Fares and NeTEx Workshop

London 6th November, Manchester 7th November, 2018
Objectives of this session

- Discuss further features that are more complex to implement
  - Additional tariffs
  - Additional products
    - Discount Rights
    - Supplements
  - Complex Offers
  - Complex conditions

- Note some further road map possibilities
  - Account Based Ticketing
  - Validation & Control
Modelling complex products

- Multiple products in one package
- Products supported by multiple operators
- Large scale tariffs
Some types of Complexity found of fares

- **More complex Products & Tariff structures**
  - E.g. Capped Pay as You Go (Oyster)

- **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

- **Products supported by multiple operators**
  - Tariff structures covering large networks
    - E.g. *Plusbus*
  - Local variation in rules & participation?

- **Complex rules for a fare product, notably**
  - Day types / Timebands / Fare demand types
    - 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
Additional Tariff Structures & Product Types

Products that give rights to use other products
- (Capped) Sales Rights
- Sales Discounts
- Other Prerequisite products
- Other Supplement Products

Other Tariff Structures
# Complex UK Bus Fare Products

Discount cards, etc

<table>
<thead>
<tr>
<th>Fare Product</th>
<th>Peak / Off Peak</th>
<th>(Can) or Must be Account Based</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Discount Right</td>
<td>✓</td>
<td>✓</td>
<td>E.g. like a Railcard</td>
</tr>
<tr>
<td>Capped Sales Discount Right</td>
<td>✓</td>
<td>✓</td>
<td>PAYG e.g. Oyster</td>
</tr>
<tr>
<td>Usage Discount Right</td>
<td>✓</td>
<td>✓</td>
<td>Rebate for use, e.g. mileage</td>
</tr>
<tr>
<td>Amount of Price Unit</td>
<td>-</td>
<td>✓</td>
<td>Stored value</td>
</tr>
<tr>
<td>Third Party Product</td>
<td>-</td>
<td>-</td>
<td>E.g. Military Pass</td>
</tr>
</tbody>
</table>
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.
# Add-on UK Bus Fare Products

Not needed except for Coach?

<table>
<thead>
<tr>
<th>FARE PRODUCT</th>
<th>Flat</th>
<th>Point to point</th>
<th>Named Zones</th>
<th>Peak / Off Peak</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat Reservation</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>If separate ticket needed</td>
</tr>
<tr>
<td>Bicycle</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>If extra ticket needed</td>
</tr>
<tr>
<td>Animal</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>Size dependent?</td>
</tr>
<tr>
<td>Excess Luggage</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>If extra ticket needed</td>
</tr>
<tr>
<td>Excursion</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Window of use</td>
</tr>
<tr>
<td>Special Event</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Product Group Event date</td>
</tr>
</tbody>
</table>

**TRIP SUPPLEMENT**

**TRIP & PASS ADD ON**
(Linear) Distance. Fare prices are computed as a direct function of linear distance between stops. (usually actual mileage, but could be a notional “fare distance” or some arbitrary unit distance).
- May be stepped intervals.
- Note that distance fares can also be expressed as Z2Z/ P2P fares.
- Not to be confused with Stage count.

Elements In Sequence. Tariff prices vary or are limited according to the sequence of consumption of rights. E.g. Ticket allows Metro ride then bus ride but not bus ride then metro ride.

Routing Constraints. Tariff prices between the same origin and destination vary according to the route taken.
- Mainly relevant for rail.
- SERIES CONSTRAINTS Constraints can be described and priced separately.
Additional Tariffs

Mileage Distance
£ = distance x price per unit distance

- Price depends on distance
- Other Parameters: Rounding steps, minima and maxima.
- Distance may be in arbitrary units
- Given “Fare distance” between stops may be notional
Distance based Fares

- Distance steps specified as GEOGRAPHICAL INTERVALS
- Each interval has a price or prices

GEOGRAPHICAL INTERVALS

DISTANCE MATRIX ELEMENTS

SCHEDULED STOP POINTs

TIMETABLE

CLASS OF USE

TARIFF
Routing constraints specify an allowed envelope for travel over a network.

- The same O/D pair may have multiple alternate routings, each with a different price.

SERIES 1: via X & Y
\[ W * X * Y * Z \]

SERIES 2: via X & (V or Y)
\[ W * X * (Y / V) * Z \]

SERIES 3: via V
\[ W * (U/X) * V * Z \]
Modelling Sales Discount Rights
Additional Product Types - terminology

- **Discount Right**
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- **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.
Rail Cards

1/3 off rail fares. with our range of Railcards.

https://www.railcard.co.uk/about-railcards/
### Complex UK Bus Fare Products

Discount cards, etc

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<tbody>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>✓</td>
<td>✓</td>
<td>E.g. like a Railcard</td>
</tr>
<tr>
<td>CAPPED SALES DISCOUNT RIGHT</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td><strong>USAGE DISCOUNT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USAGE DISCOUNT RIGHT</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td><strong>STORED VALUE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMOUNT OF PRICE UNIT</td>
<td>-</td>
<td>✓</td>
<td>Stored value</td>
</tr>
<tr>
<td><strong>ENTITLING PRODUCT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THIRD PARTY PRODUCT</td>
<td>-</td>
<td>-</td>
<td>E.g. Military Pass</td>
</tr>
</tbody>
</table>
UK Rail card products

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

Railcard

Flat rate

16-25 Railcard

Senior Railcard

Disabled Railcard

Network Railcard

Family & Friends Railcard

Two Together Railcard

SALES OFFER PACKAGES
Most simple products are PRE-ASSIGNED FARE PRODUCTS

RAILCARDS are SALE DISCOUNT RIGHTS
Other Product types

Other possible Product TYPES

- CAPPED DISCOUNT RIGHT
- USAGE DISCOUNT PRODUCT
- SUPPLEMENT PRODUCT
- THIRD PARTY PRODUCT
- ENTITLEMENT PRODUCT
Complex Sales Offers

Multiple Product Bundles
Capped Pay as You go
Describing a complex product – TfL Oyster
Fares example - Tfl Oyster

### Tube, DLR and London Overground

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

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.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Cash</th>
<th>Oyster pay as you go</th>
<th>Travelcards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak Single</td>
<td>Off-peak Single</td>
<td>Peak price Off-peak price cap</td>
</tr>
<tr>
<td>Zone 1 only</td>
<td>£4.50</td>
<td>£2.10</td>
<td>£1.10</td>
</tr>
<tr>
<td>Zones 1-2</td>
<td>£4.50</td>
<td>£2.80</td>
<td>£1.10</td>
</tr>
<tr>
<td>Euston - Zone 2</td>
<td>£4.50</td>
<td>£2.20</td>
<td>£1.10</td>
</tr>
<tr>
<td>Zones 1-3</td>
<td>£4.50</td>
<td>£3.20</td>
<td>£2.70</td>
</tr>
<tr>
<td>Euston - Zone 3</td>
<td>£4.50</td>
<td>£3.00</td>
<td>£2.70</td>
</tr>
<tr>
<td>Zones 1-4</td>
<td>£5.50</td>
<td>£3.80</td>
<td>£2.70</td>
</tr>
</tbody>
</table>
Fares example - Tfl Oyster

**FARE ZONES**
1-6, A, B, C, D

**USER PROFILEs**
Adult, student, 11-15 etc

**FARE PRODUCTS**
Trip, Period Pass

**FARE PRICEs**

**GROUP TICKETS**

**FARE DEMAND FACTOR**

**MODEs**
Metro, Bus, Tram, River

**TIME INTERVALs**

**SALES PACKAGEs**
Cash, Oyster, Travelcard

**DISCOUNT RIGHTS**
Railcard

**TYPEs OF TRAVEL DOCUMENTs**
Paper, Oyster,
Zone Doughnut - TfL Zones

**TOPOGRAPHICAL PLACEs**

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

**SCHEDULED STOP POINTs**

**LINES**
Moving Britain Ahead

NeTEx UK Fare Profile - Complex Fares

Classic Tfl Products

FARE DEMAND FACTOR

Different tariff structures for different modes

Peak, off-peak

PRE-ASSIGNED FARE PRODUCT

PRE-ASSIGNED FARE PRODUCT

PREASSIGNED FARE PRODUCT

AMOUNT OF PRICE UNIT

TARIFFs

TIME INTERVALs

Travel Card (Day / Period Pass)

Group Day Travel card

Multitrip Boarding Pass Carnet for Cable CAR

24H Cycle Pass

Ticket

Ticket
What's in an Oyster?

<table>
<thead>
<tr>
<th>TIME INTERVALS</th>
<th>Day, Week, Season</th>
<th>TARIFFs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 7 31</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FARE DEMAND
Peak, Offpeak

PRE-ASSIGNED FARE PRODUCT

AMOUNT OF PRICE UNIT

CAPPED SALE DISCOUNT RIGHT

SALE DISCOUNT RIGHT

USAGE DISCOUNT RIGHT

CUSTOMER ACCOUNT

CAPPED DISCOUNT RIGHT

SALE DISCOUNT RIGHT

USAGE DISCOUNT RIGHT

Oyster Pay As You Go

Oyster Contactless
Sales Offer Packages & Accounts

Third Party Entitlement

Customer Account
- Photo card

Account-linked card

Anonymous Card

Customized Cards:
- 16-25 Railcard
- Oyster Card
- Freedom Pass
- Disability

Specialty Cards:
- Child - Zip
- Youth - Zip
- Student
- Senior
- Veteran

Transport for London

NeTEx UK Fare Profile - Complex Fares
Sales Offer Packages & Accounts

THIRD PARTY ENTITLEMENT

CUSTOMER ACCOUNT

Photo card

Account linked card

Anonymous Card

FARE PRICE

NeTEx UK Fare Profile - Complex Fares
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

- **CHARGING MOMENT**
  - *When is payment made?*

- **PURCHASE WINDOW**
  - *Can purchase within window: before (or maybe even during) travel*

- **EXCHANGING**
  - *Allowed window*

- **REFUNDING**
  - *Allowed window*

- **REPLACING**
  - *If lost etc Allowed window*

- **End Use**

- **Space**
  - **Origin**
  - **Destination**

- **Time**
Pay as you go Trips

Each trip is prepaid at set price

CHARGING MOMENT

PURCHASE WINDOW
Buy Smartcard before

VALIDITY PERIOD
Card expiry date

Moving Britain Ahead
Pay as you go - Trips - Capped

Each trip is prepaid at a set price up a limit within a time interval, there may be further charging moments to just at end of period.

CAPPING RULE
TIME INTERVALs

CHARGING MOMENT

TIME INTERVALs

CHARGING MOMENTs

PURCHASE WINDOW
Applies to card

VALIDITY PERIOD
To use

Destination

Stop

Stop

Stop

Origin

Space

Time
Pay as you go Trip – Contactless Capped

All trips are post paid at end of interval, capped if set price is reached.
Other Fare Product terminology
Mostly Complex products

- **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
Modelling Multi-Operator Fares
Interoperating fares – eg Plus Bus: Zonal add on for rail tickets

Zones around country
- Multiple participating Bus operators
- Exceptions in each zone
- Sold via rail sales channels
PLUS BUS – National bus fare trip supplements

- Available as
  - Zonal day pass origin and destination stations
  - Zonal Season pass origin and destination stations

- Coverage
  - City wide Tariff zones around stations,
  - Named operators & Lines
  - Local exceptions

- Sales Packages / Distribution / Media
  - Add-on purchased with rail ticket / season pass
  - Bought separately to rail ticket or season pass
  - As paper ticket, on smartcard some areas

- Further discounts
  - Rail cards for different User types
  - Peak/Off-peak restrictions apply to railcard discounts

- Product Owner: JSP: Branding?
Modularise; references may be internal or external

NeTEx XML documents
How to partition a Multi-operator product

Plusbus Prices

Plusbus Product definitions

National Rail Travel Products

National Rail Railcard Products

Operator specific Lines & exceptions

Common Plus Bus definitions

National Stop & Plusbus Zone definitions (NPTG & NAPTAN)
Quite straightforward to use existing NeTEx data elements to describe.

- SALES OFFER PACKAGE + SALES OFFER PACKAGE ELEMENT + FARE PRODUCT
- ENTITLEMENT REQUIRED / ENTITLEMENT GIVEN can be used to stated prerequisites

Potential semantic complexity as to how to interpret
- How to combine conditions at different levels?
- How to avoid contradictions

Important to modularise products in to manageable groupings – use Version Frames
- Eg Separate FARE FRAMEs for different types of Product
Specifying Complex Conditions

Parameter Assignments
Using Parameters #1

- **Generic Assignment:**
  - List of parameters. Can be Ored or ANDed
    - *Eg 1st Class | Second Class*
    - *E.g. 1st Class & Private Compartment | 2nd Class & Couchette Berth*

- **Can be used to build complex conditions:**
  - *Eg Travel times for zones.*
    - Zone 1 allows 30 minutes, Zone 2 allows 60 Minutes
  - *E.G. Exclusions to services*
    - Plusbus zone: Night Buses after 22.40, Line 23 Excluded
  - *E.G. Timebands into London etc*
    - Arriving into Liverpool street between 8:00 and 9:30 am
  - *E.g. Fare Demand restrictions*
    - Students and Seniors can only get half price off peak
Instances for a typical Fare Product & Sales Offer

- VALIDABLE ELEMENT describes access rights as a set of FARE STRUCTURE ELEMENTs which may be consumed.
- May have complex assignment conditions

**NeTEx UK Fare Profile - Basic Scope**

Moving Britain Ahead
Assignments can be ANDed and ORed together and nested to build complex conditions.
Instances for a typical Fare Product & Sales Offer

- **TARIFF**
  - VALIDABLE ELEMENTs (product)
  - FARE PRODUCTS
  - SALES OFFER PACKAGE ELEMENTs
- **FARE STRUCTURE ELEMENTs**
  - PARAMETER ASSIGNMENTs (fare structure)
  - PARAMETER ASSIGNMENTs (validable element)
  - PARAMETER ASSIGNMENTs (product)
  - PARAMETER ASSIGNMENTs (sales offer element)
- **DISTANCE MATRIX ELEMENTs**
- **TIME INTERVALs**
  - Scoping & Temporal Parameters
  - TARIFF ZONEs
  - OPERATORS
  - USER PROFILEs
  - DAY TYPES
  - MODEs
  - Etcetera

NeTEx UK Fare Profile - Complex Fares
Validity Parameters

Most Network elements, Temporal elements and product components can be used as validity parameters.
## Access rights & Conditions – UK fares

<table>
<thead>
<tr>
<th>Ticket type</th>
<th>Refunds available*</th>
<th>Use with Railcards</th>
<th>Travel on any train</th>
<th>Book on the day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance</td>
<td>Non-refundable</td>
<td>✓</td>
<td>Specified train only</td>
<td>Up to 18:00 on the day before</td>
</tr>
<tr>
<td>Off-Peak</td>
<td>✓</td>
<td>✓</td>
<td>Within Off-Peak times</td>
<td>✓</td>
</tr>
<tr>
<td>Super Off-Peak</td>
<td>✓</td>
<td>✓</td>
<td>Within Super Off-Peak times</td>
<td>✓</td>
</tr>
<tr>
<td>Anytime</td>
<td>✓</td>
<td>✓</td>
<td>Minimum fare price applies</td>
<td>✓</td>
</tr>
</tbody>
</table>

*Refunds available only with valid reason.
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**FARE DEMAND FACTORS**
(Anytime / Off peak/ Super Off-peak)  

**SALES OFFER PACKAGES**
(Advance / Off-peak/ Super Off-peak, Anytime)  

**ENTITLEMENT REQUIRED / GIVEN**  

**LIMITING PRICE RULE**  

**EXCHANGING**  

**PURCHASE WINDOW**  

**VALIDITY PERIOD**
Complex time restrictions – Directional Peak/ Off-peak/ Superoff-peak

**FARE DEMAND FACTORS**
(Anytime / Off peak / Super Off-peak),

<table>
<thead>
<tr>
<th>Times</th>
<th>Arriving into London*</th>
<th>Departing from London*</th>
<th>Exceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evening</strong> (Monday - Friday)</td>
<td>No restrictions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-Peak: Not to leave Liverpool St between 16:29-18:34 (Stratford 16:00-18:41, Tottenham Hale 16:41-18:40, Seven Sisters 16:45-18:49)</td>
<td></td>
<td>During school holidays* and half-term weeks, including the Christmas and New Year period, evening restrictions on all Off-Peak tickets departing London are lifted. Restrictions remain in force on Super Off-Peak Day tickets.</td>
<td></td>
</tr>
<tr>
<td>Off-Peak Day: Not to leave Liverpool St before 00:30 (Stratford 00:38, Seven Sisters and Tottenham Hale 00:40)</td>
<td></td>
<td><strong>Suffolk school holiday dates are used.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Off-Peak Day:</strong> Not before 06:30 from all stations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Super Off-Peak Day:</strong> Not before 12:00 from Liverpool St (Stratford 12:07)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Please note that ‘London’ includes Liverpool Street, Stratford, Seven Sisters, Tottenham Hale and intermediate stations such as Hackney Downs. Unless specified, restrictions from stations other than Liverpool Street are determined by when the service arrives at or departs from Liverpool Street (or Stratford where trains start and finish there).

Tickets which do not involve travel to, from or via central London are generally restricted in the morning period only. Typically, Off-Peak and Off-Peak Day tickets are valid after 08:45 or 09:00 outside Greater London, and after 09:30 for journeys outwards from the London suburbs, and Super Off-Peak Day tickets are valid after 12:00. Please enquire as to the restrictions applying to the journey you wish to make.

Off-Peak and Super Off-Peak tickets for long-distance journeys via London have various restrictions depending on the journey being made. The time restrictions in the table may not apply, especially for tickets from south of Manningtree/Harwich and Ely/Cambridge to destinations outside the London and South-East area. Please check our online booking engine or ask ticket office staff.

If you’re unsure about the time restrictions that apply to your journey, it’s always recommended to check with the ticket office or the Greater Anglia Contact Centre on 0345 600 7245.
UK Rail Single Products

- **Anytime Single** – Fully flexible
- **Off Peak Single** – Semi-flexible. Also Super-Off peak for some operators.
- **Advance Single** – Semi flexible, no refund, quota restricted
Anytime Return – Fully flexible
Off Peak Return – semi-flexible
(No advance returns)
Graphic for directional time restrictions (East Midlands)
Further Aspects of Modelling Fares

Organising & Presentation of fares
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

SALES PACKAGE

USER PROFILE

DISTANCE MATRIX ELEMENTs

USER PROFILE

FARE ZONEs

PRICEGROUPs ➔ FARE PRICE

NOTICE ASSIGNMENTS ➔ NOTICE

NeTEx UK Fare Profile - Complex Fares
Fare Table - Layouts

- Tabular representations can be represented
- Efficient encoding in XML – Avoids repetition of common properties
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

<table>
<thead>
<tr>
<th>Col1</th>
<th>Col2</th>
<th>Col3</th>
<th>...</th>
<th>ColM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell 1,1</td>
<td>Cell 1,2</td>
<td>...</td>
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<td>Cell 1,m</td>
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<td>Row1</td>
<td>Row2</td>
<td>Row3</td>
<td>...</td>
<td>RowN</td>
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</tbody>
</table>

Notice1
Further Aspects of Modelling Fares

VALidation & COntrol
Transmodel 6.0
Also includes Validation & Control

- Not currently in NeTEx but useful for Passenger Information for Pay as You Go and Account Based Ticketing

Tm-P1: Core Framework
Tm-P2: Network
Tm-P3: Timing & Vehicle Scheduling
Tm-P4: Operations Monitoring & Control
Tm-P5: Fare Management, Fare Control
Tm-P6: Passenger Information
Tm-P7: Driver Management
Tm-P8: Management Information & Statistics

NeTEx UK Fare Profile - Complex Fares
Transmodel Fare concepts not encoded in NeTEx

(1) Validation & Control Events

- User Interaction with system can be described as events & as log entries
  - **Sales**
    - **Registration**: Account creation, update, delete, etc
    - **Purchase, fulfilment**: Selection, payment, collection, app installation, subscription, etc
    - **After Sales**: Exchange, Refund, Reinstallation, Replacement, etc
  - **Control & Validation**
    - **Travel**: Activation, Check-in, Control, Checkout…, etc
    - **Control**: No Check in, No Check out, Repeated check in, etc
    - **Revenue protection**: Access rights, No Proof of Travel, Suspicious behaviour, etc
    - **Security Action**: Suspend, Activate, Place on Security List, Delist, etc

- Useful for aligning fare with various standard, proprietary and informal descriptions of Fare Processes that generate data for control, clearing and settlement systems
  - eg IFM, FSM, UIC Account Based Ticketing report etc
Harmonising Fare Validation

NeTEx UK Fare Profile - Complex Fares
PURCHASE & FULFILMENT EVENTS

From SALES OFFER PACKAGE + TRAVEL SPECIFICATION

VALIDITY PARAMETERS (generic)

Purchase & Fulfilment

VALIDITY PARAMETERS (specific)

VALIDITY PARAMETERS (CP specific)

SALES TRANSACTION

Back Office

TRAVEL DOCUMENT + CUSTOMER PURCHASE PACKAGE + CUSTOMER PURCHASE PACKAGE PARAMETERS

NeTEx UK Fare Profile - Complex Fares
VALIDATION & CONTROL of

From TRAVEL DOCUMENT / USTOMER PURCHASE PACKAGE (Media centric) or ACCOUNT (ABT)

VALIDITY PARAMETERS

CONTROL MEANS:
From CONTROL DEVICE or TCO

Compare

CONTROL PARAMETERS

VALIDATION PARAMETERS

Back Office

VALIDATION ENTRY

NeTEx UK Fare Profile - Complex Fares
ACCOUNT MANAGEMENT

From CUSTOMER

VALIDITY PARAMETERS (generic)

Register / Update, etc

ACCOUNT PARAMETERS

CUSTOMER ACCOUNT TRANSACTION

To CUSTOMER ACCOUNT

VALIDITY PARAMETERS

Back Office
Fare Contract events

- A Contract links a Customer to Account
- Events are recorded as log entries
  - Each type of event creates a type of log entry
Recording Events – Log Entries
### Sales and Fare Transactions

#### Events to record purchase and fulfilment

<table>
<thead>
<tr>
<th>Action Name</th>
<th>Classical</th>
<th>Media Centric</th>
<th>ABT</th>
<th>Note</th>
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<tbody>
<tr>
<td><strong>Customer Purchase &amp; After Sales</strong></td>
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## Account Events

- Events to create or change a customer account

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<thead>
<tr>
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<th>Media Centric</th>
<th>ABT</th>
<th>Note</th>
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## Travel Control & Validation Events

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<th>Note</th>
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</tr>
</tbody>
</table>
Thank You!

Please send comments to
Julie.Williams@traveline.info