Department for Transport

traveline

UK Fares and NeTEx Profile – Suppliers Workshop

CPT London 29 August 2019

Describing Fares with NeTEx

Common Framework

Network Basis

Tariff Structure

Access Rights

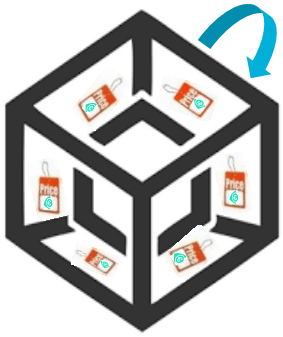
Fare Products

Sales Offer Packages

Travel Specifications & Sales

Describing Fares with NeTEx

Pricing



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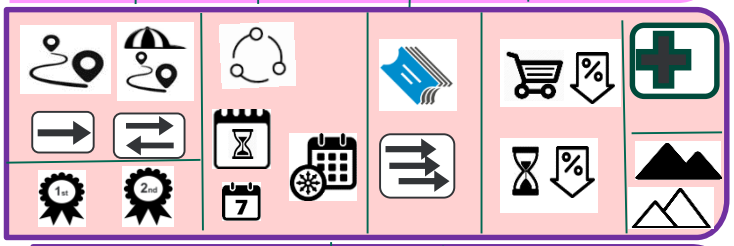
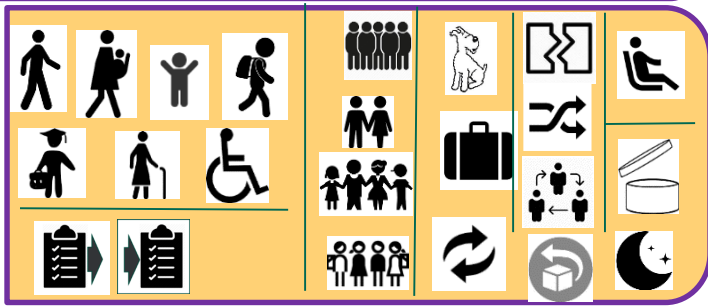
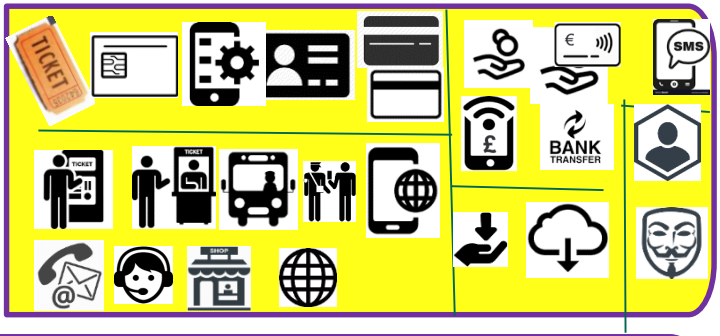
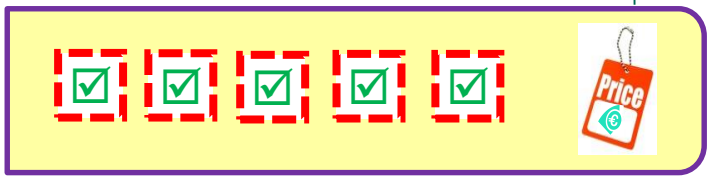
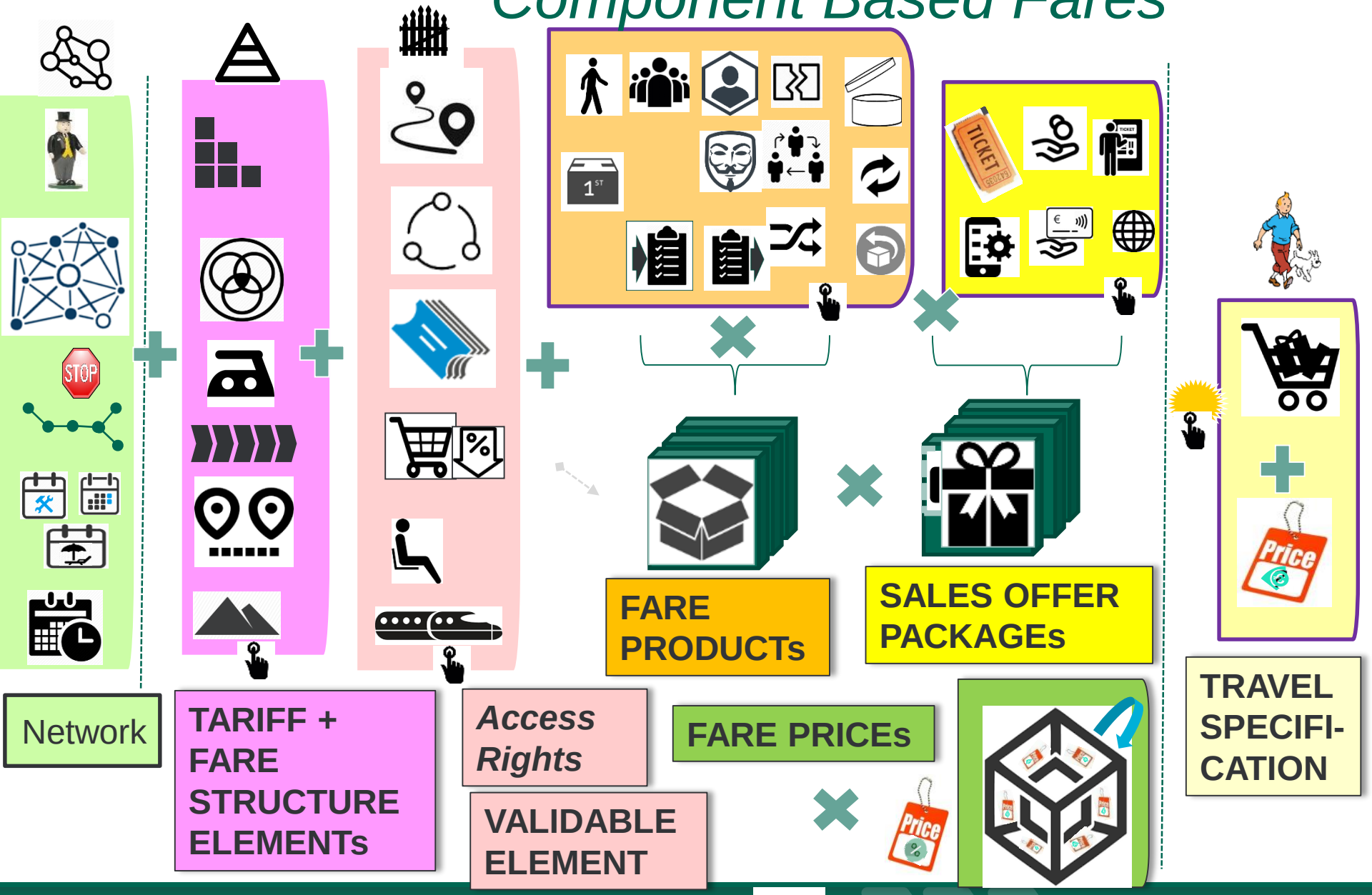








Component Based Fares



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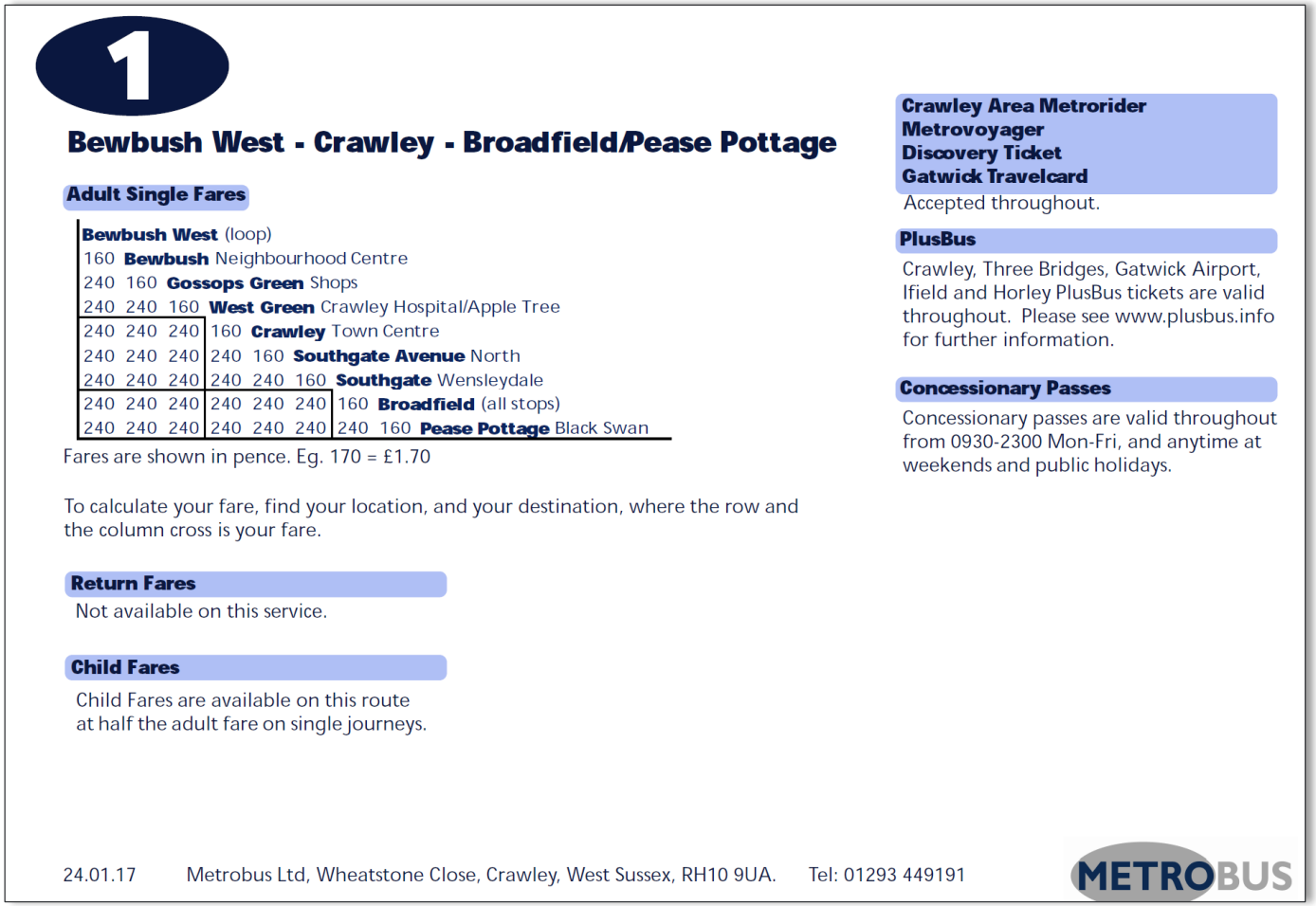
P2P / Z2Z Tariff Structure



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Bewbush West - Crawley - Broadfield/Pease Pottage

Adult Single Fares

Bewbush West (loop)						
160	**Bewbush** Neighbourhood Centre					
240	160	**Gossops Green** Shops				
240	240	160	**West Green** Crawley Hospital/Apple Tree			
240	240	240	160	**Crawley** Town Centre		
240	240	240	240	160	**Southgate Avenue** North	
240	240	240	240	240	160	**Southgate** Wensleydale
240	240	240	240	240	240	160 **Broadfield** (all stops)
240	240	240	240	240	240	240 160 **Pease Pottage** Black Swan

Fares are shown in pence. Eg. 170 = £1.70

To calculate your fare, find your location, and your destination, where the row and the column cross is your fare.

Return Fares

Not available on this service.

Child Fares

Child Fares are available on this route at half the adult fare on single journeys.

Crawley Area Metrorider
Metrovoyager
Discovery Ticket
Gatwick Travelcard

Accepted throughout.

PlusBus

Crawley, Three Bridges, Gatwick Airport, Ifield and Horley PlusBus tickets are valid throughout. Please see www.plusbus.info for further information.

Concessionary Passes

Concessionary passes are valid throughout from 0930-2300 Mon-Fri, and anytime at weekends and public holidays.

24.01.17 Metrobus Ltd, Wheatstone Close, Crawley, West Sussex, RH10 9UA. Tel: 01293 449191

METROBUS

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https://www.metrobus.co.uk/route-information/1

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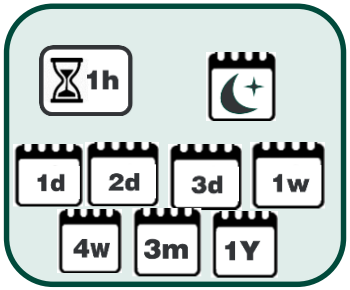
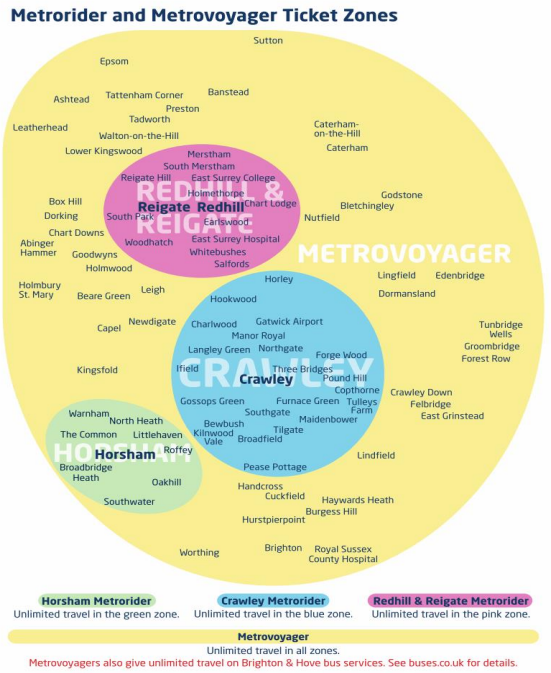
Zonal Pass with choice of durations –





TIME INTERVALs

FARE ZONE

FARE PRICE

Crawley Metrorider

Unlimited travel in the Crawley Metrorider area.

* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
** Available from 1900 and valid until 0359 on the following day.
*** For 2 adults, travelling together.

	bought on bus with cash			stored on your mobile phone as m-tickets								loaded onto our smartcard the key					
	1 day	1 week	Evening**	60 minute	1 day	2 day#	3 day#	1 week	4 week	Duo***	Evening**	1 day	1 week	4 week	13 week	Annual	Evening**
Adult	£4.90	£20	£4	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£3.70	£4.20	£18	£59	£154	£520	£3.70
Child	£2.70	£11	-	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	-	£2.35	£9.75	£32.50	£79	£290	-
Student	-	-	-	-	-	-	-	-	-	-	-	£3.15	£13.50	£44.25	£115.50	£390	-
Family*	£9	-	-	-	£9	-	-	-	-	-	-	-	-	-	-	-	-

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Stage /Section Count Fares

- Does not matter which section, just the number of sections.

First

© First Group 2018

Single tickets

The cost of single tickets within the West of England will be based on the route distance you travel, with five single fares available:

Up to three miles

Adult	from £2
16-21 year old/student	from £1.40
Child aged 5-15	from £1

Three to six miles

Adult	from £3
16-21 year old/student	from £2.10
Child aged 5-15	from £1.50

Six to nine miles

Adult	from £4
16-21 year old/student	from £2.80
Child aged 5-15	from £2

Nine to twelve miles

Adult	from £5
16-21 year old/student	from £3.50
Child aged 5-15	from £2.50

Over twelve miles

Adult	from £6
16-21 year old/student	from £4.20
Child aged 5-15	from £3

How is your single fare calculated?

Distance-based fares for the West of England

In the West of England (excluding Bath Inner and Weston-super-Mare Town Zones – see pages 6 and 14) your single fare is worked out based on the route distance you are travelling.

Distances are calculated using fare stage sections rather than individual bus stops, with each section being approximately one mile long*.

If you travel in 1-3 mile long sections it'll be £1.50, 4-6 mile long sections will be £2.50 and so on.

Here is an example of one route and some of the fares along it:

Emersons Green, Sainsbury's to Long Close would be £1.50 as you are travelling in three sections (numbers 1, 2 and 3, Long Close is classed as section 3 in this example as it's where you are getting off the bus).

Long Close to Narroways Road would be £2.50 as you are travelling in four sections (4, 5, 6, 7, Long Close is counted as section 4 in this example as it's your boarding point).

Blackberry Hospital to Downend, The Leap would be £2.50 as you are travelling in four sections (5, 4, 3, 2).

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NETWORK ELEMENTS FOR TARIFFS

- Stops,
- Zones
- Service Journeys

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Network elements for tariff and product definition

- Fare structures build on Stops, Tariff Zones, and other Network & Timetable elements
  - Equivalent to those used in NaPTAN, TransXChange
- Mostly the same elements as defined in UK Basic Timetable Profile
  - MODEs, OPERATORs, LINEs, etc
  - SCHEDULED STOP POINT vs STOP PLACE.
  - Fare definitions can reference /or include them
- Some elements extended for fares:
  - TARIFF ZONE → FARE ZONE
    - Adds additional attributes
  - POINT IN PATTERN → FARE POINT IN JOURNEY PATTERN
    - Used to define Fare Stages for a route

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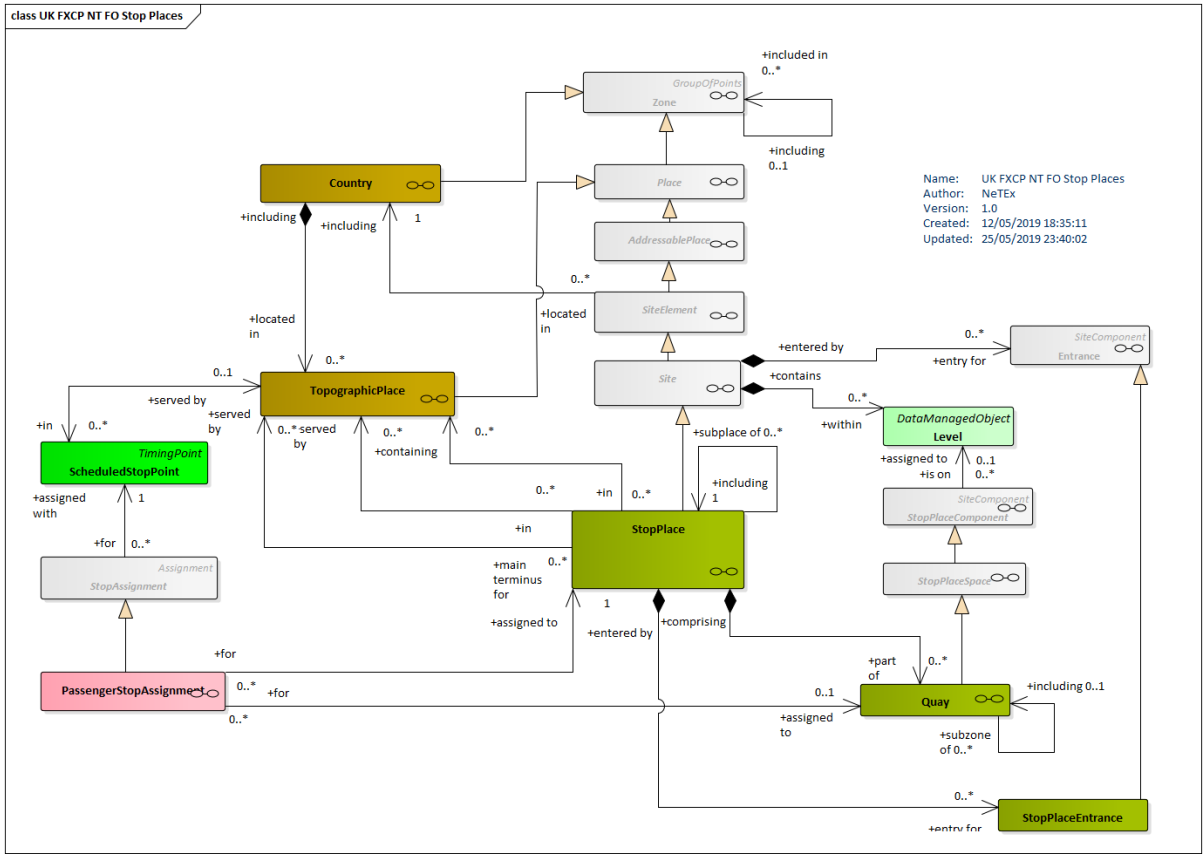
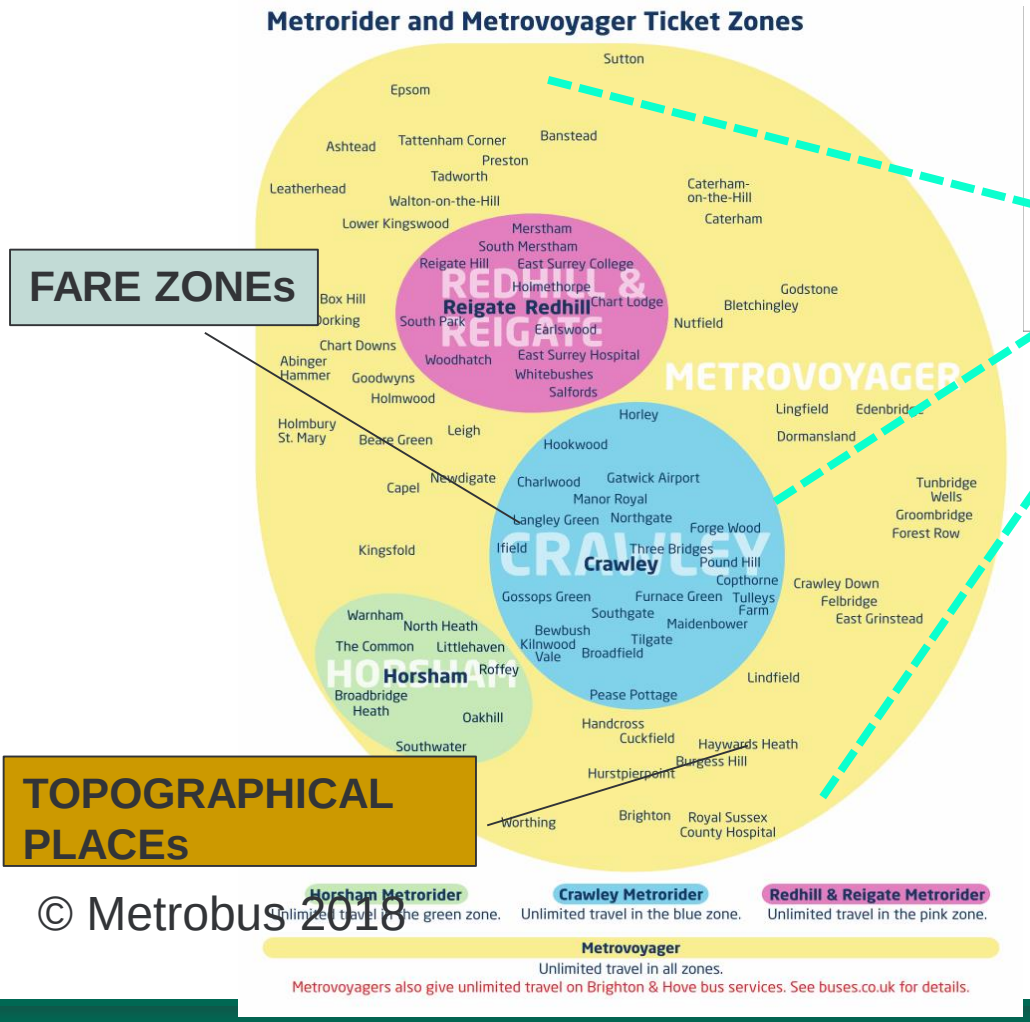
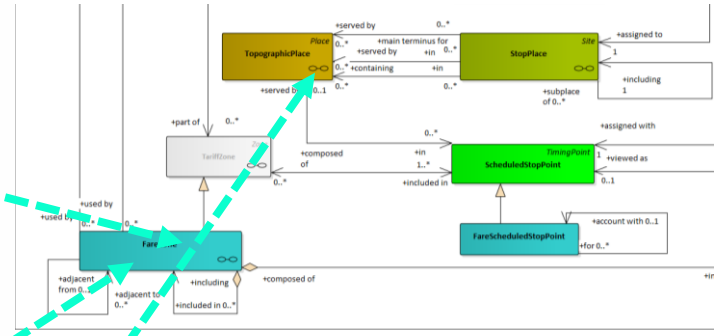
Stop model

- **Geographical Context**
  - TOPOGRAPHIC PLACE
    - (NPTG Locality),
- **Physical Stop**
  - STOP PLACE
    - (NaPTAN Stop
- **Timetable Stop**
  - SCHEDULED STOP POINTs
    - (TXC reference to a NaPTAN STOP)
  - STOP ASSIGNMENT



Nested Fare Zones - Metrorider &





- Sets of individual zones can be assigned as fare structure elements
- Zones can relate to stops
- Zones can be nested.

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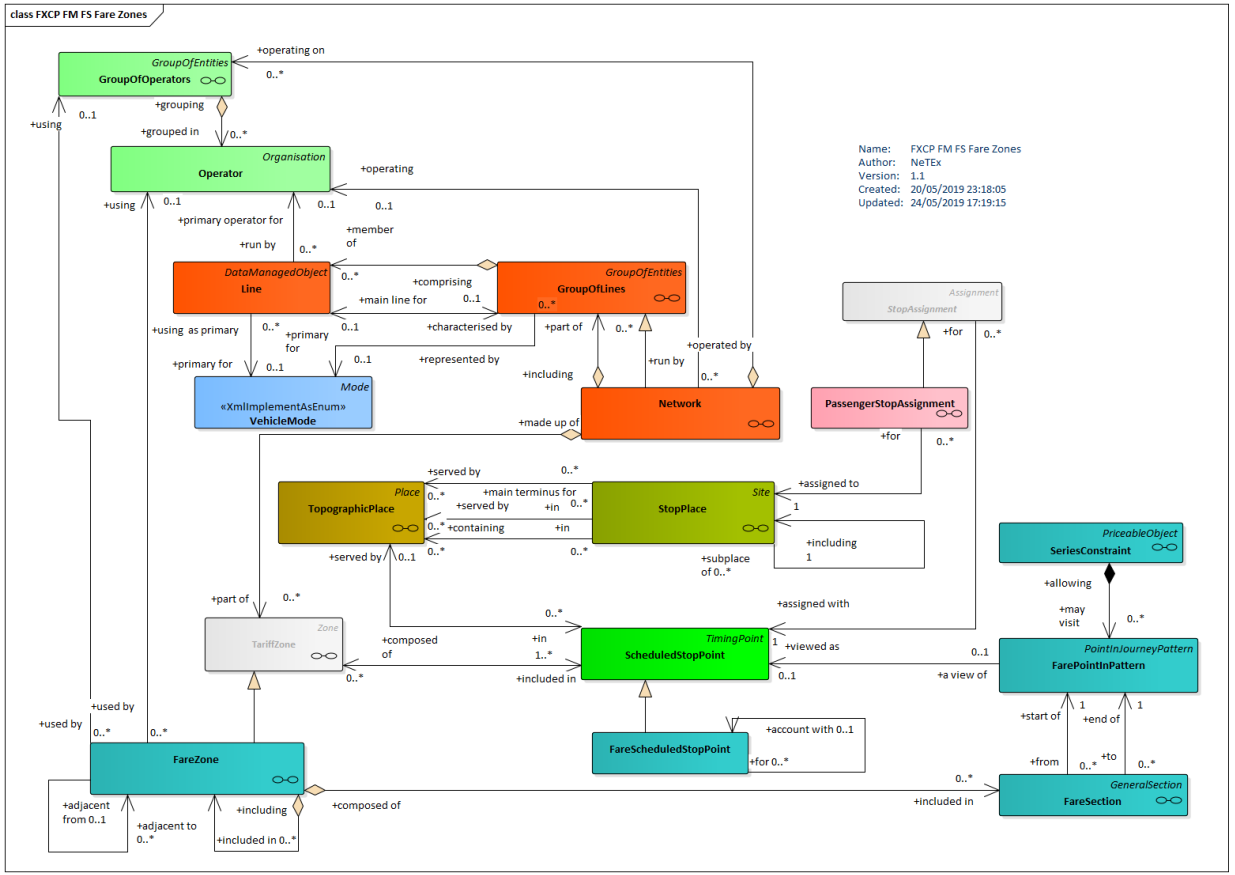
Network elements for tariff and product definition

- **Tariffs & Fare Products may apply to individual instances or combinations of**
  - MODEs
  - OPERATORs
  - LINEs
  - +GROUPS OF LINEs
  - +NETWORKs,
- **Tariffs structures may be based on**
  - STOP POINTs
  - +FARE ZONES (Tariff Zones)
  - +FARE SECTIONS
    - (FARE POINTs IN JP)



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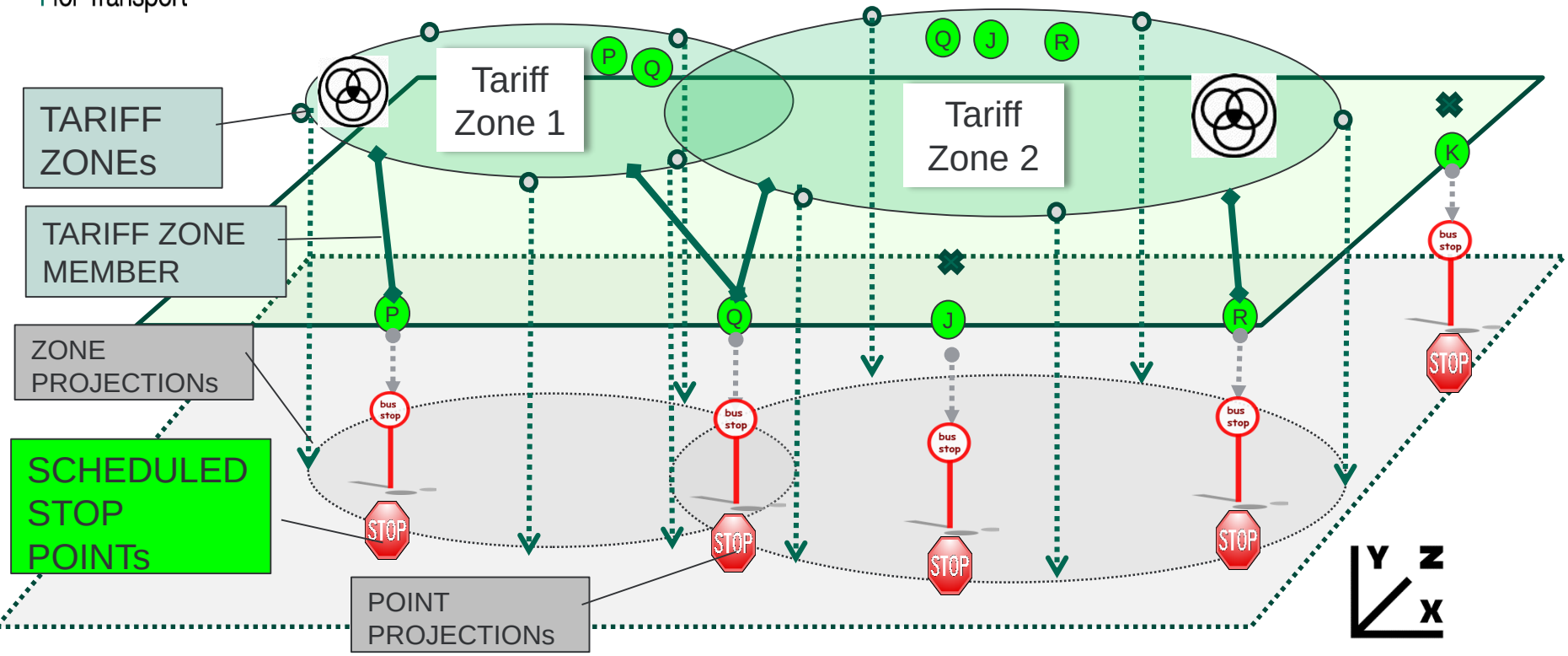
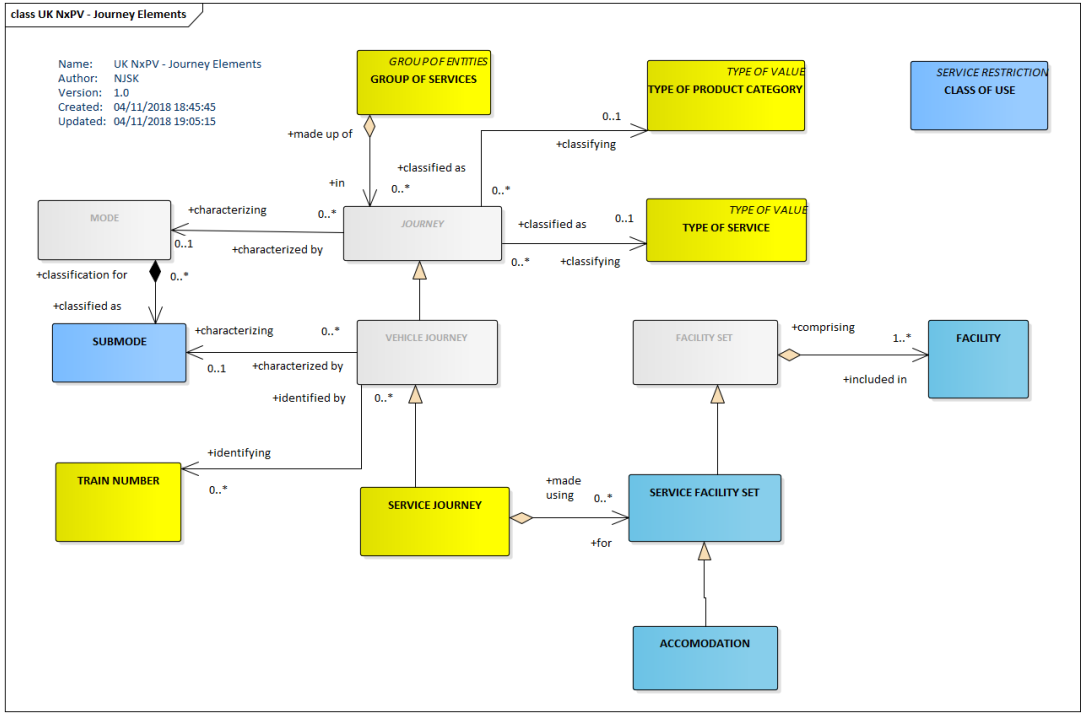
Membership of Tariff Zones by Stops is explicit.



- ***The model specifies which stops are in which** tariff **zone:** a stop may be in more than one zone, zones maybe specific to an operator or shared.*
- ***Both stops and zones have a spatial projection.** However spatial containment of a stop within a zone's extent does not invariably imply semantic membership of the zone. In many cases the coordinates can be used to compute which stops are in a given tariff zone so as to populate the membership links.*
- *A Tariff zone may also **have presentation properties** such as colour.*
- *Tariff zones can also be related to **Topographic places** in a Gazeteer (ie NPTG localities)*

Journey Elements for tariff definition

- **Tariffs may apply to specific journeys or to journey classifications: Mostly only relevant for Coach or Rail**
  - SERVICE JOURNEY
  - GROUPs OF SERVICES
  - TYPEs OF SERVICE
  - TYPEs OF PRODUCT CATEGORY
- **Tariffs may apply to facilities & specific accomodation**
  - CLASS OF USE
  - ACCOMODATION



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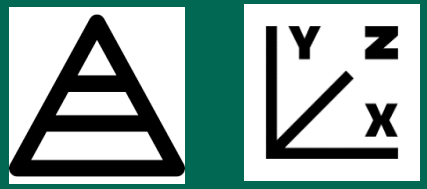

Representing Tariff Structures in NeTEx

- Point-to-Point
- Zone
- Section Count
- Flat

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Basic UK Bus fare tariff types?

Access rights		Tariff Structure						
Type of Product	PREASSIGNED FARE PRODUCT	Flat	Point to point	Named Zones	Zone/ Stage Count	Peak / Off Peak	Group Ticket	Temporal Conditions
TRIP *("single ride")*	*Short hop*	☑	☑	☑	☑	?	-	No break
	Single trip	☑	☑	☑	☑	☑	☑	Has use by date?
	Time-limited ("Hopper")	-	-	☑	-	☑	☑	Max trip duration, Can interchange
	Period Return	☑	☑	☑	-	☑	☑	Has use by date?
	Day return	☑	☑	☑	-	☑	☑	Must use same day
PASS	*Day pass*	-	-	☑	-	☑	☑	1D (elapsed or calendar)
	Termtime	-	?	☑	-	-	-	Use during term 1Y
	Season pass	☑	☑	☑	-	-	-	n x D,W,M, 1Y

Metrorider zone

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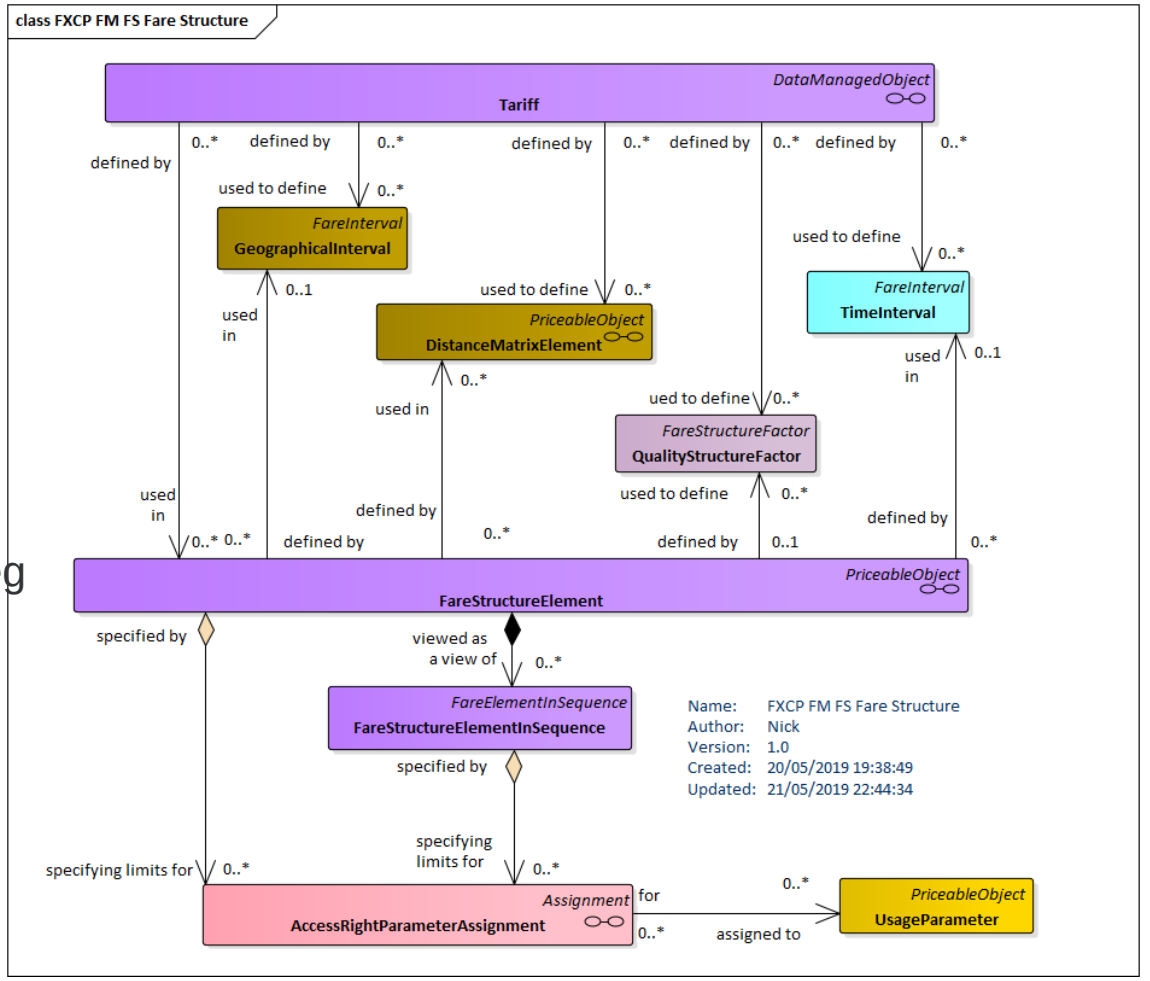
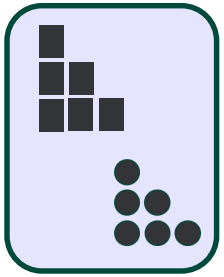
Tariff Structures

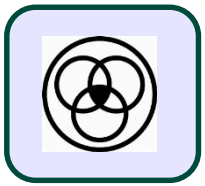
- **Tariffs may depend on**
  - Spatial factors E.g.
    - EGEOGRAPHICAL INTERVAL
    - DISTANCE MATRIX ELEMENT
  - Temporal factors E.g.
    - TIME INTERVAL
  - Other quantitative factors eg
    - QUALITY STRUCTURE FACTOR
  - Other arbitrary factors eg
    - USER PROFILE
    - CLASS OF USE



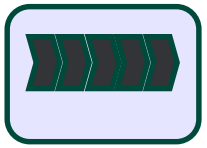
Tariffs - Spatial aspects: Terminology

- **Flat** – There is only one price for the fare or product regardless of distance.
- **Point-to-point, Zone–to-Zone.** The fare gives the right to travel between two named stops. A discrete fare price can be given for each origin/destination pair.
  - Usually the fare prices increase progressively with increasing distance travelled, but the increase is not necessarily a strict linear function (further may be cheaper, and individual O/D prices may be adjusted arbitrarily to optimize yields, traffic, competitive advantage, etc).
  - Both Zone/Stage count and distance fares can be expressed as Z2Z/ P2P.





- **Named Zone(s):** The fare gives the right to travel in and between one or more identified zones. A fare price can be given for any allowed combination of zones.
  - If the zones are disjoint , then this is in effect “Zone to Zone” If the zones overlap or are nested then the topology is more complex, but still Z2Z.



- **Stage / Section count**. The fare gives the right to travel a certain **number** of sections or “stages” regardless of which specific sections they are. There is a price per zone used. The resulting fare prices are inherently progressive.

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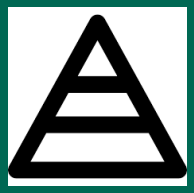
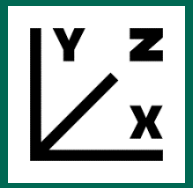
Point to Point & Zone to Zone Tariff Structures





Tariff Structure

❖ DISTANCE MATRIX ELEMENT

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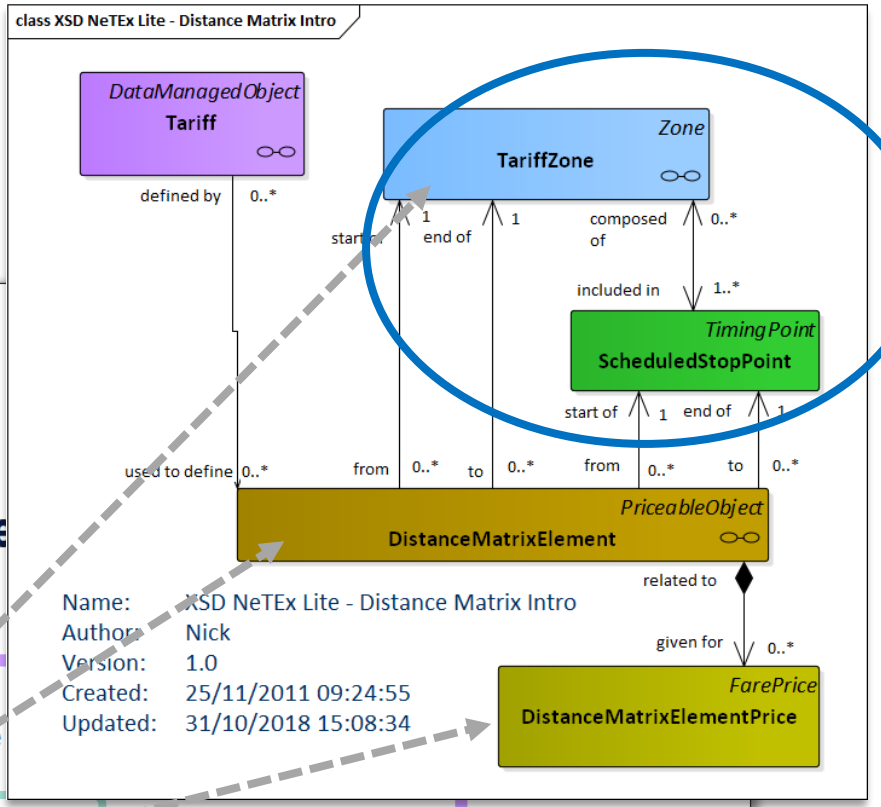
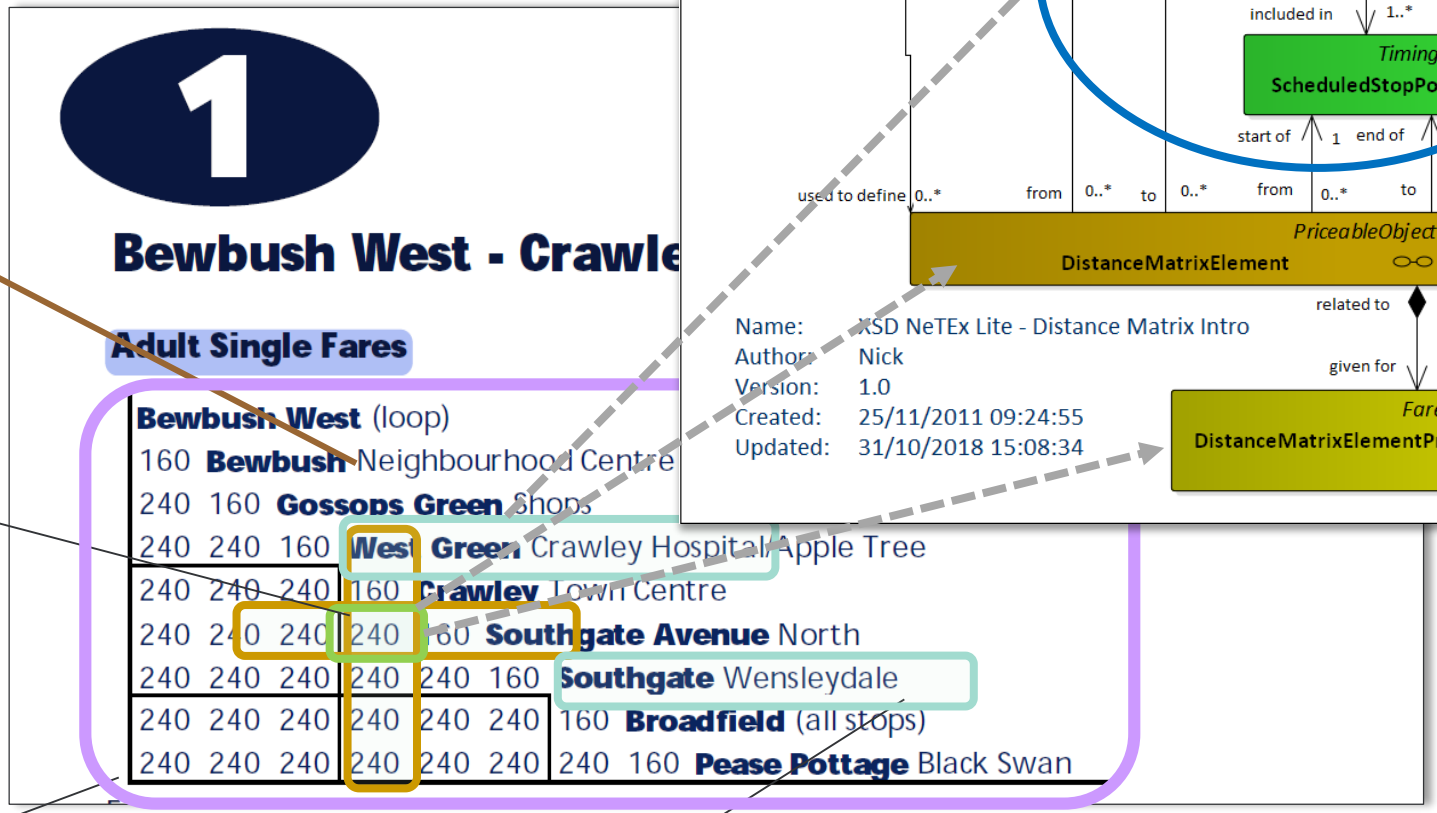
A Distance Matrix



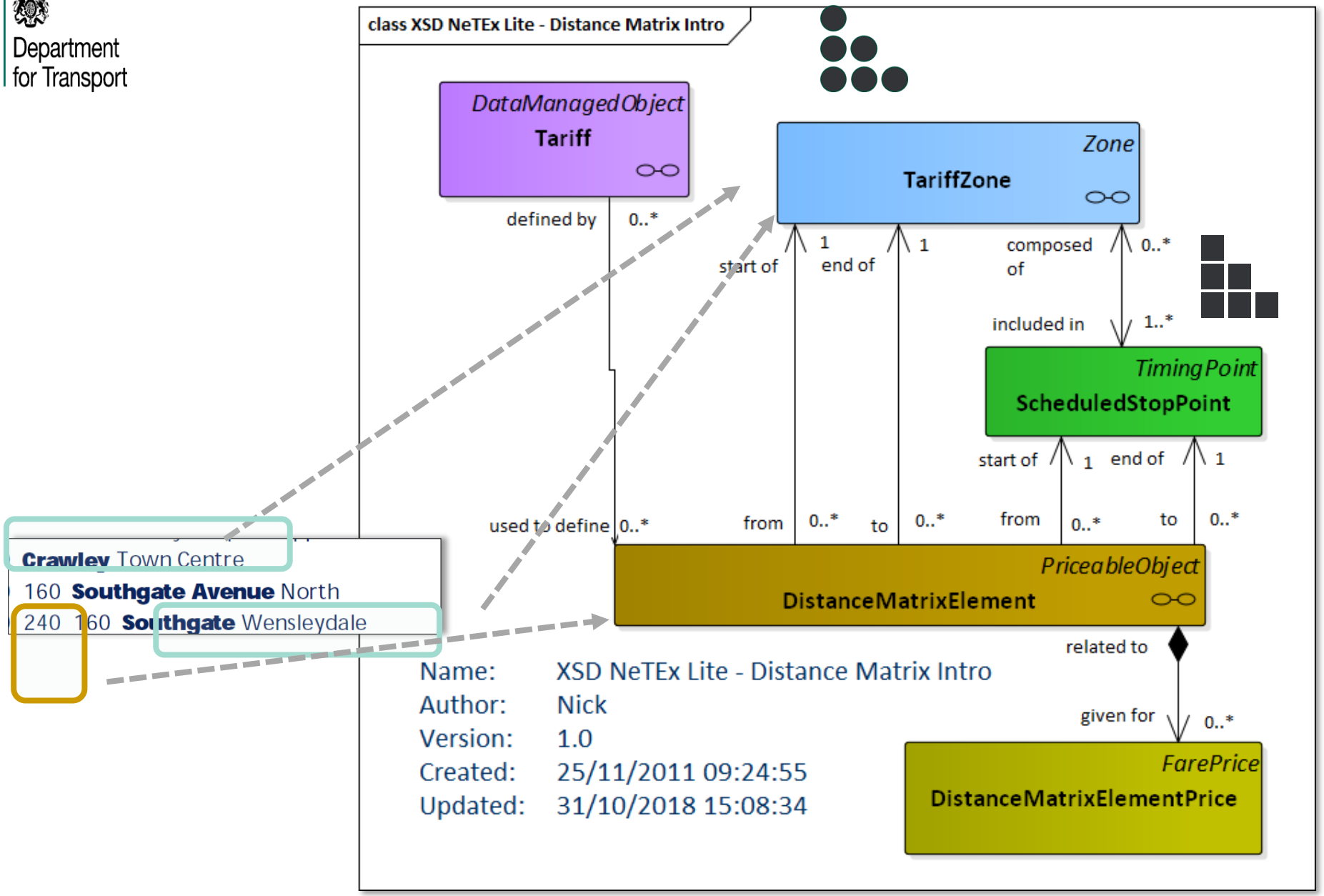


DISTANCE MATRIX ELEMENT

FARE PRICEs

TARIFF

TARIFF ZONEs


class XSD NeTEx Lite - Distance Matrix Intro
DataManagedObject
Tariff
Zone
TariffZone
defined by
0..*
start of
1
end of
1
composed of
0..*
included in
1..*
TimingPoint
ScheduledStopPoint
start of
1
end of
1
used to define
0..*
from
0..*
to
0..*
from
0..*
to
0..*
PriceableObject
DistanceMatrixElement
related to
given for
0..*
FarePrice
DistanceMatrixElementPrice
Crawley Town Centre
160 Southgate Avenue North
240 160 Southgate Wensleydale
Name: XSD NeTEx Lite - Distance Matrix Intro
Author: Nick
Version: 1.0
Created: 25/11/2011 09:24:55
Updated: 31/10/2018 15:08:34

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DISTANCE MATRIX ELEMENT - Notes

- DISTANCE MATRIX ELEMENT specifies in effect a table of Origin/Destination (O/D) pairs
  - DISTANCE MATRIX ELEMENT can be P2P (SCHEDULED STOP POINT) or Z2Z (TARIFF ZONE / FARE ZONE). Is P2Z also found?
  - The same DISTANCE MATRIX ELEMENT can be reused for many different products & fare combinations (adult, child, etc).
- A TARIFF is a set of DISTANCE MATRIX ELEMENTs
- FARE PRICEs can be associated with each DISTANCE MATRIX ELEMENT *or further combinations of it with other factors*
- Advanced Comments
  - We can have reusable GROUPS OF DISTANCE MATRIX ELEMENTs
  - We can have multiple routings (SERIES CONSTRAINTs) for the same element.

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Zonal Tariff Structures

Tariff Structure

- FARE ZONE
- FARE STRUCTURE ELEMENT

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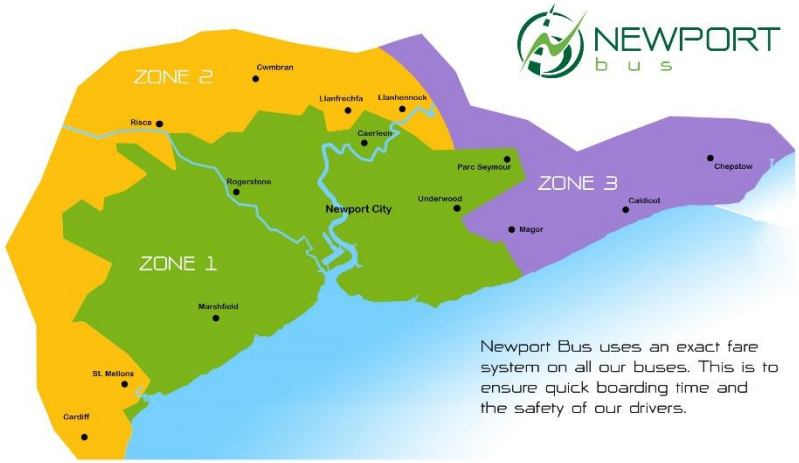
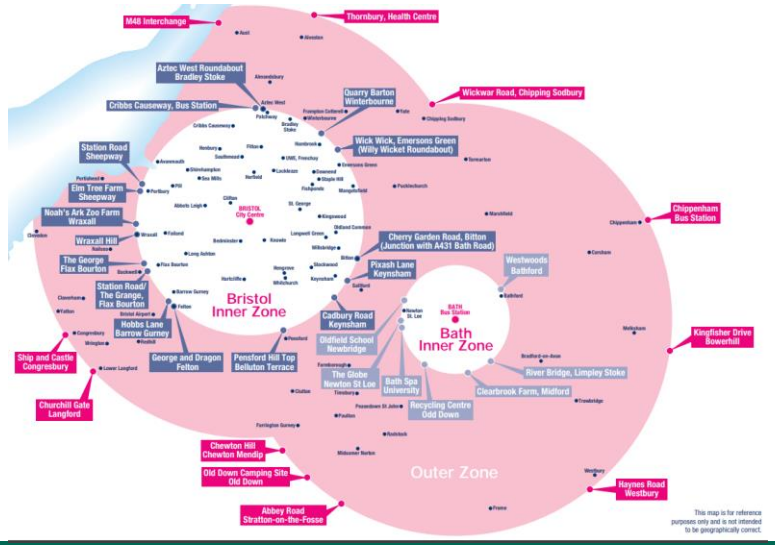
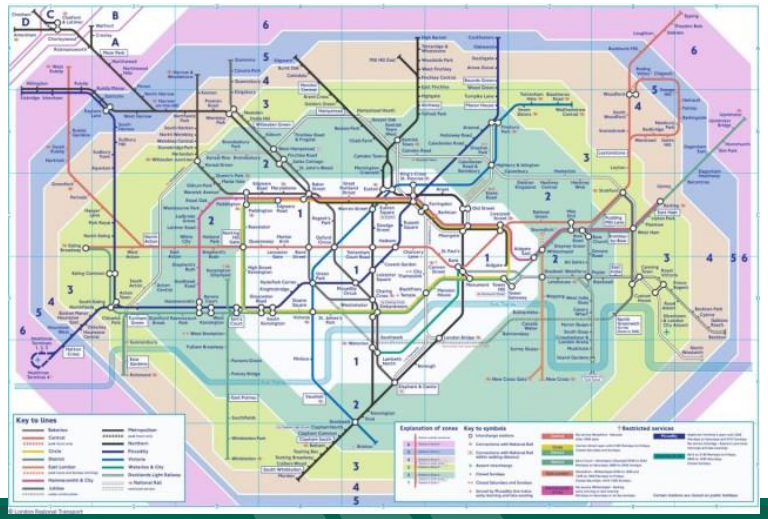
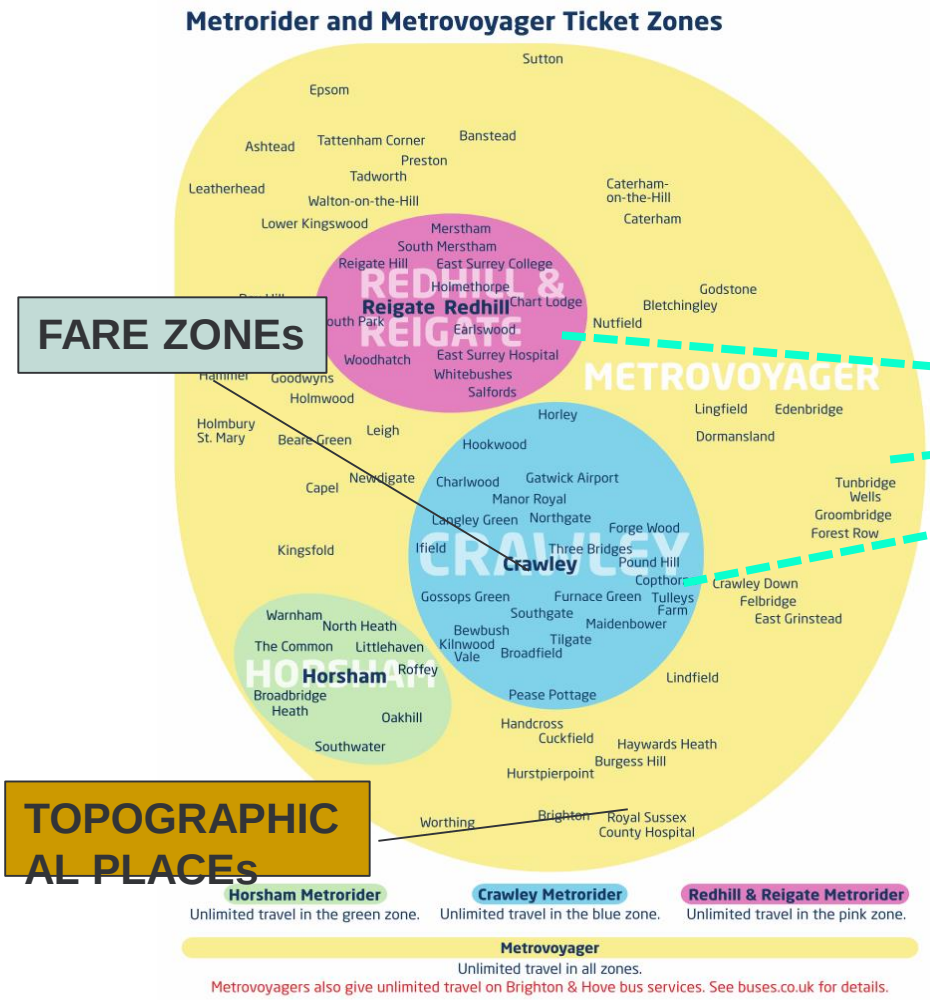
Zone topologies – Disjoint, nested, overlapping, doughnut etc…

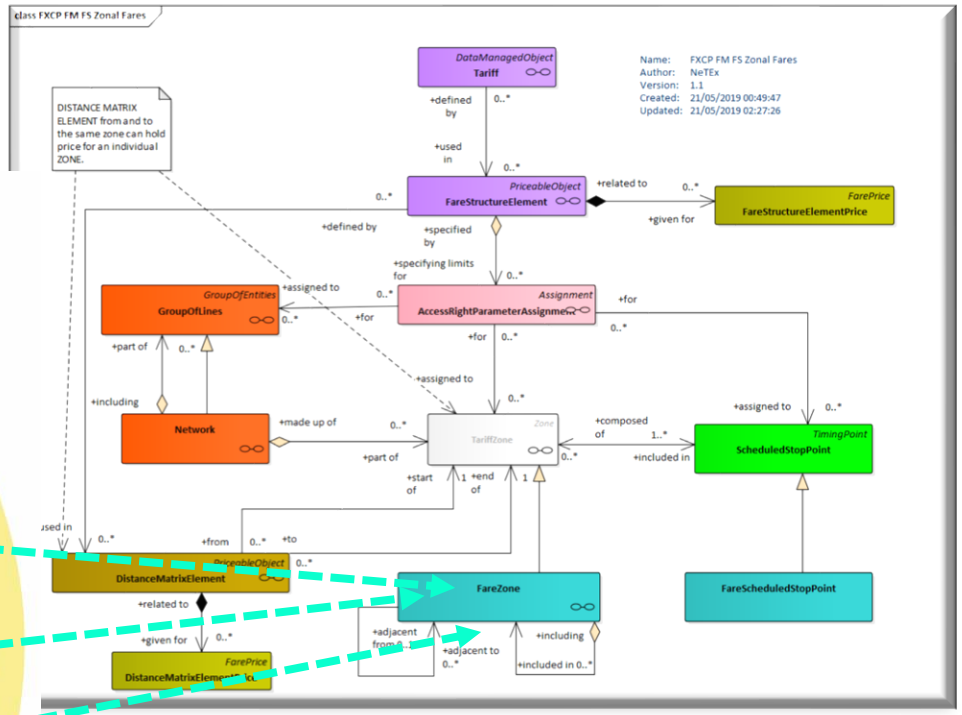






Nested Fare Zones - Metrorider &





- Sets of individual zones can be assigned as fare structure elements
- Zones can relate to stops
- Zones can be nested.

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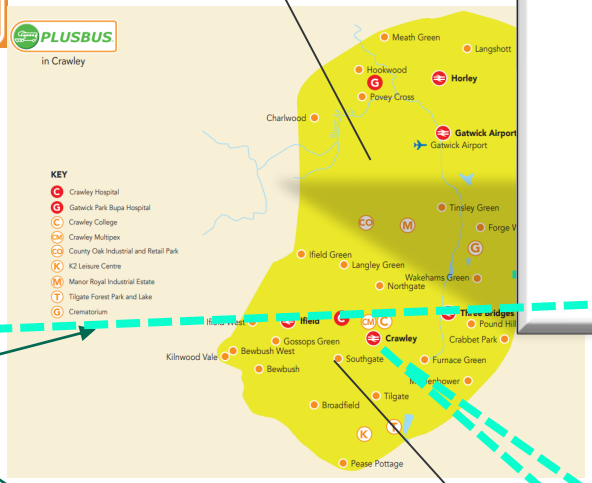
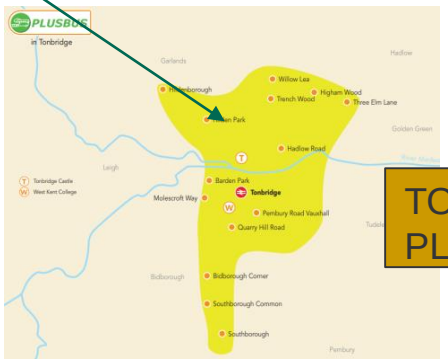
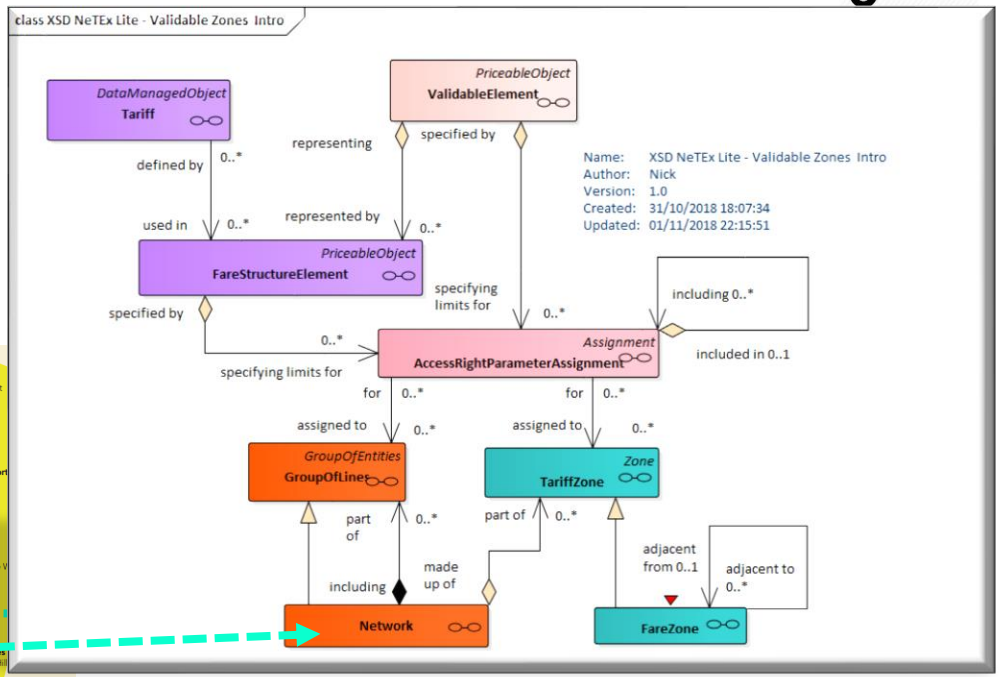
Named Zones - e.g. Plusbus

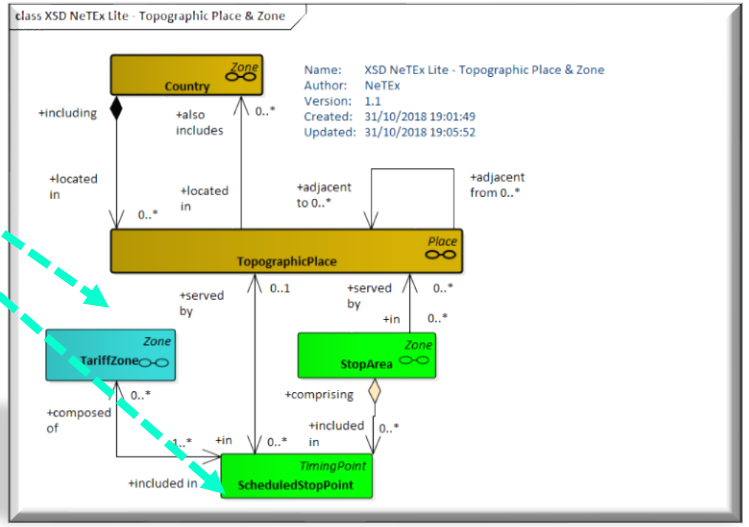
FARE ZONEs





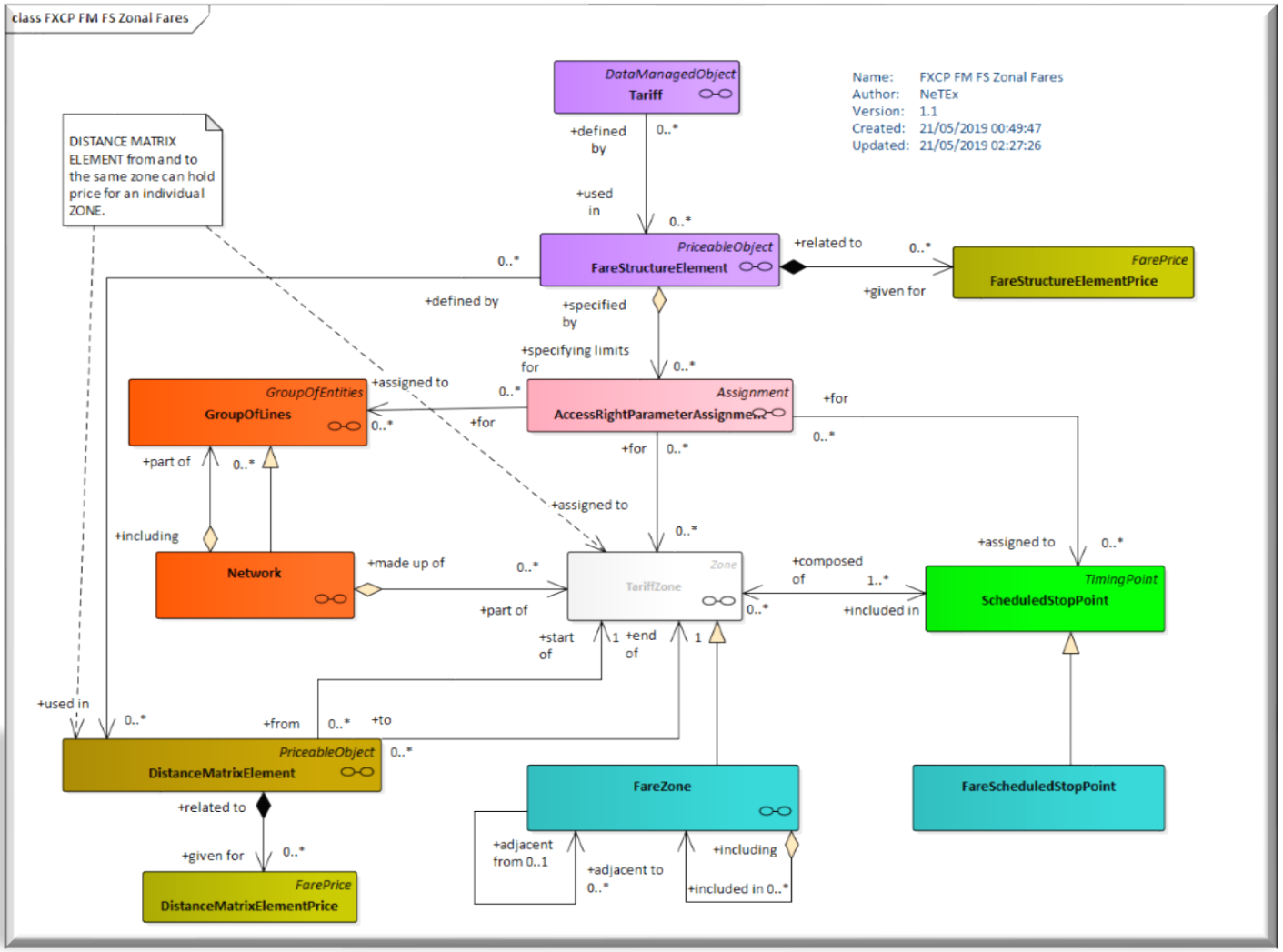
TOPOGRAPHIC PLACEs





Department for Transport

Named Zones



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Named FARE ZONEs - Notes

- SCHEDULED STOP POINTs assigned to one or more FARE ZONEs
  - A FARE ZONE specialises TARIFF ZONE with additional properties.
  - Use of FARE ZONEs may be disjoint, overlapping, nested, honeycomb etc..
- FARE ZONEs are assigned to one or more FARE STRUCTURE ELEMENTs
  - Each GENERIC PARAMETER ASSIGNMENT on ore more zones
- A TARIFF is a set of FARE STRUCTURE ELEMENTs

- Prices can be assigned for use of a ZONE
  - Using a DISTANCE MATRIX ELEMENT from/to same zone, with a DISTANCE MATRIX ELEMENT PRICE
  - Using a FARE STRUCTURE ELEMENT PRICE if single ZONE or same price for set of zones.

Named Zones in fare structure -XML Code Snippet

- Fare Structure lists all zones
- User specifies which ones on purchase

```
<Network version="01" id="jsp:PlusBus@Zones">
    <Name>Plusbus Network</Name>
    <OperatorRef version="1.0" ref="jsp:JSP"/>
    <tariffZones>
        <TariffZoneRef version="01" ref="nptg:PlusBus_zone:CRAWLEY"/>
        <TariffZoneRef version="01" ref="nptg:PlusBus_zone:IPSWICH"/>
……. Etc rest of zones
    </tariffZones>

                                    ……
```

```
<FareStructureElement version="01" id="jsp:Pass@PlusBus@1zone">
    <Name>Plusbus single zone</Name>
        <validityParameterAssignments>
        <GenericParameterAssignment version="01" id="jsp:Pass@PlusBus@1zone" order="1">
            <TypeOfAccessRightAssignmentRef ref="jsp:can_access" version="any"/>
            <ValidityParameterGroupingType>OR</ValidityParameterGroupingType>
            <validityParameters>
                <NetworkRef ref="nptg:PlusBus_zones"/>
            </validityParameters>
        <v/alidityParameterAssignments>
……
```

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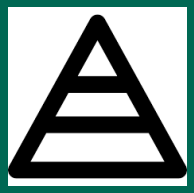
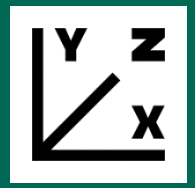




Stage (Section) Tariff Structures

Tariff Structure

- GEOGRAPHICAL INTERVAL
- FARE STRUCTURE ELEMENT

Department for Transport

Stage Fares

First

GEOGRAPHIC UNIT
1-Section

GEOGRAPHIC INTERVALS

01-03	= £1.50
04-06	= £2.50
07-09	= £4.50
10+	= £5.50

FARE PRICEs

How is your single fare calculated?

Distance-based fares for the West of England

In the West of England (excluding Bath Inner and Weston-super-Mare Town Zones – see pages 6 and 14) your single fare is worked out based on the route distance you are travelling.

Distances are calculated using fare stage sections rather than individual bus stops, with each section being approximately one mile long*.

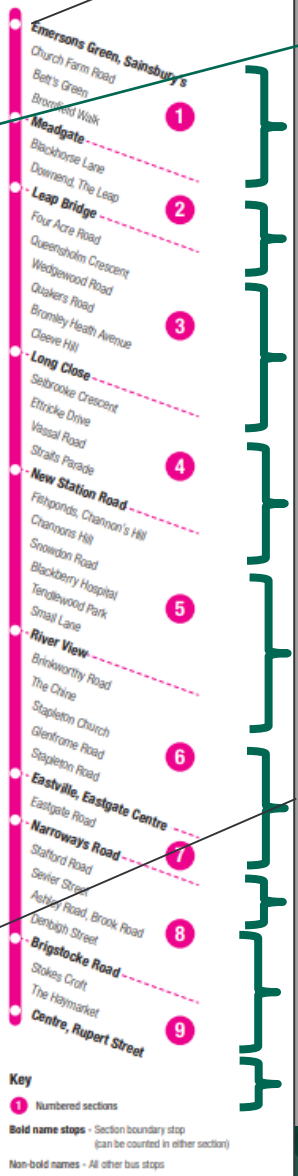
If you travel in 1-3 mile long sections it'll be £1.50, 4-6 mile long sections will be £2.50 and so on.

Here is an example of one route and some of the fares along it:

Emersons Green, Sainsbury's to Long Close would be £1.50 as you are travelling in three sections (numbers 1, 2 and 3, Long Close is classed as section 3 in this example as it's where you are getting off the bus).

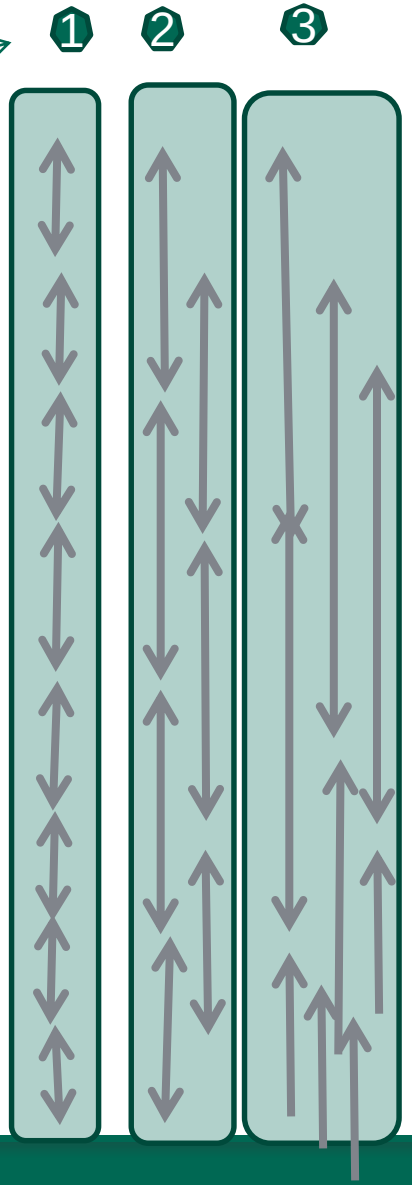
Long Close to Narroways Road would be £2.50 as you are travelling in four sections (4, 5, 6, 7, Long Close is counted as section 4 in this example as it's your boarding point).

Blackberry Hospital to Downend, The Leap would be £2.50 as you are travelling in four sections (5, 4, 3, 2).



FARE SECTIONs

SCHEDULED STOP POINTs



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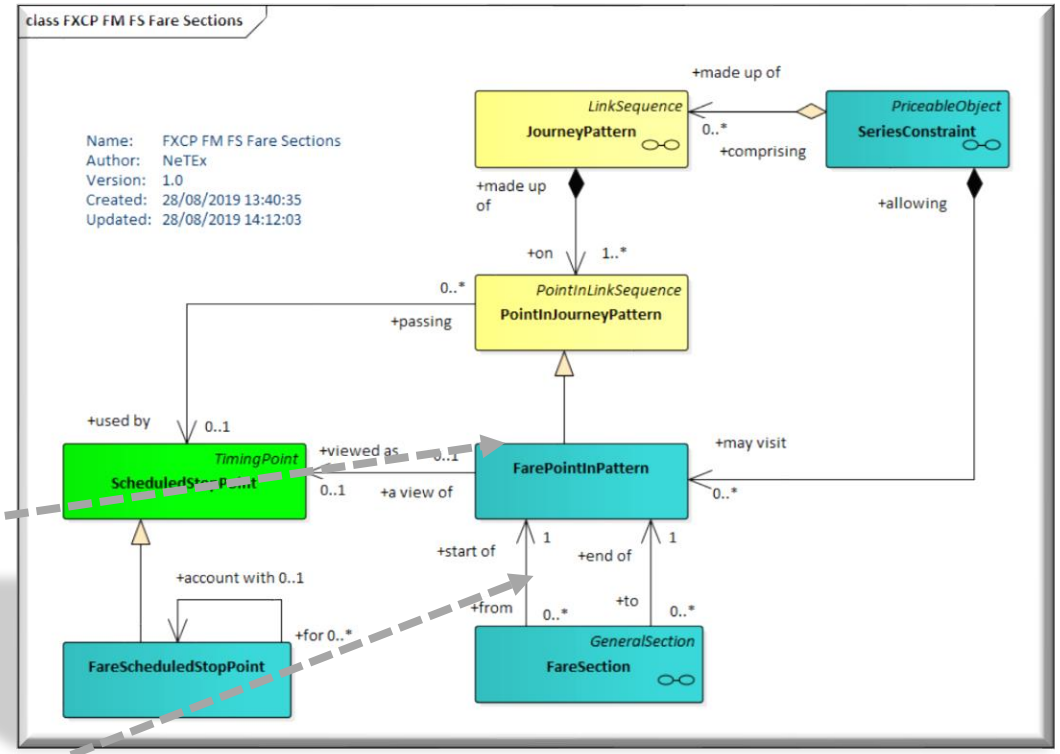
Modelling – Stage definition

SCHEDULED STOP POINTs

FARE POINT IN PATTERN

FARE SECTIONs



- Dynamic zone counting : Trip planner uses JOURNEY PATTERN to determine number of FARE SECTIONs traversed between origin and destination POINT IN PATTERN

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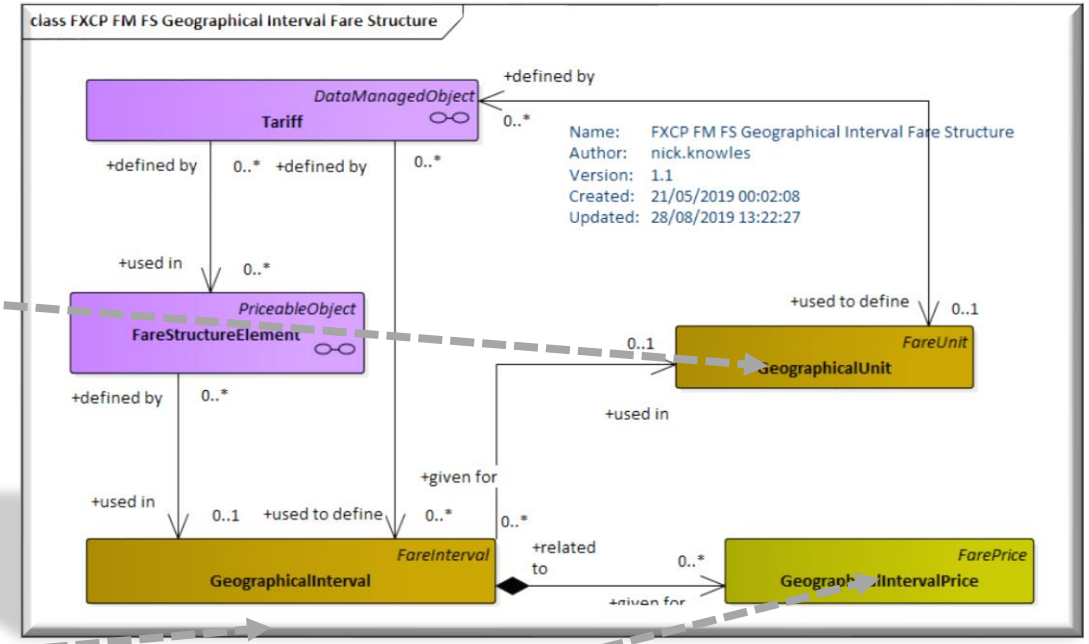
Modelling Stage Fare Unit prices

GEOGRAPHIC UNIT = a Section

GEOGRAPHIC INTERVAL



id	Start	End	➔Price
001	01	03	£1.50
002	04	06	£2.50
003	07	09	£4.50
004	10		£5.50

- Price may be uniform for every section (GEOGRAPHICAL UNIT PRICE) , or progressive for ranges of sections GEOGRAPHICAL INTERVAL PRICE).

GEOGRAPHICAL INTERVAL PRICE

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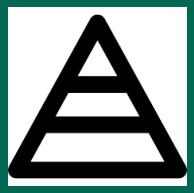

Flat Tariff Structures

Tariff Structure

- FARE STRUCTURE ELEMENT

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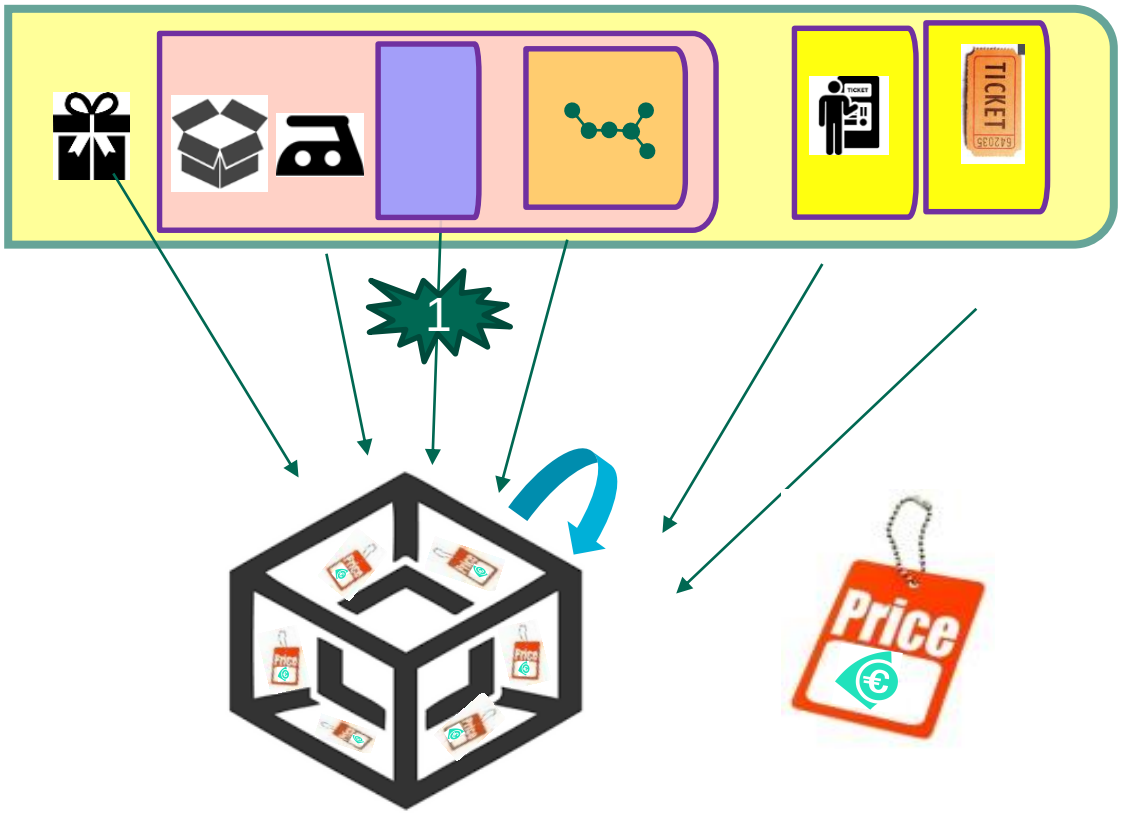
Flat – Only one tariff price regardless of distance, time, etc



- *Flat* = Non-progressive fare structure (spatially or temporally)
  - E.g. Single product, railcard, bicycle ticket etc
  - E.g. Shuttle bus with only two stops
  - E.g. Tfl Bus fare
- A “flat” fare may still may have other price dimensions
  - E.g. separate adult & child fare prices

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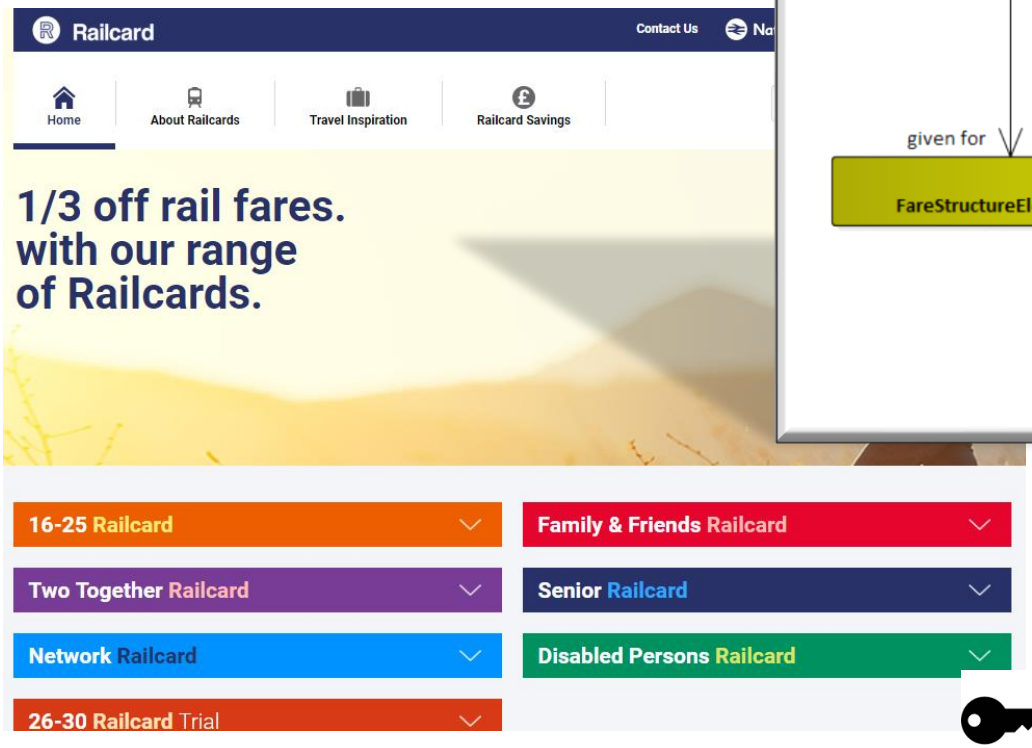
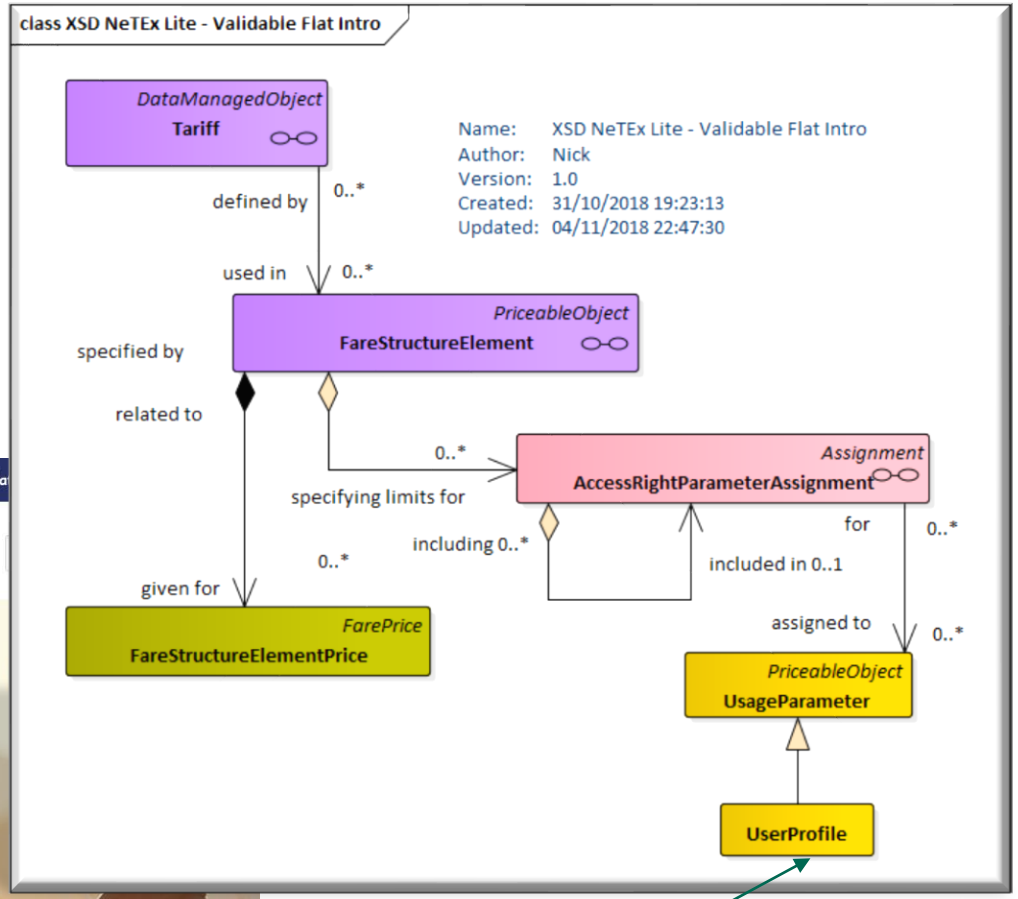
Flat Rate tariff Example

- Railcard priced by user type.





USER PROFILEs

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Common Framework

Network Basis

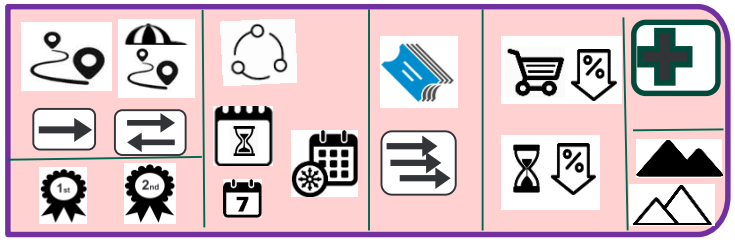
Tariff Structure

Access Rights

Fare Products

Sales Offer Packages

Travel Specifications & Sales



Representing Temporal Access rights in NeTEx

- Durations
- Validity Periods
- Fare Demand Periods

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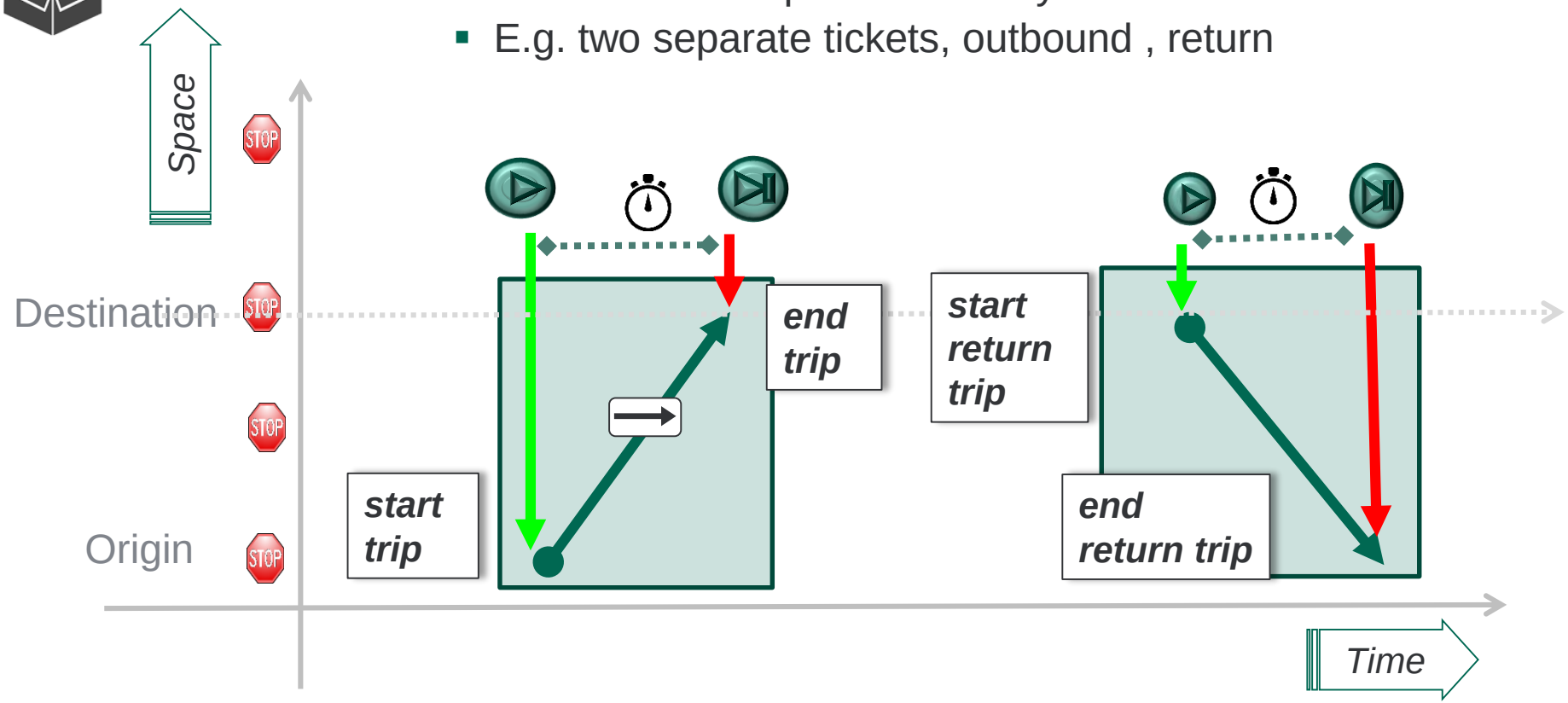
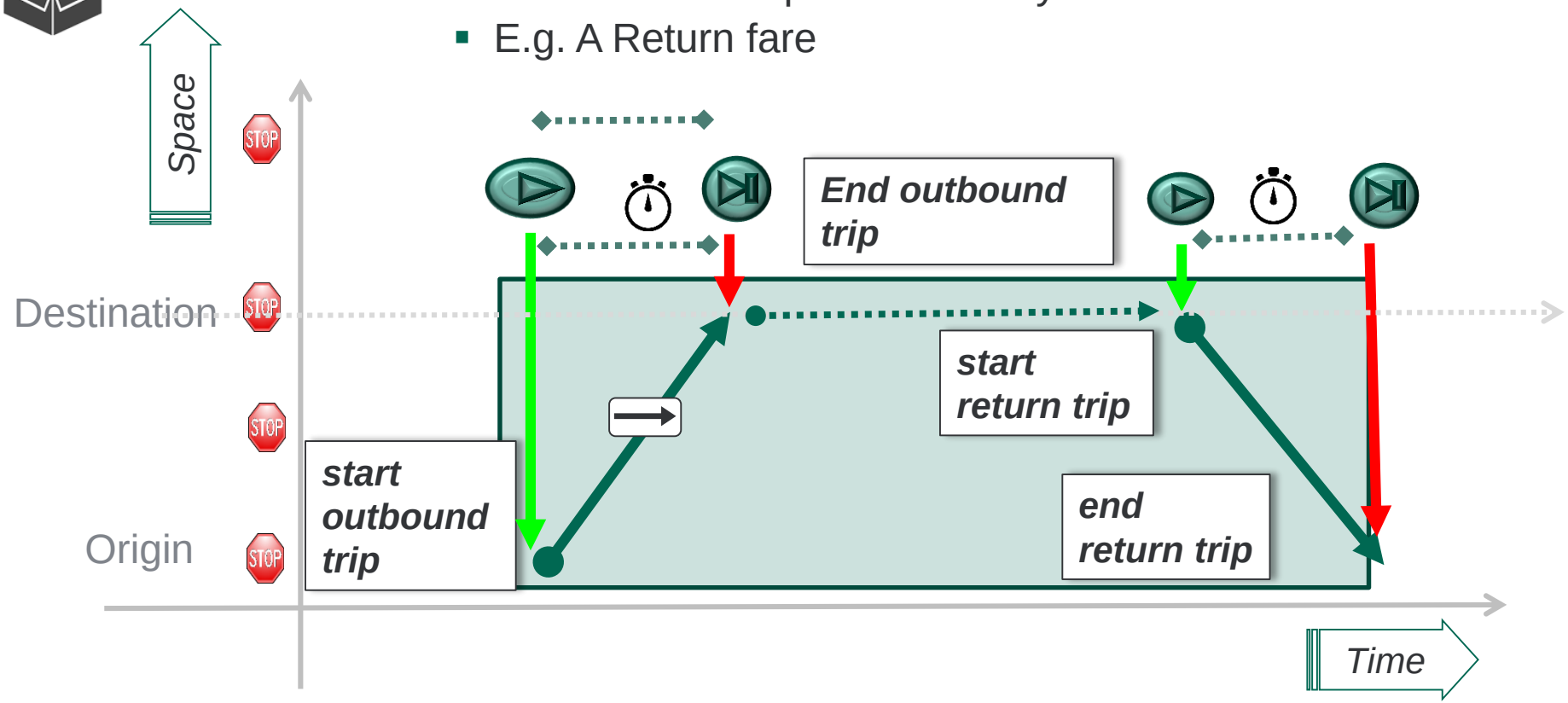
Visualising Time – Individual Trips

- We can visualise trips as lines in space time, made within the boundaries of a product validity
  - E.g. two separate tickets, outbound , return



Visualising Time – A Period return trip

- We can visualise trips as lines in space time, made within the boundaries of a product validity
  - E.g. A Return fare



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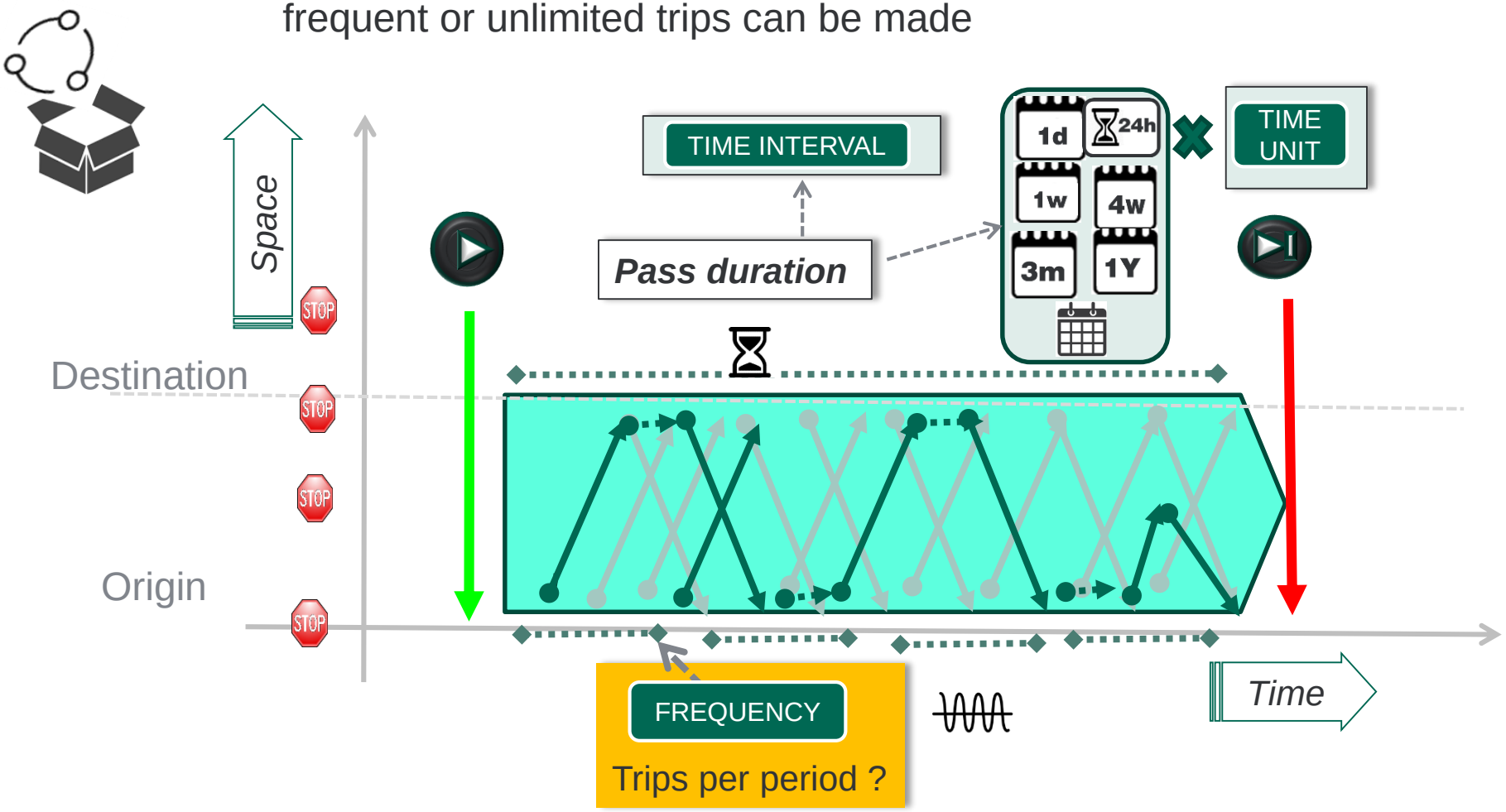
1. Time intervals (Product durations for passes))

- TIME INTERVAL
- TIME UNIT

Visualising Time – Passes

- We can visualise passes as bands in space time within which frequent or unlimited trips can be made



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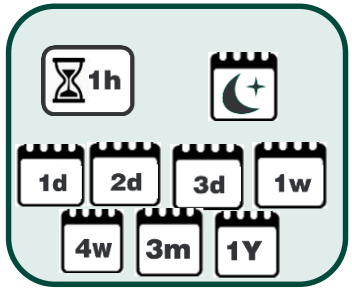
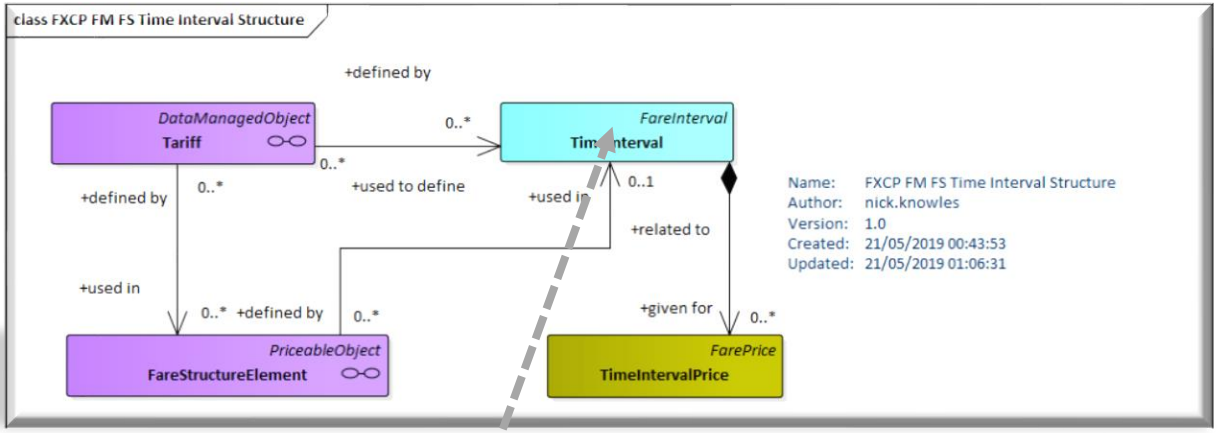
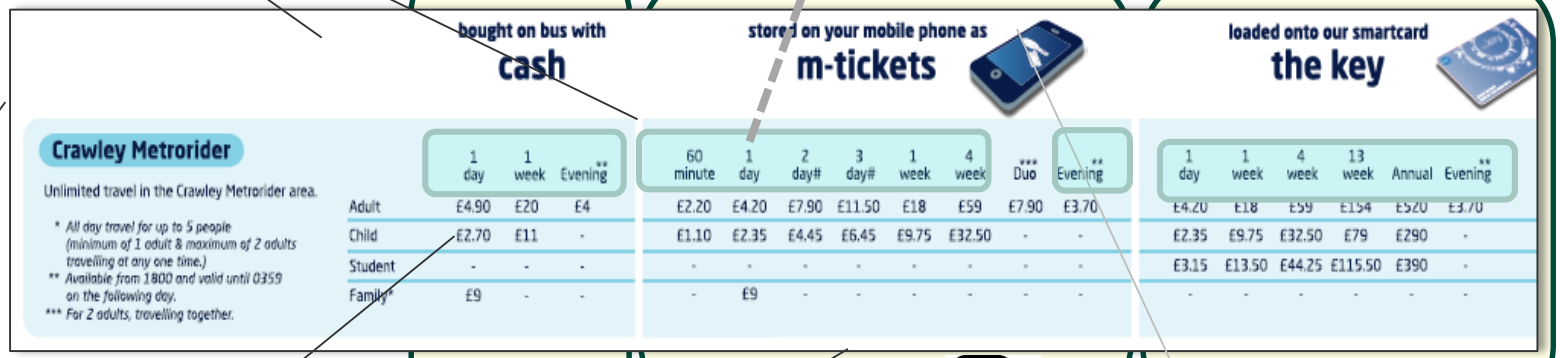
Season Pass with choice of durations – TIME INTERVALS





TIME INTERVALs



FARE ZONE

FARE PRICEs

SALES PACKAGEs

TYPE OF TRAVEL DOCUMENTs

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TIME INTERVALs- Notes

- Use TIME INTERVALs for day & season pass durations
  - Can represent both calendar periods (eg, ID, IM , IY etc) and arbitrary (e.g. Academic term)
  - Can be used for short hopper fare (1H, 2H)
  - Usually progressive (longer is cheaper)

  - Can be combined with FREQUENCY etc to limit number of trips per intreval

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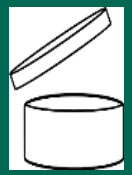
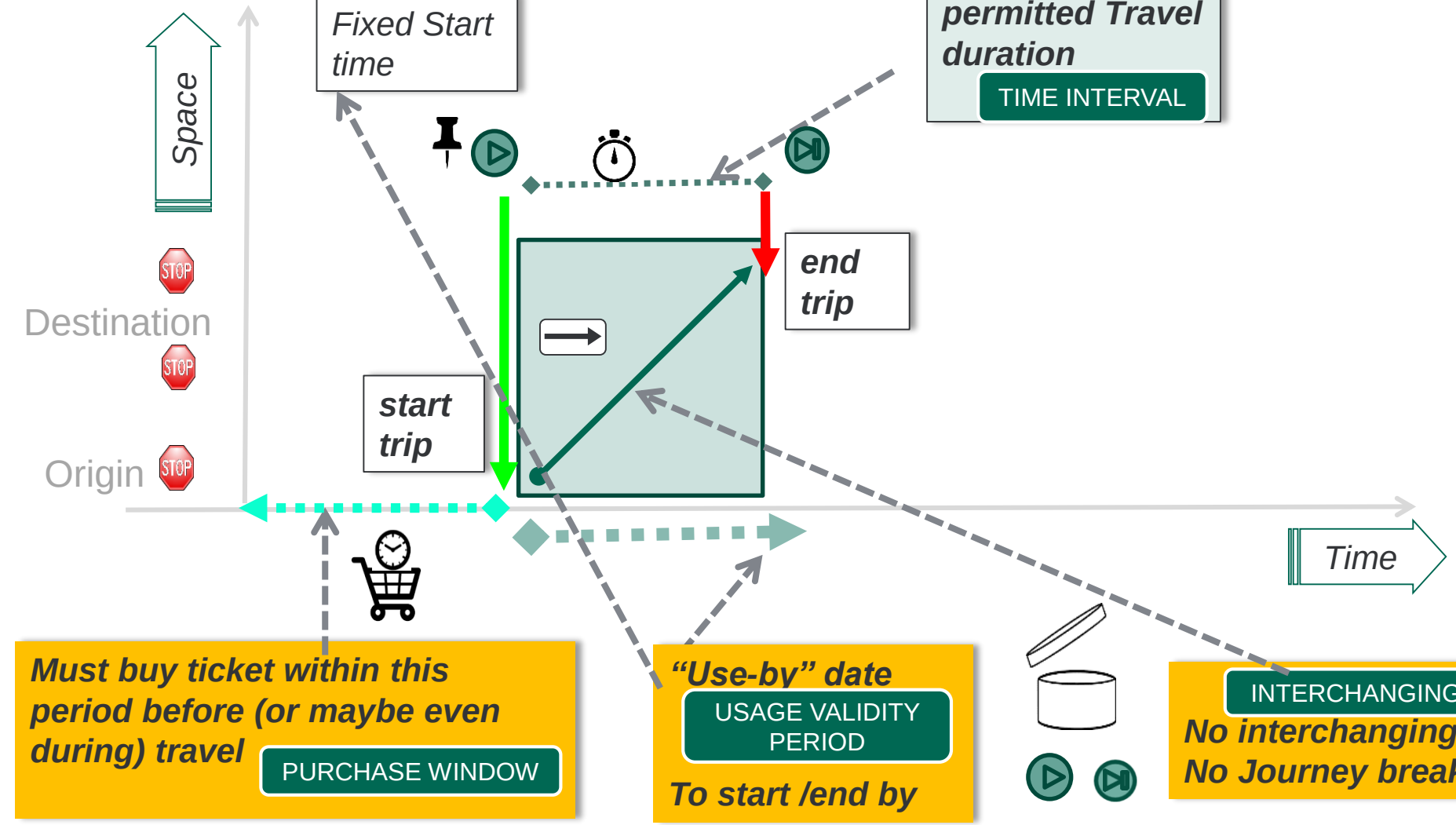


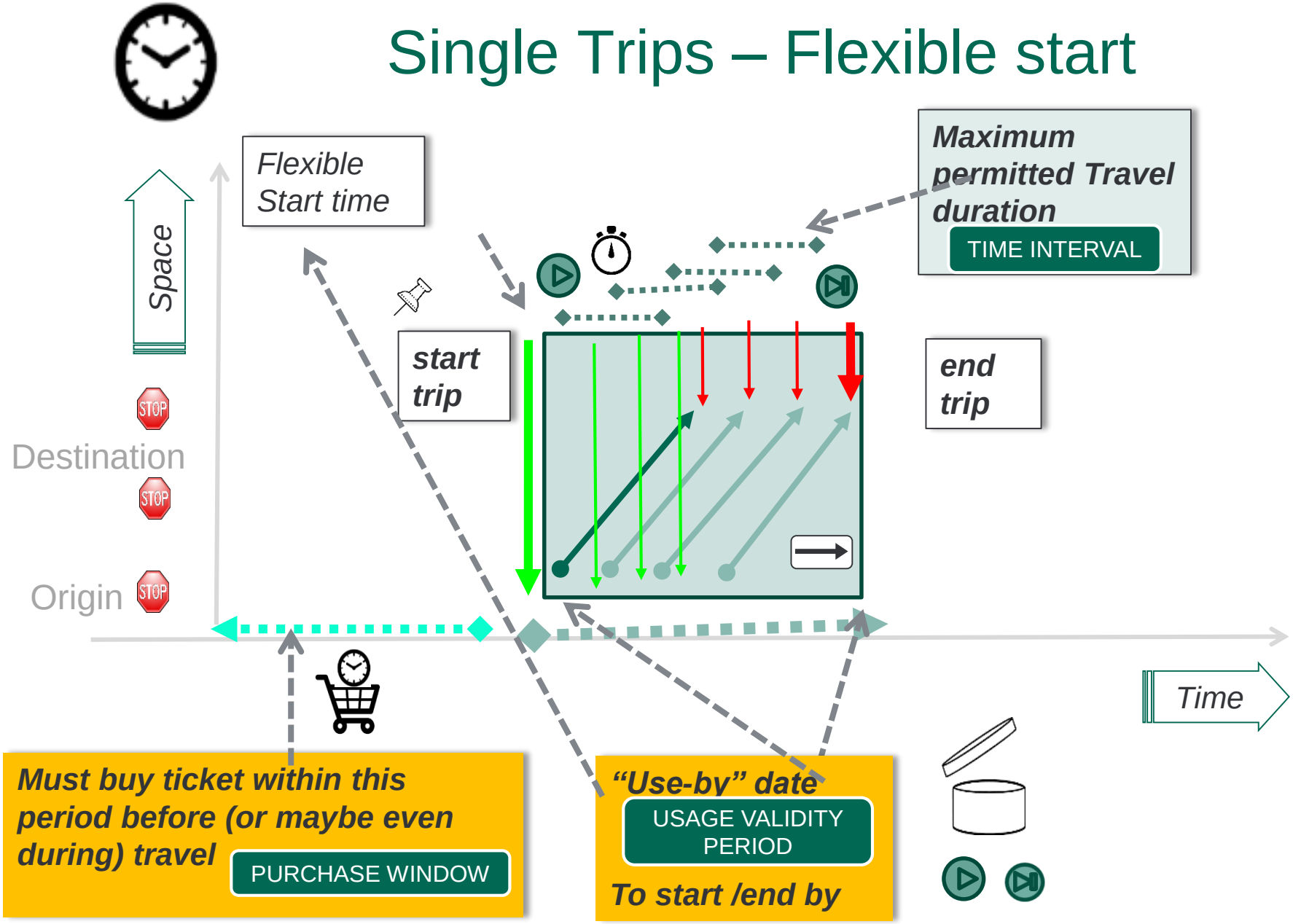
2. Use-by dates (And other commercial conditions)

- USAGE VALIDITY PERIOD
- INTERCHANGING
- PURCHASE WINDOW

Single Trips – Fixed start



Single Trips – Flexible start



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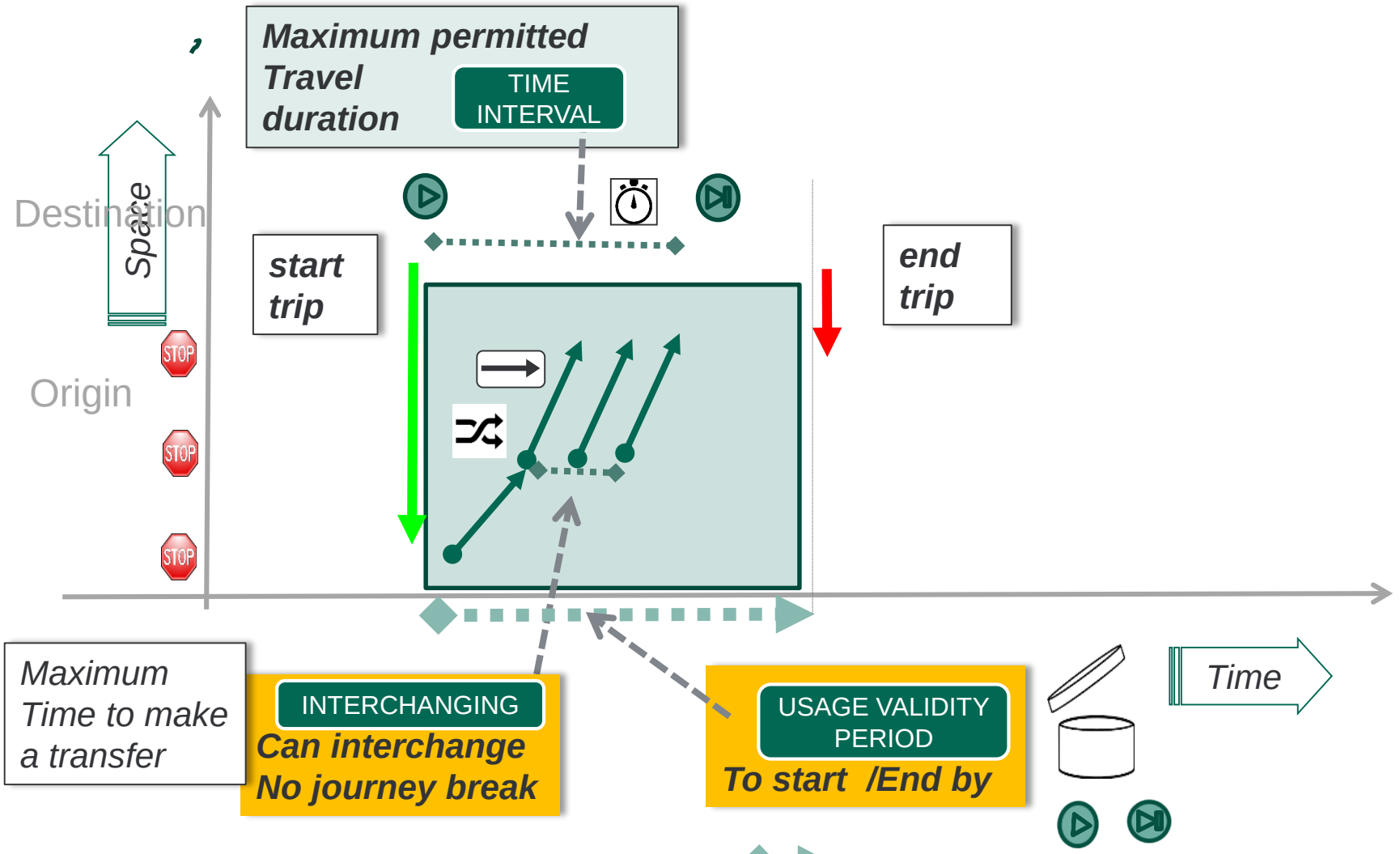
Single Trip – Interchanging



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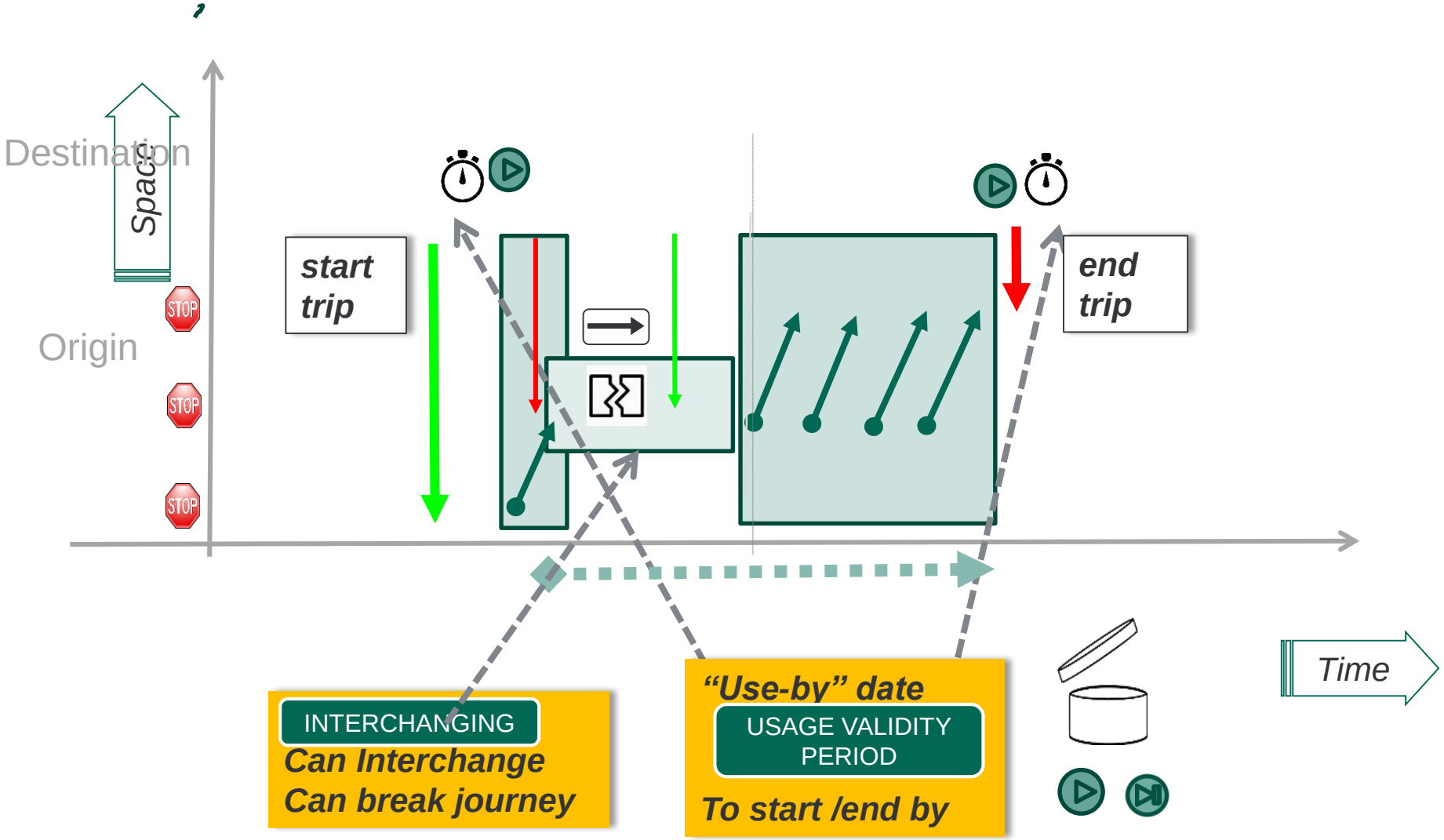
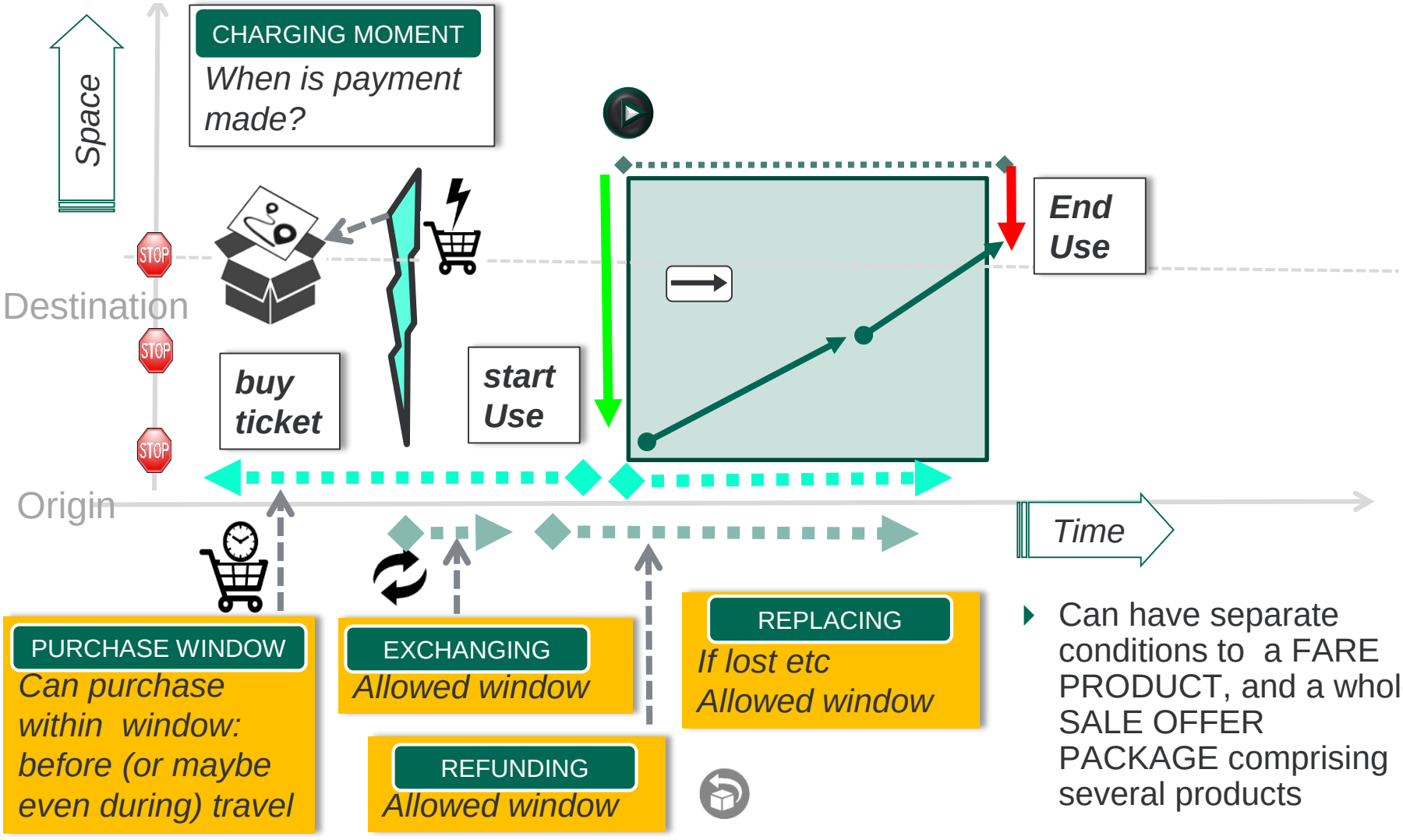
Single Trip – Break of Journey Allowed



Products – Time concepts relating to commercial conditions



- Can have separate conditions to a FARE PRODUCT, and a whole SALE OFFER PACKAGE comprising several products

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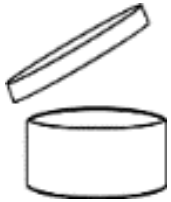
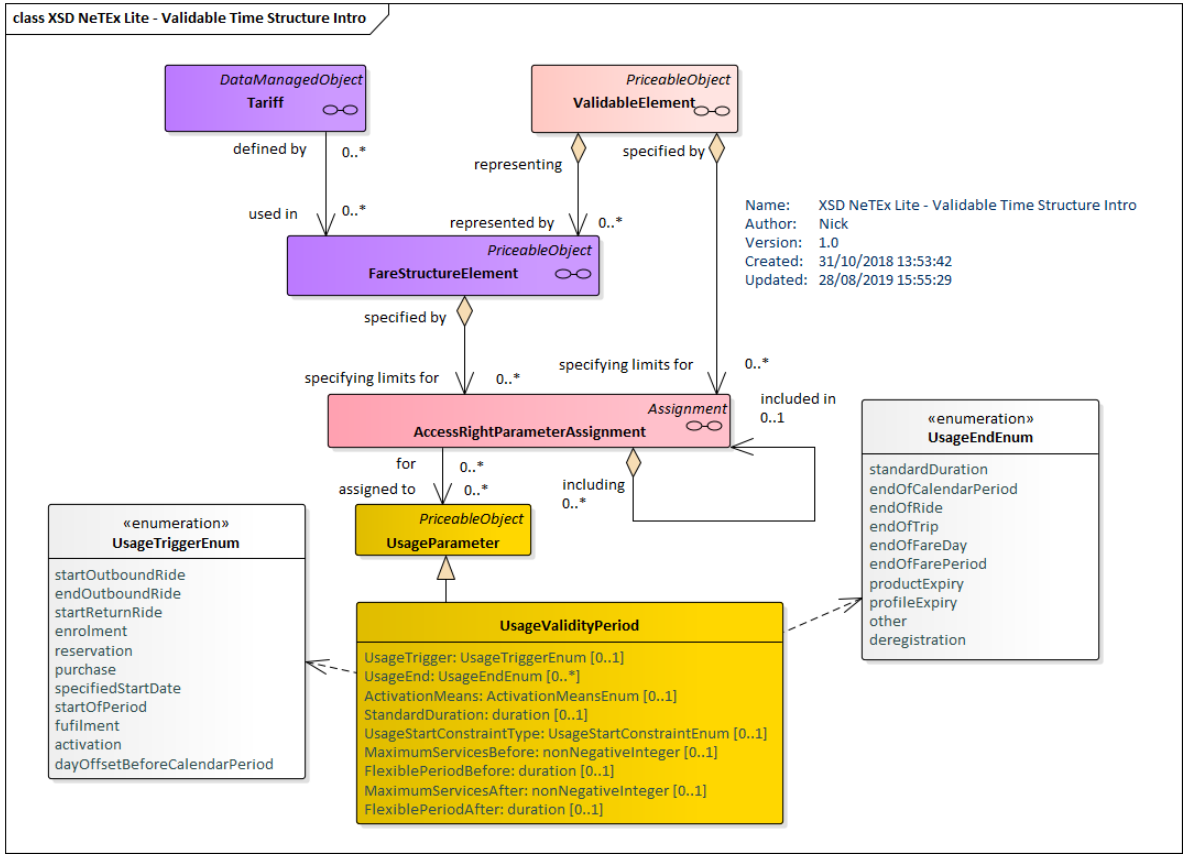
Specifying a “Use by date” and other validity periods



- Assigning USAGE VALIDITY PERIOD parameter
- Can be used to set “Use by date” as interval from a given point in time,
  - Eg Purchase, fulfilment start of trip, start of outbound etc



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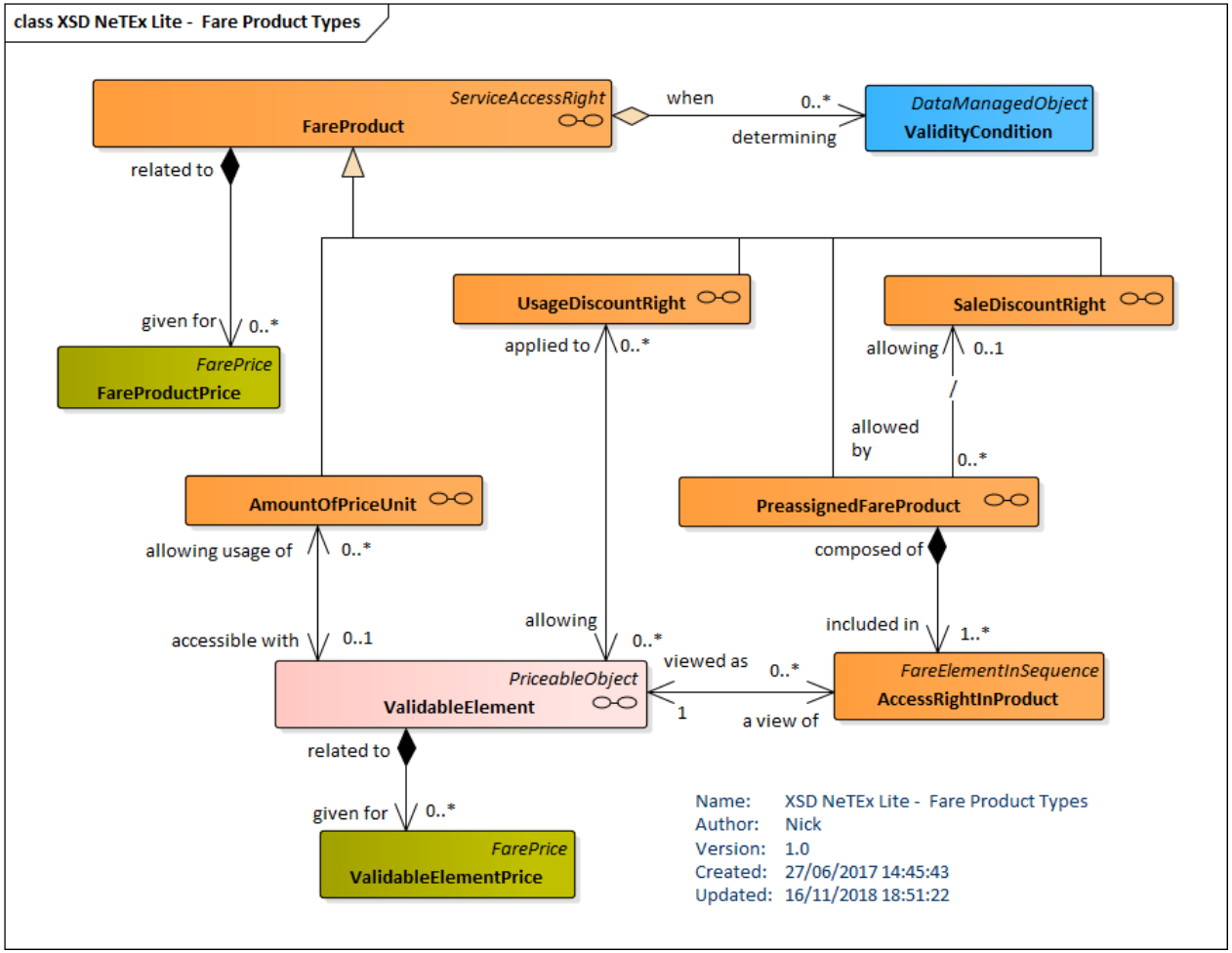

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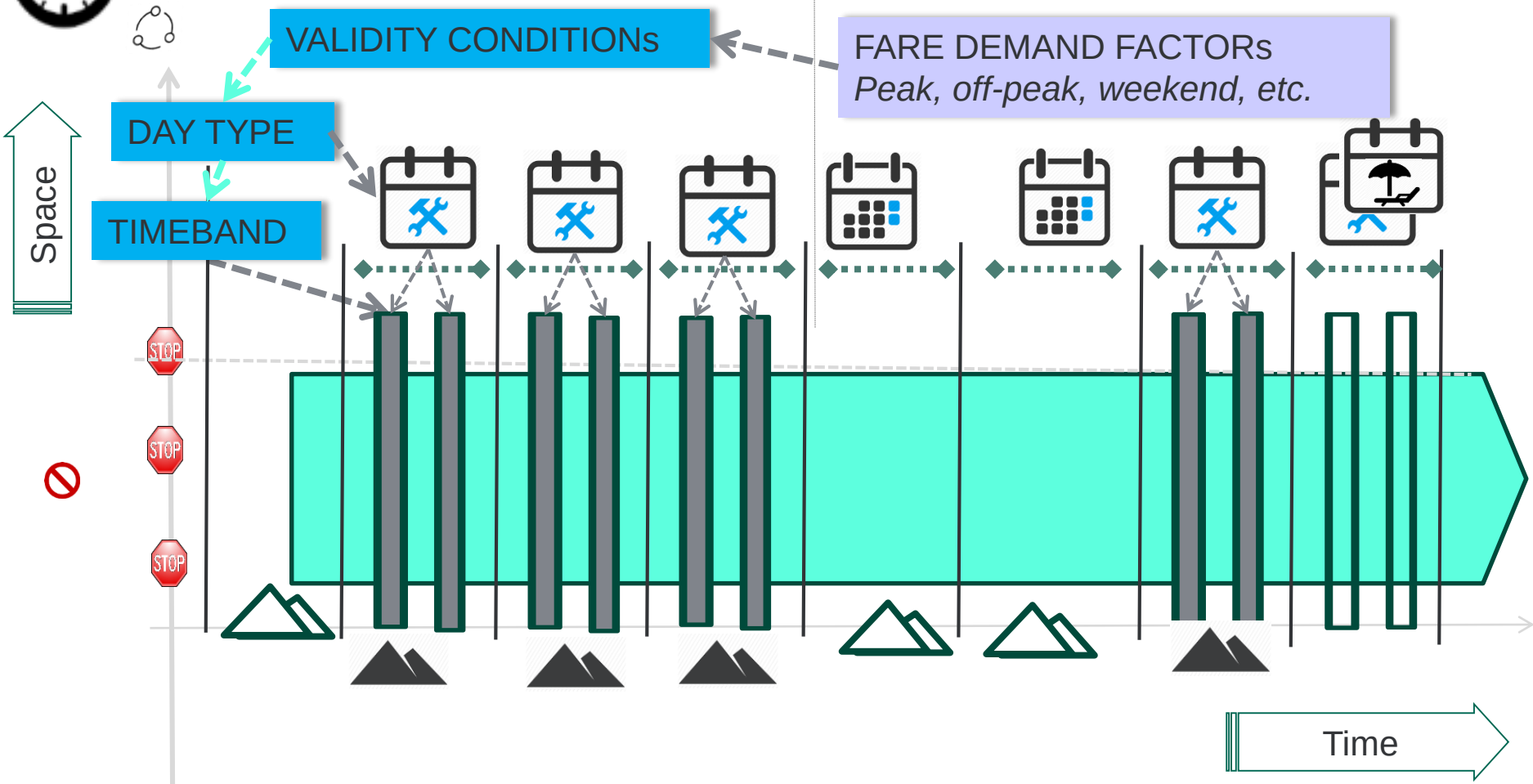
3. Peak/Offpeak Fare Demand periods

- FARE DEMAND FACTOR
- DAY TYPE
- TIMEBAND
- SERVICE CALENDAR

: Peak /Off-peak Fares & Blackouts



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Peak and Offpeak – Fares

- E.g. Concessionary Pass product has use restrictions

Crawley Area Metrorider
Metrovoyager
Discovery Ticket
Gatwick Travelcard

Accepted throughout.

PlusBus

Crawley, Three Bridges, Gatwick Airport, Ifield and Horley PlusBus tickets are valid throughout. Please see www.plusbus.info for further information.

Concessionary Passes

Concessionary passes are valid throughout from 0930-2300 Mon-Fri, and anytime at weekends and public holidays.

FARE DEMAND FACTOR

***Peak**: DT-Weekdays 0:00-09:30, 23:00-00:00*

***Off-Peak:** DT-Weekdays 09:30-23:00, + DT-Weekend*

DAY TYPEs

TIMEBANDs

2020
2019
2018

SERVICE CALENDAR

Date →Day Type

2018/01/01 → DT-Holiday
2018/01/02 → DT-Weekday
2018/01/03 → DT-Weekday
2018/01/04 → DT-Weekend

…..etc

DAY TYPE ASSIGNMENTs

2020
2019
2018

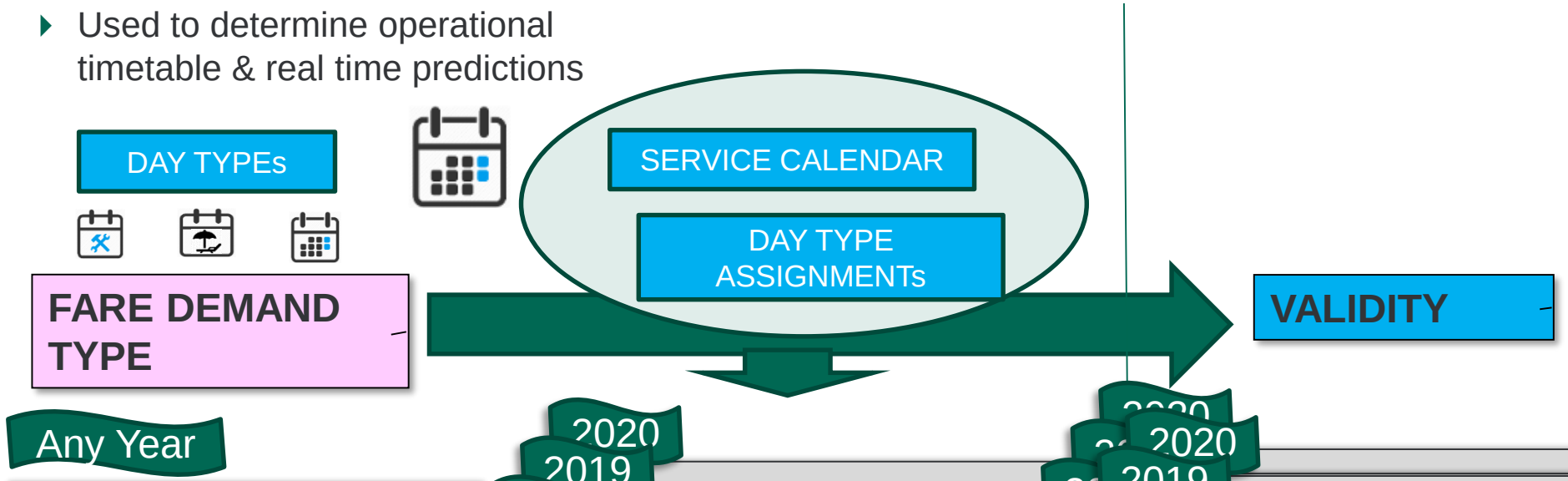
Fare Validity ,

2018/01/01;
00:00-24:00 Off-Peak
2018/01/02;
- *00:00-08:30 Off-Peak*
- *08:30-09:30 Peak*
- *09:30-17:00 Off-Peak*

ETC, ETC

Day types and Fare Validity

- Used to determine operational timetable & real time predictions



Any Year

Fare Demand Type

***Peak**: DT-Weekdays 08:00-09:30, 07:00-18:30*

***Off-Peak:** DT-Weekdays 09:30-17:00, 18:30-08:00 + DT-Weekend*

***Super Off-Peak:** DT-Holiday*

2020
2019
2018

Date →Day Type

2018/01/01 → DT-Holiday
2018/01/02 → DT-Weekday
2018/01/03 → DT-Weekday
2018/01/04 → DT-Weekend

…..etc

2020
2019
2018

Fare Validity ,

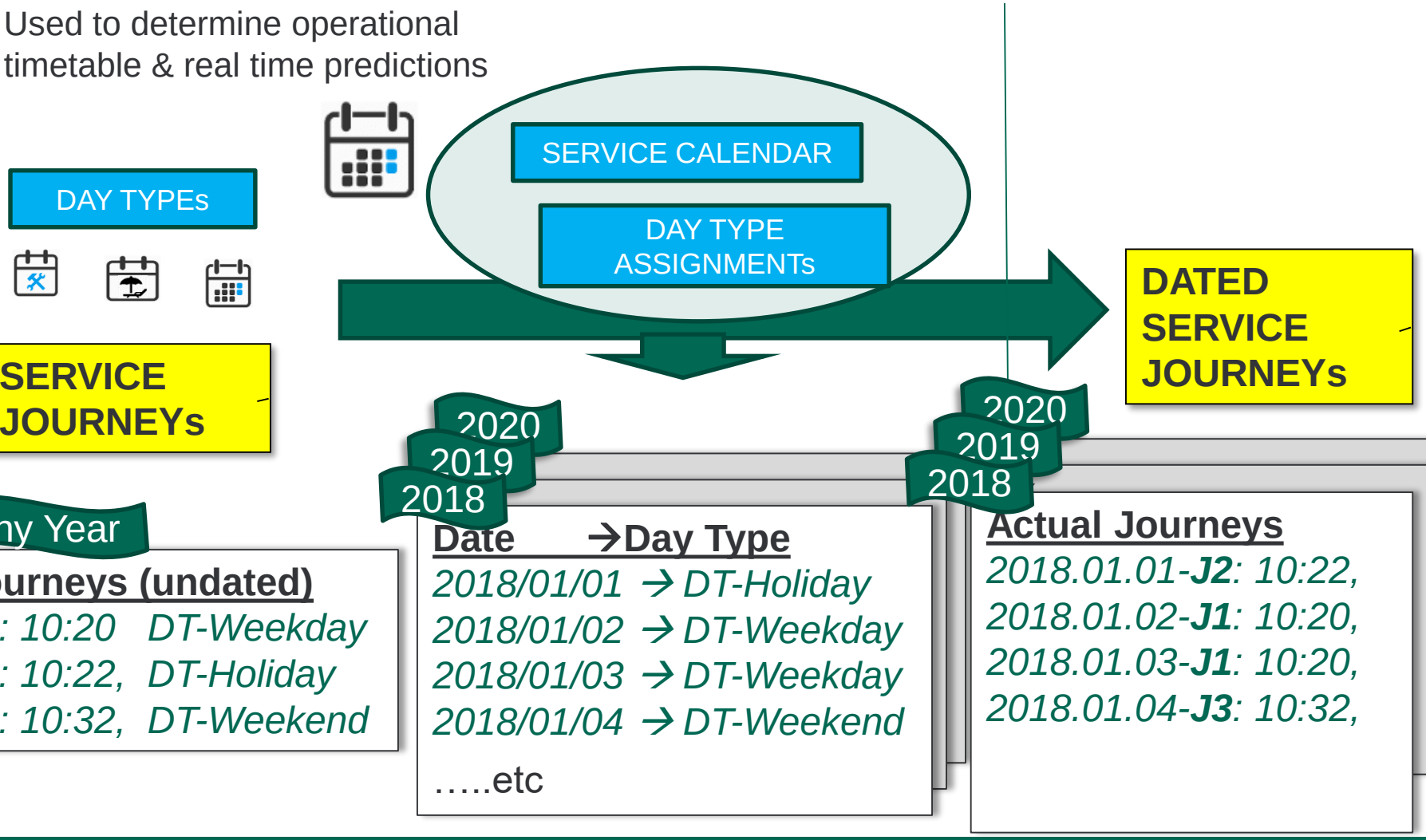
2018/01/01;
- *00:00-24:00 Super OP*

2018/01/02;
- *00:00-08:30 Off-Peak*
- *08:30-09:30 Peak*
- *09:30-17:00 Off-Peak*

ETC, ETC

Day types and Service Journeys

- Used to determine operational timetable & real time predictions



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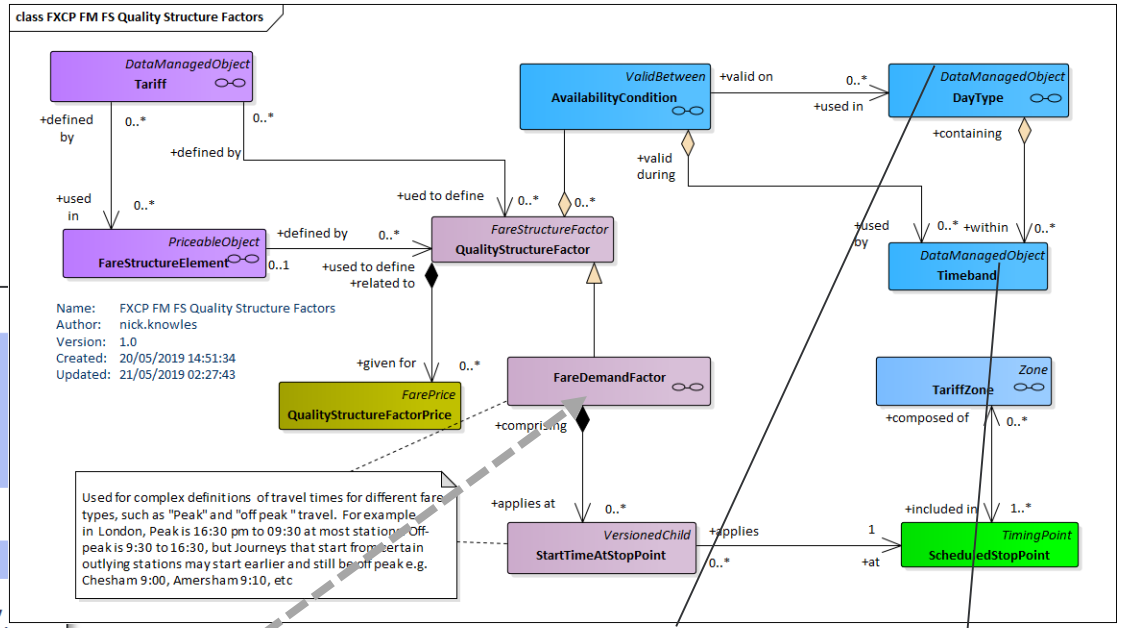


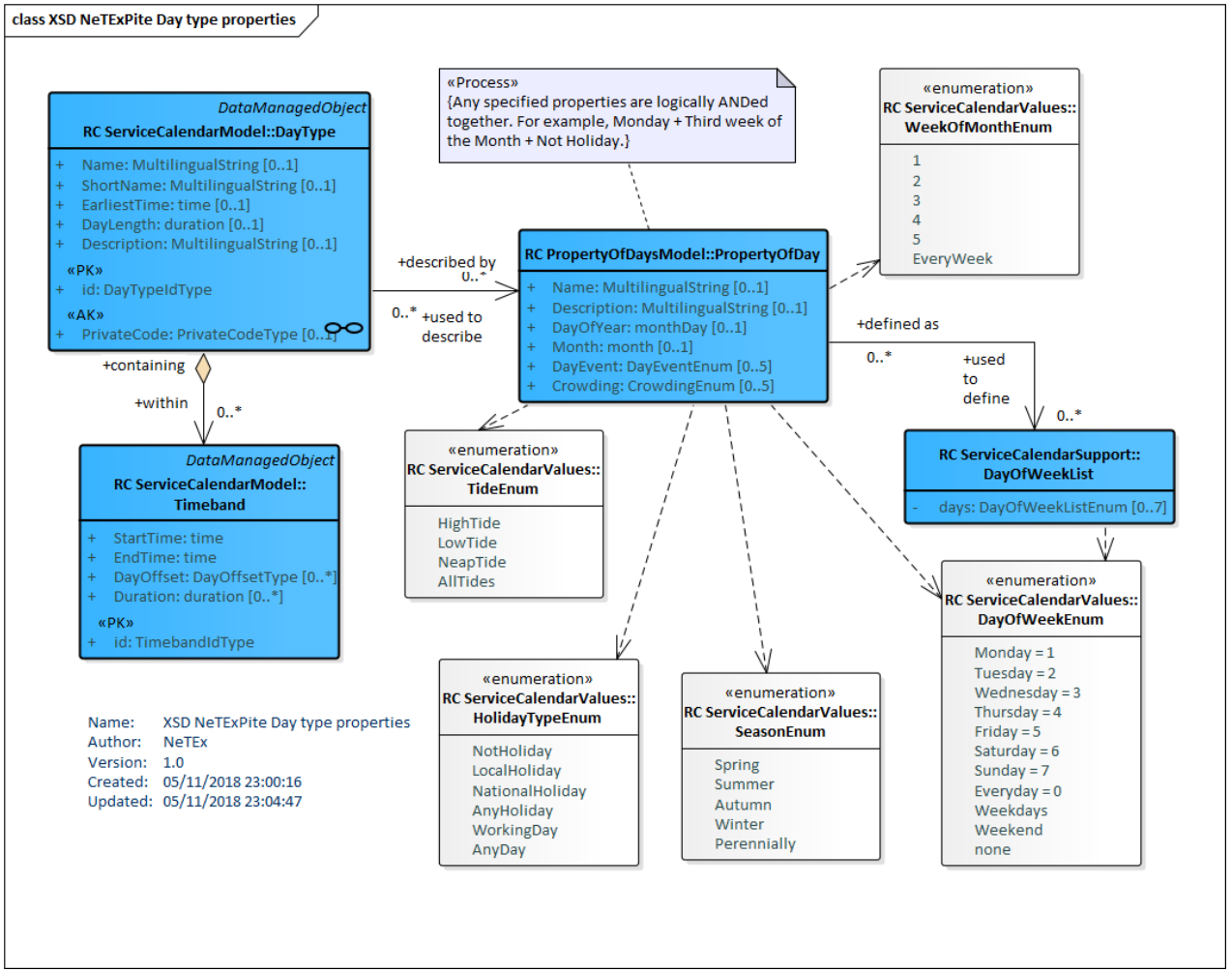
DAY TYPE

FARE DEMAND FACTOR

TIMEBAND

Defining a day type

- For example
- Monday to Friday, except bank holidays
- Saturday



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Representing Fare Products in NeTEx

- FARE PRODUCTS
- VALIDABLE ELEMENTS

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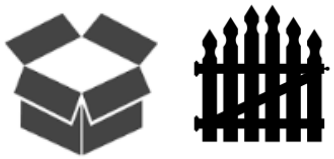
A FARE PRODUCT gives specific access rights



- That can be validated…
  - *E.g. A single trip between two points*
  - *E.g. A return trip to be made in a period*
  - *E.g. Unlimited travel within a zone for a given period*
  - *E.g. Unlimited travel along a route between two points for a given period*
  - *E.g. The right to buy other products at a discount for a given period*

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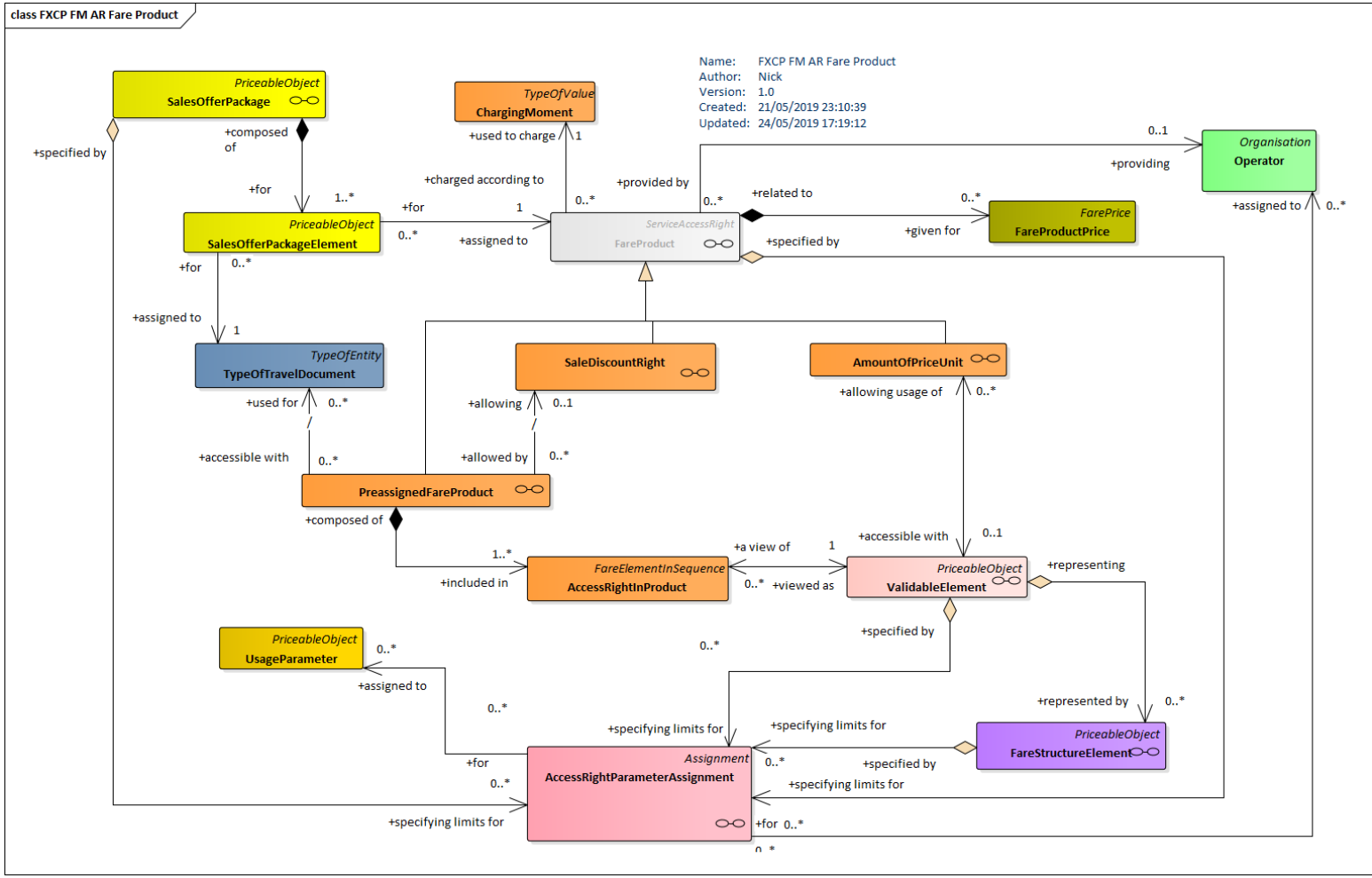
NeTEx Fare Products

- A FARE PRODUCT groups a set of access or discount rights
- Has VALIDABLE elements



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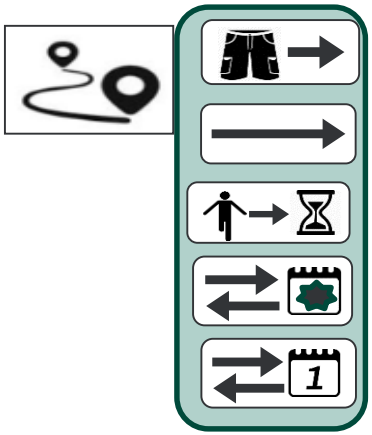
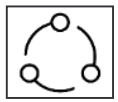
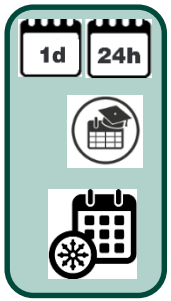
Basic UK Bus fare products







Type of Product	Fare Product	Group Ticket
PREASSIGNED FARE PRODUCT — **TRIP** *("single ride")*	***Short hop***	-
	Single trip	☑
	Time-limited ("Hopper")	☑
	Period Return	☑
	Day return	☑
PREASSIGNED FARE PRODUCT — **PASS**	***Day pass***	☑
	Termtime	-
	Season pass	(☑)
Carnet AMOUNT OF PRICE UNIT	***Trip***	
	Day Pass	

UK ☞Products must be one of the specified types

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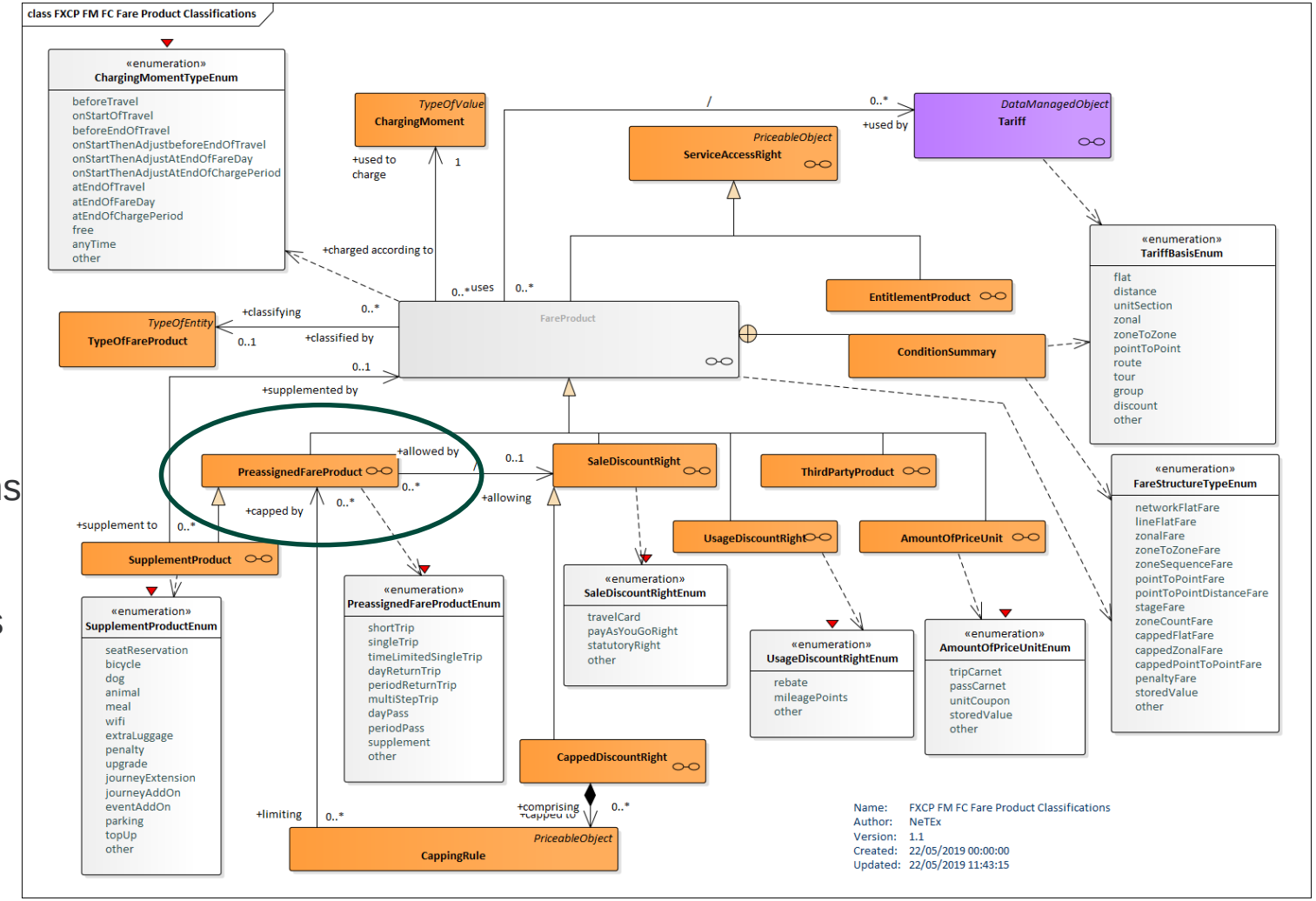
Product Classification

- "Product Types" presented to user e.g. "single trip", "day pass", etc are classifications of different FARE PRODUCT s



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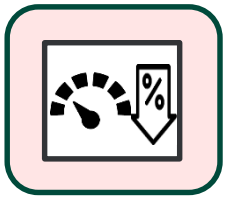
Additional Product Types - terminology

- **Discount Right (SALE DISCOUNT RIGHT)**

The product gives the right to purchase other fare products for travel at a discount, but is not itself a ticket. (e.g. Rail card, Oyster card).

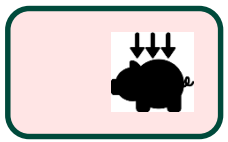
- **Capped Discount Right (CAPPED DISCOUNT RIGHT)**

If there are multiple purchases, the purchase price is capped within a given time period (e.g. Oyster Card)



- **Usage Discount (USAGE DISCOUNT RIGHT)**

The product gives a discount or rebate based on access rights consumed within a given period. Requires an account.



- **Amount Of Price Unit**

The product either holds an amount of stored value which can be used to purchase, . May be linked to an account.

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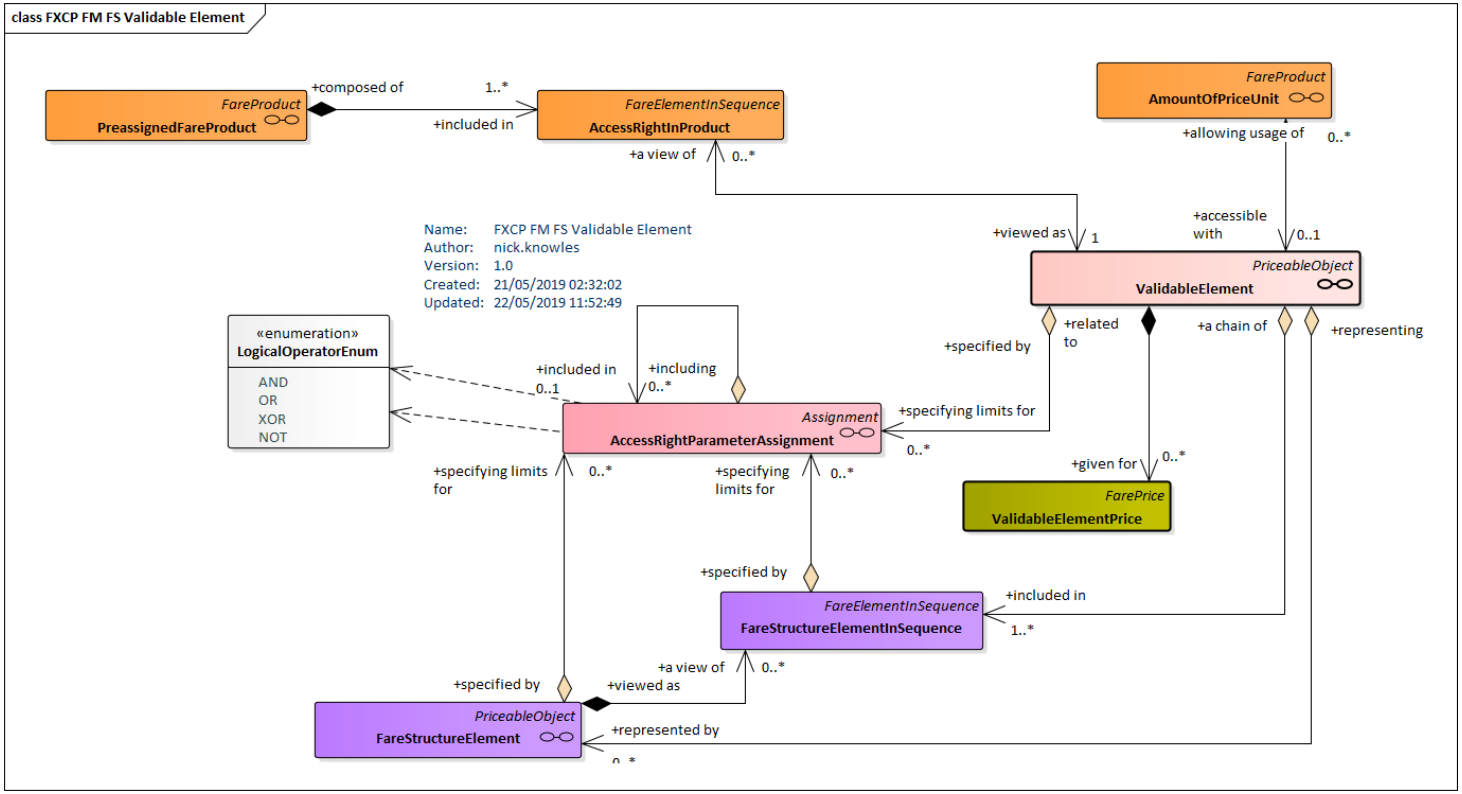
Associating Tariff elements with products – VALIDABLE ELEMENT



- "A sequence or set of FARE STRUCTURE ELEMENTs, grouped together to be validated in one go."
  - Effectively the smallest unit of detectable access to the network

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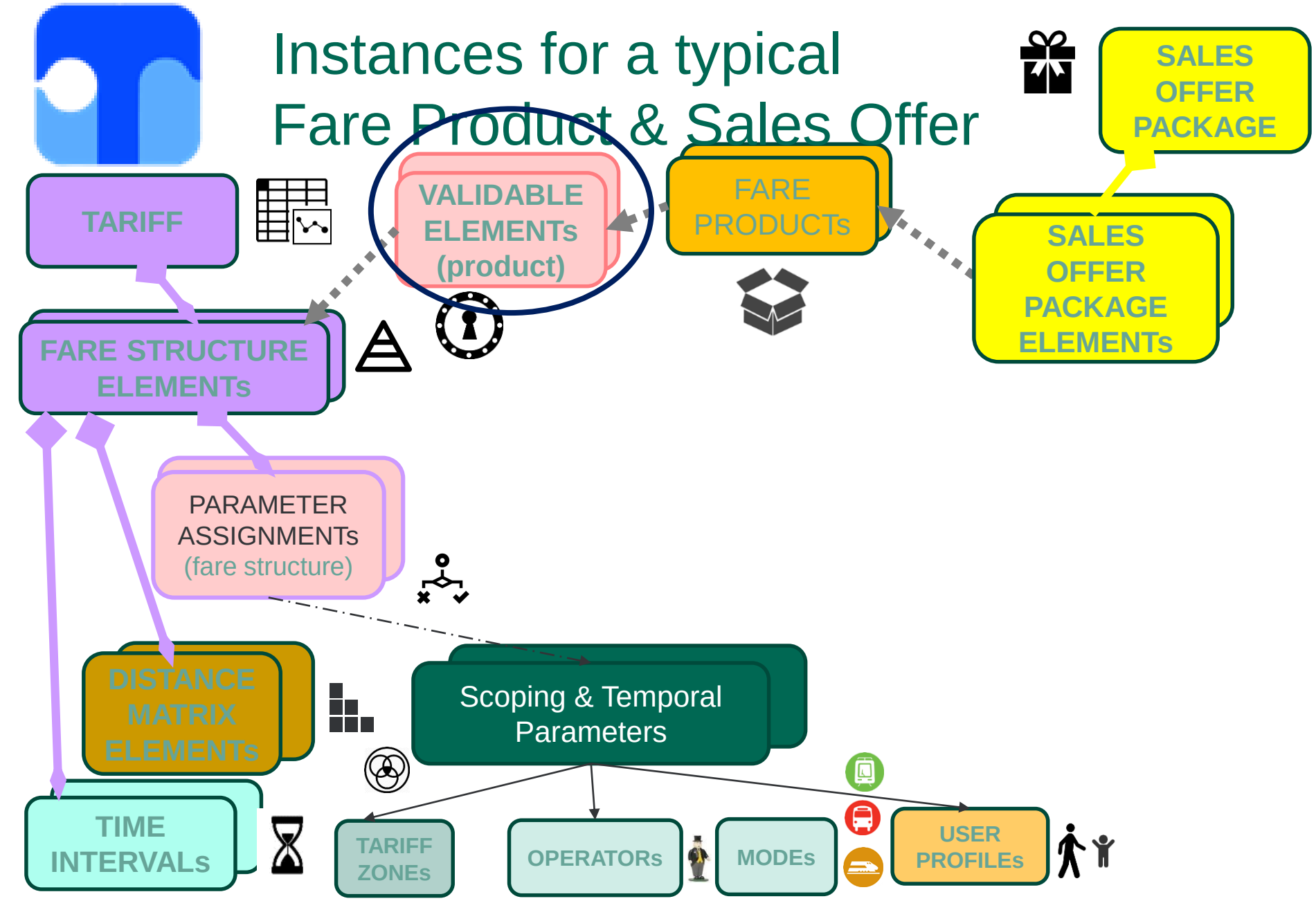
Validable Elements

- VALIDABLE ELEMENT groups sets of access rights from the Tariff structure for use in FARE PRODUCTs
  - Can be used in more than one product
    - ACCESS RIGHTS IN PRODUCTs as VALIDABLE ELEMENTs
  - VALIDABLE ELEMENTS typically correspond to sets of parameters that can be valduated or control by the control system
    - E.g. A bus ride between a origin and destination
    - E.g. A Day pass in a specified zone
- VALIDABLE elements use Fare STRUCTURE ELEMENTs
  - These may include alternative choices
  - E.g. The set of O/Ds as DISTANCE MATRIX ELEMENTs
  - E.G. The allowed durations for Season Passes
  -

Instances for a typical Fare Product & Sales Offer



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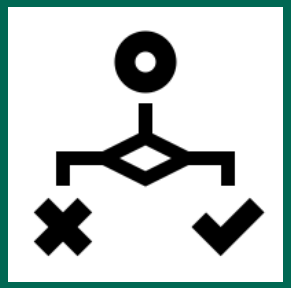

Parameter Assignment for FARE PRODUCTs, SALES PACKAGEs, etc

- GENERIC PARAMETER ASSIGNMENT

Parameter Assignment

- **Allows product rules to be defined in terms of other NeTEx Elements**
  - Access rights
    - (TARIFF SONEs, LINEs, DAY TYPEs, etc etc)
  - Limitations on Travel & Commercial Conditions
    - USAGE PARAMETERs,
- **Used to define products and choices**
  - Product definition: can be used on
    - FARE STRUCTURE ELEMENTs, VALIDABLE ELEMENTs, FARE PRODUCTs, SALES OFFER PACKAGEs,
  - For product choice by user
    - TRAVEL SPECIFICATION, CUSTOMER PURCHASE PACKAGE
- **Can be combined to created compound conditions**
  - AND / OR operators

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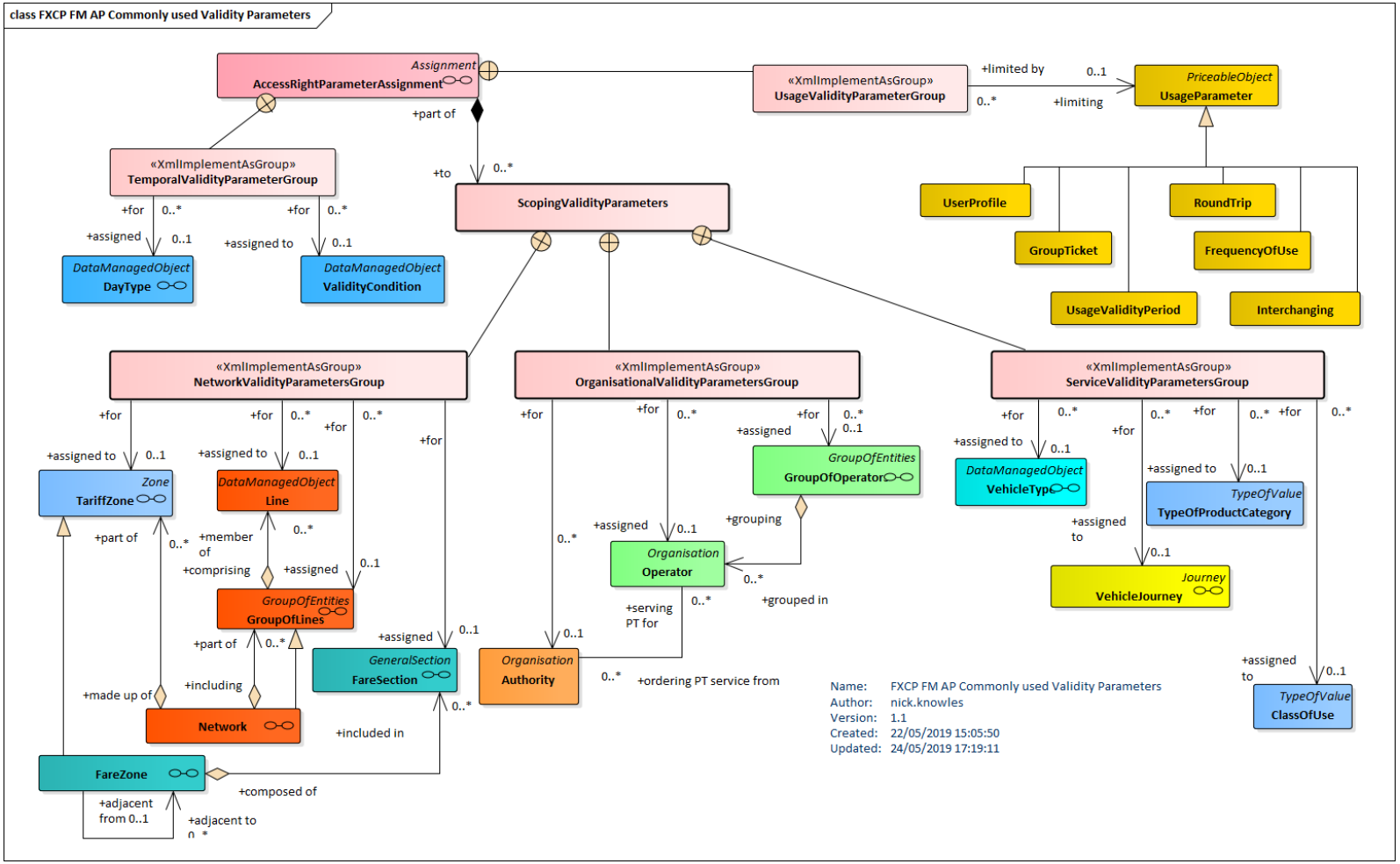
Some Commonly used parameters



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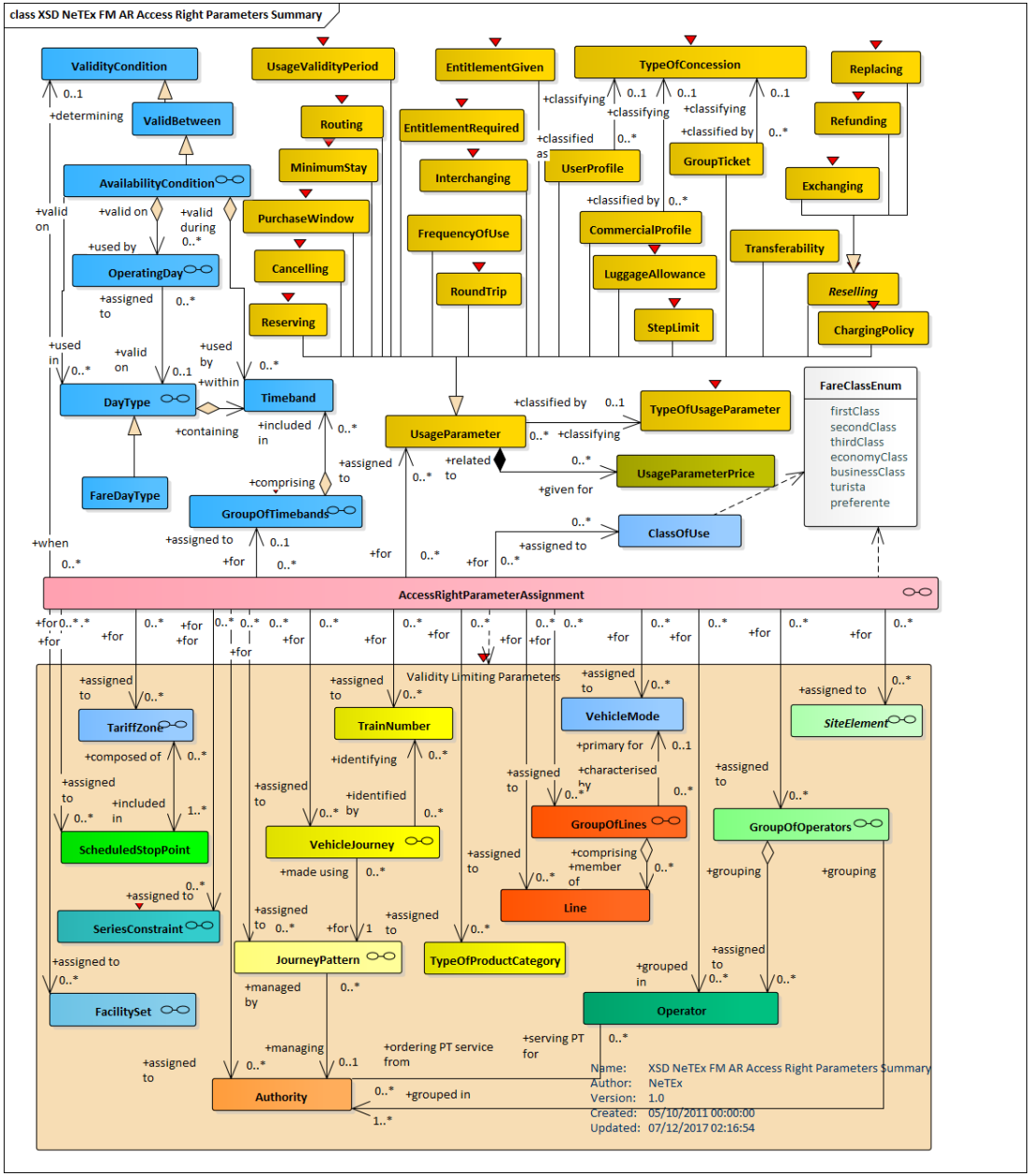
Validity Parameters

Most Network elements, Temporal elements and product components can be used as validity parameters



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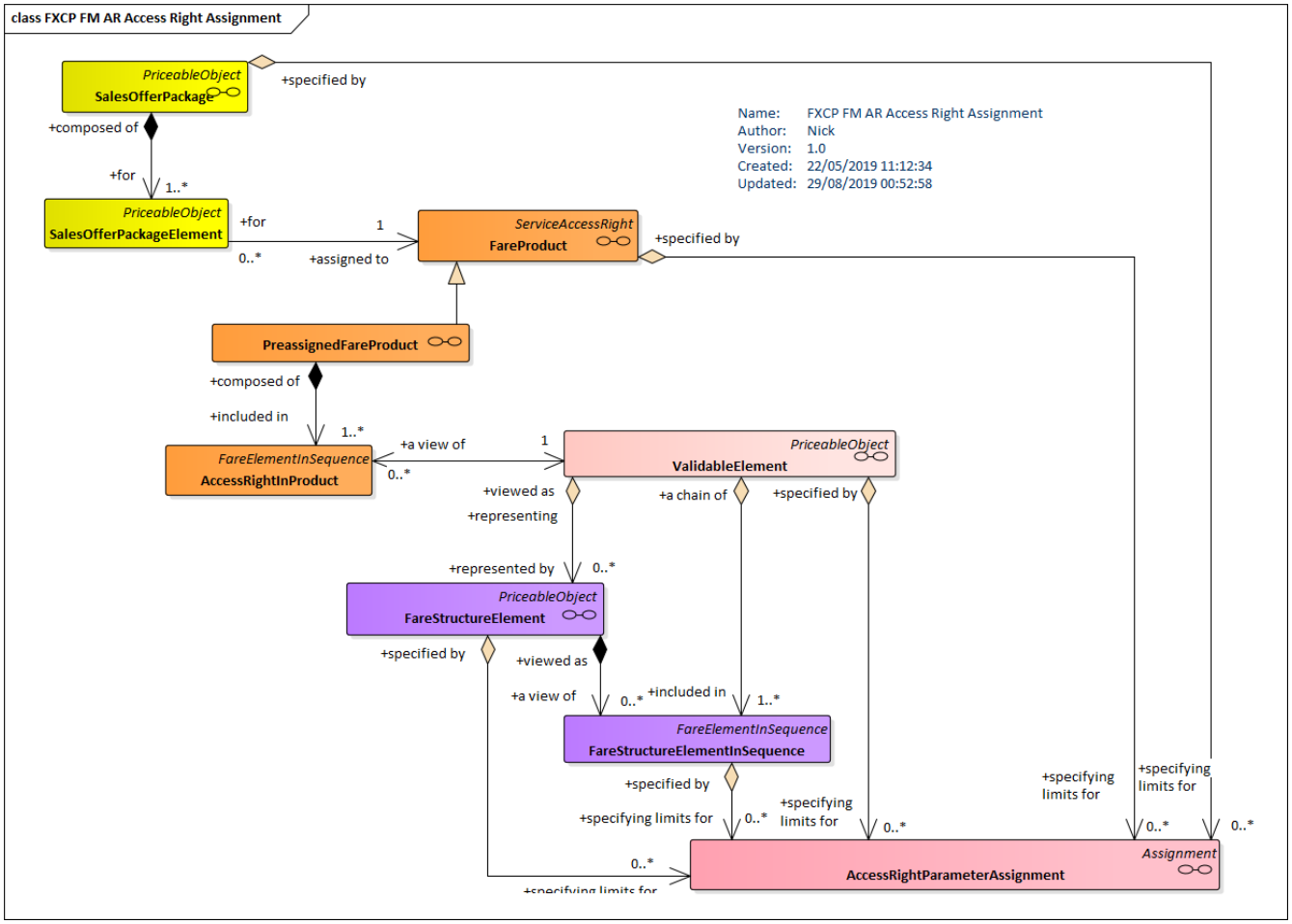
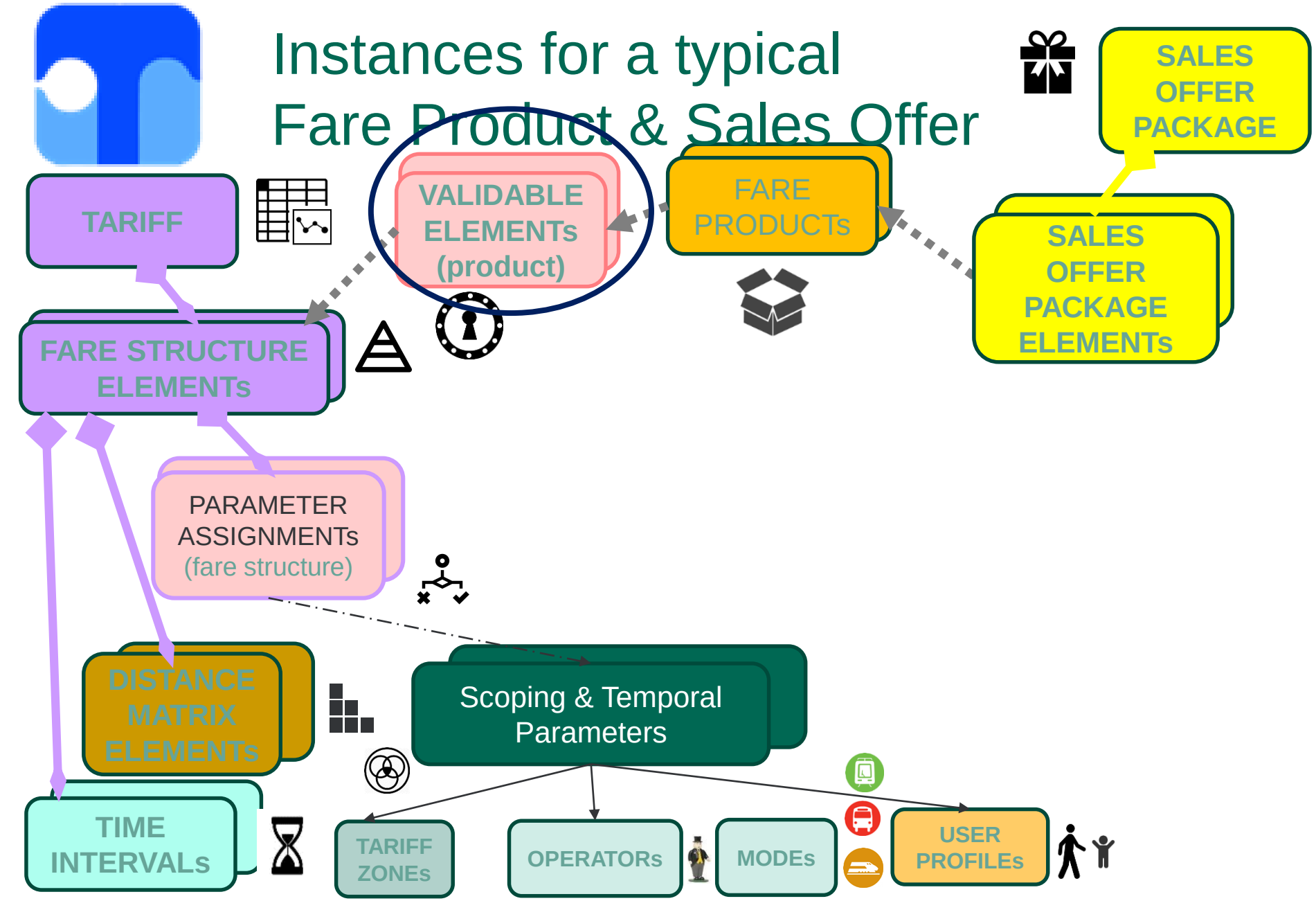
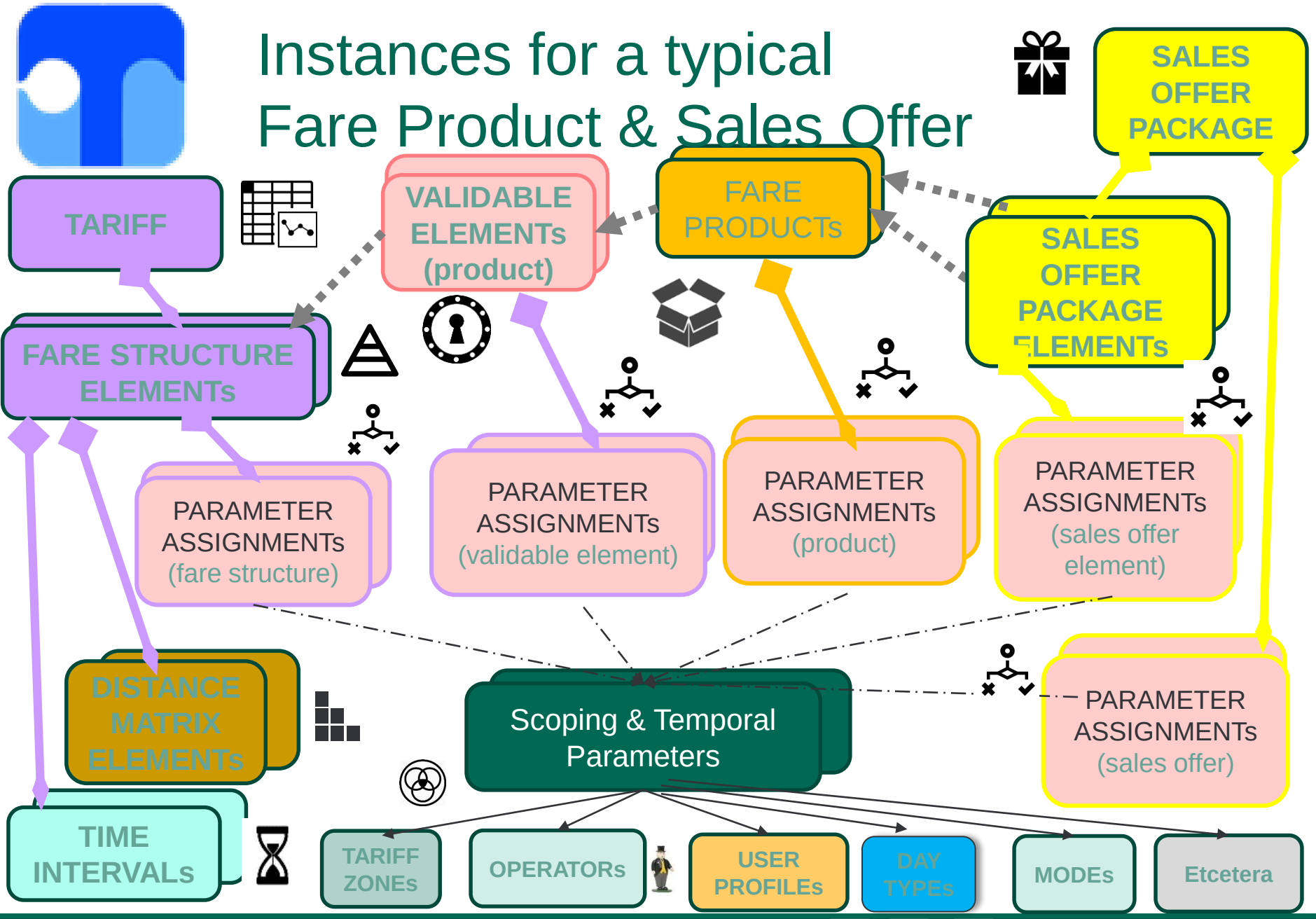
Elements that can make assignments



Instances for a typical Fare Product & Sales Offer



Instances for a typical Fare Product & Sales Offer



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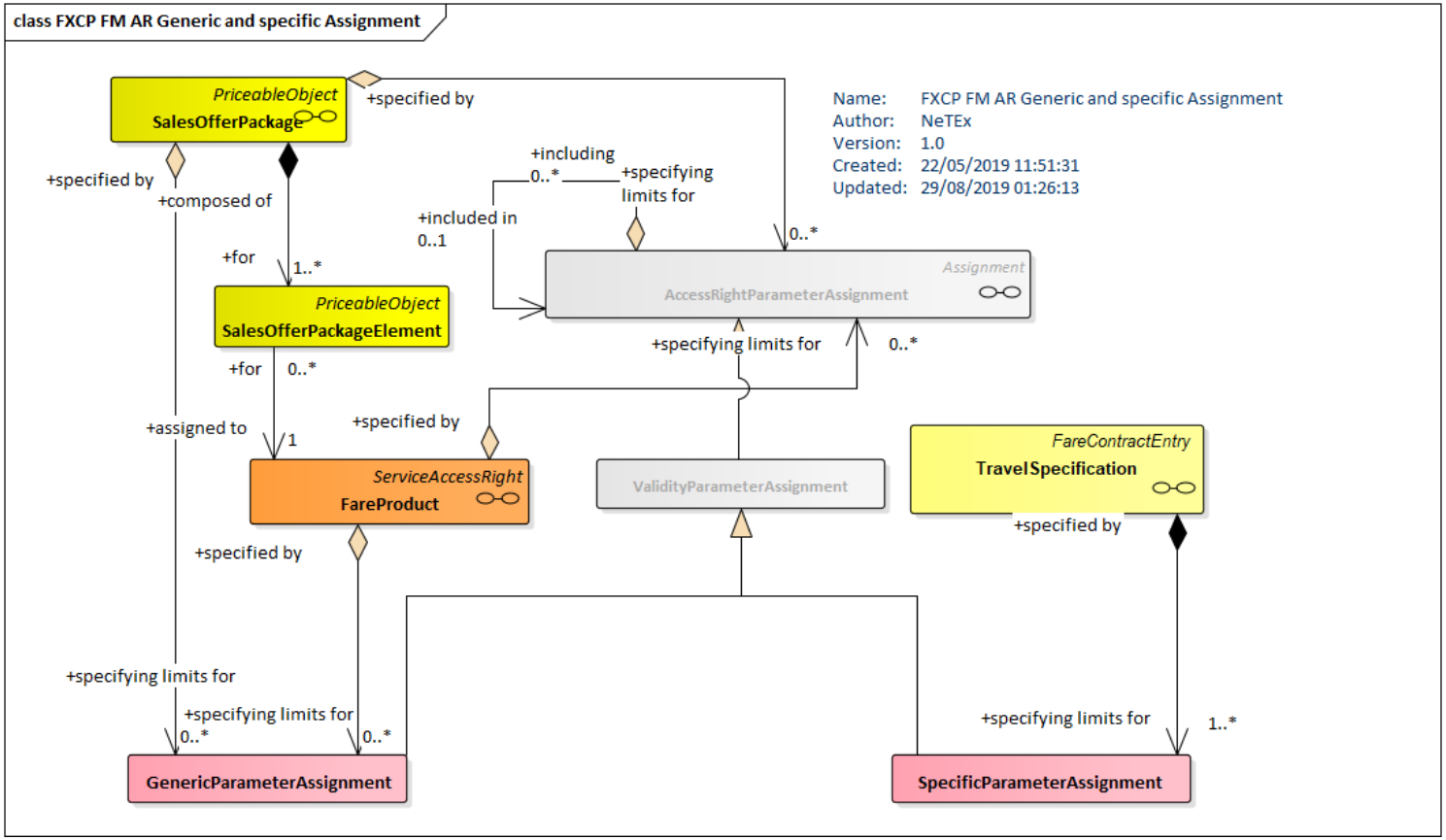
Generic Versus Specifc Assignmemt



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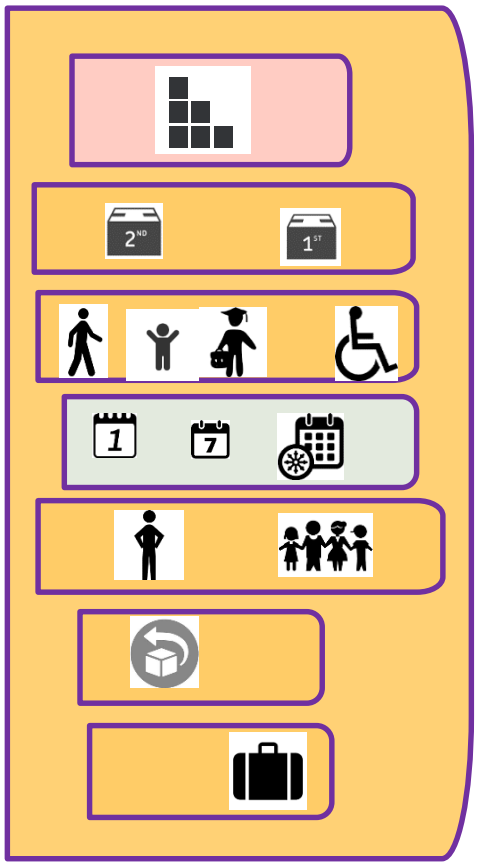
A Fare Product is a set of marketable access rights



- A single FARE PRODUCT may includes all the alternate choices (with different prices for the combinations):
  - *E.g. All permitted Origin & Destination pairs*
  - *E.g. E.g. 1st & 2nd Class accommodation*
  - *E.g. Adult & Child & Student users*
  - *E.g. Valid for a period: of either 7 , 30, or 180 days*
  - *E.g. One, or up to 5-10 travellers as a group*
  - *E.g. Refundable / Not Refundable*
  - *E.g. With Luggage allowance*

Single Trip Fare Pricess

LINE *1*

SALES PACKAGE
Single ride, "Cash"

FARE PRODUCT

TYPE OF TRAVEL DOCUMENT

FARE ZONEs

TARIFF

USER PROFILE
Adult

DISTANCE MATRIX ELEMENTs

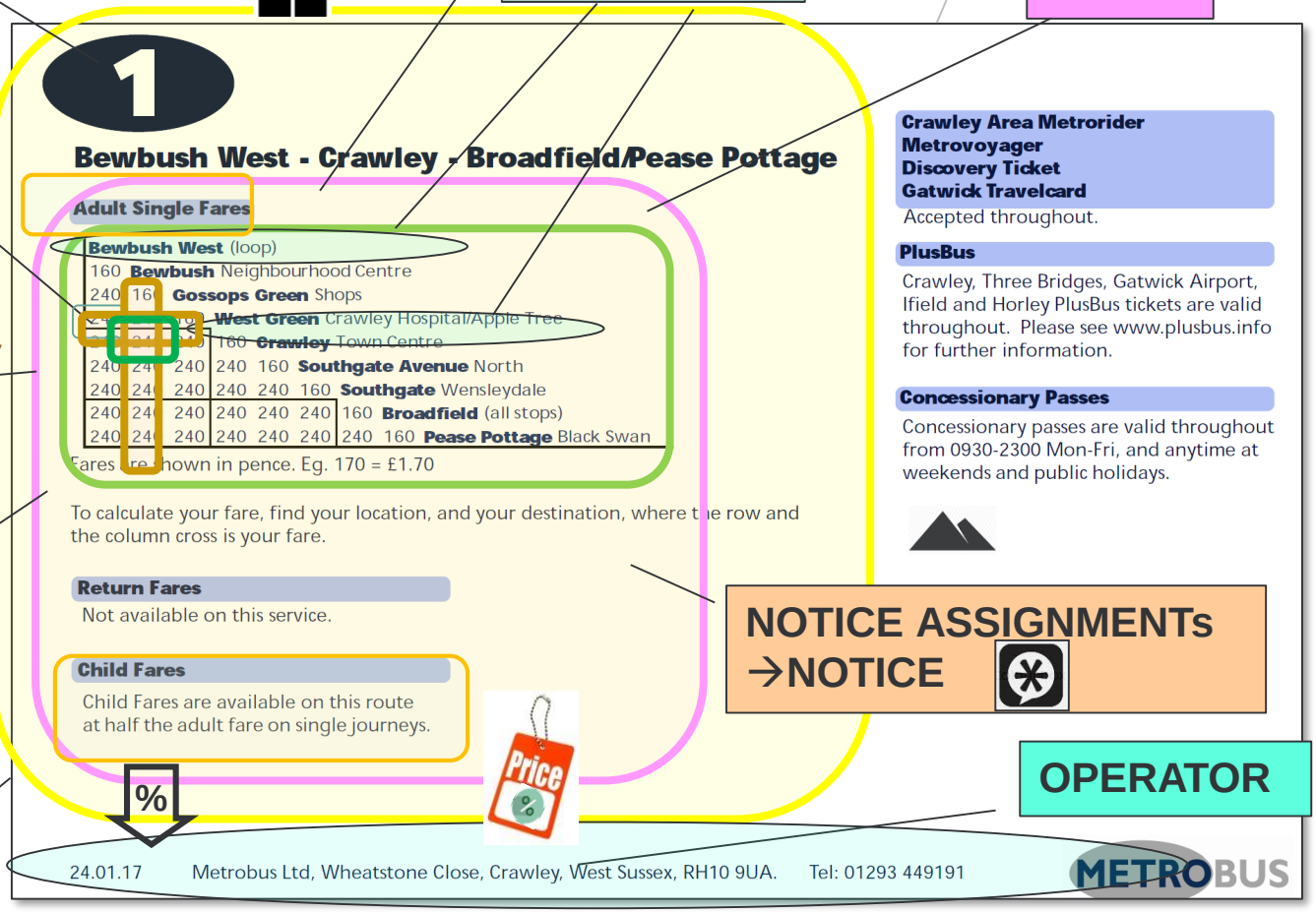
FARE PRICEs

FARE TABLE

PRICE UNIT

USER PROFILE

PRICE RULE



NOTICE ASSIGNMENTs
→NOTICE

OPERATOR

Example – Single Trip Offer

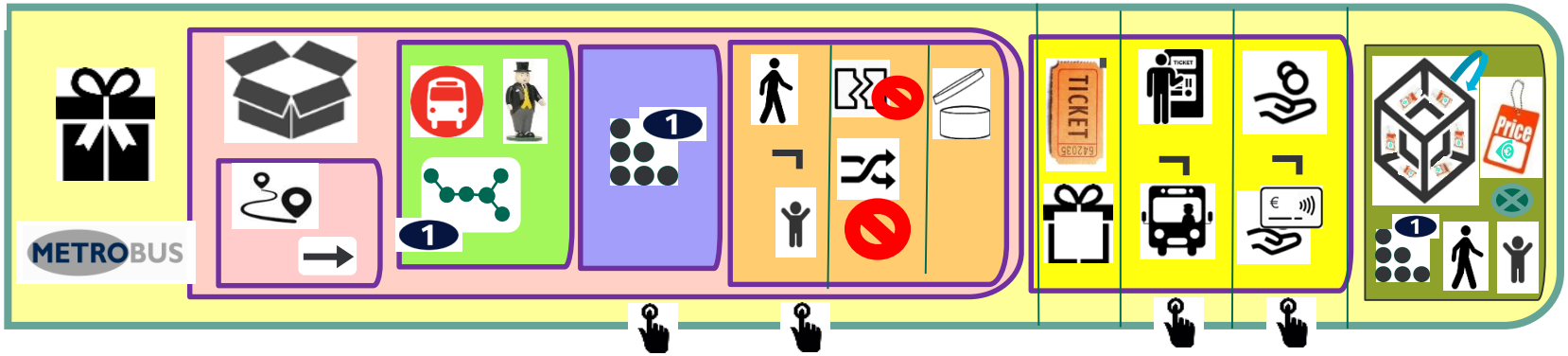
1

FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | DISTRIBUTION ASSIGNMENT | FARE PRICEs

METROBUS 1

SALES OFFER PACKAGE

"Cash Single"



Offer; "Metrobus cash ticket"

- **Tariff Structure:** *Zone to Zone;*
- **Product Access rights:** *single trip*; bus, Operator=*Metrobus, Line1*
- **User Profiles:** *Adult, Child,*
- **Conditions:** *Cannot break journey; Cannot interchange*; Refundable?
- **Travel Document:** *Printed "Cash ticket";*
- **Available:** at stop, or on-board (no discount);
- **Pay with:** *cash or card*
- **Prices :** ***Line1 x (n x n** Z2Z elements) x (Adult | Child)*
- **Brand** = *Metrobus*

Travel Specification;

- ***Which Zones?***
  - *Origin + Destination*
- ***Which User Profile?***
  - *(Adult | Child)*

Purchase options

- ***Where?***
  - *At stop | on-board*
- ***Pay How?***
  - *Cash | Card*

Example – Single Purchase

1

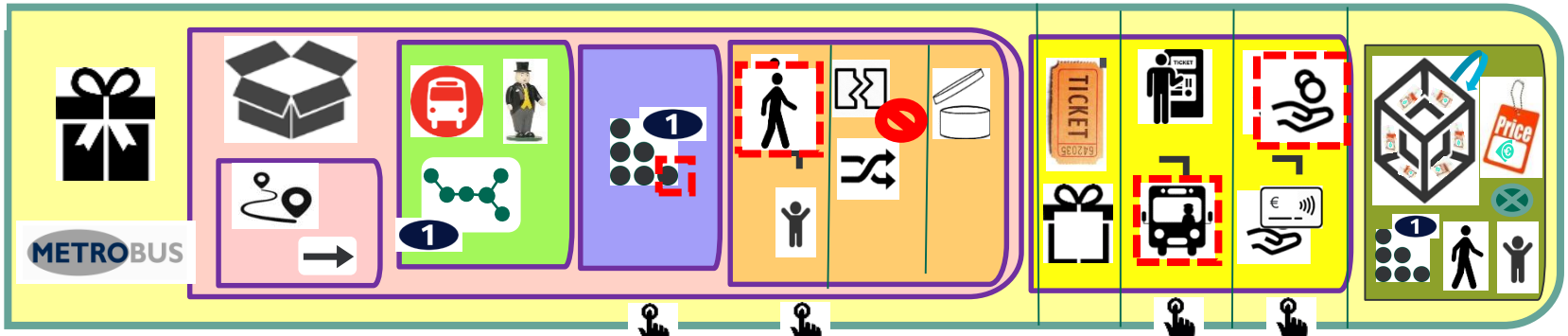
FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | DISTRIBUTION ASSIGNMENT | FARE PRICEs

METROBUS

1

SALES OFFER PACKAGE

"Cash Single"



Travel Specification;

- *Which Zones?*
  - *Bewbush to Crawley*
- *Which User Profile?*
  - *Adult*

Purchase options

- *Where?*
  - *On-board*
- *Pay How?*
  - *Cash*

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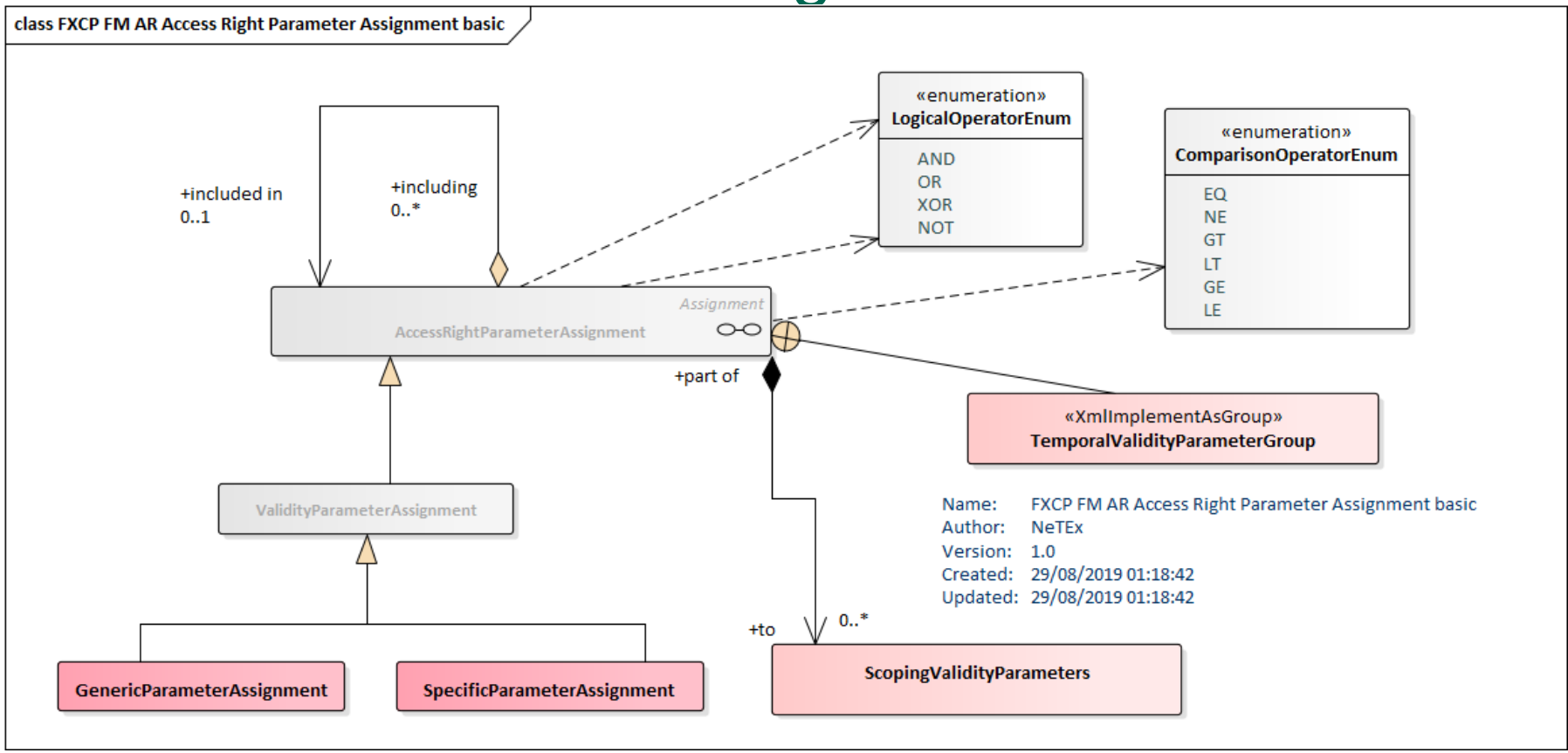
Combining Access Right Parameter Assignments



Usage Parameters

- User Profiles
- Group Tickets
- Travel Conditions
- Luggage Allowance
- Sales and After sales
- Product Entitlements

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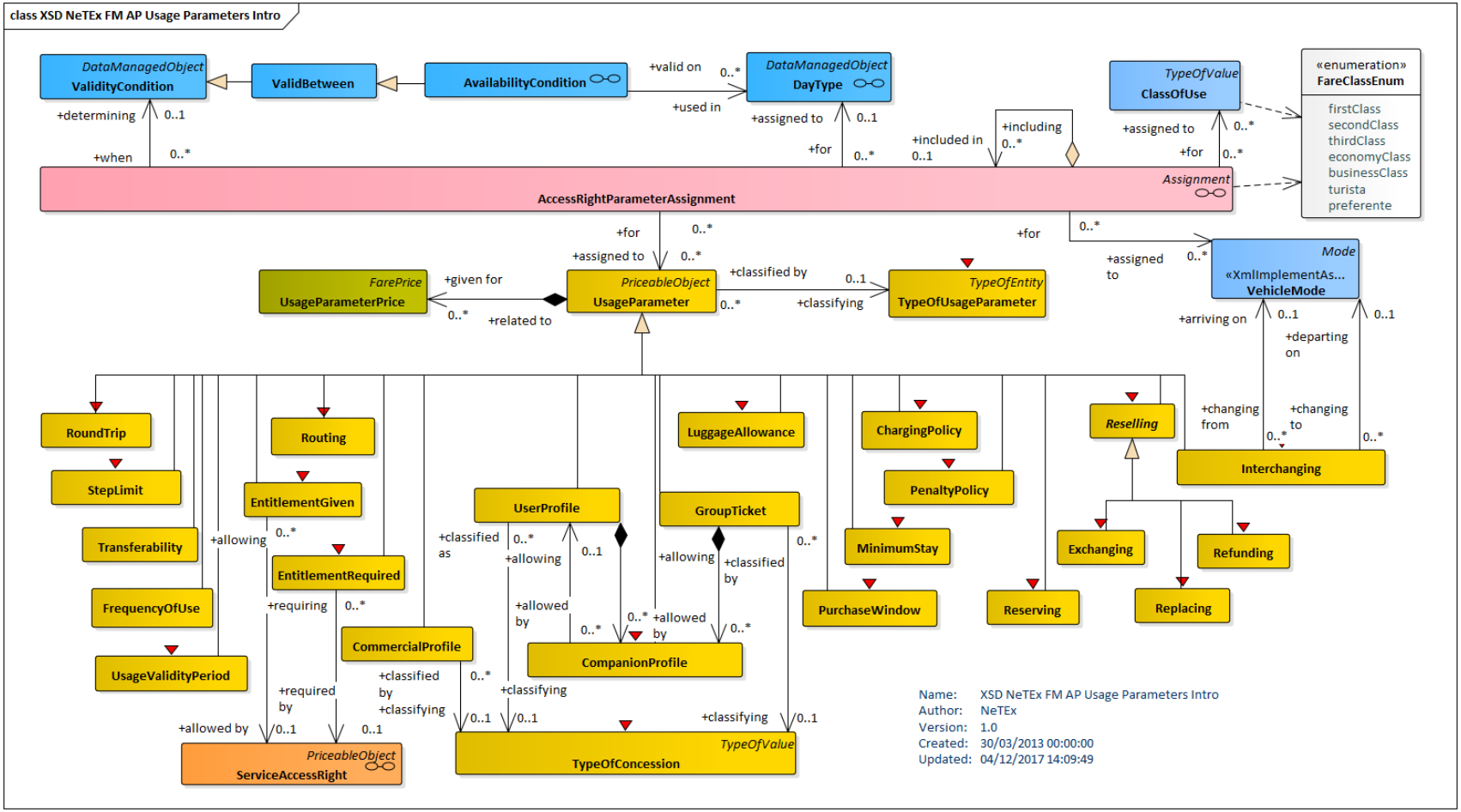
USAGE PARAMETERs - Summary

- Easy to extend with new attributes or parameters



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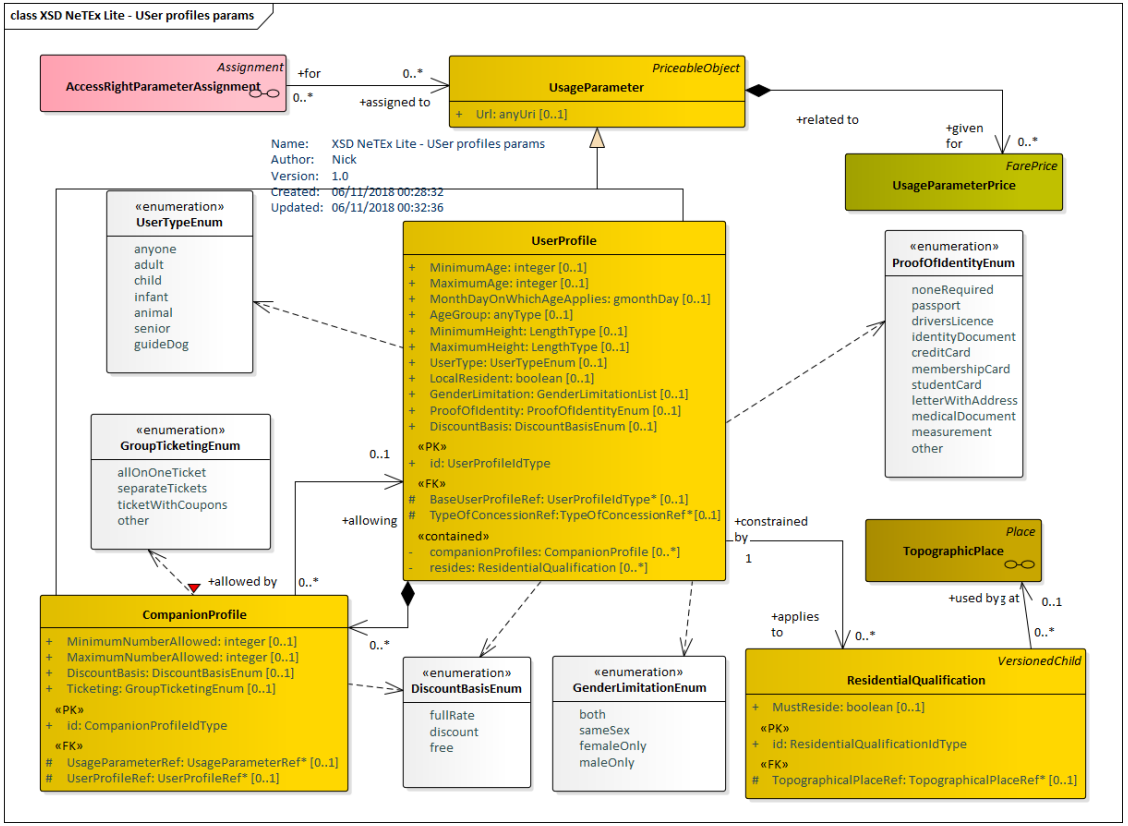
User types in NeTEx: implemented as USER PROFILEs

- USER PROFILE: a named user type.
- Allows for precise characterisation:
  - Minimum maximum age, et
  - Textual description
- Specialisation of USAGE PARAMETER
  - Can have url to external Web page with further description



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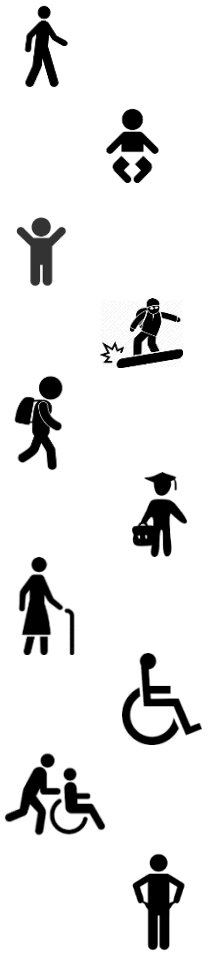
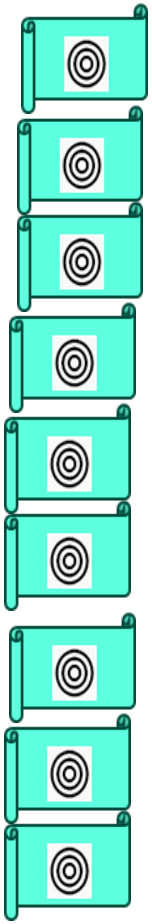
#6.1: UK Bus Fares - User Types?

USER PROFILE	Personal	Discounted	Note
Adult	x	x	Over 16
Infant	x	✓	Babes in arms free
Child	x	✓	c5 – c16 years
Youth	x	✓	c16-18 years
School Pupil	x	✓	At School
Student / Trainee	✓	✓	University, APprentice
Senior	✓	✓	Resident, >60 years
Disabled	✓	✓	Registered disabled
Disabled Companion	✓	✓	With disabled
Job seeker	✓	✓	





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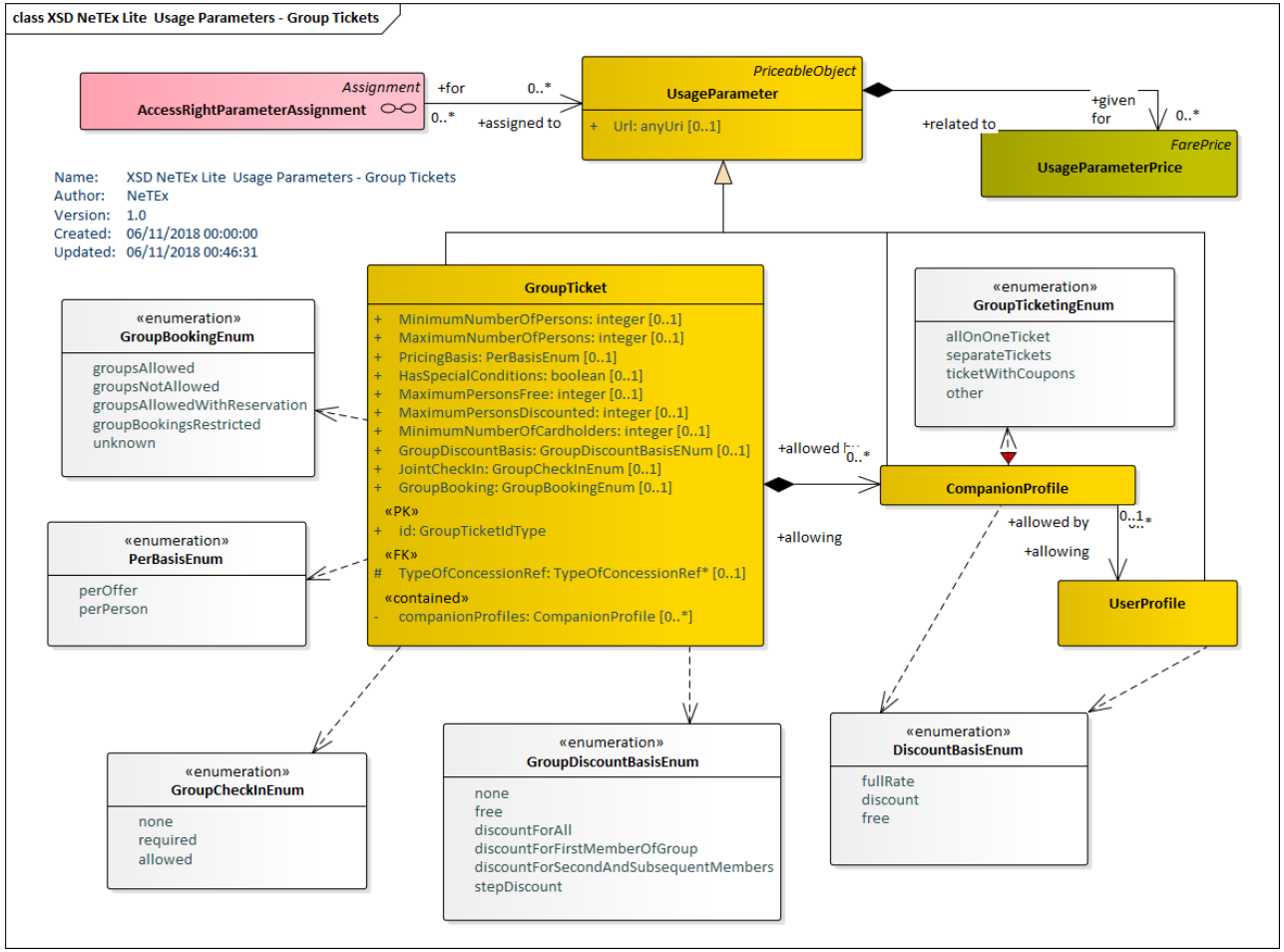
GROUP TICKETs

- GROUP TICKET specifies parameters for a Group
  - How many;
  - Which types of Users
  - Discount basis
  - etc
- Specialisation of USAGE PARAMETER
  - Can have url to external Web page with further description



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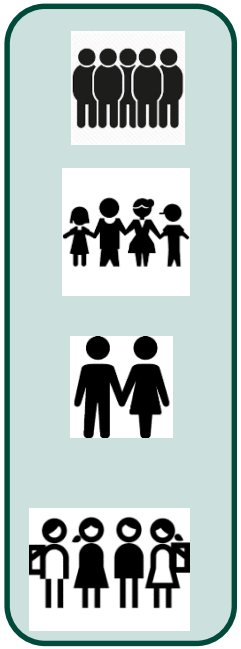
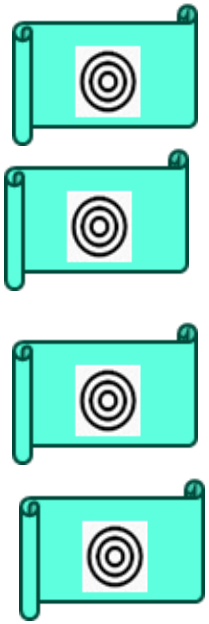
#6.3: UK Bus Profile – Group Ticket Types?



GROUP TICKET	Note
Anyone	2-N Anyone
Family	1-2 Adults + 1-N, Children
Couple / Duo	2 Adults
School Pupils	1-N Adults + 2-N Pupils



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UK BUS Product parameters – Travel Conditions

		Relevance				
Condition	**Condition**	**Local Trip**	**Coach Trip**	**Season Ticket**	**Note**	USAGE PARAMETER
TRAVEL HOW	**Right to Interchange**	✓	✓	X	Trips only	INTERCHANGING
	Right to Break Journey	✓	✓	X	Trips only	INTERCHANGING
	Routing Restrictions	X	?	X		ROUTING
	Round Trip	✓	✓	X	Single, Period Return, Day Trip	ROUND TRIP
TRAVEL WHEN	**Usage Validity Period**	✓	✓	✓	See discussion of temporal factors	USAGE VALIDITY PERIOD
	Frequency of Use	X	X	✓	e.g. 2 per day, vs unlimited use	FREQUENCY
	Minimum Stay	x	?	x	Excursion products only?	MINIMUM STAY

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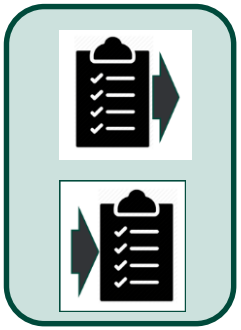
UK BUS Product Parameters – Sales & After-Sales Conditions

		Relevance			
Condition	**Condition**	**Local Trip**	**Coach Trip**	**Season Ticket**	USAGE PARAMETERs
Presales	Period in which a ticket can be bought.	?	✓	✓	PURCHASE WINDOW
	Period and conditions for reserving a ticket.	x	✓	x	RESERVING
	Can ticket be given to another to use?	✓	✓	✓	TRANSFERABILITY
After Sales	Can reservation be cancelled?	x	✓	x	CANCELLING
	Can you modify travel times or change journey details?	x	✓	x	EXCHANGING
	Can you get all or some money back?	?	✓	✓	REFUNDING
	Can you get a replacement for a lost ticket?	x	✓	✓	REPLACING

Prerequisites & Dependencies between products

- How may products and sales offers depend on each other



Condition☑	Note
Entitlement Required	Specifies a prerequisite product
Entitlement Given	Specifies rights to another products

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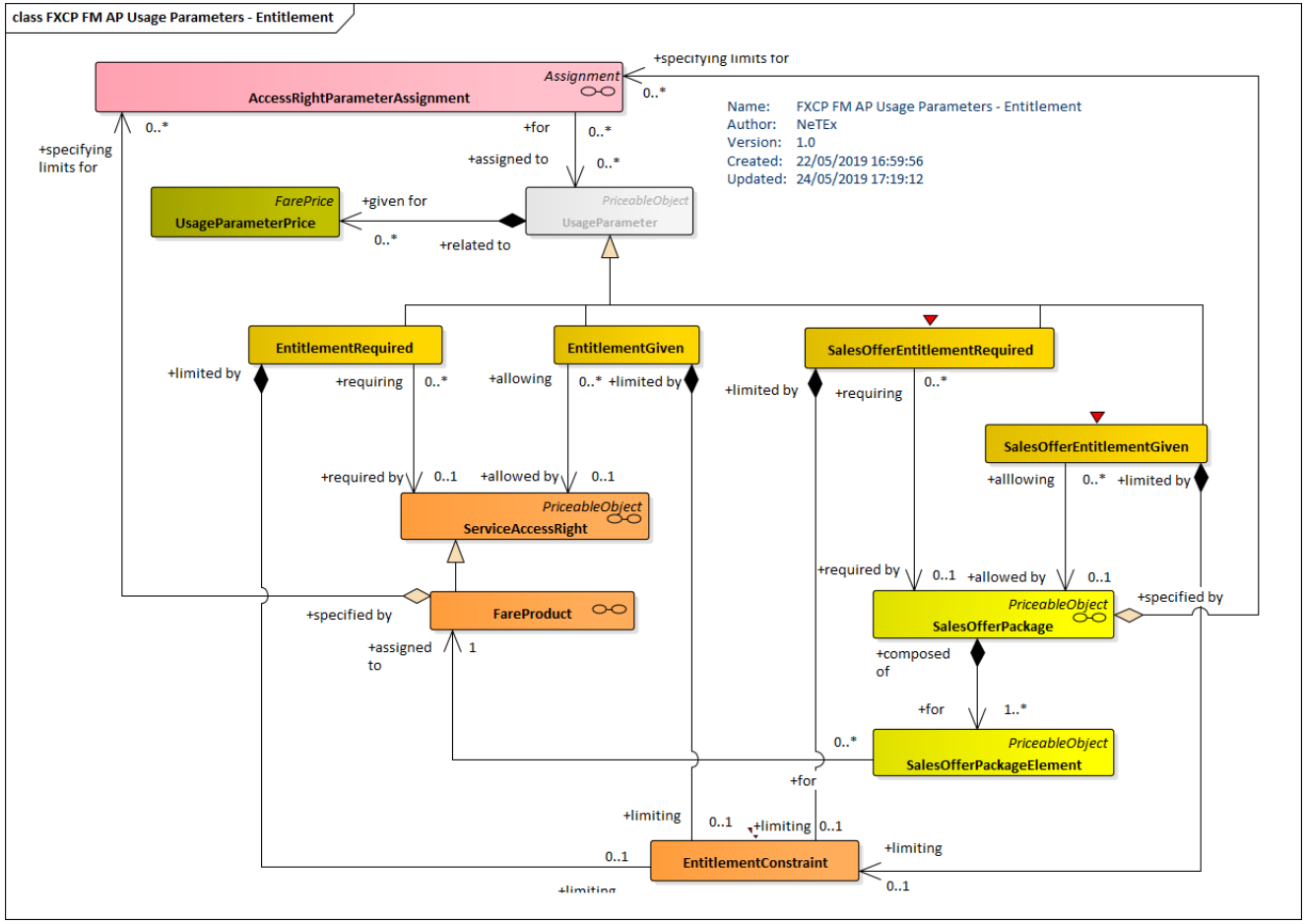
Entitlements: Prerequisites & rights



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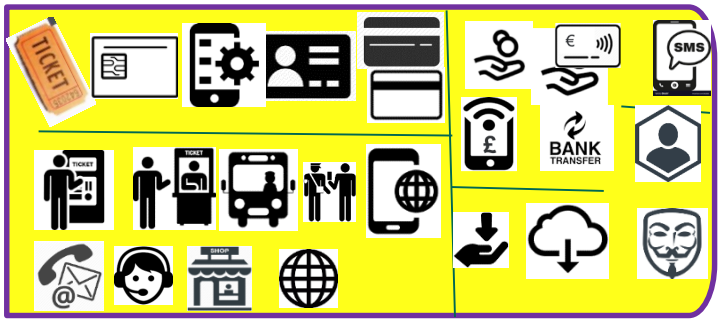
Representing Sales Offers in NeTEx



- SALES OFFER PACKAGE
- TRAVEL DOCUMENT
- DISTRIBUTION CHANNEL
- PAYMENT METHOD

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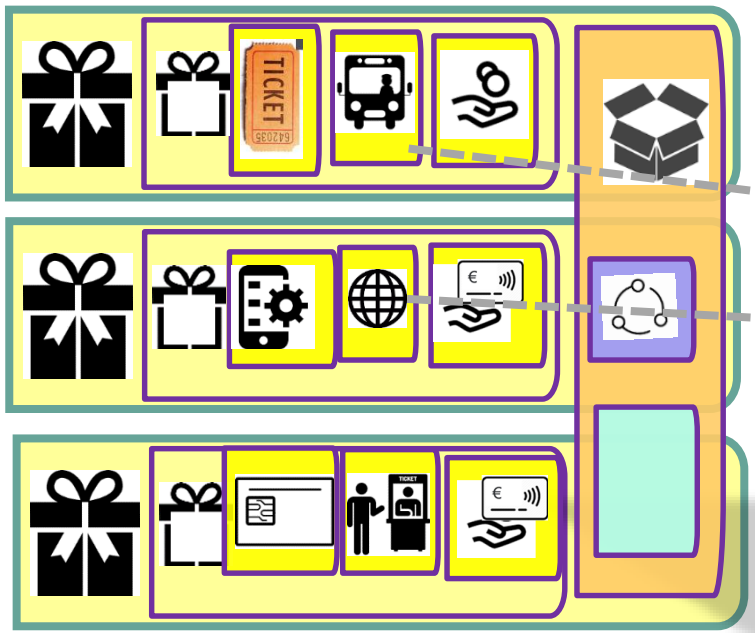
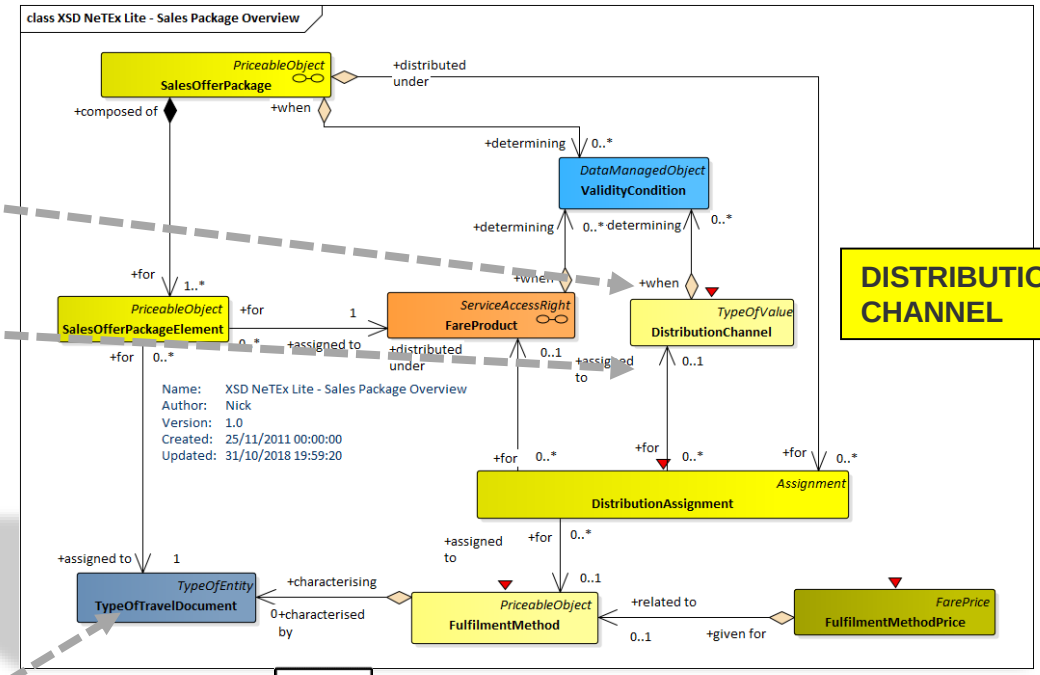
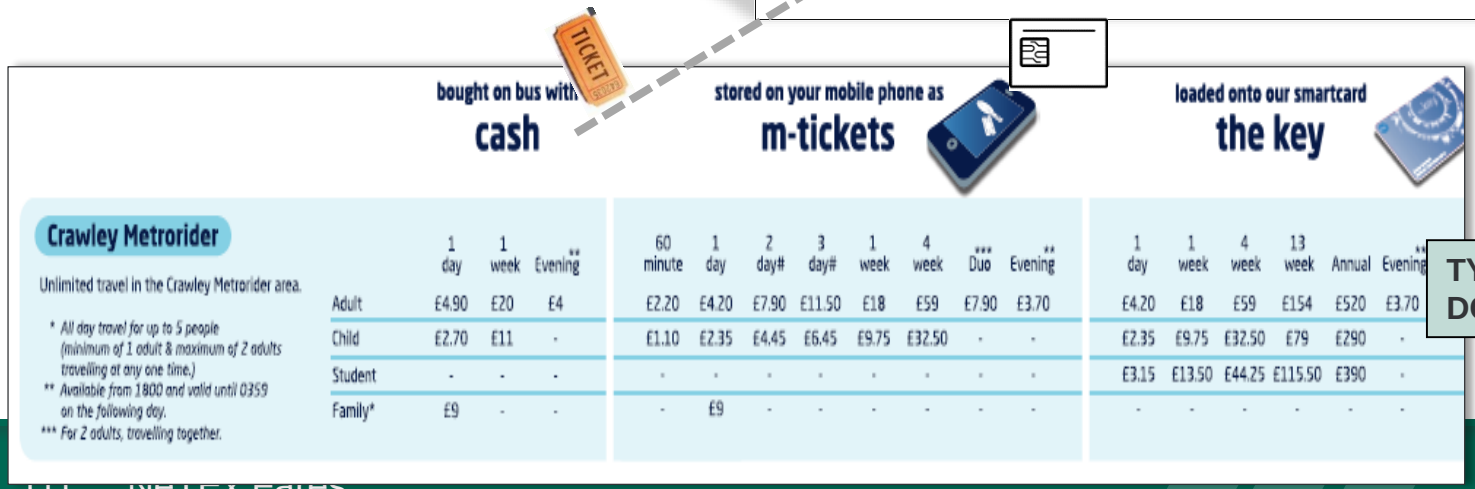
Packaging example





DISTRIBUTION CHANNEL



PAYMENT METHOD

TYPE OF TRAVEL DOCUMENT

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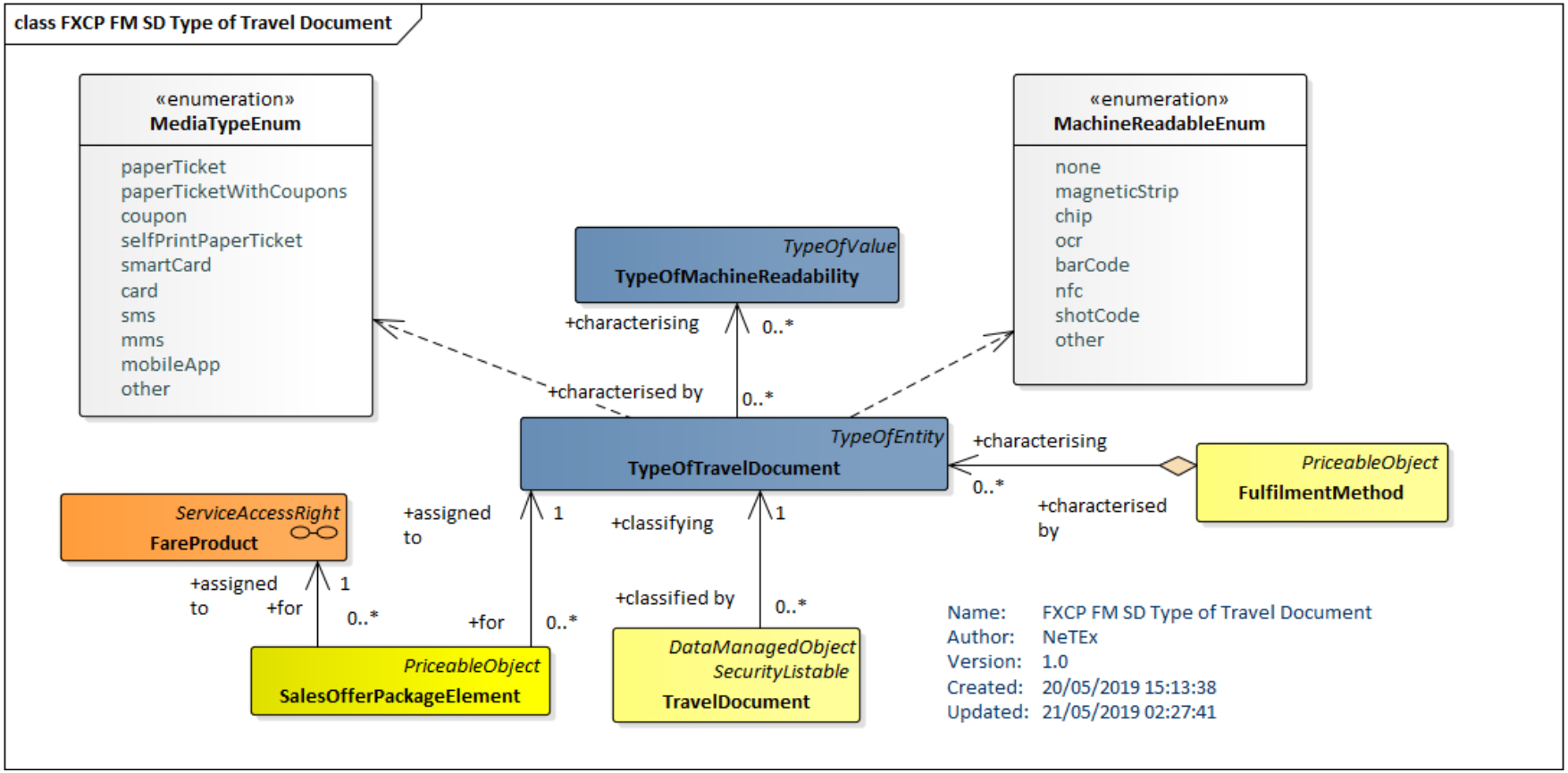
Materialisation of product on a ticket medium – TRAVEL DOCUMENT



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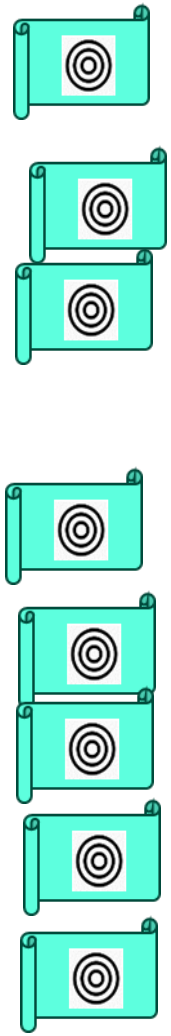
#7.1: UK Bus – Media / Travel Documents?

	TYPE OF TRAVEL DOCUMENT	Machine Readable	Human Readable	Note
VISUAL	**Paper**	Barcode, OCR, ShotCode, etc	✓	From machine or conductor
	E-document/pdf	Barcode, OCR, ShotCode, etc	✓	Self print / store on mobile device
	SMS /MMS	Barcode, OCR, ShotCode, etc	✓	
	Card	OCR	✓	e.g. Travel card
E-PASSIVE	**Magstripe**	Contact	✓	Ticket Machine / Counter only
	EMV	Contact, NFC	X	Account Based Ticketing has id but no app
E-ACTIVE	**SmartCard**	Contact, NFC	X	(ABT) Has travel app chip
	Mobile App	NFC, (bluetooth)	✓	ABT Downloadable to smart device



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- information about how/where products **can be bought**.

➔ Distribution Channels and Fulfillment methods

Department for Transport

#7.2: UK Bus – Distribution Channels?

	DISTRIBUTION CHANNEL	Fulfilment	Payment	Charging Moment	Note
Staffed	**Ticket Office Counter**	Immediate (or despatch)	Cash, Card, ePay	Prepaid	All
	On board / Conductor	Immediate	**Cash**, Card, ePay	Prepaid	Trips, day passes
	Retailer	Despatch	Card, ePay, (bank)	Prepaid	
	Call Centre	Despatch	Card, ePay, (bank)	Prepaid	Travel cards, season passes
Self Service	**Ticket Machine**	Immediate	**Cash**, Card, (ePay)	Prepaid	At Stop Also On board
	Online, mobile	Immediate or despatch	Card, ePay	Prepaid	Anywhere
	Electronic	Immediate (or on travel)	Card, ePay	Pre & Post Pay (Pay as you go)	Acquire, top up / purchase etc

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#7.3: UK Bus – Payment Methods?

	PAYMENT METHOD	Subscription/ Top up	Note
ANONYMOUS	Cash	x	£
	Cash – Coins only	x	
ELECTRONIC / MOBILE	EMV Card	✓	Self print / store on mobile device
	ePay	✓	
	SMS	x	
OTHER	Bank transfer	✓	Use for Season Passes, Auto top up, & Subscriptions
	Cheque	x	Eg. For Season Passes
	Coupon / Voucher	x	E.g. for promotions

Bus – Offer: Fulfilment Methods

Type of method	FULFILMENT METHOD	Note
COLLECT	**Collect from driver or conductor**	Basic products
	Collect at counter	E.g. for Season passes,
	Collect at Machine	Not all products
	Collect at shop	Basic products
REMOTE DOWNLOAD	**Download to device**	App or pdf eticket
	Self print	Self print to paper
	email	Online & call centre purchases
	SMS	Online purchases
DESPATCH	**Post**	E.g. For Season Passes
	Courier	E.g. Online - Extra fee

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Season Pass (es)

FARE PRODUCT
Season Pass

TYPEs OF TRAVEL DOCUMENTs
paper, app, smartcard

SALES PACKAGEs
"cash, m-ticket, the key"

TIME INTERVALs
(1day, 1 week, Evening, 1 month, Annual, etc)

FARE ZONEs
(Horsham, Crawley, Redhill, All)

FARE PRICEs

bought on bus with **cash** | stored on your mobile phone as **m-tickets** | loaded onto our smartcard **the key**

Multi Trip single journeys grouped onto the key

Crawley Metrorider

Unlimited travel in the Crawley Metrorider area.

* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
** Available from 1800 and valid until 0359 on the following day.
*** For 2 adults, travelling together.

	1 day	1 week	**	60 minute	1 day	2 day#	3 day#	1 week	4 week	*** Duo	**	1 day	1 week	4 week	13 week	Annual	**	5 journeys	10 journeys	25 journeys
Adult	£4.90	£20	£4	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£3.70	£4.20	£18	£59	£154	£520	£3.70	£11	£21	£50
Child	£2.70	£11	-	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	-	£2.35	£9.75	£32.50	£79	£290	-	£5.50	£10.50	£25
Student	-	-	-	-	-	-	-	-	-	-	-	£3.15	£13.50	£44.25	£115.50	£390	-	-	-	-
Family*	£9	-	-	-	£9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Horsham Metrorider

Unlimited travel in the Horsham Metrorider area

\# Consecutive days.
* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
*** For 2 adults, travelling together.

	1 day	1 week	60 minute	1 day	2 day#	3 day#	1 week	4 week	*** Duo	1 day	1 week	4 week	13 week	Annual	5 journeys	10 journeys	25 journeys
Adult	£4.90	£20	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£4.20	£18	£59	£154	£520	£11	£21	£50
Child	£2.70	£11	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	£2.35	£9.75	£32.50	£79	£290	£5.50	£10.50	£25
Student	-	-	-	-	-	-	-	-	-	£3.15	£13.50	£44.25	£115.50	£390	-	-	-
Family*	£9	-	-	£9	-	-	-	-	-	-	-	-	-	-	-	-	-

Redhill & Reigate Metrorider

Unlimited travel in the Redhill & Reigate Metrorider area.

\# Consecutive days.
c Surrey Student card holders can purchase Child rate tickets for cash on the bus, or students can purchase a Child Metrovoyager (on the key only) for longer validity tickets. **See below** for prices.
* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
*** For 2 adults, travelling together.

	1 day	1 week	60 minute	1 day	2 day#	3 day#	1 week	4 week	*** Duo	1 day	1 week	4 week	13 week	Annual	5 journeys	10 journeys	25 journeys
Adult	£4.90	£20	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£4.20	£18	£59	£154	£520	£11	£21	£50
Child	£2.70c	£11c	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	£2.35	£9.75	£32.50	£79	£290	£5.50	£10.50	£25
Family*	£9	-	-	£9	-	-	-	-	-	-	-	-	-	-	-	-	-

cash | **m-tickets** | **key**

Metrovoyager

This ticket bought on the bus gives you unlimited travel on all of our services across our entire network, including both the Crawley, Horsham, and Redhill & Reigate Metrorider area. Also valid on all Brighton & Hove bus services.

\# Consecutive days.
* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)

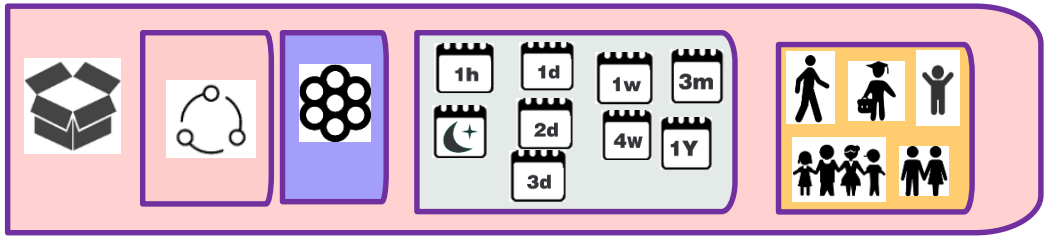
	1 day	1 week	1 day	2 day#	3 day#	1 week	4 week	1 day	1 week	4 week	13 week	Annual
Adult	£7.40	£26	£6.70	£12.50	£18.20	£24	£85	£6.70	£24	£85	£250	£870
Child	£4.20	£16.50	£3.80	£6.90	£10.10	£15.75	£52	£3.80	£15.75	£52	£153	£610
Student	-	-	-	-	-	-	-	£5.05	£18	£63.75	£187.50	£652.50
Family*	£12.50	-	£12.50	-	-	-	-	-	-	-	-	-

Multi Trip is available in the separate **Metrorider** areas only.

For further fares information including Summer Travelcard on the key, the Heysham Heath Day Saver, and Surgeons Hill Day Saver, please see the fares page on our website.

Example - Period Passes

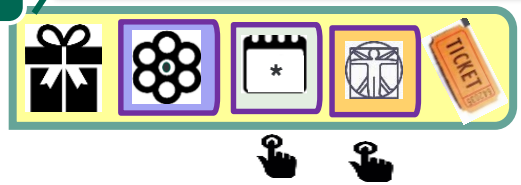
FARE PRODUCTs



Period Pass Product

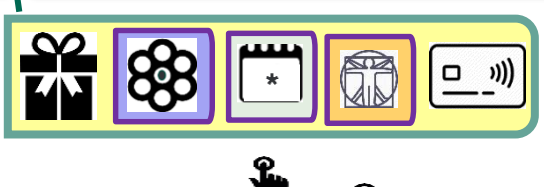
SALES OFFER PACKAGEs

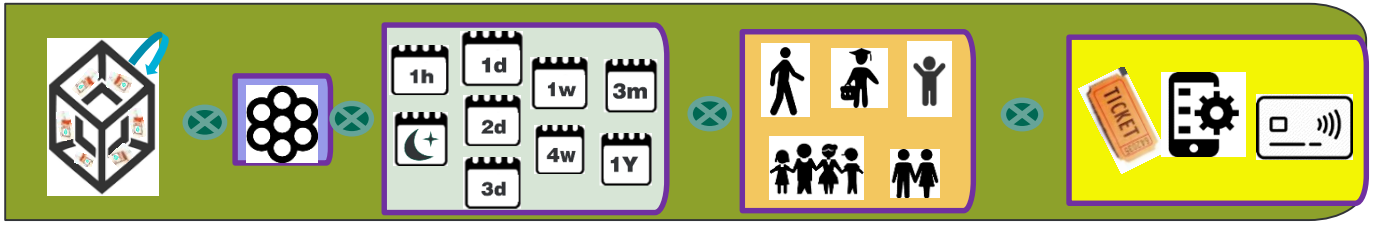
Paper "Cash Ticket"



Mobile App (*m-ticket*)

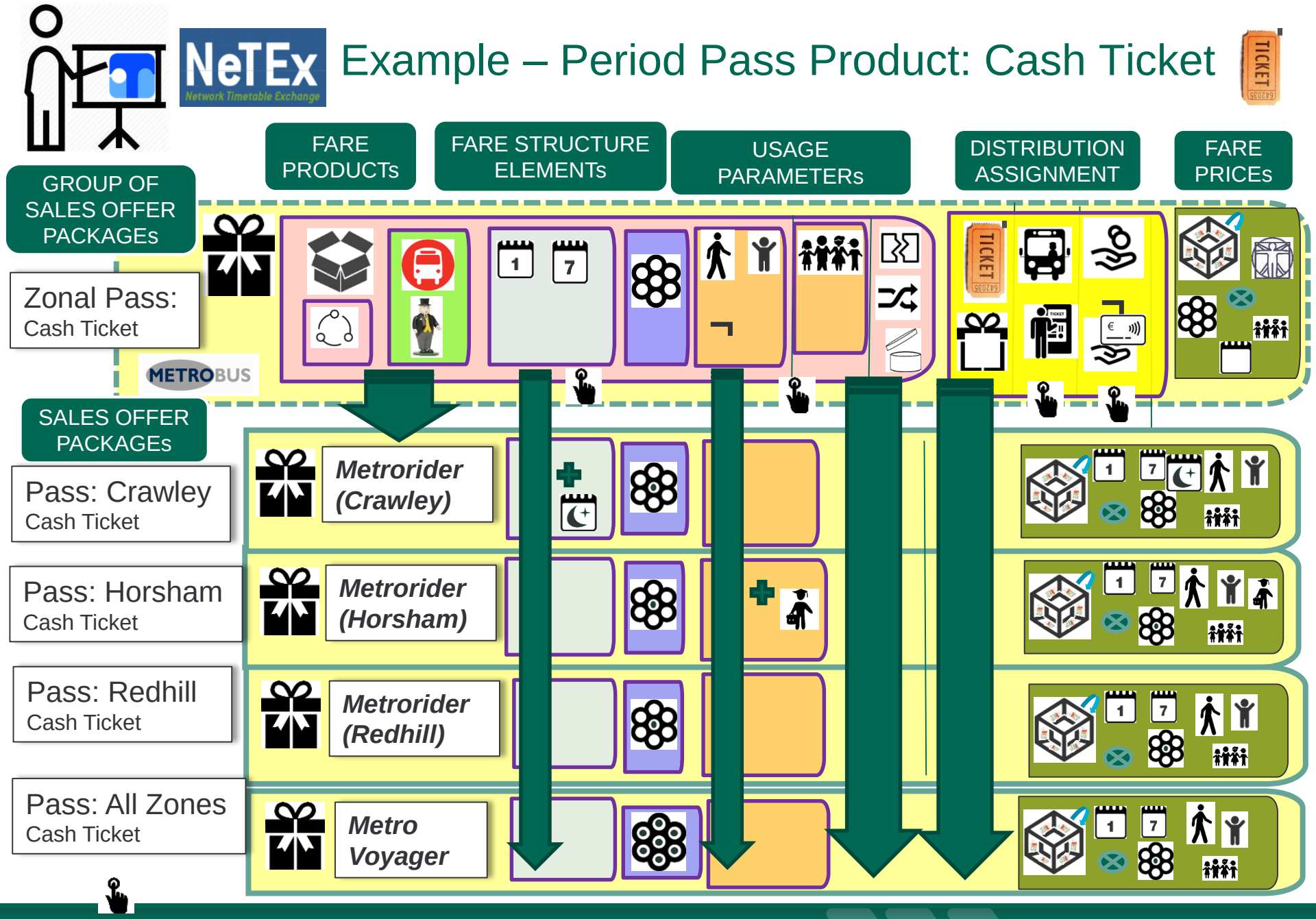
Smartcard(*the-key*)



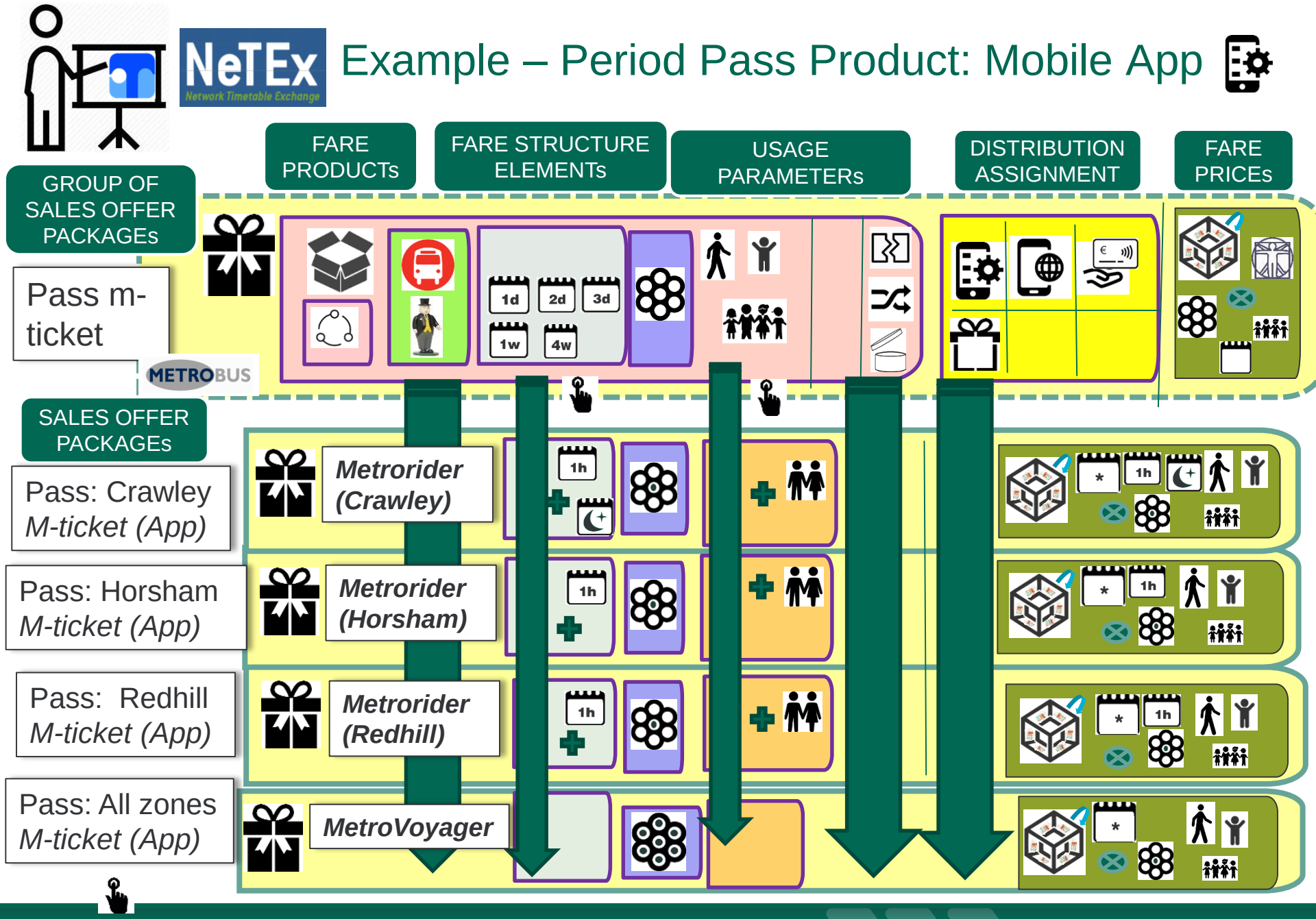


PRICE TABLE

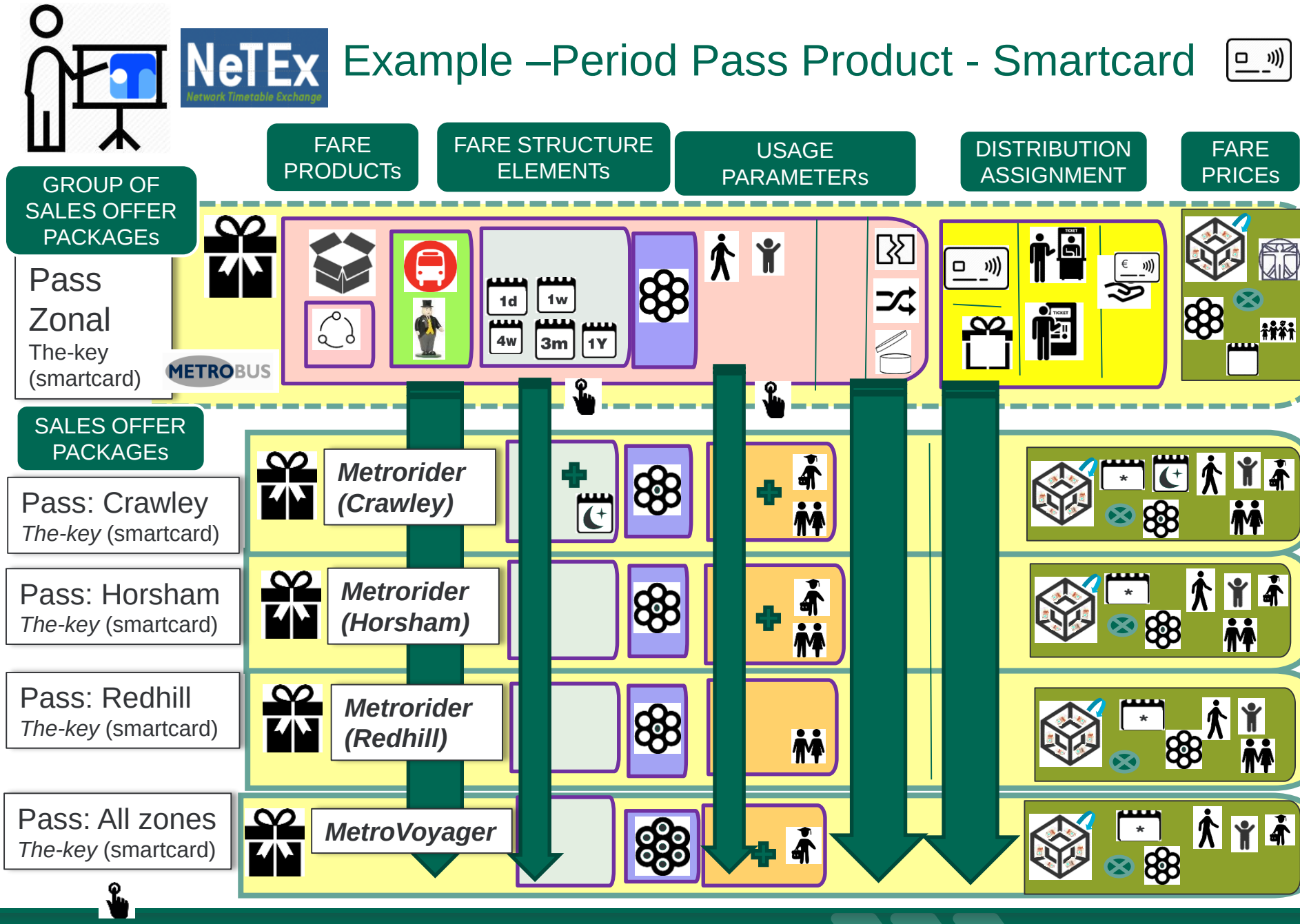
Example – Period Pass Product: Cash Ticket



Example – Period Pass Product: Mobile App



Example –Period Pass Product - Smartcard



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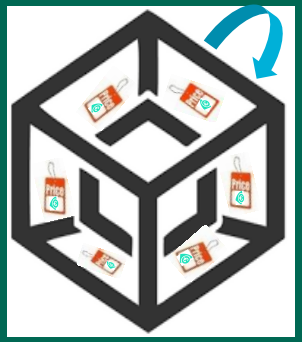

Representing Fare Products in NeTEx

- FARE PRICES
- PRICING PARAMETERs

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Fare Prices

- Prices are separate from the tariff elements they price.
  - An element may have different prices with different validities.
  - Prices may apply to individual elements or combination of priceable elements
- Different type of prices
  - Static / Base Prices
  - Prices Derived from Base Prices
    - Both amount and derivation
  - Dynamic Prices (pricing service)
    - Range bands for dynamic prices can be indicated by FARE QUOTA FACTORs

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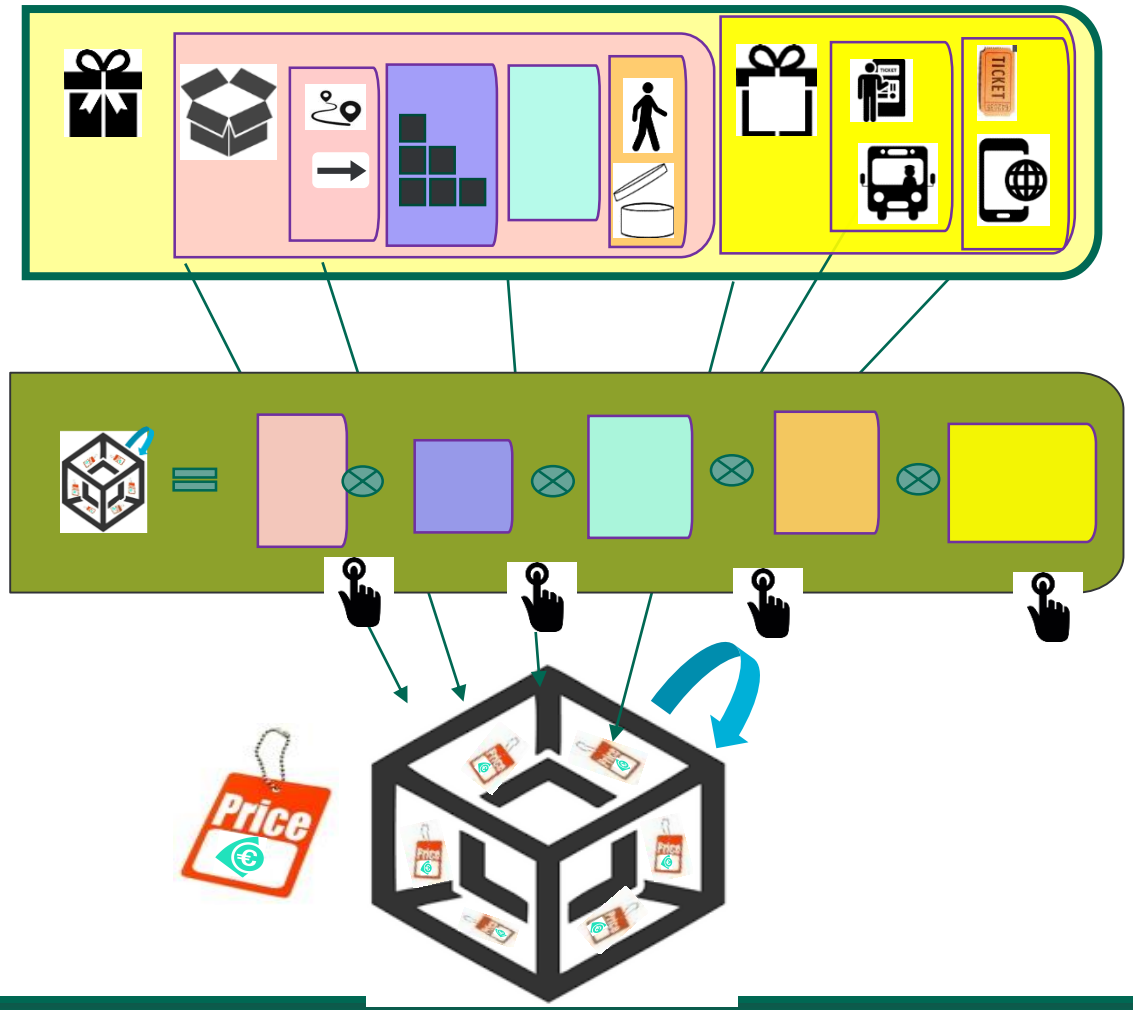
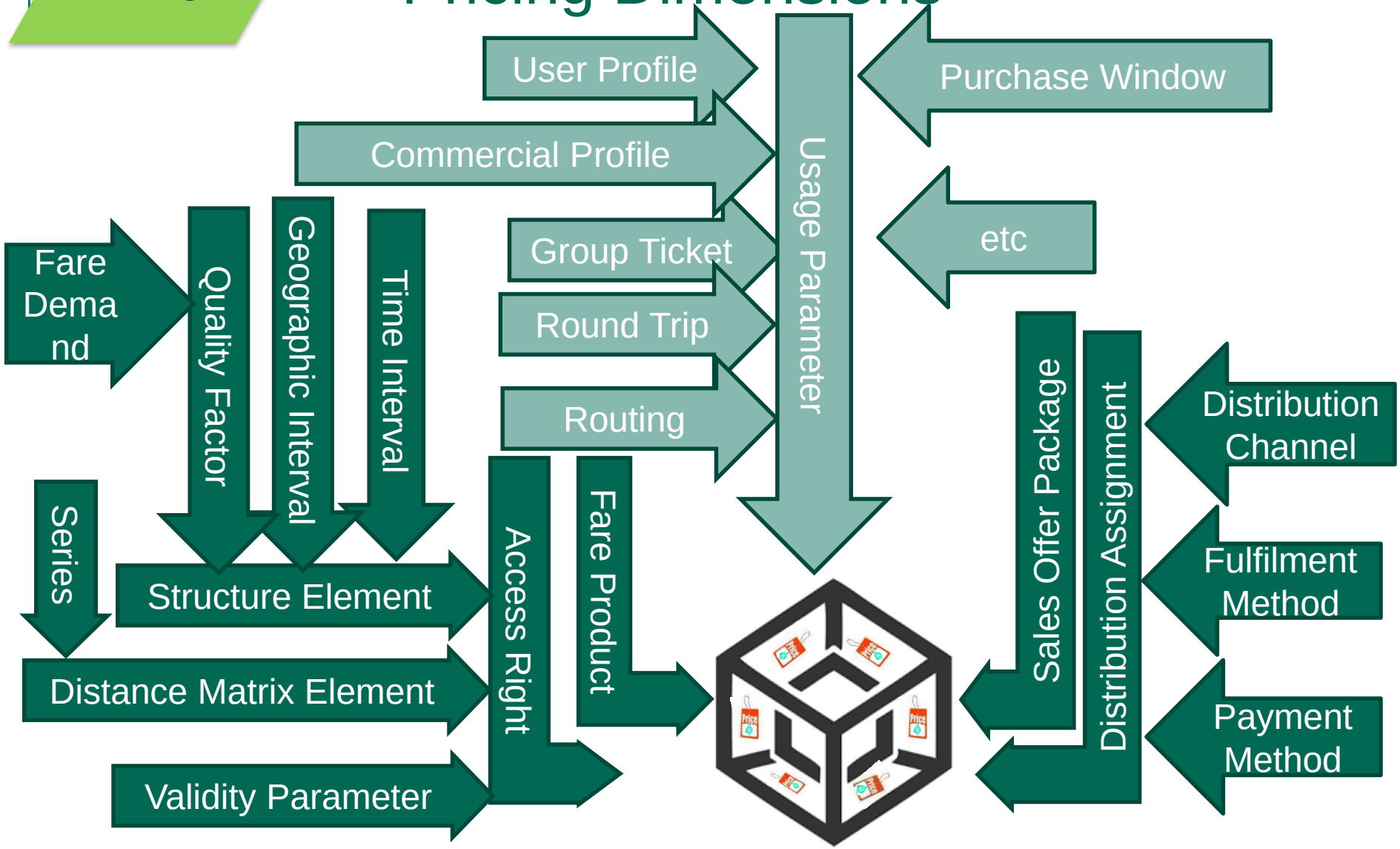
Price dimensions set the Fare Profile scope



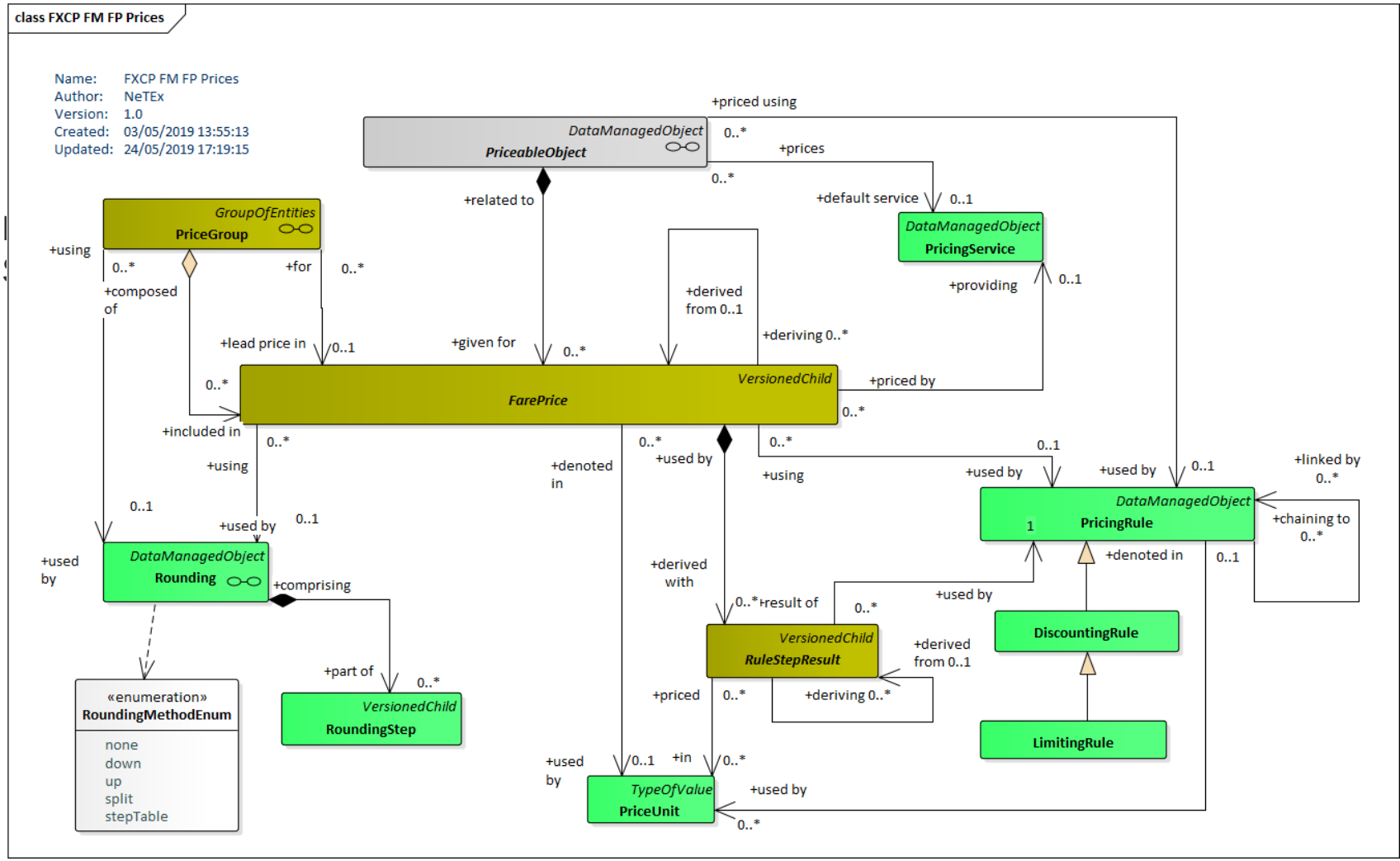
- Anything which is a price dimension for a UK Bus Fare needs to be represented by a model element in the profile
  - E.g. O/Ds, zones, user types, channels, media types, etc
- Anything else is optional –
  - E.g. rules for ages of a use type such as child or senior
  - E.g. Locations to buy tickets

Pricing Dimensions



Fare Prices – can be associated with pricing rules

- Can



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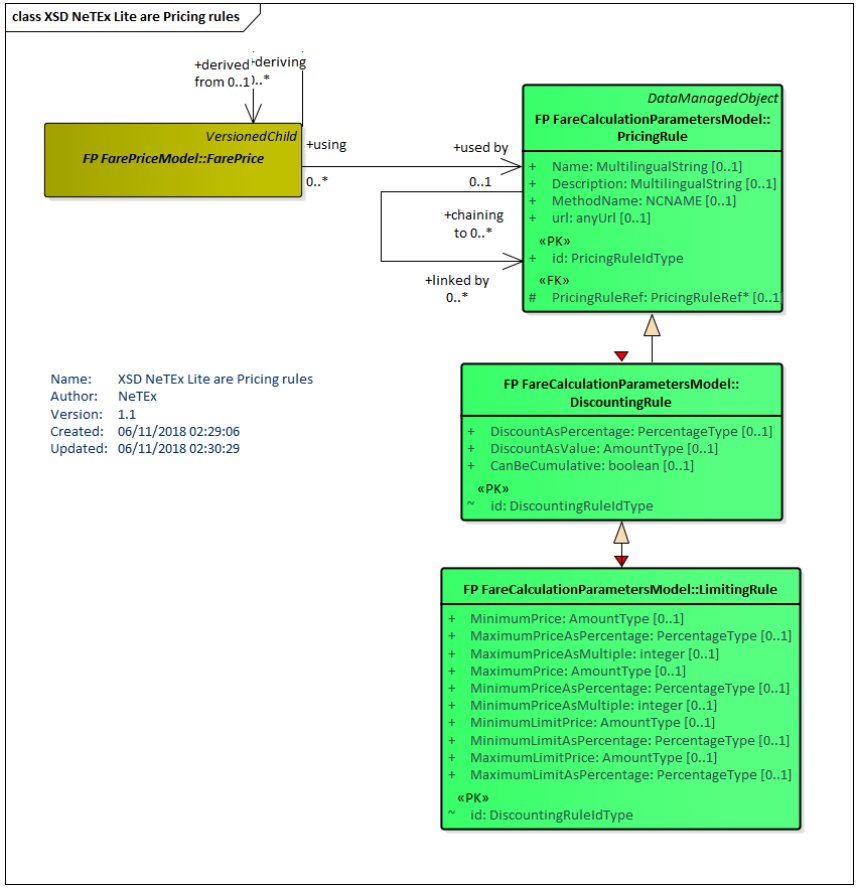
Price Rules – Specify discounts etc



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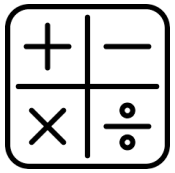
Pricing Rules



- Pricing rule
  - Any arbitrary named calculation
- Discounting rule
  - Price is a % discount
- Limiting discounting rule
  - Ount with absolute minima and maxima
- Rounding: Global parameter
  - Round to limit
  - Round in stepsAm

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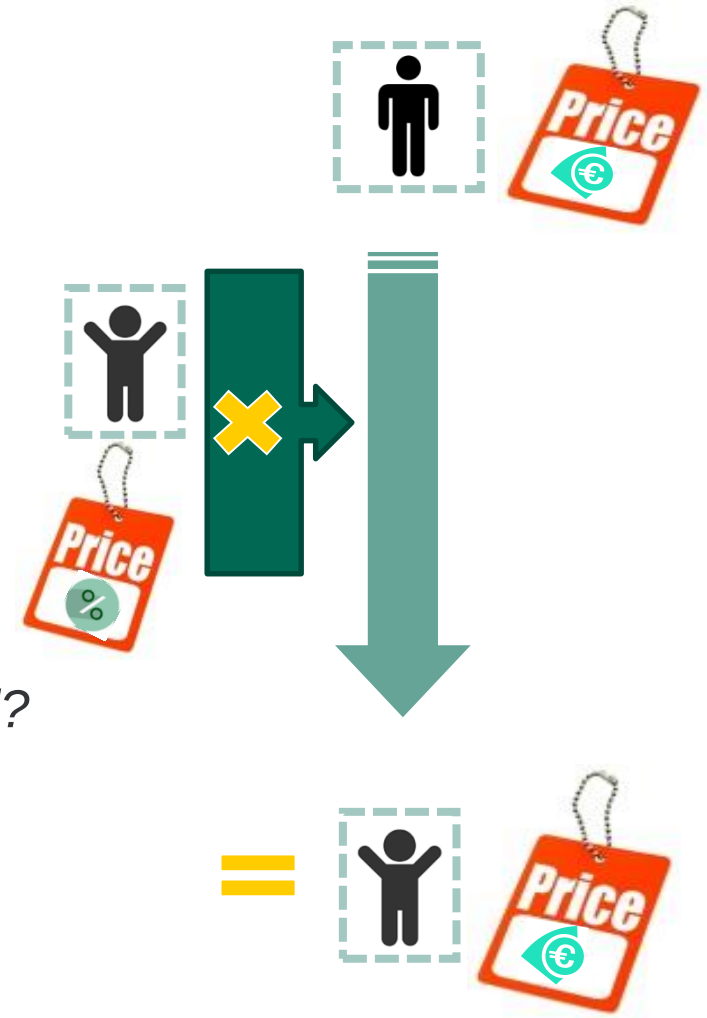
Prices may be absolute or derived

- **Base Price**
  - E.g. *Adult =£1.50*
- **Pricing Rule**
  - Discounting
    - E.g. *Child = 50% of Adult*
  - *Limiting*
    - *Minimum price = 50p*
  - *Cumulative discounts allowed?*
- **Derived Price**
  - *E.g. Child = £0.75*



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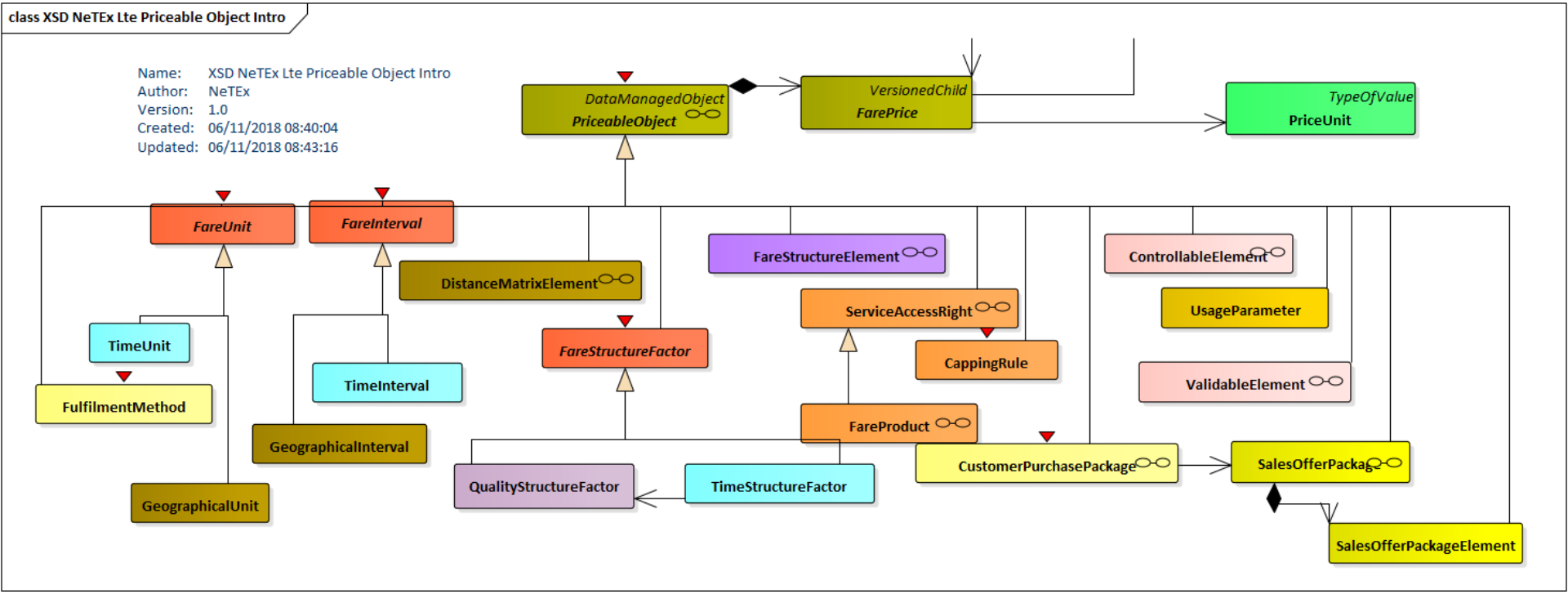
Priceable objects



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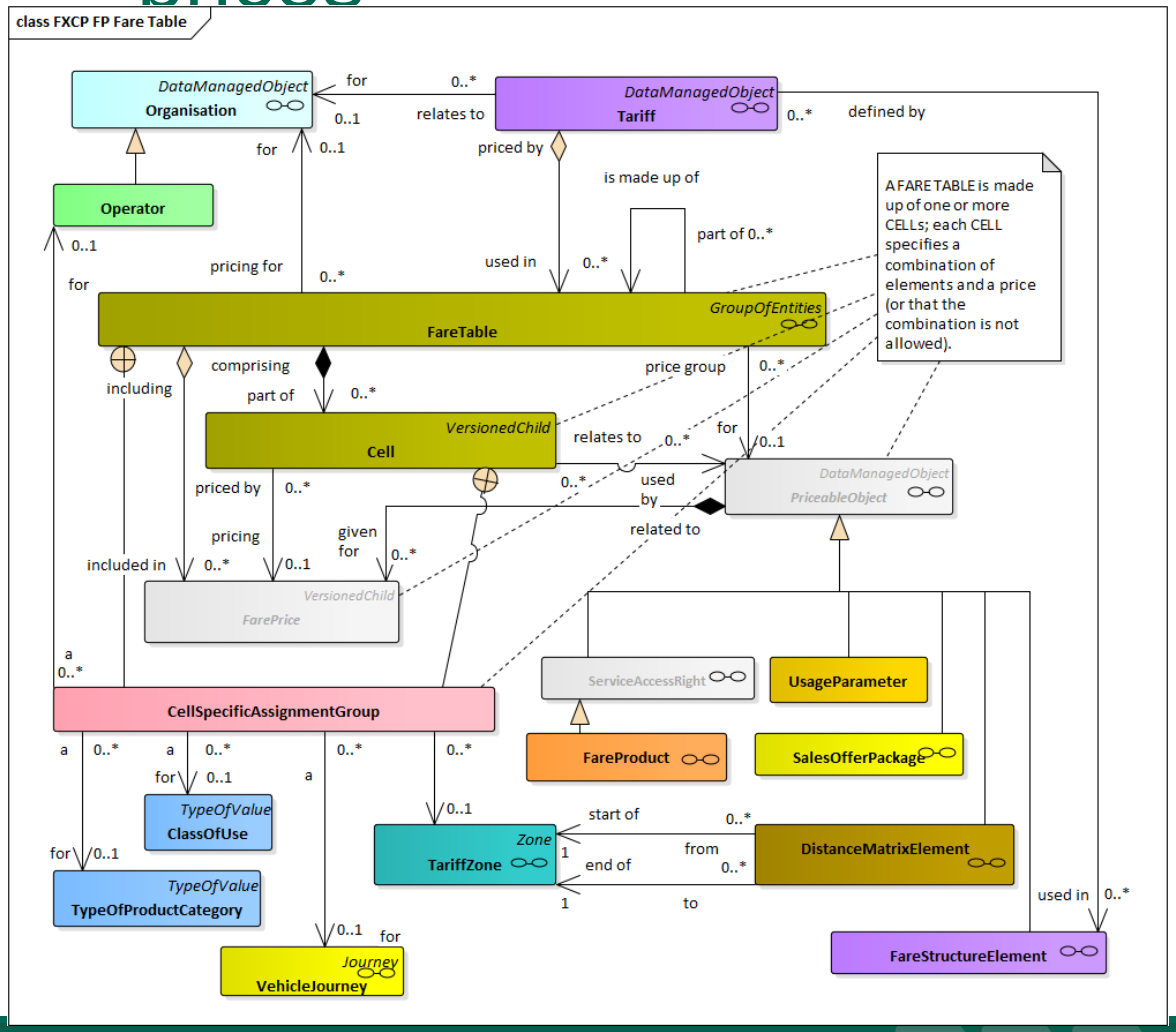
Dare Table – Used to group prices



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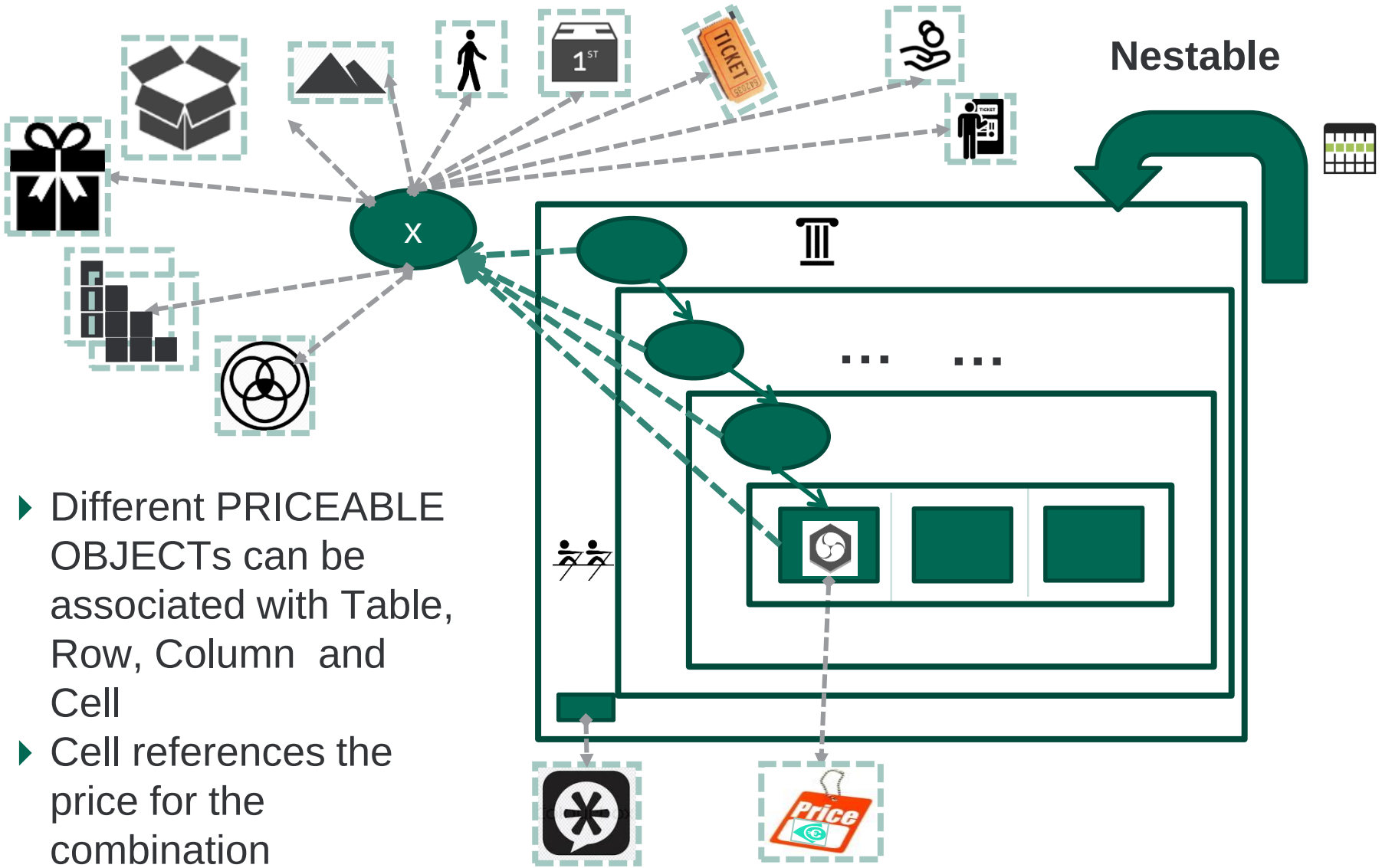
Nesting Tables

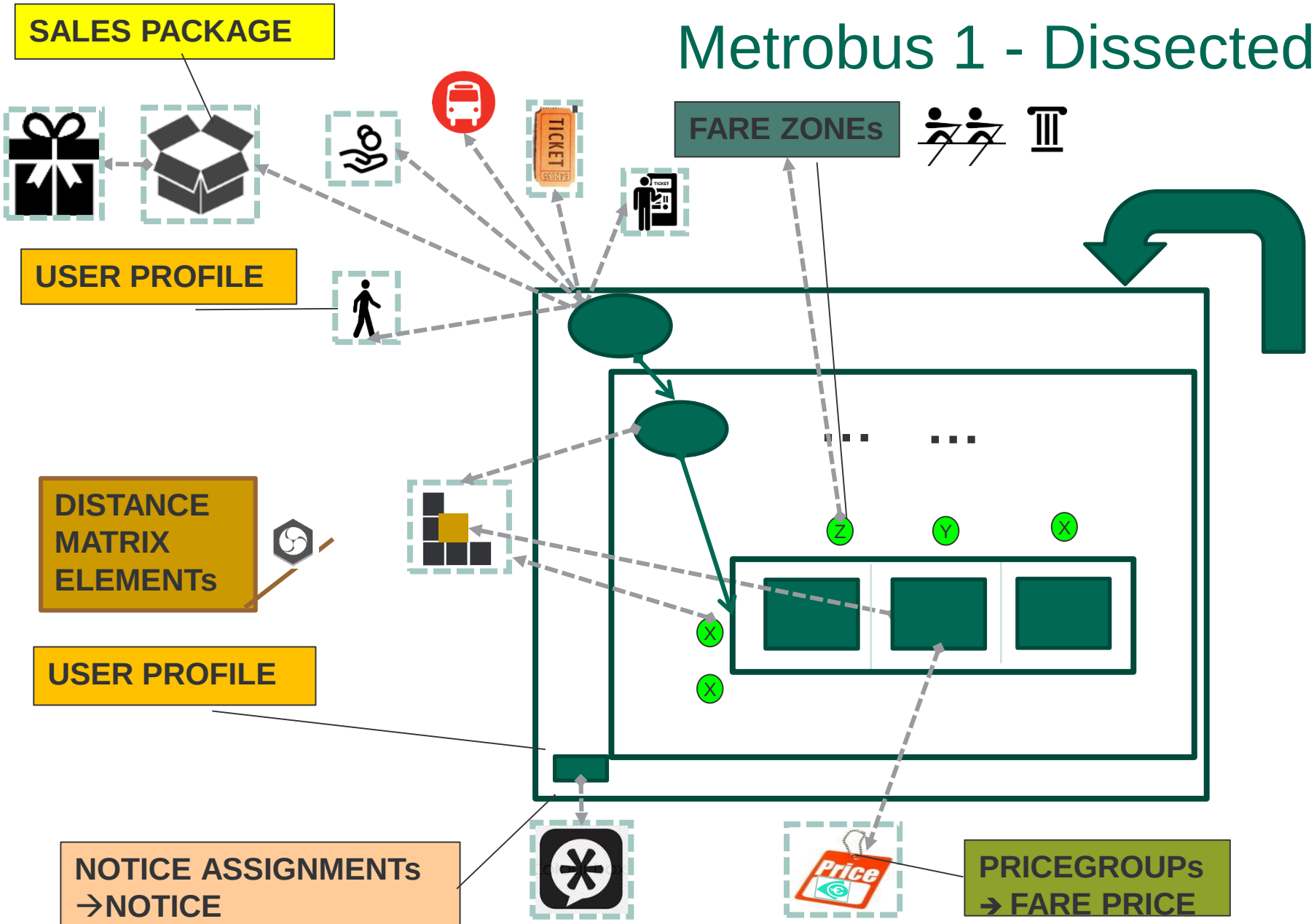
- Tables can eb nested
  - Efficient encoding in XML – Avoids repetition of common properties

Fare Tables – Organising Price Combinations



- Different PRICEABLE OBJECTs can be associated with Table, Row, Column and Cell
- Cell references the price for the combination

Metrobus 1 - Dissected



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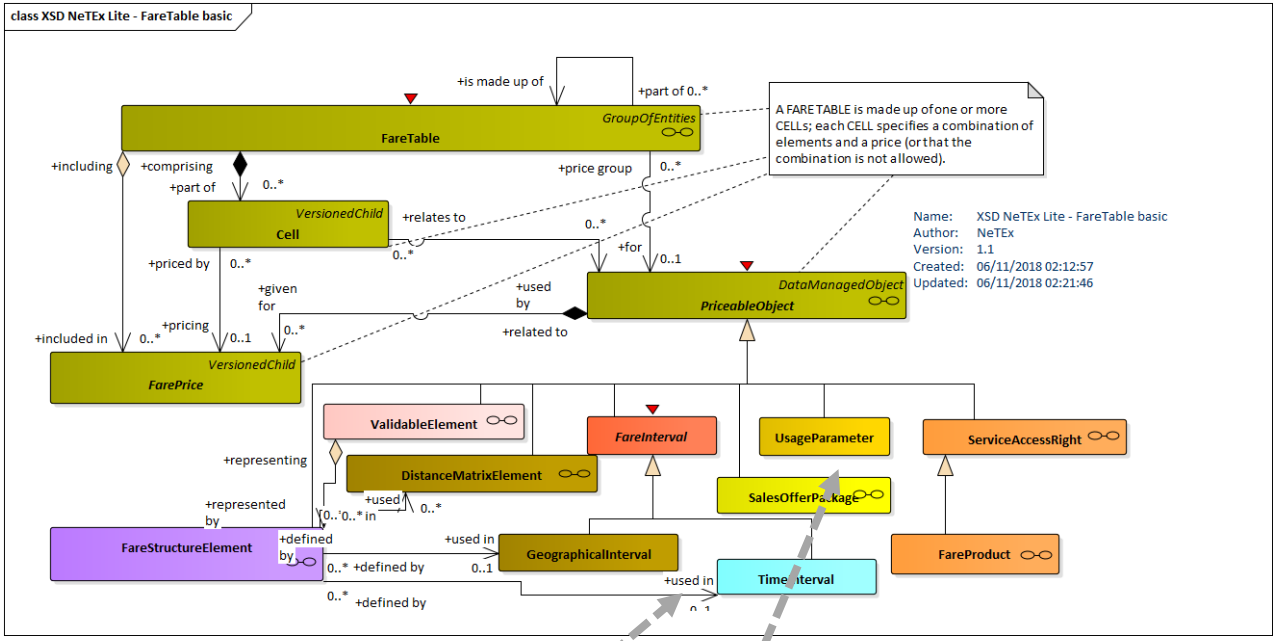
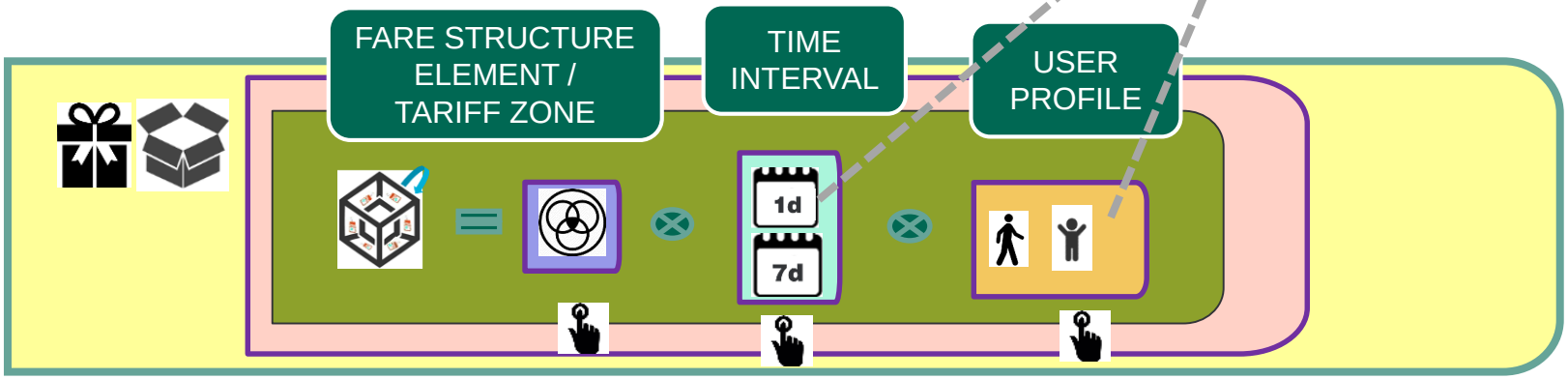
Fare Table – Recursive Row/Column

- Each cell can refer to a price

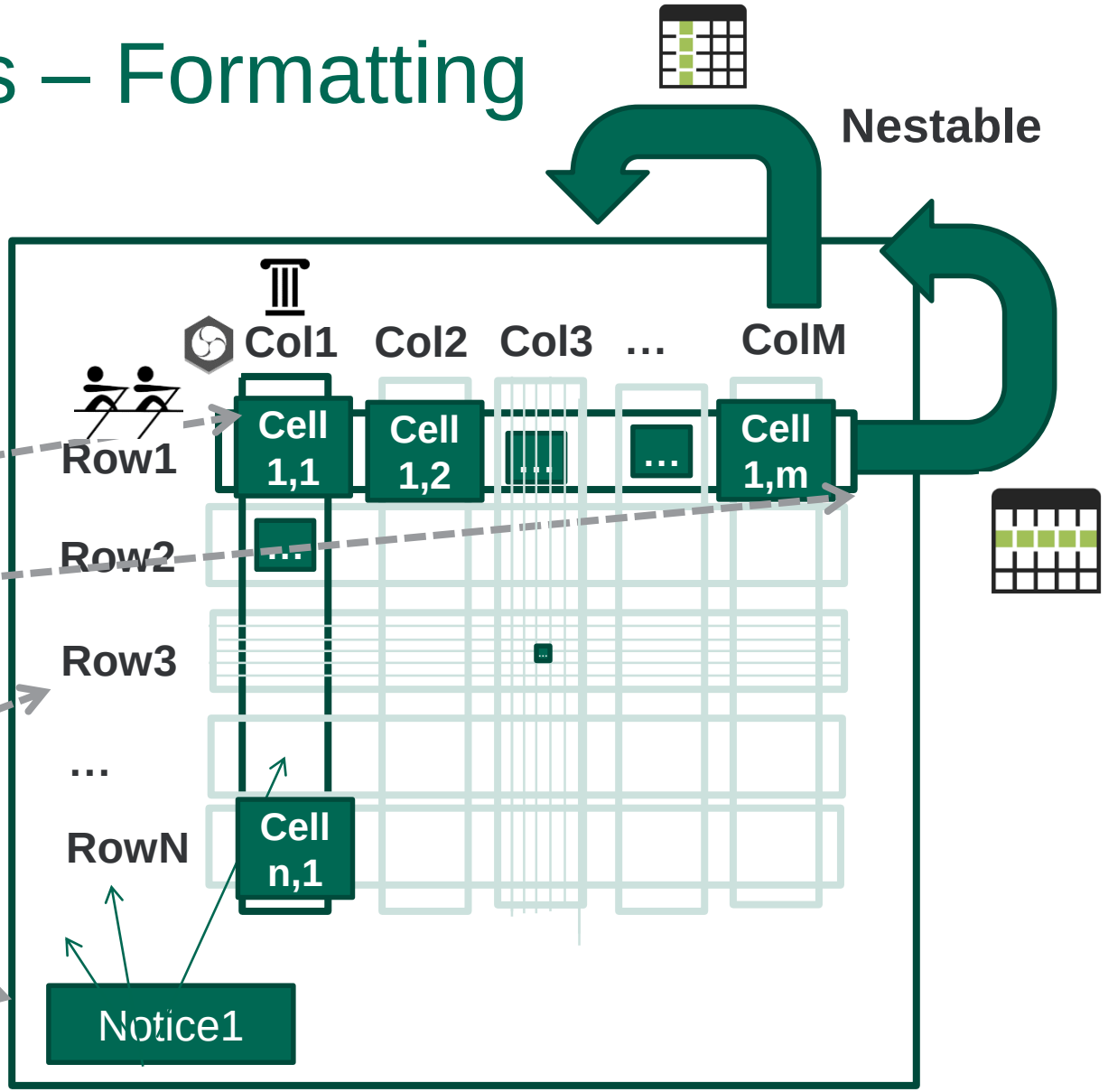
Prices - Allowed combinations





Fare Tables – Formatting

- **Presentation of fares in tabular form**
  - Table of price **cells**
  - Row or column can be another nested table
  - Can have row and column **headers**
  - **Notices** may relate to any element



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Part II
NeTEx Bus Fare Advanced features

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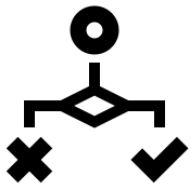
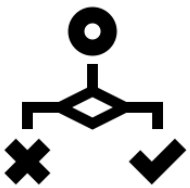
Some types of Complexity found of fares





- **Products supported by multiple operators**
  - Tariff structures covering large networks
    - E.g. *Plusbus*
- **Compound products / offers:**
  - Multiple products in one package
    - E.g. Oyster , Plusbus
  - Products that are available both as separate offers and as single purchase
    - E.g. Plusbus
  - Local variation in rules & participation?
- **More complex Products & Tariff structures**
  - E.g. Capped Pay as You Go (Oyster)
- **Complex rules for a fare product, notably**
  - Day types / Timebands / Fare demand typs
    - E.g. *Metro & rail peak/offpeak into London*
    - Plusbus exceptions Night buses after 11.30
  - Exclusions / inclusions of services
    - E.g. all Metrobus in Crawley region except and line 4
  - Eligibility conditions
- **Combining rules specified at different levels**
  - E.g. Temporal Validity conditions on tariff, product, sales offer

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Modelling Multi-Operator Fares

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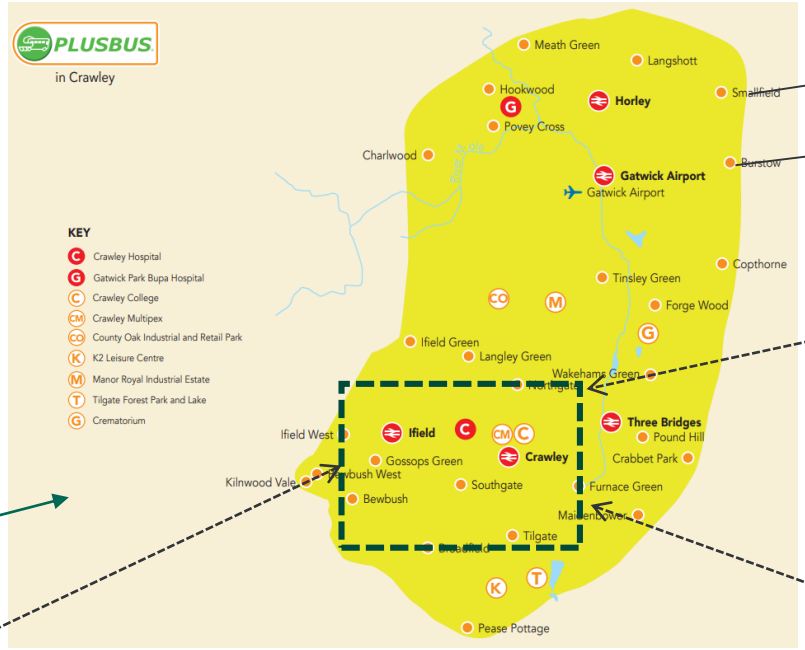
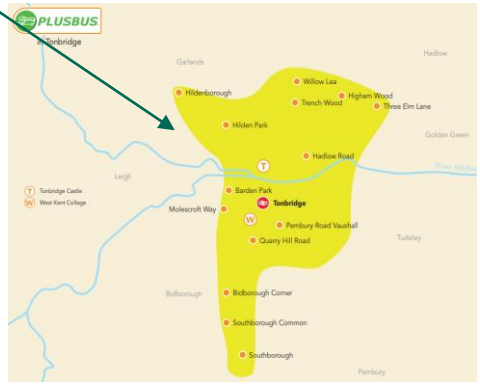
Interoperating fares – eg Plus Bus : Zonal add on for rail tickets

FARE ZONEs

TOPOGRAPHIC PLACEs

PlusBus





Zones around country

- Multiple participating Bus operators
- Exceptions in each zone
- Sold via rail sales channels

Plus Bus tariff - Crawley

Department for Transport

SALES PACKAGEs

USER PROFILEs

FARE PRODUCTs

TARIFFs

FARE ZONE

DISCOUNT RIGHT

TIME INTERVALs

USER PROFILEs

FARE PRICEs

PlusBus

Adds urban bus travel to your train ticket.

search by postcode: GO > search by town: GO >

Crawley, Gatwick Airport, Horley, & Three Bridges PlusBus

A **Crawley, Gatwick, Horley** or **Three Bridges PlusBus** ticket gives you **unlimited bus travel** on participating operators' services, around the whole urban area of **Crawley**, **Gatwick**, Horley, and Three Bridges, as shown by the travel maps (below).

Interchange stations

Crawley (Station Way), Gatwick Airport, Horley (Victoria Rd), Three Bridges (Haslett Ave).

Day prices:
Adult: £3.70
Child: £1.85
Railcard holder: £2.45

Season prices:

	Adult	Price / Day
7-days	£16.00	£3.20
Month	£52.00	£2.60
Quarter	£125.00	£2.08
Annual	£440.00	£1.83

Child discount: half adult season ticket prices.

Railcard discount restrictions for PLUSBUS

Railcard holders get 1/3 off the adult price of *PLUSBUS* day
Some Railcards have retail restrictions, ee individua
Sorry, Railcards do **NOT** give a discount off any P eason ticket pr

NETWORK Railcard (Annual Gold Card) ho 3 off the adult *PLUSBUS* day tickets for towns and cities locate South East of England, upon presentation of their valid Network Railcard (Annual Gold Card), as follows:-
Mondays to Fridays **after 10:00hours**;
Saturday, Sunday, Bank Holidays any time.
The £13 minimum fare restriction does not apply to ***PLUSBUS*** day ticket purchases.

Two Together Railcard holders get 1/3 off the adult price of ***PLUSBUS*** day tickets, upon presentation of their valid Two Together Railcard, as follows:-
Mondays to Fridays **after 09:30hours**;
Saturday, Sunday, Bank Holidays any time.
You must buy 2 tickets at the same time.

16-25 Railcard, 26-30 Railcard & HM Forces Railcard holders get holders get 1/3 off the adult price of ***PLUSBUS*** day tickets, upon presentation of their valid 16-25 or 26-30 Railcard or HM Forces Railcard, **at all times**.
The £12 minimum fare restriction does not apply to ***PLUSBUS*** day ticket purchases.

Senior Railcard holders get 1/3 off the adult price of ***PLUSBUS*** day tickets, upon presentation of their valid Senior Railcard, as follows:-
outside of the South East of England at all times;
in the South East after the Monday to Friday morning peak period* (excluding Bank Holidays) for a journey wholly within the South East region.
* times of off-peak services vary by route, but generally related to the availability of Off-Peak tickets.

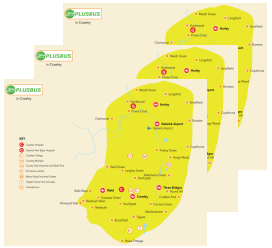
Disabled Persons Railcard holders get 1/3 off the adult price of ***PLUSBUS*** day tickets, upon presentation of their valid Disabled Persons Railcard at all times, when purchased with the following rail ticket types:-
Off-Peak Day Singles, Off-Peak Day Returns;
Anytime Singles, Anytime Returns;
Advance fares.
Disabled Persons discounts are valid during the morning peak hours.

Family&Friends Railcard
Adult travellers get one third off the adult ***PLUSBUS*** day ticket price upon presentation of their valid Family&Friends Railcard:
outside of the South East of England at all times;
in the South East after the Monday to Friday morning peak period* (excluding Bank Holidays) for a journey wholly within the South East region.
* times of off-peak services vary by route, but generally related to the availability of Off-Peak tickets.

Children MUST be charged the normal child ***PLUSBUS*** day ticket price (which is half the adult fare).

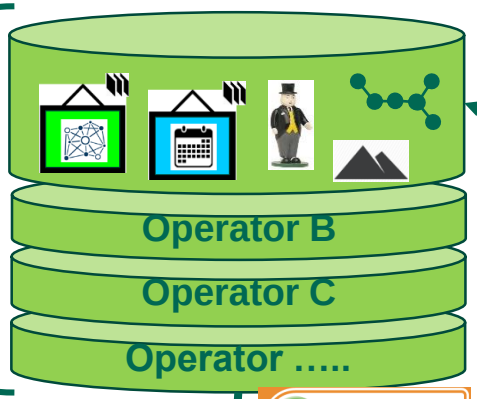
Railcard discount restrictions for PLUSBUS. Updated: 06/12/2017

How to partition a Multi-operator product

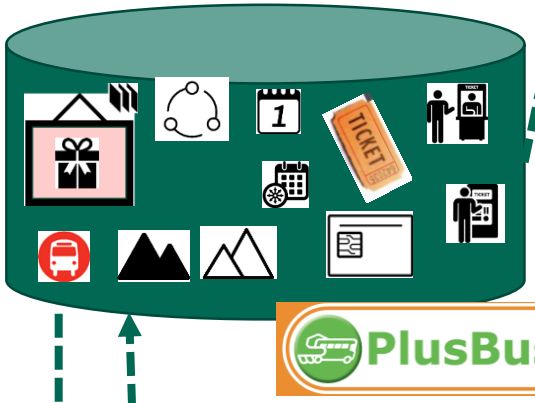


Plusbus Prices

Operator specific Lines & exceptions

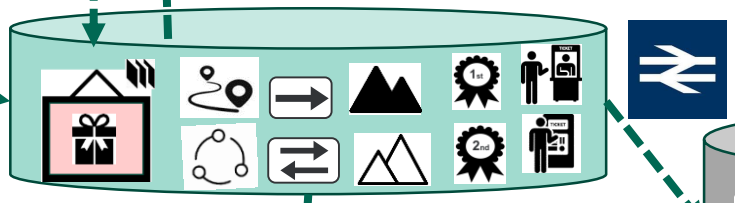


Plusbus Product definitions

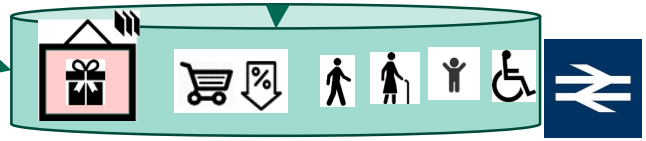


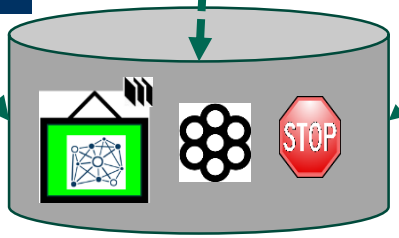
Common Plus Bus definitions

National Rail Travel Products



National Rail Railcard Products





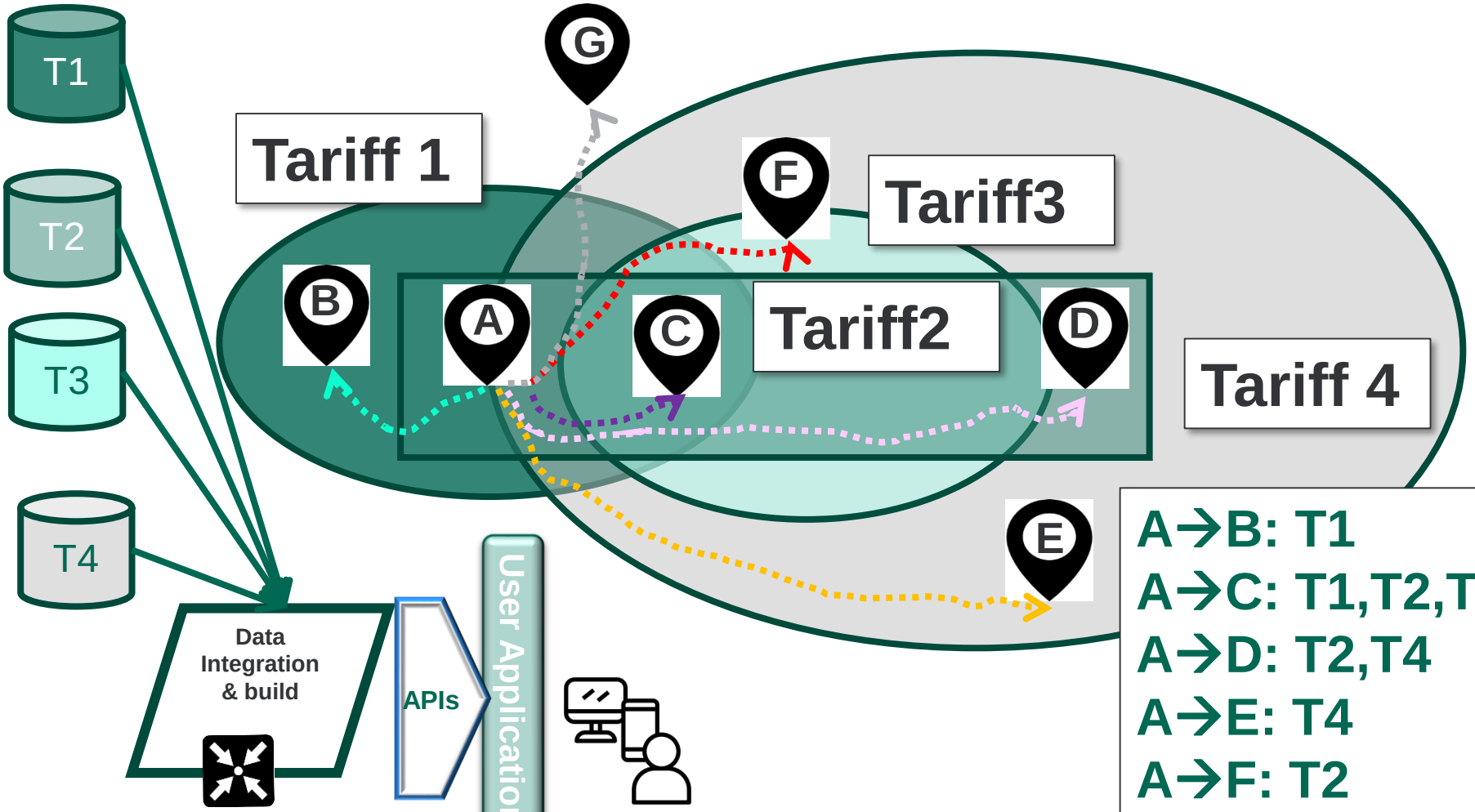
National Stop & Plusbus Zone definitions (NPTG & NAPTAN)

Department for Transport

Routes for which multiple Tariffs are applicable?

Department for Transport

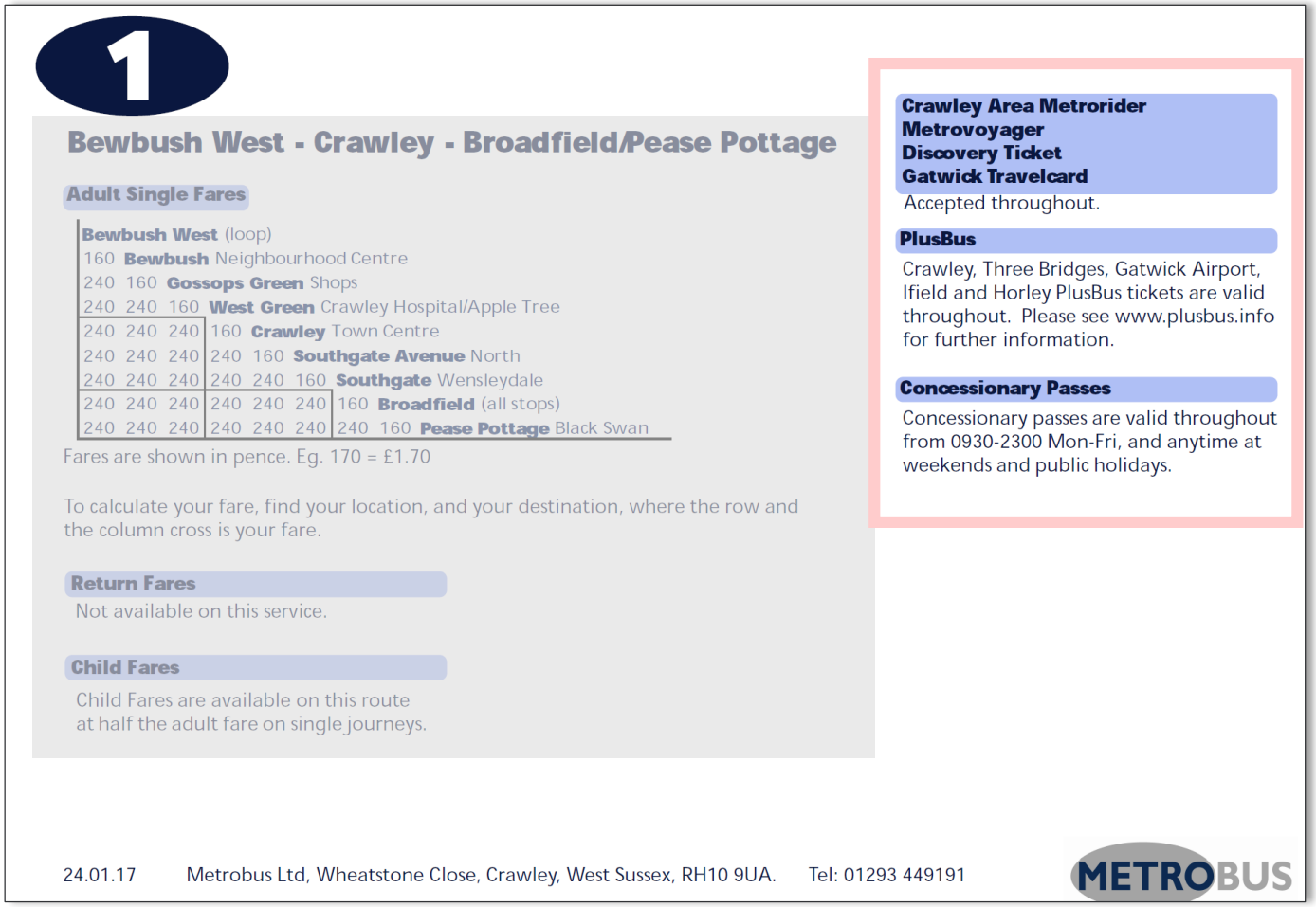
Each tariff describes itself; it is the trip planner/ fare engine's task to find the applicable, best value fares for given trip



A→B: T1
A→C: T1,T2,T4
A→D: T2,T4
A→E: T4
A→F: T2
A→G: x

Department for Transport

Metrobus 1 - Other Tariffs



1

Bewbush West - Crawley - Broadfield/Pease Pottage

Adult Single Fares

Bewbush West (loop)							
160	**Bewbush** Neighbourhood Centre						
240	160	**Gossops Green** Shops					
240	240	160	**West Green** Crawley Hospital/Apple Tree				
240	240	240	160	**Crawley** Town Centre			
240	240	240	240	160	**Southgate Avenue** North		
240	240	240	240	240	160	**Southgate** Wensleydale	
240	240	240	240	240	240	160	**Broadfield** (all stops)
240	240	240	240	240	240	240	160 **Pease Pottage** Black Swan

Fares are shown in pence. Eg. 170 = £1.70

To calculate your fare, find your location, and your destination, where the row and the column cross is your fare.

Return Fares

Not available on this service.

Child Fares

Child Fares are available on this route at half the adult fare on single journeys.

Crawley Area Metrorider
Metrovoyager
Discovery Ticket
Gatwick Travelcard

Accepted throughout.

PlusBus

Crawley, Three Bridges, Gatwick Airport, Ifield and Horley PlusBus tickets are valid throughout. Please see www.plusbus.info for further information.

Concessionary Passes

Concessionary passes are valid throughout from 0930-2300 Mon-Fri, and anytime at weekends and public holidays.

24.01.17 Metrobus Ltd, Wheatstone Close, Crawley, West Sussex, RH10 9UA. Tel: 01293 449191

METROBUS

© Metrobus 2018

https://www.metrobus.co.uk/route-information/1

Metrobus 1 - Other Tariffs

Department for

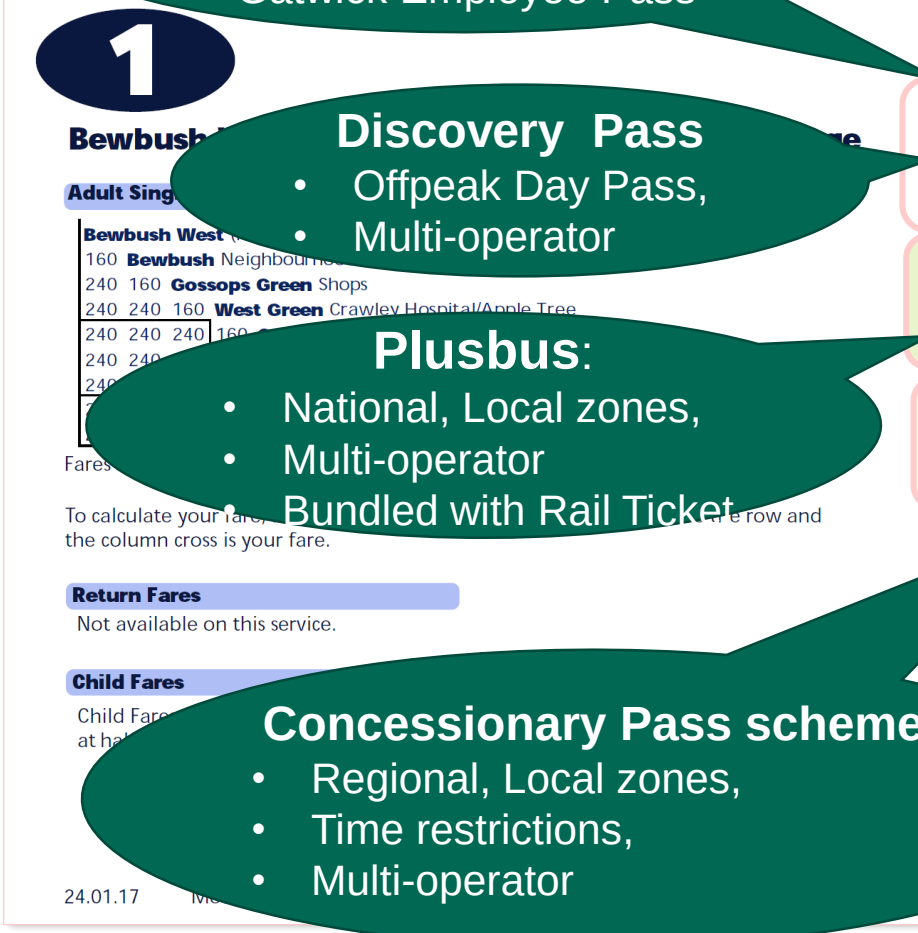
Metrobus Products
- Metrorider / Metrovoyager,
- Gatwick Employee Pass

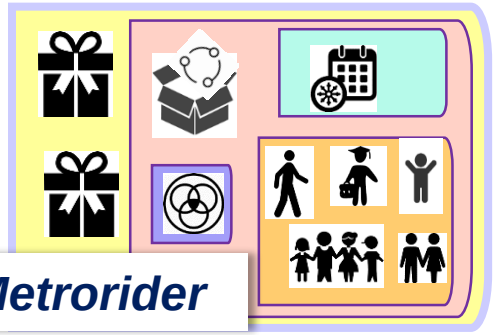
Discovery Pass
- Offpeak Day Pass,
- Multi-operator

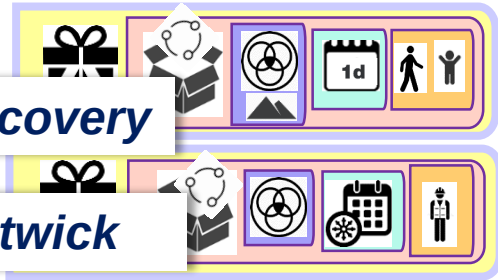
Plusbus:
- National, Local zones,
- Multi-operator
- Bundled with Rail Ticket

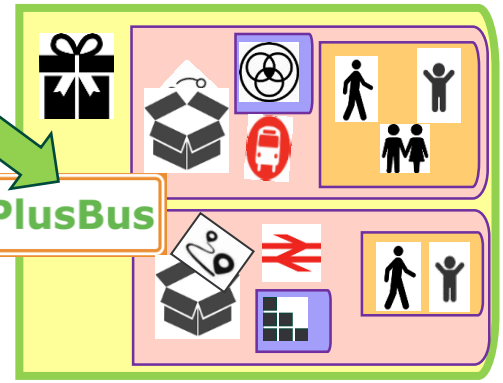
Concessionary Pass scheme
- Regional, Local zones,
- Time restrictions,
- Multi-operator

FARE PRODUCTs
(Other day & Period passes)



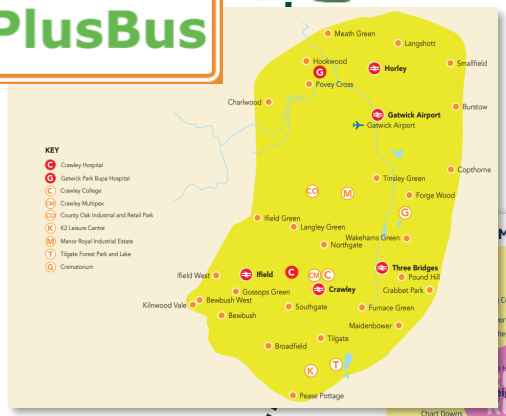


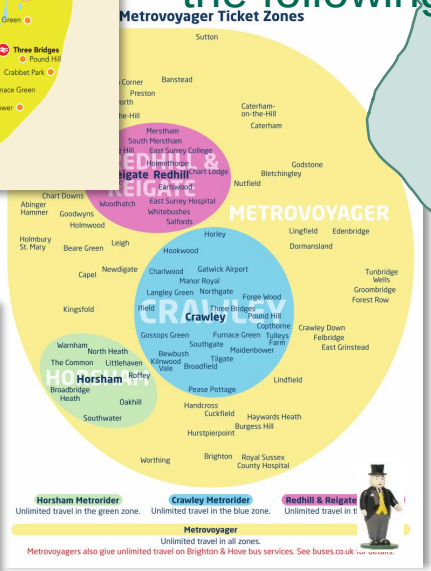


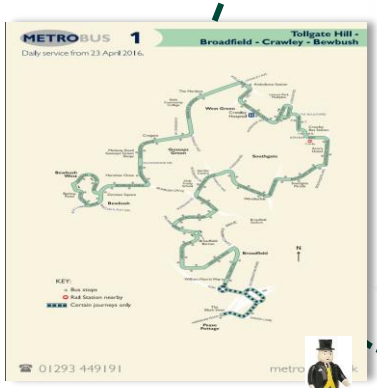


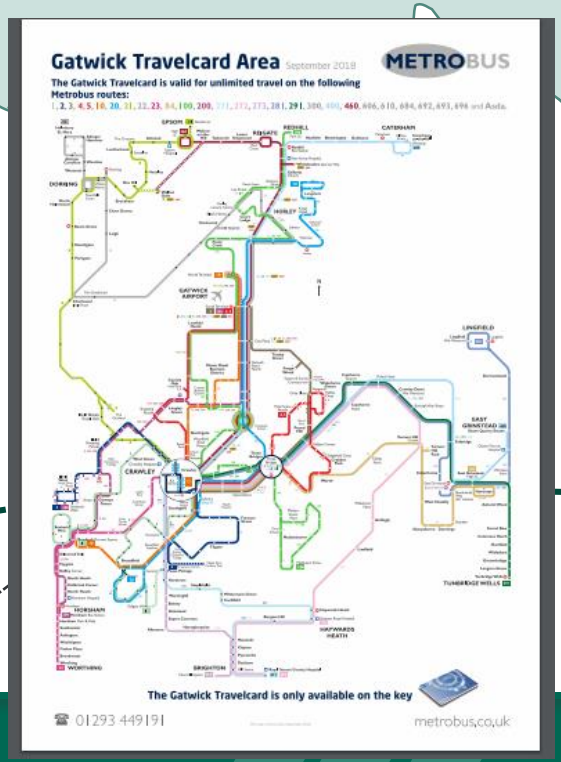
Multiple Tariffs applicable

Discovery Ticket, a one day travel ticket, allowing you to travel unlimited in West Sussex, East Sussex, Surrey, Brighton & Hove, East Hampshire, Kent and Medwy on the following operated services:









Concessionary Pass Schema

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Department for Transport

Modelling Sales Discount Rights

Department for Transport

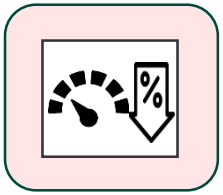
Additional Product Types - terminology

- **Discount Right**

The product gives the right to purchase other fare products for travel at a discount, but is not itself a ticket. (e.g. Rail card, Oyster card).

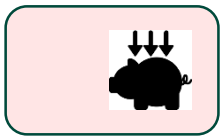
- **Capped Discount Right**

If there are multiple purchases, the purchase price is capped within a given time period (e.g. Oyster Card)



- **Usage Discount**

The product gives a discount or rebate based on access rights consumed within a given period. Requires an account.



- **Amount Of Price Unit**

The product holds an amount of stored value which can be used to purchase. May be linked to an account.

Department for Transport

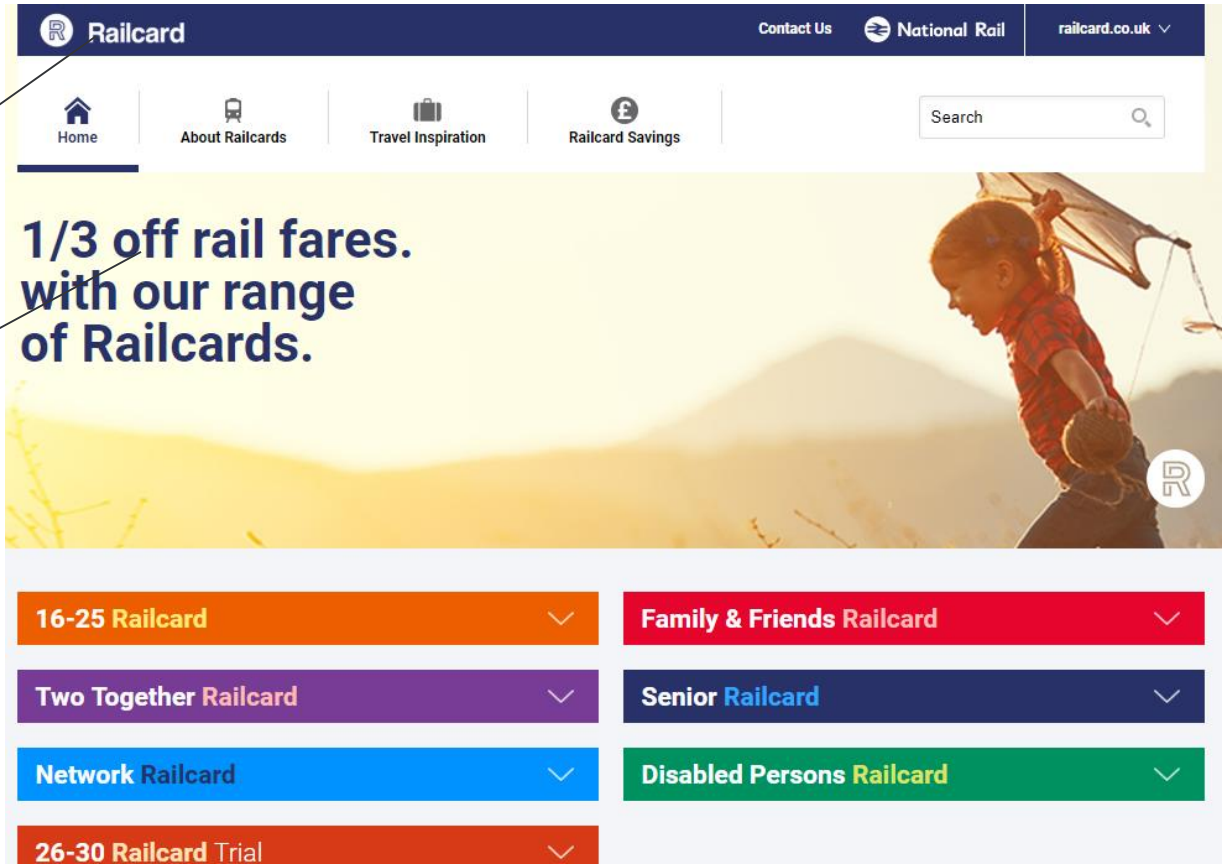
Rail Cards

SALE DISCOUNT RIGHT (FARE PRODUCT)

DISCOUNTING RULE

SALES OFFER PACKAGEs

USER PROFILEs

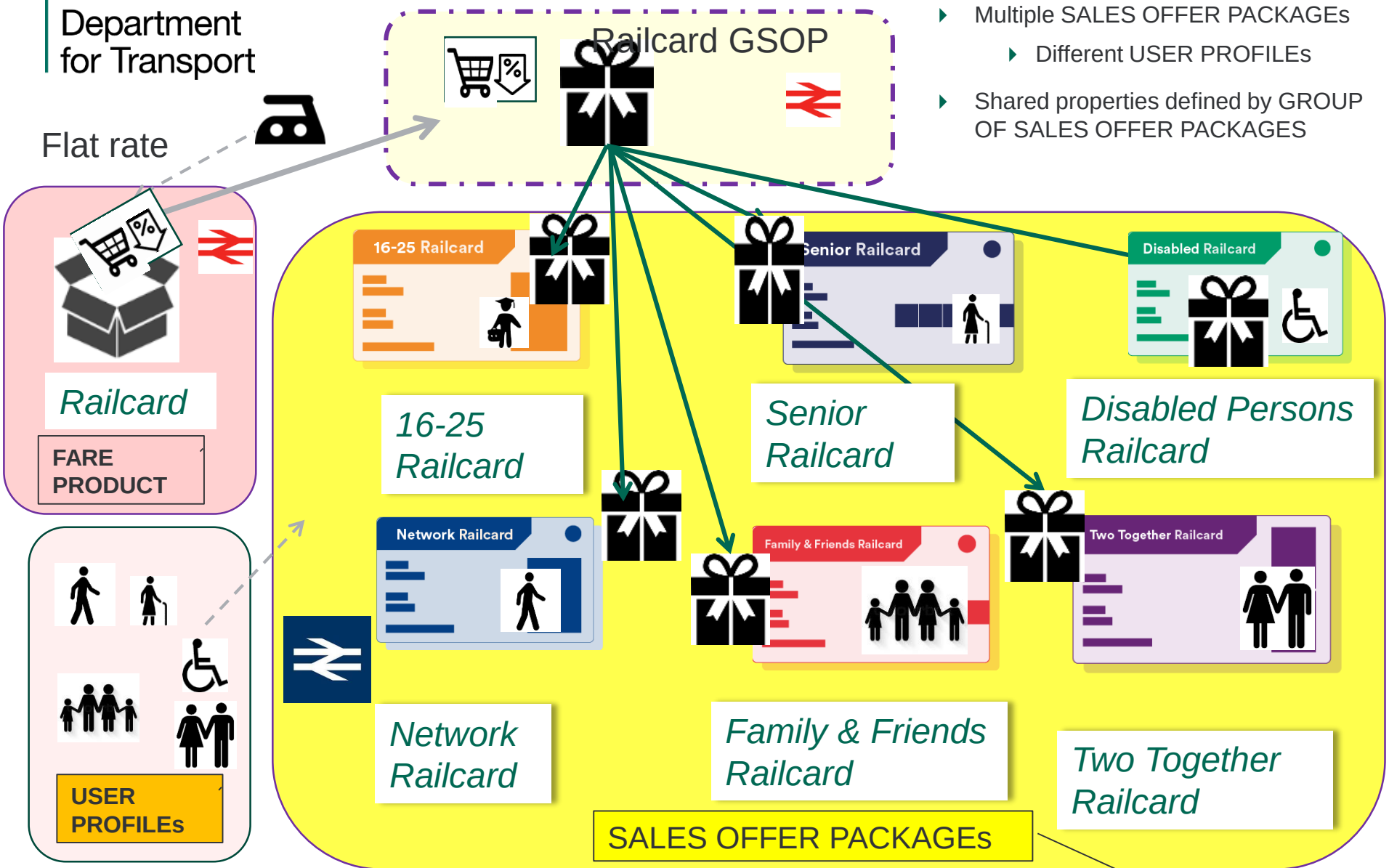


https://www.railcard.co.uk/about-railcards/

UK Rail card products

Department for Transport

- Single FARE PRODUCT
- Multiple SALES OFFER PACKAGEs
  - Different USER PROFILEs
- Shared properties defined by GROUP OF SALES OFFER PACKAGES



Department for Transport

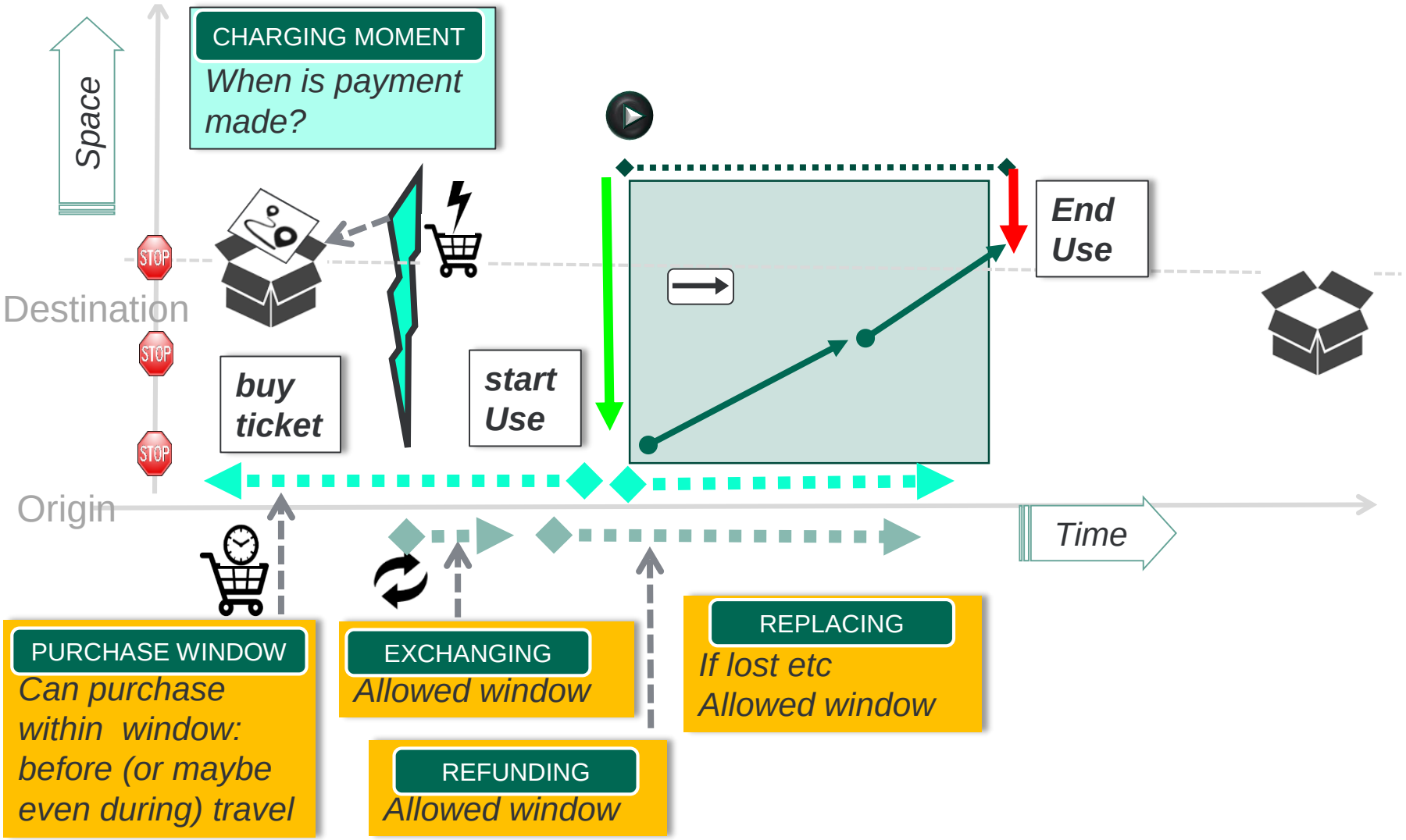
Modelling Pay As You Go Capping

Department for Transport

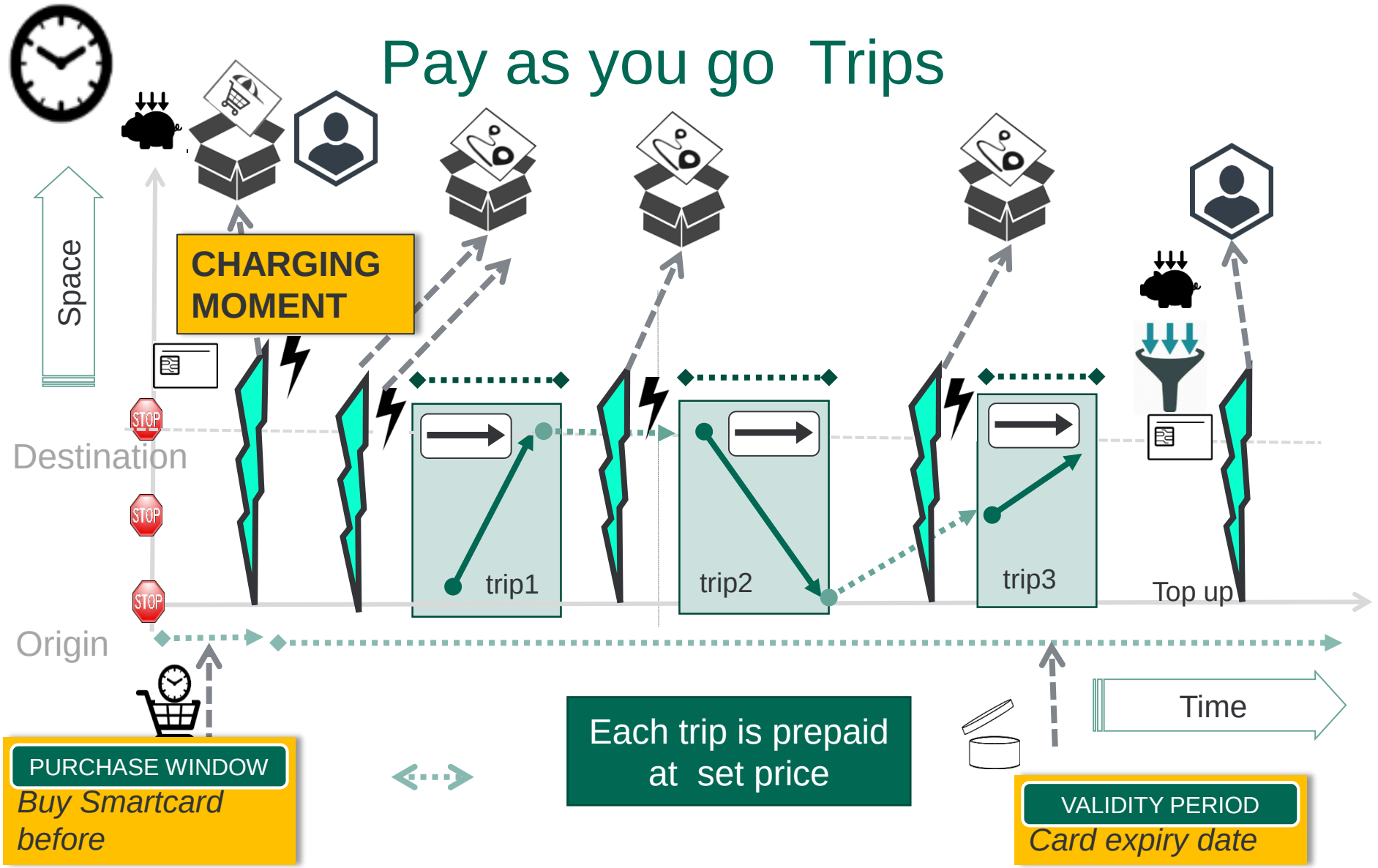
Pay as you go products – Technology options for charging

1. **Simple pre-payment** (E.g. Metrobus the Key)
   - Made at start of each trip from stored value on card
   - Card debited immediately
2. **Pre-payment, post payment adjustment for usage**
   - Made at start of each trip from stored value on card, adjusted at check out or afterwards to reflect actual trip made
   - Card linked to account – deferred adjustment to card balance on next trip.
3. **Pre-payment, post payment adjustment for usage, Capped** (E.g. Oyster Card)
   - Made at start of each trip from stored value on card, adjusted afterwards to reflect actual trip made
   - Can be capped to a predefined amount within a given period, , account linked.
4. **Post-payment at end of period** (E.g. Oyster Contactless)
   - Made at end of period , Card linked to account – deferred payment
   - Can be capped or discounted to a predefined amount within a given period

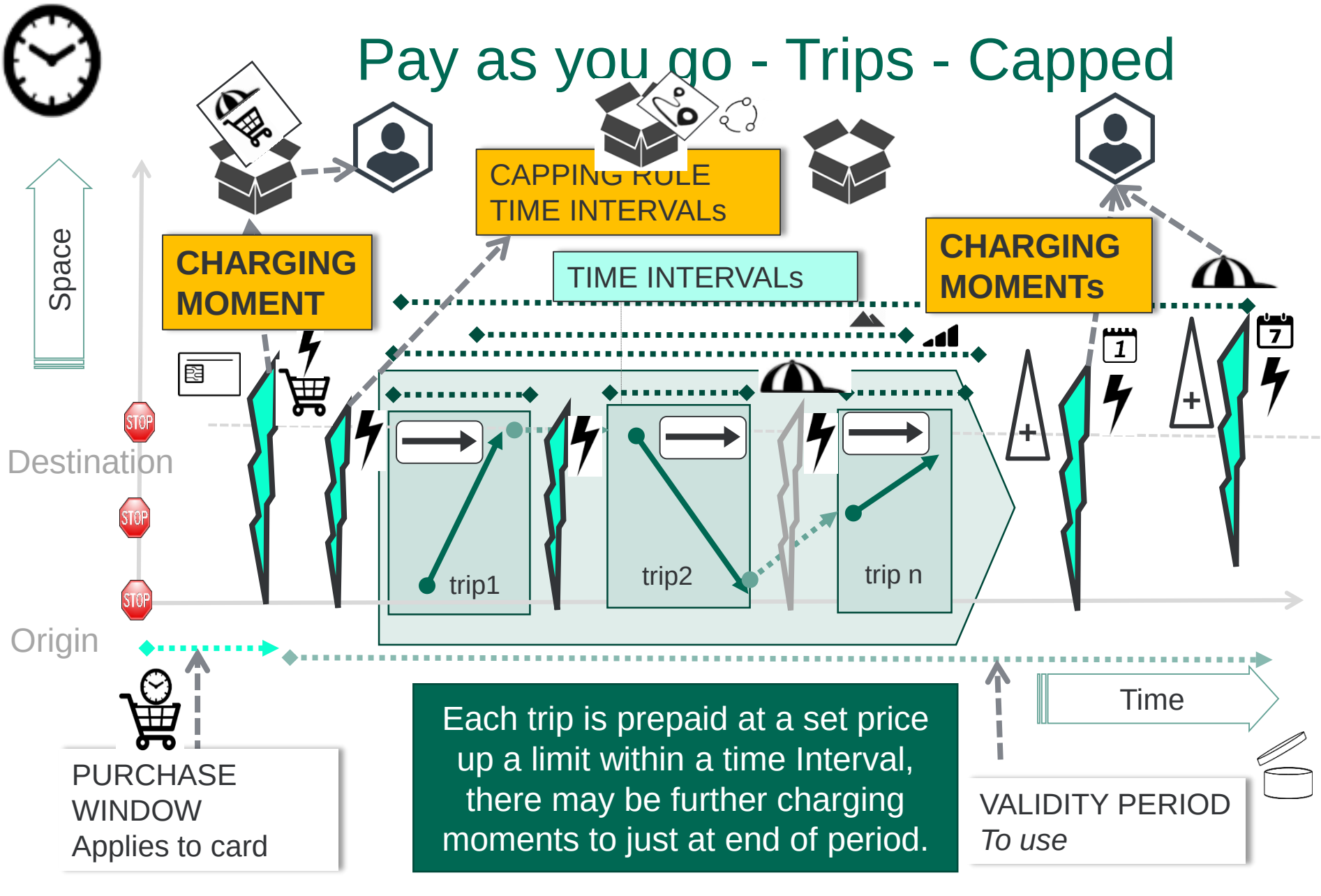
Products – Prepaid CHARGING MOMENT



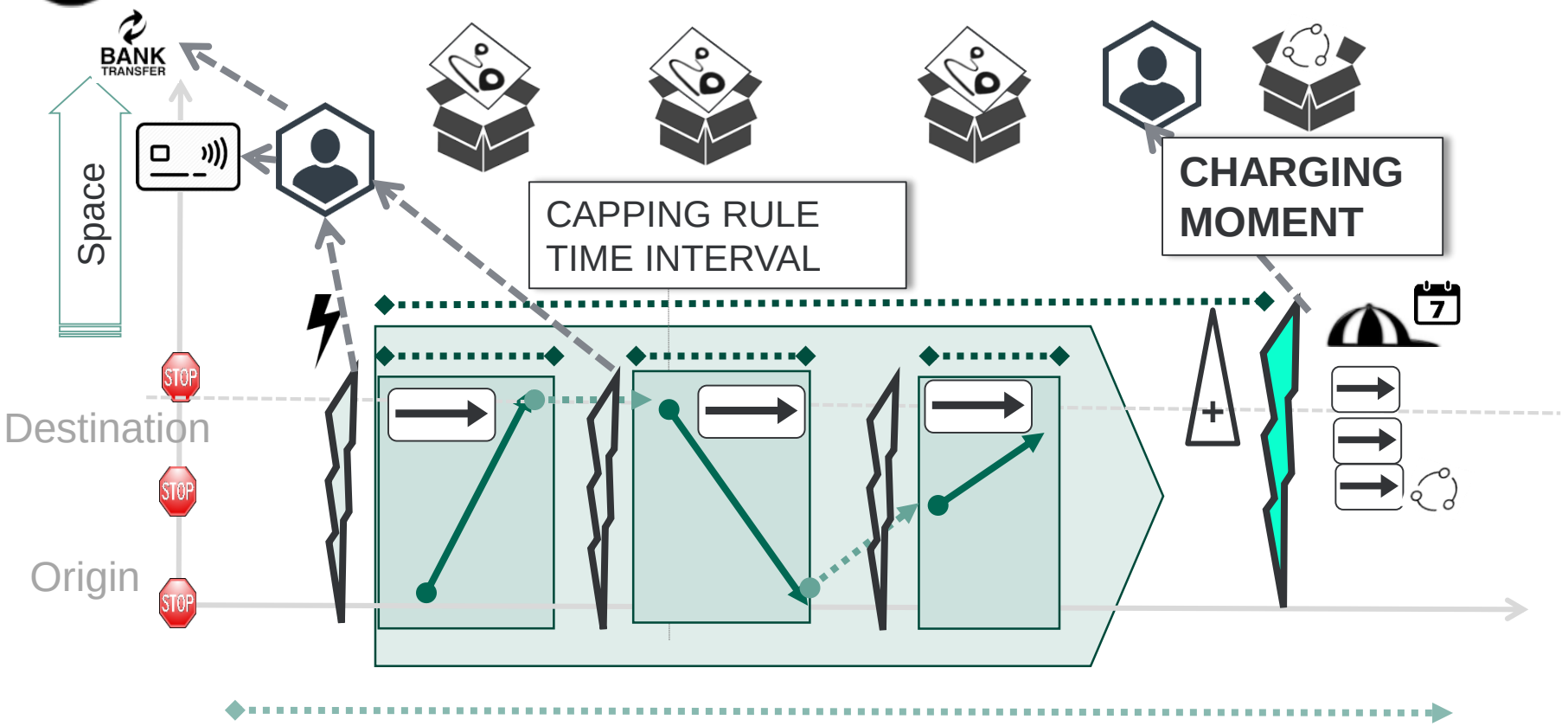
Pay as you go Trips



Pay as you go - Trips - Capped



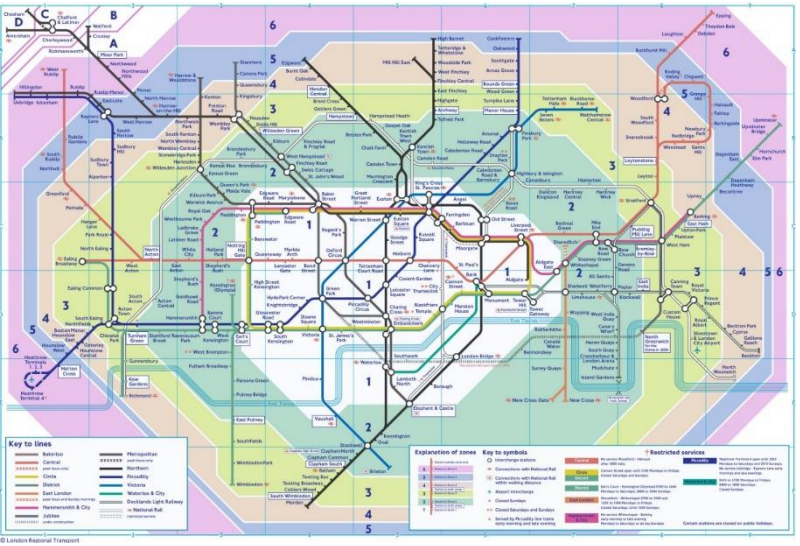
Pay as you go Trip – Contactless Capped



All trips are post paid at end of interval, capped if set price is reached

Department for Transport

Fares example - Tfl Oyster



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Transport for London

Search: Search

Home | Live travel news | Getting around | Tickets | Road users | Corporate | Business & partners

Tickets > Fares

Tube, DLR and London Overground | National Rail | Single fare finder | Bus and tram | River | Emirates Air Line

Save money with Oyster pay as you go
- Store credit and use it journey by journey
- Never run out of credit with Auto top-up
- Cheaper than cash for single fares

Travelcards
- Travel as much as you like, as often as you like
- Add Travelcards to your Oyster card

Adult | 18+ student | 16-18 | 11-15 | 5 -10 | Jobcentre Plus | Bus & Tram | Railcard | Groups

Adult

You need an Oyster card to:
- Use pay as you go and daily price capping
- Buy 7 Day, Monthly and longer period Travelcards

You do not need an Oyster card to pay cash single fares or to buy Day Travelcards.

Zone	Cash	Oyster pay as you go				Travelcards				
		Peak single	Off-peak single	Peak price cap	Off-peak price cap	Day Anytime	Day Off-peak	7 Day	Monthly	Annual
Zone 1 only	£4.50	£2.10	£2.10	£8.40	£7.00	£8.80	£7.30	£30.40	£116.80	£1,216
Zones 1-2	£4.50	£2.80	£2.10	£8.40	£7.00	£8.80	£7.30	£30.40	£116.80	£1,216
Euston - Zone 2*	£4.50	£2.20	£2.10	£8.40	£7.00	£8.80	£7.30	£30.40	£116.80	£1,216
Zones 1-3	£4.50	£3.20	£2.70	£10.60	£7.70	£11.00	£8.00	£35.60	£136.80	£1,424
Euston - Zone 3*	£4.50	£3.00	£2.70	£10.60	£7.70	£11.00	£8.00	£35.60	£136.80	£1,424
Zones 1-4	£5.50	£3.80	£2.70	£10.60	£7.70	£11.00	£8.00	£43.60	£167.50	£1,744
Euston -	£5.50	£3.40	£2.70	£10.60	£7.70	£11.00	£8.00	£43.60	£167.50	£1,744

Fares example - Tfl Oyster

TYPEs OF TRAVEL DOCUMENTs
Paper, Oyster,

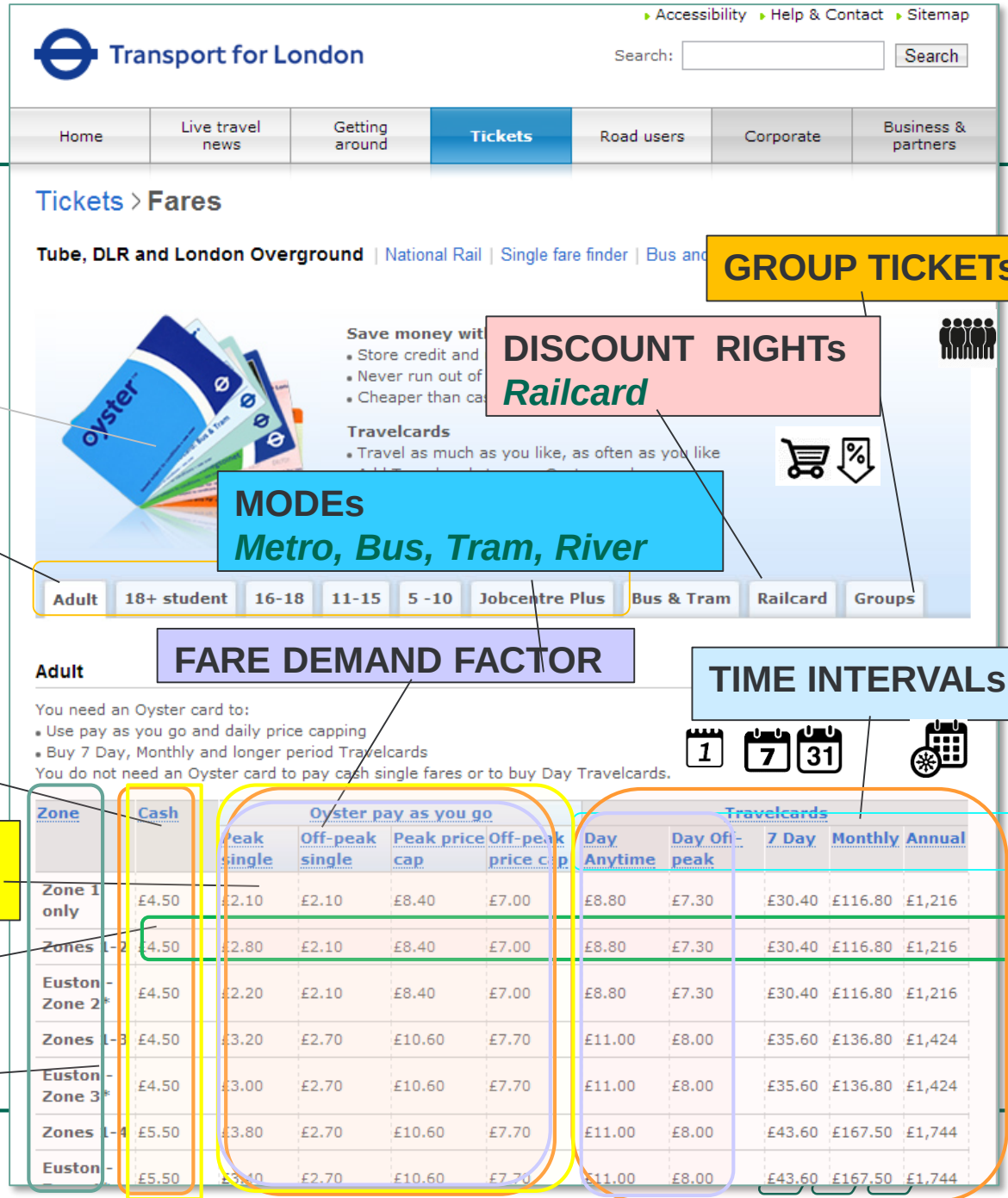
USER PROFILEs
Adult, student, 11-15 etc

FARE PRODUCTs
Trip, Period Pass

SALES PACKAGEs
Cash, Oyster, Travelcard

FARE PRICEs

FARE ZONEs
1-6, A, B, C, D



© TfL 2016-18

Classic Tfl Products

FARE DEMAND FACTOR

TARIFFs

Different tariff structures for different modes

UNDERGROUND | TFL·RAIL | DLR | TRAMS | BUSES | RIVER | Emirates AIR·LINE | CYCLES

Peak, off-peak

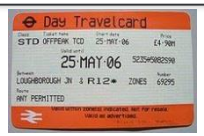
TIME INTERVALs

PRE-ASSIGNED FARE PRODUCT

Ticket

PRE-ASSIGNED FARE PRODUCT

Travel Card (Day / Period Pass)



PREASSIGNED FARE PRODUCT

Group Day Travel card

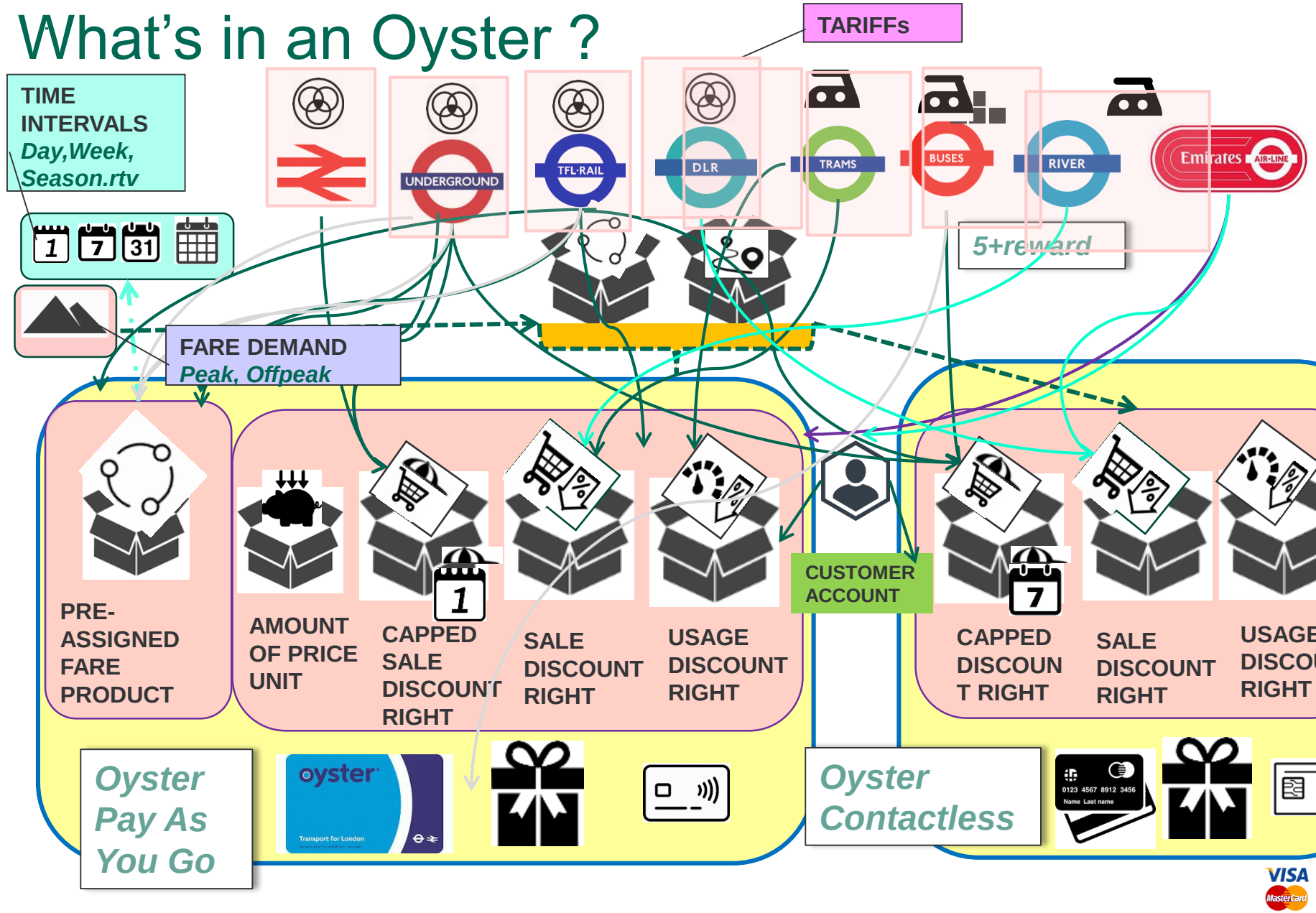
AMOUNT OF PRICE UNIT

Multitrip Boarding Pass Carnet for Cable CAR

PRE-ASSIGNED FARE PRODUCT

24H Cycle Pass

What's in an Oyster ?



Department for Transport

Account Based Ticketing

- **Account Based Ticketing –** The product may be linked with an online account . E.g. Pay as you go, or Usage based discounts, Subscription with automatic payment or renewal
  - **Customer Account**. The fare product is linked to a Customer account. The customer's identity is known to the operator.
  - **Anonymous Customer Account.** The product is linked to a Customer but the Customer is not necessarily known to the Operator (e.g. by means of a an anonymous token, or card only product)
- **Auto top up** – balance increases if falls below a threshold
- **Subscription** – product automatically renewed
- **Pay by Installment** – Annual subscription paid monthly

Sales Offer Packages & Accounts

THIRD PARTY ENTITLEMENT

CUSTOMER ACCOUNT

Photo card

Account- linked card

Anonymous Card

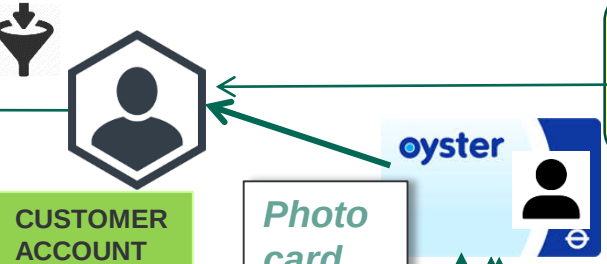
Child -Zip

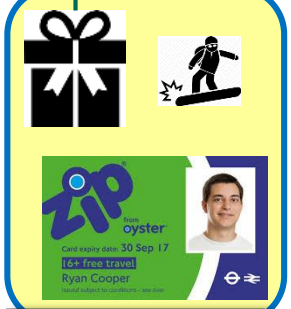
Youth -Zip

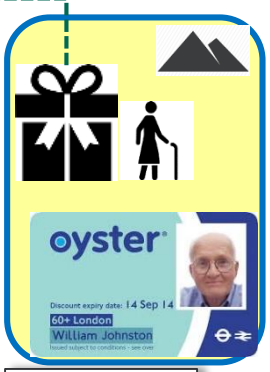
Student

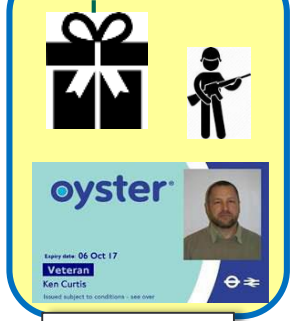
Senior

Veteran









Transport for London

EA

Sales Offer Packages & Accounts

THIRD PARTY ENTITLEMENT

CUSTOMER ACCOUNT

Photo card

Account linked card

Anonymous Card

FARE PRICE

Department for Transport

Complex UK Bus Fare Products
Discount cards, etc

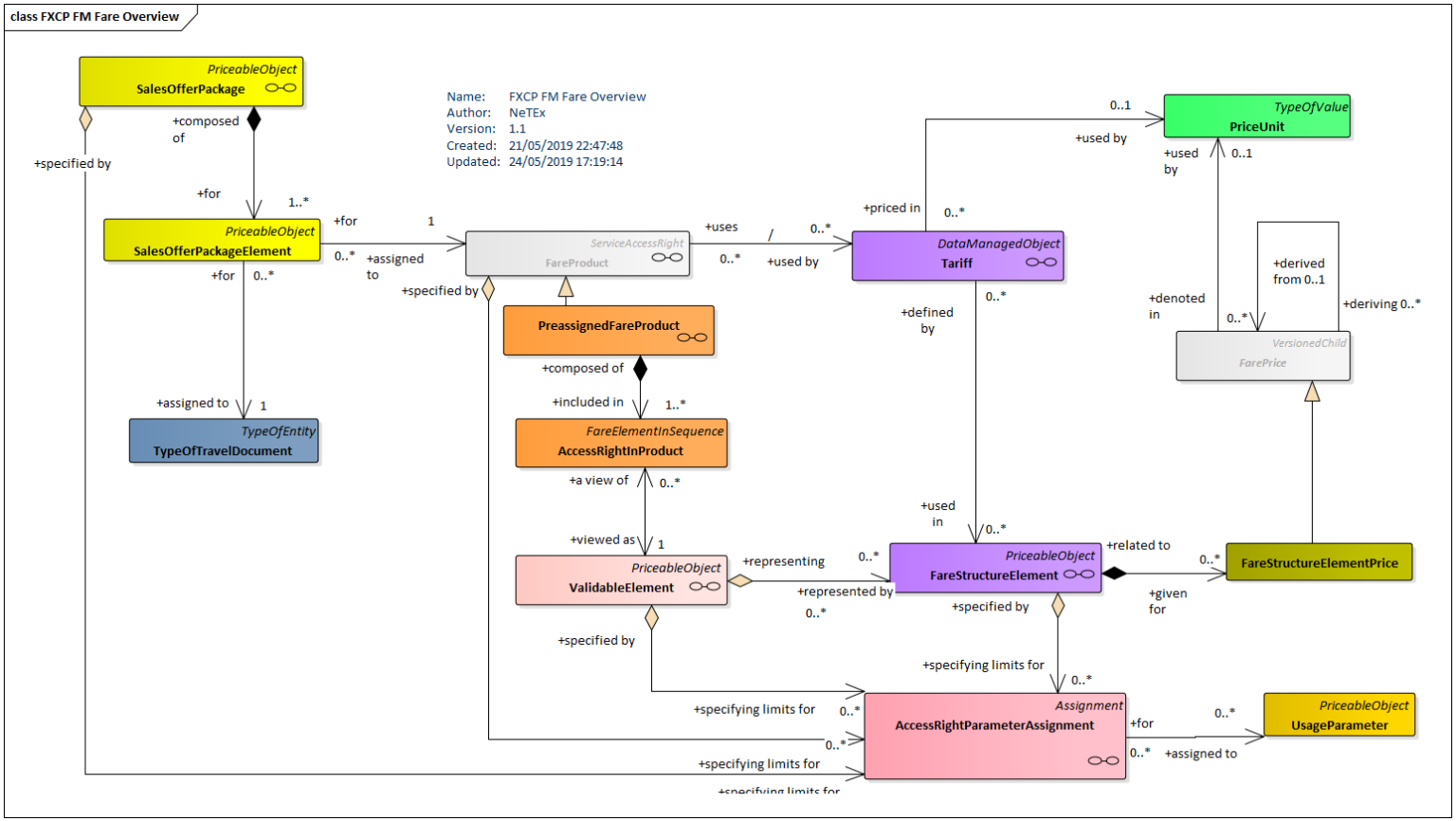
	FARE PRODUCT	Peak / Off Peak	(Can) or Must be Account Based	Notes
SALES DISCOUNT	SALES DISCOUNT RIGHT	☑	☑	E.g. like a Railcard
	CAPPED SALES DISCOUNT RIGHT	☑	☑	PAYG e.g. Oyster
USAGE DISCOUNT	USAGE DISCOUNT RIGHT	☑	☑	Rebate for use, e.g. mileage
STORED VALUE	AMOUNT OF PRICE UNIT	-	☑	Stored value
ENTITLING PRODUCT	THIRD PARTY PRODUCT	-	-	E.g. Military Pass

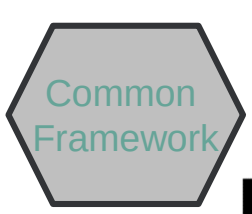
Department for Transport

Summary

Department for Transport

UK Fares – core UML Model





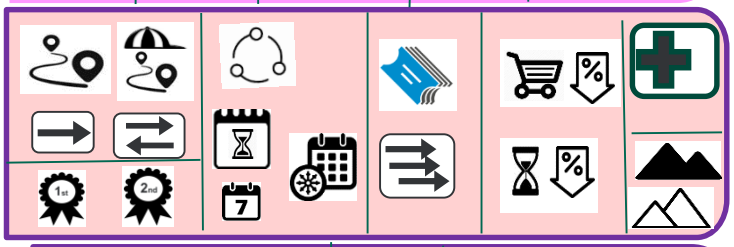
Describing Fares with NeTEx

Pricing

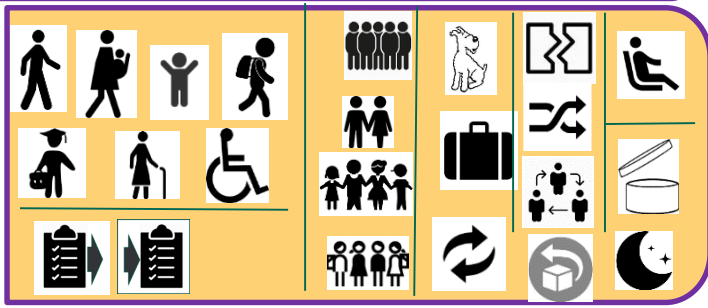
Network Basis

Tariff Structure

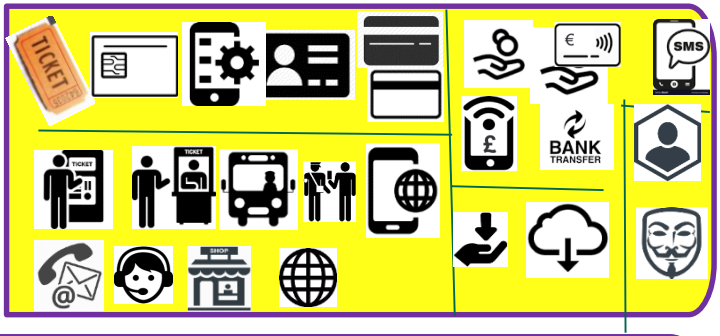
Access Rights



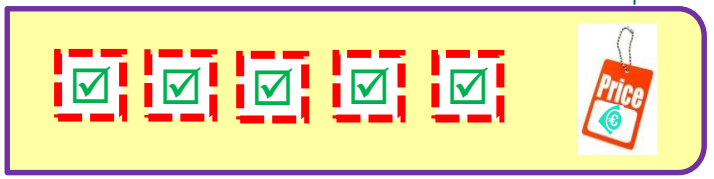
Fare Products



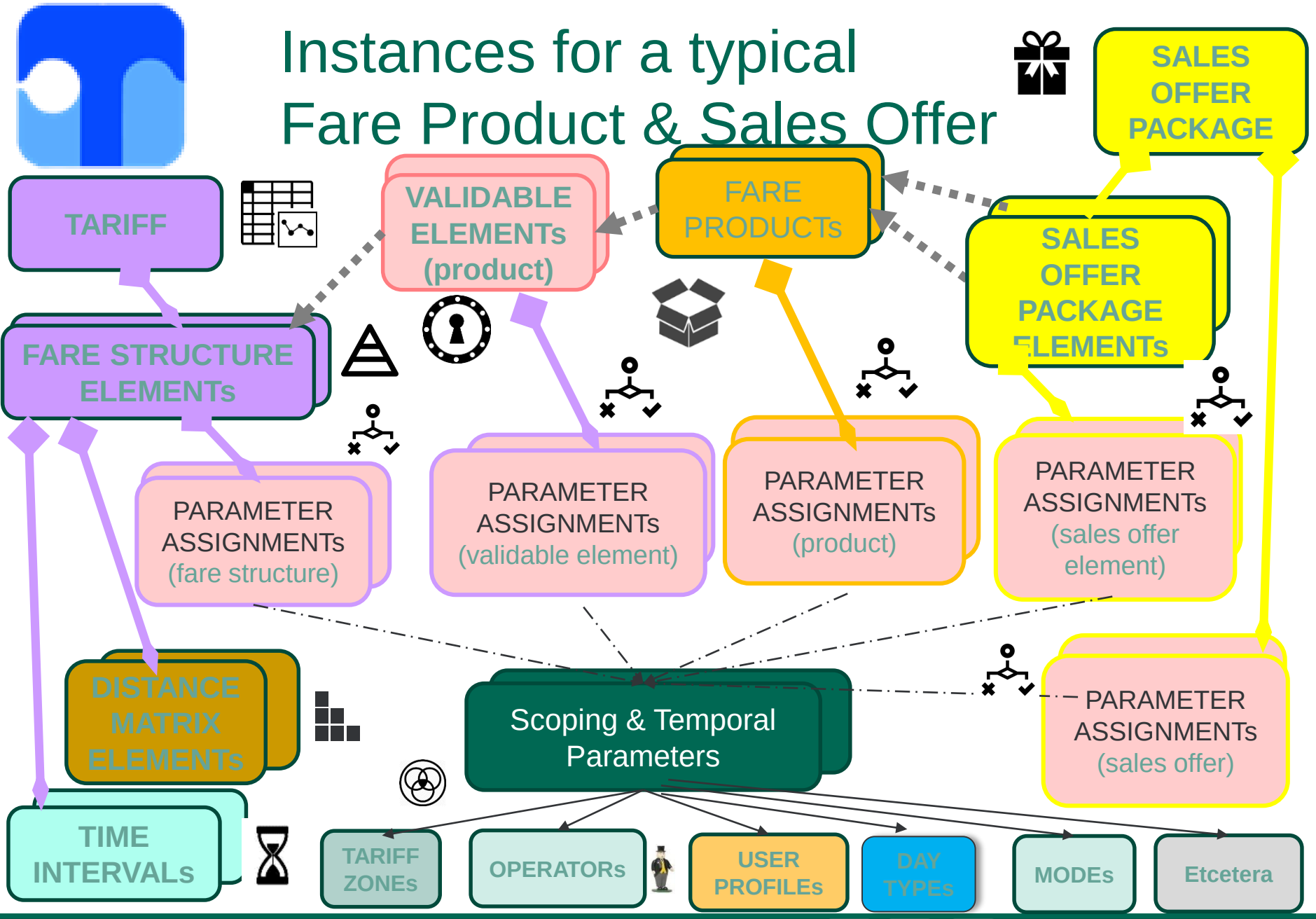
Sales Offer Packages



Travel Specifications & Sales



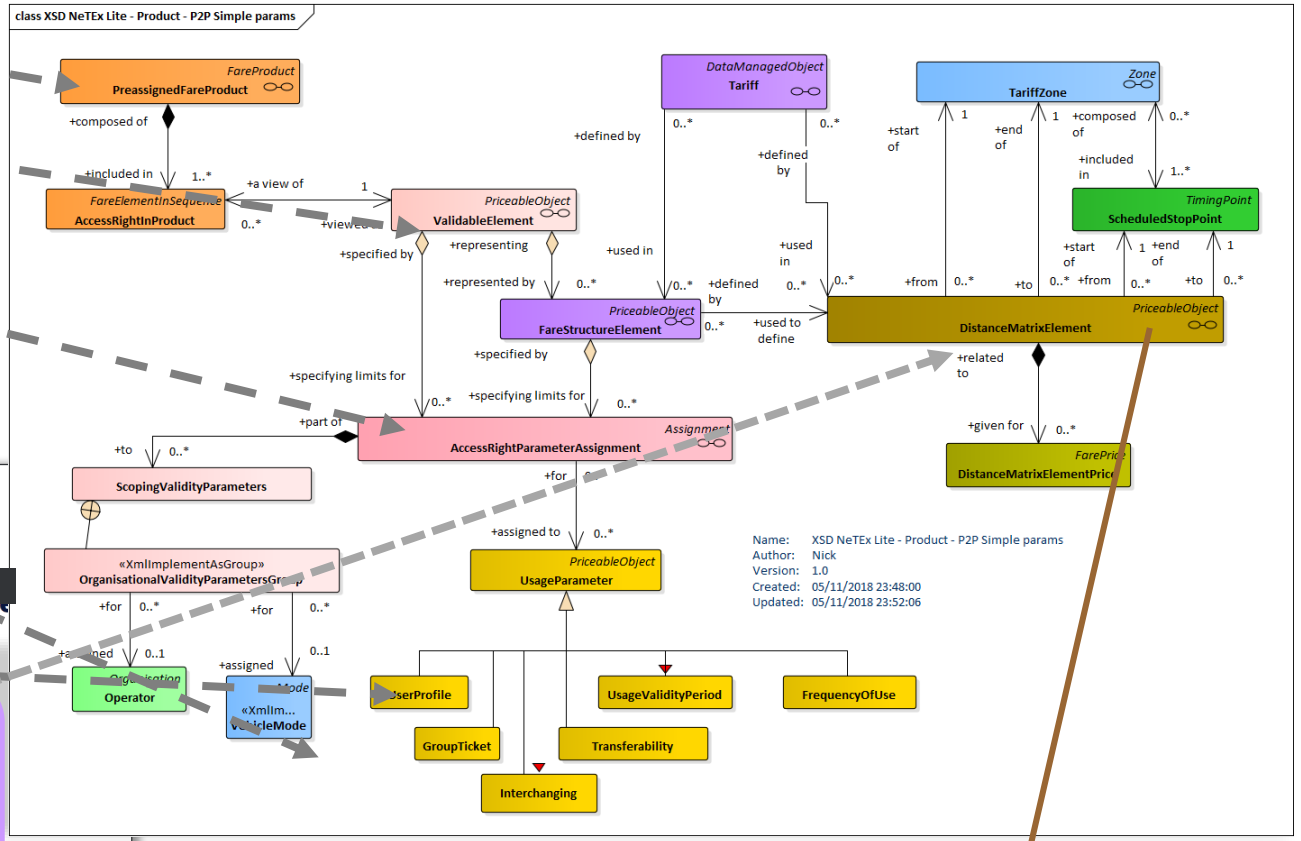
Instances for a typical Fare Product & Sales Offer

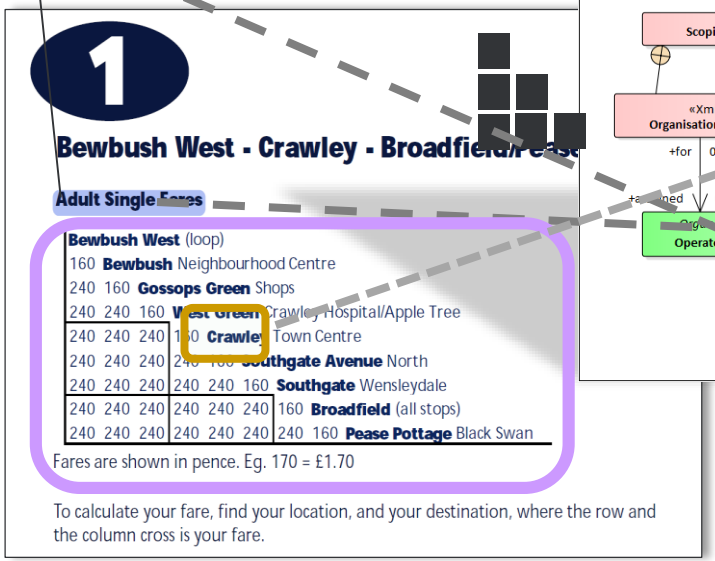


Department for Transport

A Zone to Zone Product: Use DISTANCE MATRIX + Assign OPERATOR, MODE, USER PROFLEs, etc

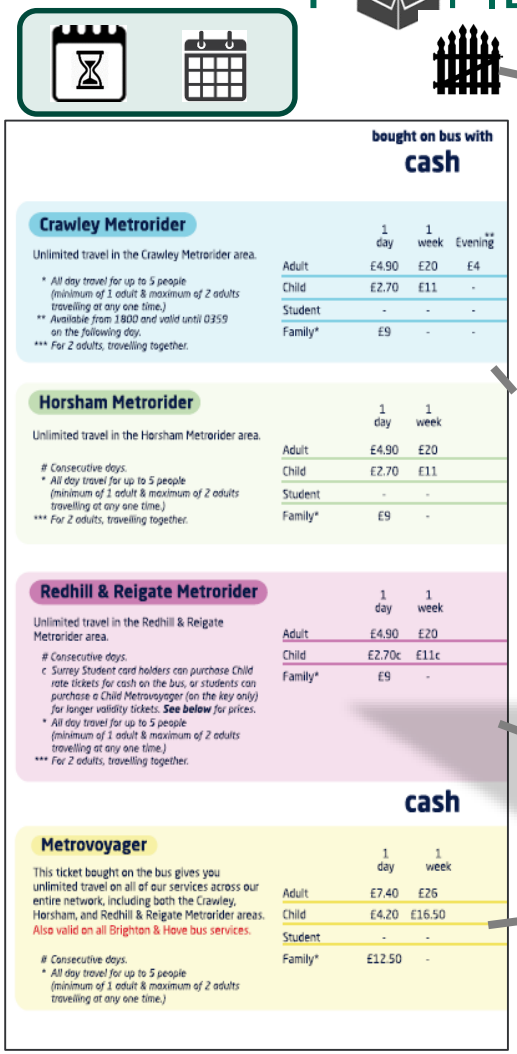
USER PROFILE

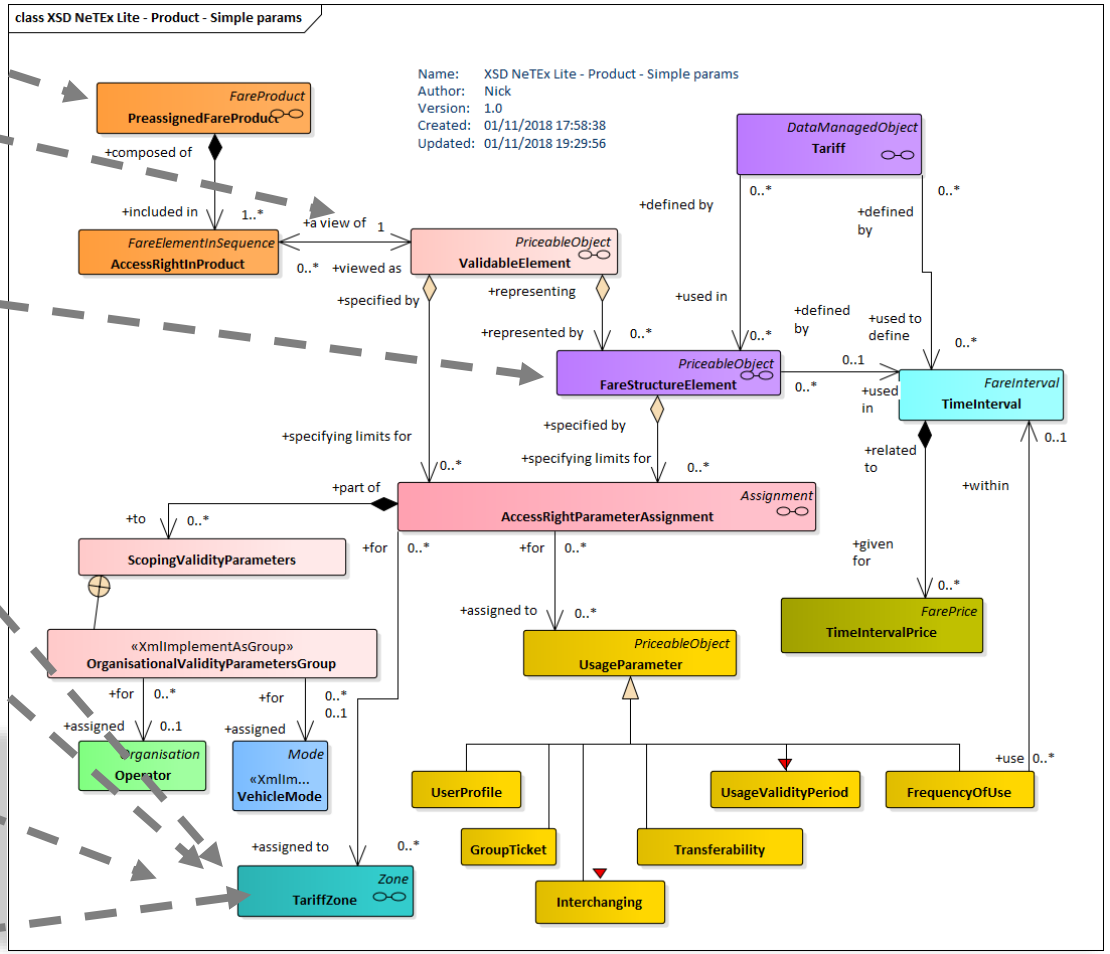




DISTANCE MATRIX ELEMENT

A Season Pass Product : Assign FARE ZONEs + OPERATOR, MODE, & USER PROFILEs





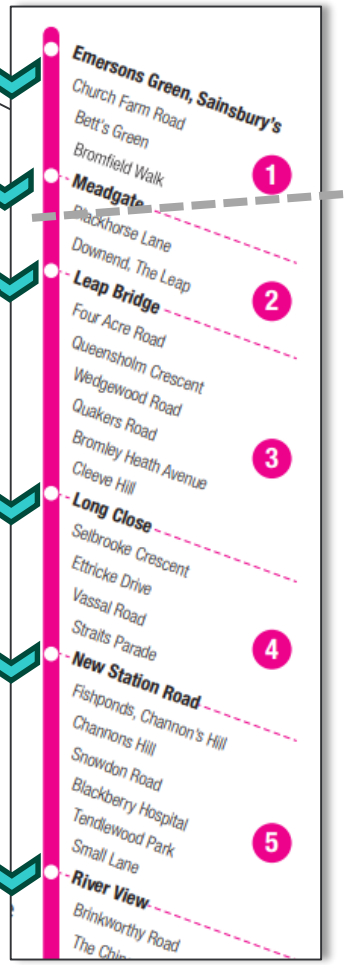
Department for Transport

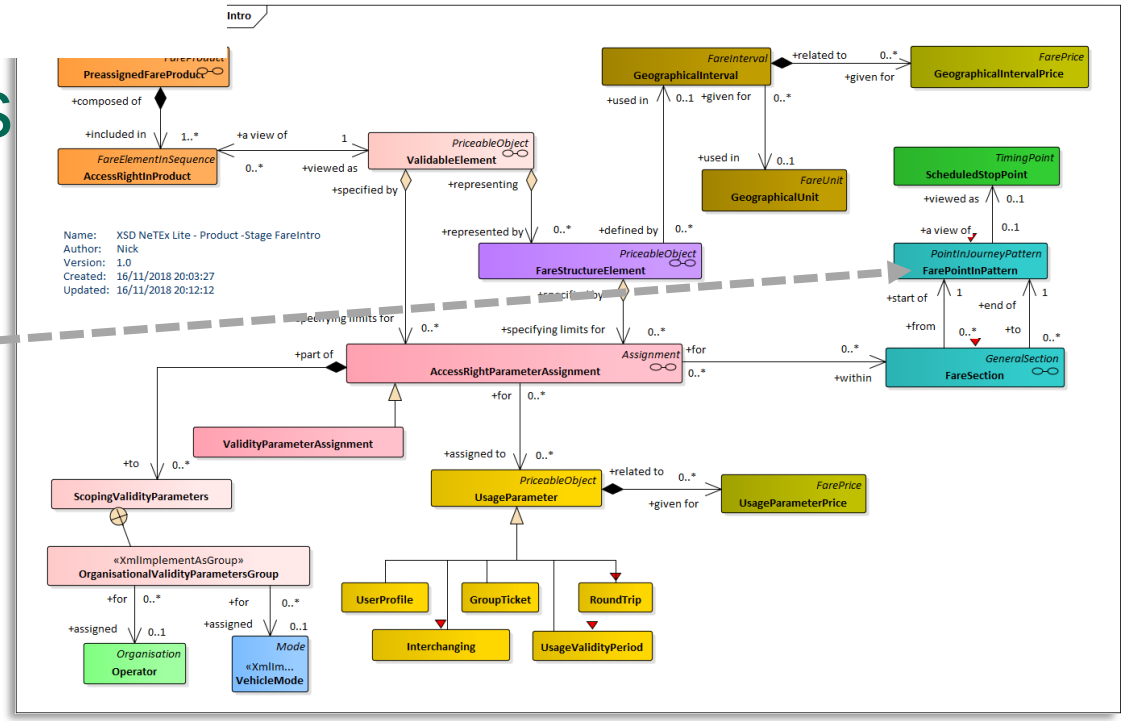
Modelling – Stage definitions

SCHEDULED STOP POINTs

FARE POINT IN PATTERN

FARE SECTIONs





- Dynamic zone counting : Trip planner uses JOURNEY PATTERN to determine number of FARE SECTIONs traversed between origin and destination POINT IN PATTERN

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