="myb:tariffs">
        <TypeOfFrameRef ref="fxc:UK:DFT:TypeOfFrame_UK_PI_FARE_PRICE:FXCP" versionRef="fxc:v1.0"/>
        <FrameDefaults>
            <DefaultCurrency>GBP</DefaultCurrency>
        </FrameDefaults>
```

```
        <prerequisites>
            <FareFrameRef version="1.0"
                    ref="epd:UK:myb:FareFrame_UK_PI_FARE_PRODUCT:Trip@Line_3:myb"/>
        </prerequisites>
        <fareTables>
            <FareTable version="1.0" id="myb:Trip@single-SOP@p-ticket@Line_3@adult">
                <Description>Adult Single Fares - Organised as a fare triangle</Description>
                <!--
Alpha
160 Beta
240 180 Gamma    -->
                <pricesFor>
                    <PreassignedFareProductRef version="1.0" ref="myb:Trip@single"/>
                    <SalesOfferPackageRef version="1.0" ref="myb:Trip@single-SOP@p-ticket"/>
                    <UserProfileRef version="1.0" ref="myb:adult"/>
                </pricesFor>
                <usedIn>
                    <TariffRef version="1.0" ref="myb:Tariff@single@Line_3"/>
                </usedIn>
                <specifics>
                    <LineRef version="1.0" ref="myb:Line_3"/>
                    <TypeOfTravelDocumentRef versionRef="fxc:v1.0" ref="fxc:printed_ticket"/>
                </specifics>
                <prices>
                    <DistanceMatrixElementPrice version="1.0"
                            id="myb:Trip@single-SOP@p-ticket@Line_3@adult@4400CY0037+4400CY0038">
                        <Amount>1.60</Amount>
                        <DistanceMatrixElementRef version="1.0" ref="myb:4400CY0037+4400CY0038"/>
                    </DistanceMatrixElementPrice>
                    <DistanceMatrixElementPrice version="1.0"
                            id="myb:Trip@single-SOP@p-ticket@Line_3@adult@4400CY0037+4400CY0039">
                        <Amount>2.40</Amount>
                        <DistanceMatrixElementRef version="1.0" ref="myb:4400CY0037+4400CY0039"/>
                    </DistanceMatrixElementPrice>
                    <DistanceMatrixElementPrice version="1.0"
                            id="myb:Trip@single-SOP@p-ticket@Line_3@adult@4400CY0038+4400CY0039">
                        <Amount>1.80</Amount>
                        <DistanceMatrixElementRef version="1.0" ref="myb:4400CY0038+4400CY0039"/>
                    </DistanceMatrixElementPrice>
                </prices>
            </FareTable>
        </fareTables>
    </FareFrame>
```

13 Profile compliance and data quality checking

The checking of profile conformance and of data quality is extremely important for achieving successful interoperability. Data producers need a means to verify that their output is correct and usable. Data consumers need to know that any FXCP compliant document meets a reasonable set of quality criteria before they even attempt to use it. There also needs to be a process for resolving issues in exported data with the producer.

See the Part2 FXCP -NT specification for a discussion of validation and data quality.

13.1 Summary of data quality rules for FXCP

The same quality rules apply to the fare profile as to the base profile – See the Part2 FXCP -NT specification. In addition, a number of additional semantic rules can be applied that are specific to fare. Some examples are given below.

Table 7 — Primary quality checking rules

Type	Checking rule category	Description
D	**Common NeTEx semantic rules conformance** (General Profile validator)	Rules relating to the use of NeTEx elements arising from the real-world semantics of the objects that they represent; that cannot be or are not expressed in the XML but which apply to any NeTEx schema. — The fare structures and product must be a realistic combination, e.g. DayPass will normally be Zonal, Season tickets, SingleTrip products will be point to point, zonal or stage fares, etc. — A ***TariffZone*** must have a at least one member ***ScheduledStopPoint***; — If the ***FareZone*** topology is given as disjoint, then each ***ScheduledStopPoints*** should be in only one ***TariffZone*** — There should be a separate ***SalesOfferPackage*** for each ***TypeOfTravelDocument***; — Etc.
E	**Specific profile conformance** (FXCP Profile validators)	The populating of data values in a profile conformant document shall fully uphold the specific semantics of the profile: — The rules for encoding FXCP-FM profile identifiers shall be followed. — A ***Tariff*** must be categorised with a ***TariffType*** — A ***FareProduct*** must be categorised with a ***ProductType*** — Etc.
F	**Data Completeness** (FXCP Profile validators)	All data required to make the data consistent and usable as a coherent set shall be available. The notion of 'completeness' depends on the intended use case; for example, whether all tariff zones or just the tariff zones that are used by a line should be present; or whether only current data is needed or future data as well. Examples for the FXCP include: — All the ***ScheduledStopPoints*** in a ***FareZone*** should be specified as members.

		— A ***DistanceMatrixElement*** must be given for each permitted Origin/Destination pair of a point-to-point tariff. — All the ***TariffZone*** instances must be given for a zonal tariff. — A ***UserProfile*** must be defined for each type of user. — A ***FarePrice*** should be given for every combination of price that is available**.** — Etc.
G	**Data Plausibility** (General Profile validator)	Values of parameters should be plausible against common sense measures. (Thus, individual bus trips do not cost £100**,** tariff distances for buses are not measured in hundreds of miles, child fares are cheaper than adult ones**)**. — Prices increase with distance, usually progressively (i.e. more is cheaper) — Period pass prices increase with ***TimeInterval*** length. (A month cost more than a day). — The spatial coordinates of ***ScheduledStopPoints*** should lie within those of their ***TariffZone***. — ***TariffZone*** instances should lie within the bounds of their ***TopographicPlace***. — Dates should lie within a few years of the present, durations should be plausible for their usage (e.g. season passes are only available in simple interval multiples of a day, week or month, etc). — The public identifiers used to label tariff zones should be unique within their expected scope of use. (For example, many towns and operators will have a *'Town Centre,* but there should only be one '*Town Centre* (at least per ***Operator***) in a given town). — Instances of ***PriceRule, Roundings***, etc referenced other elements and needed to calculate prices should be defined.
H	**Data Relevance** (Profile validator)	Documents should not contain irrelevant or unused instances of data. (this requires a notion of which elements in a frame are the primary payload for the profile). For example, for the FXC fares: — Every ***ScheduledStopPoint*** present in a document, or one of its components should be used by at least one ***TariffZone, FarePointInPattern*** or ***DistanceMatrixElement***. — Every ***TariffZone*** should be used by at least one ***DistanceMatrixElement or FareStructureElement/ GenericParameterAssignment.*** — Etc.
I	**Data correctness**	Data values should accurately describe the real-world entities they are meant to represent. — For an UK_PI_NETWORK_FARE_OFFER, all the lines of a ***Network*** shall be described.

	(Manual inspection against real-world evidence)	— Names of Sales Offer Packages, etc, should be correct and spelled right. — For a stage fare, all the Fare Stages for a ***Line*** shall be specified. — For a zonal fare, all the instances of a ***TariffZone*** for a given ***Network*** shall be specified. — Prices should be correct. — Etc.

14 Presenting FXCP data in tables and spreadsheets

It is often useful to have fare price data available as a spreadsheet. or other simple table format. It is straightforward to establish mappings between the FXCP core fare elements and such tables and generic principles can be used to identify data elements and to combine normalised model elements in a smaller number of tables as show below.

The qualified name of the NeTEx schema attribute should be used as a column heading for a given attribute in a table. Columns may include both values, references to elements in other tables (since NeTEx uses a unified system of identifiers, codespaces and references) and “view” elements, derived from other tables through the reference, that annotate or explain the references o that data in a given table can be understood. Each table should have a default codespace: data identifiers and references in the table that are not in the default codespace should be qualified with the codespace prefix.

As well as a table of prices, tables to describe the tariff components making up the prices in the table can also be defined, for example, THE TARIFF ZONES, GEOGRAPHIC INTERVALS, TIME INTERVALS, FARE PRODUCTS, SALES PACKAGES, etc. Commercial conditions not relevant for access or pricing are omitted in the example (e.g. USAGE PARAMETERS for EXCHANGING. REFUNDING, etc) but could be added.

The essential data for many basic UK bus data fare types can thus be defined by a small number of tables.

Prices

- FARE TABLE – Prices.

Networks

- FARE ZONEs. Tariff zones – referencing NPTG Locality data and NPTG Tariff zones.
- FARE ZONE members – Stops in a zone – referencing NaPTAN stop data.
- FARE POINTs IN PATTERN – Stages on a JOURNEY PATTERN.

Tariffs

Spatial aspects

- Access: TARIFF / DISTANCE MATRIX – Point-to-point, zone-to-zone., or zonal
- Access: TARIFF / GEOGRAPHIC INTERVALs.
- Access: NETWORK, OPERATOR, LINE, GROUP OF LINEs, GROUP OF OPERATORs,

Temporal aspects

- Durations: TARIFF / TIME INTERVALs.

Other quality aspects

- Access: When TARIFF / FARE DEMAND FACTORs – Peak, off peak etc.
- Carnet Units: TARIFF / FARE QUALITY FACTORs – Carnet Quantities numbers.

Parameters

- Eligibility: TARIFF / USER PROFILEs.
- Groups: TARIFF / GROUP TICKETs.

Fare Products

- FARE PRODUCT.
- FARE PRODUCT / ACCESS RIGHTS IN PRODUCT.
- VALIDABLE ELEMENT/ TARIFF / FARE STRUCTURE ELEMENT.

Sales Packages

- TYPEs OF TRAVEL DOCUMENT.
- SALES OFFER PACKAGEs.
- SALES OFFER PACKAGE ELEMENTs.

Framework

- CODESPACEs
- OPERATORS

The rest of this section provides examples of all of the above tables. Only a minimum et of attributes I included.

14.1 Presenting prices as a spreadsheet or csv file

Since a NeTEx FARE TABLE is already tabular, it is straightforward to transform one into a spreadsheet, flattening out the nesting by repeating the table attributes for each nesting level. In the price table, all the tariff aspects characterising a price should be given as reference to the identifiers of the respective NeTEx component as defined by the other tables. (For example, as a **DistanceMatrixElementRef**, ***UserProfileRef***, ***SalesOfferPackageRef***, etc).

A default codespace can be indicated for the spreadsheet and can be assumed for all values that do not have a prefix– only data from other codespaces needs to include a codespace prefix.

A similar convention for naming data files can be used as for FXCP XML documents, except that instead of a frame type, a NeTEx element or pair of elements can be named

FX-PI-01_UK_MYBUS_FM-FarePrice_LINE1_20190520_myb

14.1 Example data

For example, some price data for a simple point-to-point tariff between A, B and C

	Single								Return			
	Adult		Child		Adult		Child		Adult			
To	**Paper**	**Mobile**	**Paper**	**Mobile**	**Paper**	**Mobile**	**Paper**	**Mobile**	**Paper**	**Mobile**	**Paper**	**Mobile**
B	£10.00	£9.00	£5.00	£4.50					£18:00	£17:00		
C	£20.00	£18:00	£9.00	£10.00	£9.00	£8.50	££4.50	£4.25	£30.00	£28.00	£16.00	$.1400
From	A				**B**				A		B	

This would be encoded as nested FARE TABLEs.

FARE TABLE 1.

→DISTANCE MATRIX ELEMENT: *"myb:Ab+B"*

→FARE TABLE 1.1 *"myb:A+B@adult"*

→USER PROFILE: *"fxc:adult"*

→FARE TABLE 1.1.1 *"myb:A+B@adult@Trip@single"*

→FARE PRODUCT: *"myb:Trip@single"*

→*SALES OFFER PACKAGE PRICE "myb:001" £10*

→*SALES OFFER PACKAGE "myb:Trip@single@paper_ticket"*

→*SALES OFFER PACKAGE PRICE "myb:002" £9.00*

→*SALES OFFER PACKAGE "myb:Trip@single@mobile_app"*

→FARE TABLE 1.1.2 *"myb: A+B@adult@Trip@retrun@paper_ticket"*

→FARE PRODUCT: *"myb:Trip@Returm"*

→*SALES OFFER PACKAGE PRICE "myb:009" £18.00*

→*SALES OFFER PACKAGE "myb:Trip@return@paper_ticket"*

→*SALES OFFER PACKAGE PRICE "myb:010" £17.00*

→*SALES OFFER PACKAGE "myb:Trip@return@mobile_app"*

→FARE TABLE 1.2 *"myb:A+B@child"*

→USER PROFILE: *"fxc:child"*

→FARE TABLE 1.2.1 *"myb:A+B@child@Trip@single"*

→FARE PRODUCT: *"myb:Trip@single"*

→*SALES OFFER PACKAGE PRICE "myb:003" £5.00*

→*SALES OFFER PACKAGE "myb:Trip@single@paper_ticket"*

→*SALES OFFER PACKAGE PRICE "myb:004" £4.50*

→*SALES OFFER PACKAGE "myb:Trip@single@mobile_app"*

etc

The following FARE TABLE would preent the same data.

14.1.1 Example of fare prices as a spreadsheet

FX-PI-01_UK_MYBUS_FM-FarePrice_LINE1_20190520_myb

FarePrice.id	*DistanceMatrix-ElementRef.ref*	*UserProfileRef.ref*	*SalesOfferPackageRef.ref*	*Amount*
001	A+B	fxc:adult	Trip@single@paper_ticket	10.00
002	A+B	fxc:adult	Trip@single@mobile_app	9.00
003	A+B	fxc:child	Trip@single@paper_ticket	5.00
004	A+B	fxc:child	Trip@single@mobile_app	4.50
005	A+C	fxc:adult	Trip@single@paper_ticket	20.00
006	A+C	fxc:adult	Trip@single@mobile_app	18.00
007	A+C	fxc:child	Trip@single@paper_ticket	10.00
008	A+C	fxc:child	Trip@single@mobile_app	9.00
009	A+B	fxc:adult	Trip@return@paper_ticket	18.00
010	A+B	fxc:adult	Trip@return@mobile_app	17.00
011	A+C	fxc:adult	Trip@return@paper_ticket	30.00
012	A+C	fxc:adult	Trip@return@mobile_app	28.00
etc				

A spreadsheet may also include additional 'view' columns to give details of specific elements, for example the above table of prices could be expanded with view elements to show the origin and destination SCHEDULED STOP POINTs for each DISTANCE MATRIX ELEMENT, or the FARE PRODUCT and TYPE OF TRAVEL DOCUMENT for each SALES OFFER PACKAGE.

Fare-Price .id	*Distance-Matrix-Element Ref .ref*	*Distance Matrix-Element-Ref .Start-Stop-PointRef .ref*	*Distance-Matrix-Element-Ref .End Stop-PointRef .ref f*	*User-Profile Ref .ref*	*SalesOffer-PackageRef .ref*	*SalesOffer-PackageRef .SalesOffer-Package-ElementRef .ref*	*SalesOffer-Package .SalesOffer-Package-Element .FareProduct-Ref .ref*	*SalesOffer-Package .SalesOffer-Package-Element .TypeOfTravel-DocumentRef .ref*	*Amount*

001	A+B	A	B	fxc:adult	Trip@single @paper_ticket	Trip@single @paper_ticket @01	Trip@single	fxc: paper_ticket	10.00
002	A+B	A	B	fxc:adult	Trip@single @mobile_app	Trip@single @mobile_app @01	Trip@single	fxc: mobile_app	9.00
003	A+B	A	B	fxc:child	Trip@single @paper_ticket	Trip@single @paper_ticket @01	Trip@single	fxc: paper_ticket	5.00
004	A+B	A	B	fxc:child	Trip@single @mobile_app	Trip@single @mobile_app @01	Trip@single	fxc: mobile_app	4.50
005	A+C	A	C	fxc:adult	Trip@single @paper_ticket	Trip@single @paper_ticket @01	Trip@single	fxc: paper_ticket	20.00
006	A+C	A	C	fxc:adult	Trip@single @mobile_app	Trip@single @mobile_app @01	Trip@single	fxc: mobile_app	18.00
007	A+C	A	C	fxc:child	Trip@single @paper_ticket	Trip@single @paper_ticket @01	Trip@single	fxc: paper_ticket	10.00
008	A+C	A	C	fxc:child	Trip@single @mobile_app	Trip@single @mobile_app @01	Trip@single	fxc: mobile_app	9.00
009	A+B	A	B	fxc:adult	Trip@returne @paper_ticket	Trip@single @paper_ticket @01	Trip@return	fxc: paper_ticket	18.00
010	A+B	A	B	fxc:adult	Trip@return @mobile_app	Trip@single @mobile_app @01	Trip@return	fxc: mobile_app	17.00

14.1 Network elements

NaPTAN and NPTG data is assumed for references to SCHEDULED STOP POINT an TOPOGRAPHIC LOCALITY data; the data does not need to be exchanged

14.1.1 Fare zone definitions for a zonal fare structure

FX-PI-01_UK_MYBUS_FM-FareZone_NETWORK-ABCDE_20190520_myb

FareZone.id	*FareZone.Name*	*ParentZareZoneRef.ref*	*ChildZareZoneRef.ref*
A	Alpha		

B	Beta		
C	Gamma		
D	Delta	C	
E	Epsilon	C	
AB	Alpha & Beta		
AB	Alpha & Beta		A
AB	Alpha & Beta		B

14.1.2 Stops in a fare zone

FX-PI-01_UK_MYBUS_FM-FareZoneMember_NETWORK-ABC_20190520_myb

FareZone.ref	*ScheduledStopPointRef.ref*	*ScheduledStopPointRef.Name*
A	naptStop:1110123456S2	Hull
A	naptStop:1110123000S2	Hell
B	naptStop:2200123000S2	Halifax

14.1.3 Fare sages on a route

FX-PI-01_UK_YOBUS_FM-FarePointInPattern_YOTON-LINE-48_20190520_yob

SeriesConstraint.ref	*FarePointInPattern.id*	*order*	*ScheduledStopPoint Ref.ref*	*ScheduledStopPoint Ref.Name*	*IsFareStage*
L48@outbound	L48@outbound_01	1	naptStop:1560100124	Eeny	true
L48@outbound	L48@outbound_07	2	naptStop:1110123000S2	Meeny	true
L48@outbound	L48@outbound_16	3	naptStop:2200123000S2	Miney	true
L48@outbound	L48@outbound_25	4	naptStop:2200123000S2	Miney	true

14.2 Spatial fare structure elements

The price sheet

14.2.1 Tariff / Distance Matrix for point-to-point FareStructure

FX-PI-01_UK_MYBUS_FM-Tariff-DistanceMatrixElement_MYBUS-T01_20190520_myb

Tariff Ref.ref	*FareStructure ElementRef.ref*	*TypeOfFare Structure ElementRef.ref*	*Distance-Matrix-Element.id*	*StartStopPoint Ref.ref*	*StartPoint View.Name*	*EndStopPoint Ref.ref*	*EnStopPoint View.Name*
T01	FSE011	fxc:access	A+B	A	Alpha	B	Beta
T01	FSE011	fxc:access	A+C	A	Alpha	C	Gamma

14.2.2 Tariff / Distance Matrix for zone-to-zone FareStructure

FX-PI-01_UK_MYBUS_FM-Tariff-DistanceMatrixElement_MYBUS-T02_20190520_myb

Tariff Ref.ref	*FareStructure ElementRef.ref*	*TypeOfFare Structure ElementRef.ref*	*Distance-Matrix-Element.id*	*StartTariffZone Ref.ref*	*StartTariffZone View.Name*	*EndTariffZone Ref.ref*	*EndTariffZone View.Name*
T02	FSE021	fxc:access	A+B	A	Alpha	B	Beta
T02	FSE021	fxc:access	A+C	A	Alpha	C	Gamma

14.2.3 Tariff / Distance Matrix for zonal FareStructure

FX-PI-01_UK_MYBUS_FM-Tariff-DistanceMatrixElement_MYBUS-T03_20190520_myb

Tariff Ref.ref	*FareStructure ElementRef.ref*	*TypeOfFare Structure ElementRef.ref*	*DistanceMatrix-Element.id*	*StartTariffZone Ref.ref*	*StartTariffZone View.Name*	*EndTariffZone Ref.ref*	*EndTariffZone View.Name*
T03	FSE031	fxc:access	A+	A	Alpha	*same*	*same*
T03	FSE031	fxc:access	B+	B	Beta	*same*	*same*
T03	FSE031	c:access	C+	C	Gamma	*same*	*same*
T03	FSE031	c:access	AB+	AB	Alpha & Beta	*same*	*same*

14.2.4 Tariff / Geographic Intervals

FX-PI-01_UK_YOBUS_FM-Tariff-GeographicInterval-YOBUS-T04_20190520_yob

TariffRef.ref	*FareStructure ElementRef.ref*	*TypeOfFareStructure ElementRef.ref*	*GeographicIntervalId.id*	*Units*	*StartValue*	*EndValue*
Y10	FSEY102	fxc:intervals	0+10	unitZone	0	10
Y10	FSEY102	fxc:intervals	10+20	10	10	20

14.2.5 Tariff / Network Validity Parameters

FX-PI-01_UK_YOUBUS_FM-Tariff-GeographicInterval_YOBUS-T04_20190520_yob

TariffRef.ref	*FareStructureElementRef.ref*	*TypeOfFareStructureElementRef.ref*	*OperatorRef.ref.id*	*NetworkRef.ref*	*VehicleModes*	*LineRef.Ref*
Y10	FSEY101	fxc:access	noc:YOB		bus	
Y10	FSEY101	fxc:access		Yoville	bus	line48
Y10	FSEY101	fxc:access	noc:yXWb		bus	

14.3 Time & Quality fare structure elements

14.3.1 Tariff / Time Intervals

FX-PI-01_UK_MYBUS_FM-Tariff-TimeInterval_MYBUS-T03_20190520_myb

Tariff Ref.ref	*FareStructureElementRef.ref*	*TypeOfFareStructureElementRef.ref*	*TimecIntervalId.id*	*Duration*	*ValidityConditionRef.ref*
T03	FSE032	*fxc:durations*	1H	PT60M	
T03	FSE032	*fxc:durations*	1D	P1D	
T03	FSE032	*fxc:durations*	1W	P1W	
T03	FSE032	*fxc:durations*	1Y	P1W	
T03	FSE032	*fxc:durations*	E1Term		dth:Dotheboys_term_VC

14.3.2 Tariff / Fare Demand Factors (for peak / off peak, etc)

FX-PI-01_UK_MYBUS_FM-Tariff-TimeDemandFactor_MYBUS-T03_20190520_myb

Tariff Ref.ref	*FareStructureElementRef.ref*	*TypeOfFareStructureElementRef.ref*	**FareDemandFactor.id**	**Name**	**ValidityConditionRef.ref**
T03	FSE033	*fxc:access_when*	D1	Peak	Peak_VC
T03	FSE033	*fxc:access_when*	D2	OffPeak	Off_peak_VC

14.3.3 Tariff / Fare Quality Factors (for carnet numbers)

FX-PI-01_UK_MYBUS_FM-Tariff-FareQualityFactor_MYBUS-T04_20190520_myb

Tariff Ref.ref	**FareStructureElementRef.ref**	*TypeOfFareStructureElementRef.ref*	**FareQualityFactor.id**	**Units**	**ValidityCondition Ref.ref**

T04	FSE041	*fxc:carnet_units*	Q01	trip	5
T04	FSE041	*fxc:carnet_units*	Q02	trip	10
T04	FSE041	*fxc:carnet_units*	Q03	trip	20

14.4 Usage Parameter fare structure elements

14.4.1 Tariff / User profiles

FX-PI-01_UK_MYBUS_FM-Tariff-UserProfile_MYBUS-T01_20190520_myb

Tariff Ref.ref	**FareStructure ElementRef.ref**	***TypeOfFareStructure ElementRef.ref***	**UserProfile Ref.Ref**	**UserProfileRef .Name**	**UserProfileRef .MinimumAge**	**UserProfileRef .MaximumAge**
T01	FSE012	*fxc:eligibility*	adult	Adult	18	
T01	FSE012	*fxc:eligibility*	infant	Infant	0	5
T01	FSE012	*fxc:eligibility*	child	Child	5	15
T01	FSE012	*fxc:eligibility*	student	Student		
T01	FSE012	*fxc:eligibility*	senior	Senior	60	

14.4.2 Tariff / Group Tickets

FX-PI-01_UK_MYBUS_FM-Tariff-GroupTicket_MYBUS-T01_20190520_myb

Tariff Ref.ref	**FareStructure ElementRef.ref**	***TypeOfFareStructure ElementRef.ref***	***GroupTicket Ref.ref***	***GroupTicket Ref.Name***	***GroupTicketRef .Minimum-NumberOf-Persons***	***GroupTicketRef .Maximum-NumberOf-Persons***
T01	FSE013	*fxc: groups*	G01	Duo	2	2
T01	FSE013	*fxc: groups*	G02	Family	0	5
T01	FSE013	*fxc: groups*	G03	Lareg group	10	15

14.5 Products

14.5.1 Fare Products

FX-PI-01_UK_MYBUS_FM-FareProduct_MYBUS_20190520_myb

FareProduct.id	****Type***	***Name***	***ProductType***
TripSingle-P2P_011	*PreassignedfareProduct*	Mybus Trip Single	*singleTrip*

TripReturn-Z2Z_026	*PreassignedfareProduct*	Mybus Trip Return	*returnTrip*
yob:TripSingle-FS_055	*PreassignedfareProduct*	Yobus Trip Stage	*singleTrip*
DayPass-Z_004	*PreassignedfareProduct*	Mybus Day Pass	*dayReturnTrip*
TripCarnet-Z2Z_005	*AmountOfPriceUnit*	Mybus Trip Carnet	*tripCarnet*

14.5.2 Fare Product Access rights / Validable elements

FX-PI-01_UK_MYBUS_FM-AccessRightInProduct_MYBUS_20190520_myb

FareProduct.id	***AccessRightInProductId***	***order***	***ValidableElementRef.ref***
TripSingle-P2P_011	TripSingle-P2P_011_01	1	TripSingle-P2P_011_travel
TripReturn-Z2Z_026	TripReturn-Z2Z_026_01	1	TripReturn-Z2Z_026_out_travel
TripReturn-Z2Z_026	TripReturn-Z2Z_026_01	2	TripReturn-Z2Z_026_back_travel
yob:TripSingle-FS_055	yob:TripSingle-FS_055_01	1	yob:TripSingle-FS_055_travel
DayPass-Z_004	DayPass-Z_004_01	1	DayPass-Z_004_travel
TripCarnet-Z2Z_005	TripCarnet-Z2Z_005_01	1	TripCarnet-Z2Z_005_travel

14.5.3 Validable Elements / Fare Structure Elements

FX-PI-01_UK_MYBUS_FM-ValidableElement_MYBUS_20190520_myb

ValidableElement.id	***FareStructureElement Ref,ref***	***FareStructureElement Ref.TariffBasis***	***FareStructureElement Ref.TypeOfFareStructureElement***
TripSingle-P2P_011_travel	FSE011	*pointToPoint*	*'fxc:access'*
TripSingle-P2P_011_travel	FSE012	*pointToPoint*	*'fxc:eligibility'*
TripSingle-P2P_011_travel	FSE013	*pointToPoint*	*'fxc:groups'*
TripReturn-Z2Z_026_out_travel	FSE021	*zoneToZone*	*'fxc:access'*
TripReturn-Z2Z_026_back_travel	FSE021	*zoneToZone*	*'fxc:access'*
yob:TripSingle-FS_055_travel	FSEY101	*unitSection*	*'fxc:access'*
yob:TripSingle-FS_055_travel	FSEY102	*unitSection*	*'fxc: intervals'*
DayPass-Z_004_travel	FSE031	*zone*	*'fxc:access'*
DayPass-Z_004_travel	FSE032	*zone*	*'fxc: durations'*

DayPass-Z_004_travel	FSE033	*zone*	*'fxc:access_when'*
DayPass-Z_004_travel	FSE012	*zone*	*'fxc:eligibility'*
TripCarnet-Z2Z_005_travel	FSE041	*zoneToZone*	*'fxc:carnet_units*
TripCarnet-Z2Z_005_travel	FSE012	*zoneToZone*	*'fxc:eligibility'*

14.6 Sales offers

14.6.1 Types of Travel Document

FX-PI-01_UK_MYBUS_FM-TypeOfTavelDocument_MYBUS_20190520_myb

TypeOfTravelDocument.id	*Name*	*MediaType*
p-ticket	Paper Ticket	paperTicket
m-ticket	Mobile App	mobileAPp
smartcard	Smart card	smartCard

14.6.2 Sales offer packages

FX-PI-01_UK_MYBUS_FM-SalesOfferPackage_MYBUS_20190520_myb

SalesOfferPackaget.id	*Name*
T001p	Mybus Trip Single P2P – paper
T001m	Mybus Trip Single P2P – smartcard
T002s	Mybus Trip Return Z2Z – smartcard
P001p	Mybus day pass – paper
P001m	Mybus day pass – mobile app
C001s	Mybus carnet trips – smartcard

14.6.3 Sales offer package elements

FX-PI-01_UK_MYBUS_FM-SalesOfferPackageElement_MYBUS_20190520_myb

SalesOffer Package.ref	*SalesOfferPackageElementt.id*	*order*	*FareProductRef.ref*	*TypeOfTravelDocument Ref.ref*
T001p	T001p_01	1	TripSingle-P2P_011	p-ticket

T001m	T001m_01	1	TripSingle-P2P_011	smartcard
T002s	T002s_01	1	TripReturn-Z2ZP_026	smartcard
P001p	P001p_01	1	DayPass-Z_04	p-ticket
P001m	P001m_01	1	DayPass-Z_04	m-ticket
C001s	C001s_01	1	Carnet05	smartcard

14.7 Framework elements

14.7.1 Codespaces

FX-PI-01_UK_MYBUS_FM-Codespace_MYBUS_20190520_myb

Codespace.Xmlns	*Codespace.id*	*Codespace.XmlnsUrl*
myb	myb_data	mybus.co.uk/tariffs
yob	yob_data	yobuses.com/ids
fxc	fxc_metadata	Netex.org.uk/fxc
noc	noc_data	Traveline.org.uk/noc
naptStop	naptStop_data	naptan.org.uk/stop

14.7.2 Operators

FX-PI-01_UK_MYBUS_FM-Operator_MYBUS-T02_20190520_myb

Orgaisation.id	**Name**	**email**
noc:myb	Mybus ltd	2info@mybu.co.uk

Annex A
(Normative)

Data Dictionary

This data dictionary repeats the definitions from Transmodel (v6.0) and NeTEx (v1.1), but selects only the concepts incuded in the EPIP. Concepts written in uppercase are from the conceptual model (i.e. Transmodel); those in camel-case are specific to the NeTEx physical model. See Transmodel and NeTEx for further information.

- Basic – In naic FXCP
- Further – In enhanced FXCP
- Additional; - Not in profile (may be used in an extended data set)

ACCESS RIGHT PARAMETER ASSIGNMENT	Basic	The assignment of a fare collection parameter (referring to geography, time, quality or usage) to an element of a fare system (access right, validated access, control mean, etc.).
AMOUNT OF PRICE UNIT	Basic	A FARE PRODUCT consisting in a stored value of PRICE UNITs: an amount of money on an electronic purse, amount of units on a value card etc.
BLACKLIST	ADDITIONAL	A list of identified TRAVEL DOCUMENTs or CONTRACTs the validity of which has been cancelled temporarily or permanently, for a specific reason like loss of the document, technical malfunction, no credit on bank account, offences committed by the customer, etc.
BORDER POINT	Further	A POINT on the Network marking a boundary for the fare calculation. May or may not be a SCHEDULED STOP POINT.
CANCELLING	Further	Parameter giving conditions for cancelling of a purchased access right.
CAPPED DISCOUNT RIGHT	Further	A specialisation of SALE DISCOUNT RIGHT where the discount is expressed as a rule specifying a ceiling for a given time interval. For example, the London Oyster card fare, which charges for each journey until travel equivalent to a day pass has been consumed after which further travel is free at that day.
CAPPING RULE	Further	A capping limit for a given time interval, where the capping is expressed by another product. For example, the London Oyster card fare, which charges for each journey until travel equivalent to a day pass for the mode of travel has been consumed.
CAPPING RULE PRICE	Further	A set of all possible price features of a CAPPING RULE: default total price, discount in value or percentage etc.
CELL	Basic	An unique individual combination of features within a FARE TABLE, used to associate a FARE PRICE with a fare element.

CHARGING MOMENT	Basic	A classification of FARE PRODUCTs according to the payment method and the account location: pre-payment with cancellation (throw-away), pre-payment with debit on a value card, pre-payment without consumption registration (pass), post-payment etc.
CHARGING POLICY	Basic	Parameter governing minimum amount and credit allowed when consuming a FARE PRODUCT.
COMMERCIAL PROFILE	Further	A category of users depending on their commercial relations with the operator (frequency of use, amount of purchase etc.), often used for allowing discounts.
COMMERCIAL PROFILE ELIGIBILITY	ADDITIONAL	Whether a specific TRANSPORT CUSTOMER is eligible for a FARE PRODUCT with a specific COMMERCIAL PROFILE as a validity parameter.
COMPANION PROFILE	Basic	The number and characteristics of the persons entitled to travel in a group or as companions to another USER PROFILE.
CONTROLLABLE ELEMENT	ADDITIONAL	A CONTROLLABLE ELEMENT as a part of a FARE STRUCTURE ELEMENT, including its possible order in the sequence of CONTROLLABLE ELEMENTs grouped together to form that FARE STRUCTURE ELEMENT, and its possible quantitative limitation.
CONTROLLABLE ELEMENT PRICE	ADDITIONAL	A set of all possible price features of a CONTROLLABLE ELEMENT: default total price, discount in value or percentage etc.
CUSTOMER	ADDITIONAL	An identified person or organisation involved in a fare process. There may be a CONTRACT between the CUSTOMER and the OPERATOR or the AUTHORITY ruling the consumption of services.
CUSTOMER ACCOUNT	ADDITIONAL	A registration of the CUSTOMER with an ACCOUNT PROVIDER to obtain travel services.
CUSTOMER ACCOUNT SECURITY LISTING	ADDITIONAL	The presence of a CUSTOMER ACCOUNT on a SECURITY LIST.
CUSTOMER ACCOUNT STATUS	ADDITIONAL	A classification of CUSTOMER ACCOUNT.
CUSTOMER ELIGIBILITY	ADDITIONAL	Whether a specific TRANSPORT CUSTOMER is eligible for a FARE PRODUCT with a specific validity Parameter. This may be subject to a particular VALIDITY CONDITION
CUSTOMER PURCHASE PACKAGE	ADDITIONAL	A purchase of a SALES OFFER PACKAGE by a CUSTOMER, giving access rights to one or several FARE PRODUCTs materialised as one or several TRAVEL DOCUMENTs.
CUSTOMER PURCHASE PACKAGE ELEMENT	ADDITIONAL	The assignment of a SALES OFFER PACKAGE ELEMENT, for use in a CUSTOMER SALES PACKAGE.
CUSTOMER PURCHASE PACKAGE ELEMENT ACCESS	ADDITIONAL	Access to a VALIDABLE ELEMENT by a specific CUSTOMER PURCHASE PACKAGE through use of CUSTOMER PURCHASE PACKAGE.

CUSTOMER PURCHASE PACKAGE PRICE	ADDITIONAL	A specialisation of FARE PRICE that defines the price of a CUSTOMER PURCHASE PACKAGE
CUSTOMER PURCHASE PARAMETER ASSIGNMENT	ADDITIONAL	A VALIDITY PARAMETER ASSIGNMENT specifying practical parameters chosen for a CUSTOMER PURCHASE PACKAGE within a given fare structure (e.g. the origin or destination zone in a zone-counting system).
CUSTOMER SECURITY LISTING	ADDITIONAL	The presence of a CUSTOMER on a SECURITY LIST.
DISCOUNTING RULE	Basic	A price calculation rule determined by a set of discounts, depending upon a USAGE PARAMETER, to be applied to a FARE PRICE.
DISTANCE MATRIX ELEMENT	Basic	A cell of an origin-destination matrix for TARIFF ZONEs or STOP POINTs, expressing a fare distance for the corresponding trip: value in km, number of fare units etc.
DISTANCE MATRIX ELEMENT PRICE	Basic	A set of all possible price features of a DISTANCE MATRIX ELEMENT: default total price etc.
DISTRIBUTION ASSIGNMENT	Basic	An assignment of the COUNTRY and/or DISTRIBUTION CHANNEL through which a product may or may not be distributed.
DISTRIBUTION CHANNEL	Basic	A type of outlet for selling of a product.
ELIGIBILITY CHANGE POLICY	Further	Parameter indicating the action to be taken when a user's eligibility status changes.
ENTITLEMENT CONSTRAINT	Further	Constraints on choices for an dependent entitled product relative to the required choices for the prerequisite entitling product.
ENTITLEMENT GIVEN	Further	Parameter indicating whether a particular FARE PRODUCT provides an entitlement to buy or use an access right.
ENTITLEMENT PRODUCT	ADDITIONAL	A precondition to access a service or to purchase a FARE PRODUCT issued by an organisation that may not be a PT operator (e.g. military card).
ENTITLEMENT REQUIRED	Further	Parameter indicating whether a particular FARE PRODUCT requires an entitlement to by or use an access right.
EXCHANGING	Further	Whether and how the access right may be exchanged for another access right.
FARE CONTRACT	ADDITIONAL	A contract with a particular (but possibly anonymous) customer, ruling the consumption of transport services (and joint services). A FARE CONTRACT may be designed for a fixed SALES OFFER PACKAGE (e.g. ticket) or to allow successive purchases of SALES OFFER PACKAGEs.
FARE CONTRACT ENTRY	ADDITIONAL	A log entry describing an event referring to the life of a FARE CONTRACT: initial contracting, sales, validation entries, etc. A subset of a FARE CONTRACT ENTRY is often materialised on a TRAVEL DOCUMENT.

FARE CONTRACT SECURITY LISTING	ADDITIONAL	The presence of a FARE CONTRACT on a SECURITY LIST.
FARE DAY TYPE	Basic	A type of day used in the fare collection domain, characterised by one or more properties which affect the definition of access rights and prices in the fare system.
FARE DEMAND FACTOR	Basic	A named set of parameters defining a period of travel with a given price, for example off peak, peak, super off peak, etc.
FARE ELEMENT IN SEQUENCE	ADDITIONAL	A FARE ELEMENT as a part of an ELEMENT, including its possible order in the sequence of FARE ELEMENTs.
FARE FRAME	Basic	The set of all fare data defined for a specific VEHICLE MODE to which the same VALIDITY CONDITIONs have been assigned.
FARE FRAME DEFAULTS	Basic	Set of pricing parameters and values to apply to an individual element in the frame if no explicit value is specified on the element.
FARE INTERVAL	Basic	An interval based aspect of the fare structure.
FARE POINT IN PATTERN	Basic	A POINT IN PATTERN which represents the start or end of a FARE SECTION, or a point used to define a SERIES CONSTRAINT.
FARE PRICE	Basic	Price features DEFINED BY DEFAULT characterizing different PRICE GROUPs.
FARE PRODUCT	Basic	An immaterial marketable element (access rights, discount rights, etc.), specific to a CHARGING MOMENT.
FARE PRODUCT PRICE	Basic	A set of all possible price features of a FARE PRODUCT: default total price, discount in value or percentage etc.
FARE QUOTA FACTOR	ADDITIONAL	A named set of parameters defining a number of quota fares available of a given denomination.
FARE SCHEDULED STOP POINT	Basic	A specialisation of SCHEDULED STOP POINT describing a stop with fare accounting and routing characteristics.
FARE SECTION	Basic	A subdivision of a JOURNEY PATTERN consisting of consecutive POINTs IN JOURNEY PATTERN, used to define an element of the fare structure.
Fare structure	Basic	Set of parameters that determine the basic tariffs.
FARE STRUCTURE ELEMENT	Basic	A sequence or set of CONTROLLABLE ELEMENTs to which rules for limitation of access rights and calculation of prices (fare structure) are applied.
FARE STRUCTURE ELEMENT IN SEQUENCE	Basic	A FARE STRUCTURE ELEMENT as a part of a VALIDABLE ELEMENT, including its possible order in the sequence of FARE STRUCTURE ELEMENTs forming that VALIDABLE ELEMENT, and its possible quantitative limitation.
FARE STRUCTURE ELEMENT PRICE	Basic	A set of all possible price features of a FARE STRUCTURE ELEMENT: default total price, discount in value or percentage etc.
FARE STRUCTURE FACTOR	Basic	A factor influencing access rights definition or calculation of prices.

FARE TABLE	Basic	A grouping of prices (specialization of PRICE GROUP) that may be associated with all or any of DISTANCE MATRIX ELEMENT, FARE STRUCTURE ELEMENT GEOGRAPHICAL INTERVAL, GROUP OF ACCESS RIGHT PARAMETER, CLASS OF USE, OPERATOR, VEHICLE MODE, FARE PRODUCT.
FARE UNIT	Basic	A unit associated with a FARE STRUCTURE FACTOR.
FARE ZONE	Basic	A specialization of TARIFF ZONE to include FARE SECTIONs.
FREQUENCY OF USE	Basic	The limits of usage frequency for a FARE PRODUCT (or one of its components) or a SALES OFFER PACKAGE during a specific VALIDITY PERIOD. There may be different tariffs depending on how often the right is consumed during the period.
FULFILMENT METHOD	Basic	The means by which the ticket is delivered to the CUSTOMER, e.g. online, collection, etc.
FULFILMENT METHOD PRICE	Basic	A set of all possible price features of a FULFILMENT METHOD default total price etc.
GENERIC PARAMETER ASSIGNMENT	Basic	A VALIDITY PARAMETER ASSIGNMENT specifying generic access rights for a class of products (e.g. a time band limit - 7 to 10 a.m. - for trips made with a student pass).
GEOGRAPHICAL INTERVAL	Basic	A geographical interval specifying access rights for the FARE STRUCTURE ELEMENTs within the range of this interval: 0-5 km, 4-6 zones etc.
GEOGRAPHICAL INTERVAL PRICE	Basic	A set of all possible price features of a GEOGRAPHICAL INTERVAL: default total price etc.
GEOGRAPHICAL STRUCTURE FACTOR	Basic	The value of a GEOGRAPHICAL INTERVAL or a DISTANCE MATRIX ELEMENT expressed by a GEOGRAPHICAL UNIT.
GEOGRAPHICAL UNIT	Basic	A unit for calculating geographical graduated fares.
GEOGRAPHICAL UNIT PRICE	Basic	A set of all possible price features of a GEOGRAPHICAL UNIT: default total price etc.
GROUP OF DISTANCE MATRIX ELEMENTs	Basic	A grouping of DISTANCE MATRIX ELEMENTS. May be used to provide reusable Origin / Destination pairs (and associate them with a PRICE).
GROUP OF DISTRIBUTION CHANNELs	Further	A grouping of DISTRIBUTION CHANNELs.
GROUP OF SALES OFFER PACKAGEs	Further	A grouping of SALES OFFER PACKAGEs.
GROUP TICKET	Basic	The number and characteristics of persons entitled to travel in addition to the holder of an access right.
INTERCHANGING	Basic	Limitations on making changes within a trip.

LIMITING RULE	Basic	Rule for limiting the results of a price calculation.
LUGGAGE ALLOWANCE	Further	The number and characteristics (weight, volume) of luggage that a holder of an access right is entitled to carry.
MINIMUM STAY	ADDITIONAL	Details of any minimum stay at the destination required to use the product.
MONTH VALIDITY OFFSET	ADDITIONAL	Days before (negative) or after (positive) the start of the month that a product with a calendar period driven activation becomes valid.
NETWORK VALIDITY PARAMETER	Basic	A type of VALIDITY PARAMETER related to the network structure.
OFFERED TRAVEL SPECIFICATION	ADDITIONAL	A set of parameters giving details of the consumption of access rights associated with an offer or a purchase. (e.g. origin and destination of a travel, class of travel, etc.).
ORGANISATIONAL VALIDITY PARAMETER	Basic	A type of VALIDITY PARAMETER related to organisational issues.
PARKING CHARGE BAND	ADDITIONAL	Parking charges that describe the cost of using a PARKING or PARKING AREA for a given period.
PARKING PRICE	ADDITIONAL	A specialisation of FARE PRICE that defines the price of a PARKING CHARGE BAND.
PARKING TARIFF	ADDITIONAL	A set of parking CHARGE BANDs that describe the cost of using a PARKING or PARKING AREA.
FARE CONTRACT	ADDITIONAL	A contract with a particular (but possibly anonymous) customer, ruling the consumption of transport services (and joint services). A FARE CONTRACT may be designed for a fixed SALES OFFER PACKAGE (e.g. ticket) or to allow successive purchases of SALES OFFER PACKAGEs.
FARE CONTRACT ENTRY	ADDITIONAL	A log entry describing an event referring to the life of a FARE CONTRACT: initial contracting, sales, validation entries, etc. A subset of a FARE CONTRACT ENTRY is often materialised on a TRAVEL DOCUMENT.
PENALTY POLICY	ADDITIONAL	Policy regarding different aspects of penalty charges, for example repeated entry at the same station, not having a ticket etc.
Post-paid ticketing	Basic	The user is charged sometime after using the transport service
PRE-ASSIGNED FARE PRODUCT	Basic	A FARE PRODUCT consisting of one or several VALIDABLE ELEMENTs, specific to a CHARGING MOMENT.
Prepaid ticketing	Basic	The user is charged for either a fare product (ticket) or a deposit prior to riding (detailed description of process see below).
Price	Basic	Value of fare or tariff.
PRICE GROUP	Basic	A grouping of prices, allowing the grouping of numerous possible consumption elements into a limited number of price references, or to apply grouped increase, in value or percentage.

PRICE UNIT	Basic	A unit to express prices: amount of currency, abstract fare unit, ticket unit or token etc.
PRICEABLE OBJECT	Basic	An element which may have a FARE PRICE.
PRICING PARAMETER SET	Basic	A set of parameters controlling pricing calculations.
PRICING RULE	Basic	A rule used for the calculation of FARE PRICE, determined either by a set of parameters to be applied to a reference price or by a more complex algorithm.
PRICING SERVICE	Basic	A web service used to provide prices dynamically at time of booking or purchase.
PRODUCT VALIDITY PARAMETER	Basic	A type of VALIDITY PARAMETER linked to fare products and/or their distribution.
PURCHASE WINDOW	Additional	Period in which the product must be purchased.
QUALITY STRUCTURE FACTOR	Basic	A factor influencing access rights definition or calculation of prices, based on the quality: traffic congestion threshold, early/late reservation etc.
QUALITY STRUCTURE FACTOR PRICE	Basic	A set of all possible price features of a QUALITY STRUCTURE FACTOR, e.g. default total price etc.
REFUNDING	Further	Whether and how the product may be refunded.
REPLACING	Further	whether and how the access right may be replaced.
REQUESTED TRAVEL SPECIFICATION	ADDITIONAL	A set of parameters giving details of an intended consumption of access rights requested by a TRANSPORT CUSTOMER (e.g. origin and destination of a travel, class of travel, etc.
RESELLING	Further	Common resale conditions (i.e. for exchange or refund) attached to the product.
RESERVING	Further	indicating whether the access right requires reservation.
RESIDENTIAL ELIGIBILITY	ADDITIONAL	Whether a specific TRANSPORT CUSTOMER is eligible for a FARE PRODUCT with a specific RESIDENTIAL QUALIFICATION as a validity parameter.
RESIDENTIAL QUALIFICATION	Further	A parameter providing an authorisation to consider a user as being characterised by a USER PROFILE.
RETAIL CONSORTIUM	ADDITIONAL	A group of ORGANISATIONs formally incorporated as a retailer of fare products.
RETAIL DEVICE	ADDITIONAL	A retail device used to sell fare products. Its identity can be used to record fulfilment and support security processes.
RETAIL DEVICE SECURITY LISTING	ADDITIONAL	The presence of a RETAIL DEVICE on a SECURITY LIST..

ROUND TRIP	Basic	Properties relating to single or return trip use of an access right.
ROUNDING	Basic	Parameters directing the rounding of values that are the result of calculations.
ROUNDING STEP	Basic	A rounding step to use to round a range of values. If step stable rounding is used, any value larger than the step key and smaller that the next step key should be rounded to this value.
ROUTING	Basic	Limitations on routing of an access right.
ROUTING VALIDITY PARAMETER	Basic	A type of VALIDITY PARAMETER linked to specific routing.
RULE STEP RESULT	Basic	Interim amounts for any pricing rules applied when deriving one price from another, for example VAT amount charged.
SALE DISCOUNT RIGHT	Further	A FARE PRODUCT allowing a customer to benefit from discounts when purchasing SALES OFFER PACKAGEs.
SALE TRANSACTION	ADDITIONAL	A SALE of a FIXED PACKAGE or a SALE of a RELOADABLE PACKAGE.
SALES NOTICE ASSIGNMENT	Basic	The assignment of a NOTICE to a SALES OFFER PACKAGE or a GROUP OF SALES OFFER PACKAGEs.
SALES OFFER ENTITLEMENT GIVEN	Further	Parameter indicating whether a particular SALES OFFER PACKAGE provides an entitlement to buy or use an access right.
SALES OFFER ENTITLEMENT REQUIRED	Further	Parameter indicating whether a particular SALES OFFER PACKAGE requires an entitlement to by or use an access right.
SALES OFFER PACKAGE	Basic	A package to be sold as a whole, consisting of one or several FARE PRODUCTs materialised thanks to one or several TRAVEL DOCUMENTs. The FARE PRODUCTs may be either directly attached to the TRAVEL DOCUMENTs, or may be reloadable on the TRAVEL DOCUMENTs.
SALES OFFER PACKAGE ELEMENT	Basic	The assignment of a FARE PRODUCT to a TYPE OF TRAVEL DOCUMENT in order to define a SALES OFFER PACKAGE, realised as a fixed assignment (printing, magnetic storage etc.) or by the possibility for the FARE PRODUCT to be reloaded on the TYPE OF TRAVEL DOCUMENT.
SALES OFFER PACKAGE PRICE	Basic	A set of all possible price features of a SALES OFFER PACKAGE: default total price etc.
SALES OFFER PACKAGE SUBSTITUTION	ADDITIONAL	Information on the preferred substitution of packages with other packages if a quota restricted product is no longer available.
SALES TRANSACTION FRAME	ADDITIONAL	A set of SALES TRANSACTION data elements (SALES TRANSACTIONs, etc.) to which the same VALIDITY CONDITIONs have been assigned.

SCOPING VALIDITY PARAMETER	Basic	Grouping of assignments to elements.
SERIES CONSTRAINT	ADDITIONAL	An extension of a DISTANCE MATRIX ELEMENT (a cell of an origin-destination matrix for TARIFF ZONEs or SCHEDULED STOP POINTs) expressing a fare distance for the corresponding trip (value in km, number of fare units etc.), constrained to specific routes.SERIES CONSTRAINTs are mainly used for rail fares.
SERIES CONSTRAINT PRICE	ADDITIONAL	A set of all possible price features of a SERIES CONSTRAINT: default total price etc.
SERVICE ACCESS RIGHT	Basic	An immaterial marketable element dedicated to accessing some services.
SERVICE VALIDITY PARAMETER	Basic	A type of VALIDITY PARAMETER related to service characteristics (e.g. class).
SPECIFIC PARAMETER ASSIGNMENT	Basic	A VALIDITY PARAMETER ASSIGNMENT specifying practical parameters during a TRAVEL SPECIFICATION, within a given fare structure (e.g. the origin or destination zone in a zone-counting system).
START TIME AT STOP POINT	ADDITIONAL	A time at which a Fare time band (time band peak, off peak) is deemed to begin for trips starting at a particular station.
STEP LIMIT	Basic	Geographical parameter limiting the access rights by counts of stops, sections or zones.
Subscription	Further	Purchase of a product by staged payments made on a regular basis.
SUBSCRIBING	Further	Parameter specifying conditions relating to paying for a product by subscription.
SUPPLEMENT PRODUCT	Further	A PRE-ASSIGNED FARE PRODUCT that will provide additional right when used with (as a complement of) another (reserved seat, second to first class upgrade, etc.). SUPPLEMENT PRODUCT also usually means supplement price.
SUSPENDING	ADDITIONAL	Parameter specifying conditions relating to suspending use of a season pass.
TARIFF	Basic	A particular tariff, described by a combination of parameters. From a planner perspective: the set of discrete elements to be used according to the fare calculation rules to calculate the fare.
TEMPORAL VALIDITY PARAMETER	Basic	Grouping of temporal validity parameters.
THIRD PARTY PRODUCT	Further	A FARE PRODUCT that is marketed together with a Public Transport FARE PRODUCT.
TIME INTERVAL	Basic	A time-based interval specifying access rights for the FARE STRUCTURE ELEMENTs within the range of this interval: 0-1 hour, 1-3 days etc.
TIME INTERVAL PRICE	Basic	A set of all possible price features of a TIME INTERVAL, e.g. default total price etc.

TIME STRUCTURE FACTOR	Basic	The value of a TIME INTERVAL expressed by a TIME UNIT.
TIME UNIT	Basic	A unit for calculating time-based graduated fares.
TIME UNIT PRICE	Basic	A set of all possible price features of a TIME UNIT: default total price etc.
TRANSFERABILITY	Further	The number and characteristics of persons entitled to use the public transport service instead of the original customer.
TRAVEL DOCUMENT	ADDITIONAL	A particular physical support (ticket, card, etc.) to be held by a customer, allowing the right to travel or to consume joint-services, to proof a payment (including possible discount rights), to store a subset of the CONTRACT liabilities or a combination of those.
TRAVEL DOCUMENT SECURITY LISTING	ADDITIONAL	The presence of a TRAVEL DOCUMENT on a SECURITY LIST.
TRAVEL SPECIFICATION	ADDITIONAL	The recording of a specification by a customer of parameters giving details of an intended consumption (e.g. origin and destination of a travel).
TYPE OF CONCESSION	Basic	A classification of USER PROFILE by type of person eligible to use it.
TYPE OF CUSTOMER ACCOUNT CONTRACT	ADDITIONAL	A classification of CUSTOMER ACCOUNT CONTRACT
TYPE OF FARE PRODUCT	Basic	A classification of FARE PRODUCTs.
TYPE OF FARE CONTRACT	Basic	A classification of FARE CONTRACT.
TYPE OF FARE CONTRACT ENTRY	Basic	A classification of FARE CONTRACT ENTRies.
TYPE OF RETAIL DEVICE	ADDITIONAL	A classification of RETAIL DEVICEs.
TYPE OF SALES OFFER PACKAGE	Basic	A classification of SALES OFFER PACKAGEs.
TYPE OF TARIFF	Basic	A classification of TARIFFs to express the different classes of fares.
TYPE OF TRAVEL DOCUMENT	Basic	A classification of TRAVEL DOCUMENTs expressing their general functionalities and local functional characteristics specific to the operator. Types of TRAVEL DOCUMENTs like e.g. throw-away ticket, throw-away ticket unit, value card, electronic purse allowing access, public transport credit card etc. may be used to define these categories.
TYPE OF USAGE PARAMETER	Basic	A classification of USAGE PARAMETERs to express the nature of parameters.

USAGE DISCOUNT RIGHT	Basic	A FARE PRODUCT allowing a customer to benefit from discounts when consuming VALIDABLE ELEMENTs.
USAGE PARAMETER	Basic	A parameter used to specify the use of a SALES OFFER PACKAGE or a FARE PRODUCT.
USAGE PARAMETER PRICE	Basic	A set of all possible price features of a USAGE PARAMETER: discount in value or percentage etc.
USAGE VALIDITY PERIOD	Basic	A time limitation for validity of a FARE PRODUCT or a SALES OFFER PACKAGE. It may be composed of a standard duration (e.g. 3 days, 1 month) and/or fixed start/end dates and times.
USER PROFILE	Basic	The social profile of a passenger, based on age group, education, profession, social status, sex etc., often used for allowing discounts: 18-40 years old, graduates, drivers, unemployed, women etc.
USER PROFILE ELIGIBILITY	ADDITIONAL	Whether a specific TRANSPORT CUSTOMER is eligible for a FARE PRODUCT with a specific USER PROFILE as a validity parameter.
VALIDABLE ELEMENT	Basic	A sequence or set of FARE STRUCTURE ELEMENTs, grouped together to be validated in one go.
VALIDABLE ELEMENT PRICE	Basic	A set of all possible price features of a VALIDABLE ELEMENT: default total price, discount in value or percentage etc.
VALIDITY PARAMETER ASSIGNMENT	Basic	An ACCESS RIGHT PARAMETER ASSIGNMENT relating a fare collection parameter to a theoretical FARE PRODUCT (or one of its components) or a SALES OFFER PACKAGE.

Annex B
(Normative)
Facility code list

COMMON FACILITIES

Annex C
(informative)

Related UK Regulations

Bibliography

[1] ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

[2] ISO 639/IETF 1766, *Tags for the Identification of Languages*

[3] ISO/IEC 19501-1:2002, *Unified Modelling Language (UML) – Part 1: Specification*

[4] National standards, in particular profile NEPTUNE, TransXChange, BISON and VDV 452, and other standards like NOPTIS

[5] ERA TAP-TSI: Commission Regulation (EU) No 454/2011 of 5 May 2011 on the technical specification for interoperability relating to the subsystem 'telematics applications for passenger services' of the trans-European rail system.

[6] UIC recommendations and leaflets

[7] XML, Extensible Mark-up Language (XML) 1.0 W3C Recommendation 04 February 2004, available at http://www.w3.org/TR/2004/REC-xml-20040204.