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traveline

# Fares and NeTEx Workshop

London 6th November, Manchester 7th November, 20

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# Stops, Routes and Timetables for UK NeTEx Timetable profiles

## Objectives

- Discuss use of stops routes and fares for a **Basic** UK timetable NeTEx Profile
- Outline issues for a **Full** UK timetable NeTEx Profile  equivalent to current TransXChange function
- Get Feedback from you as to what scope of full UK profile should be ,

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# Using NeTEx for Stop, route & Timetable data

Introduction

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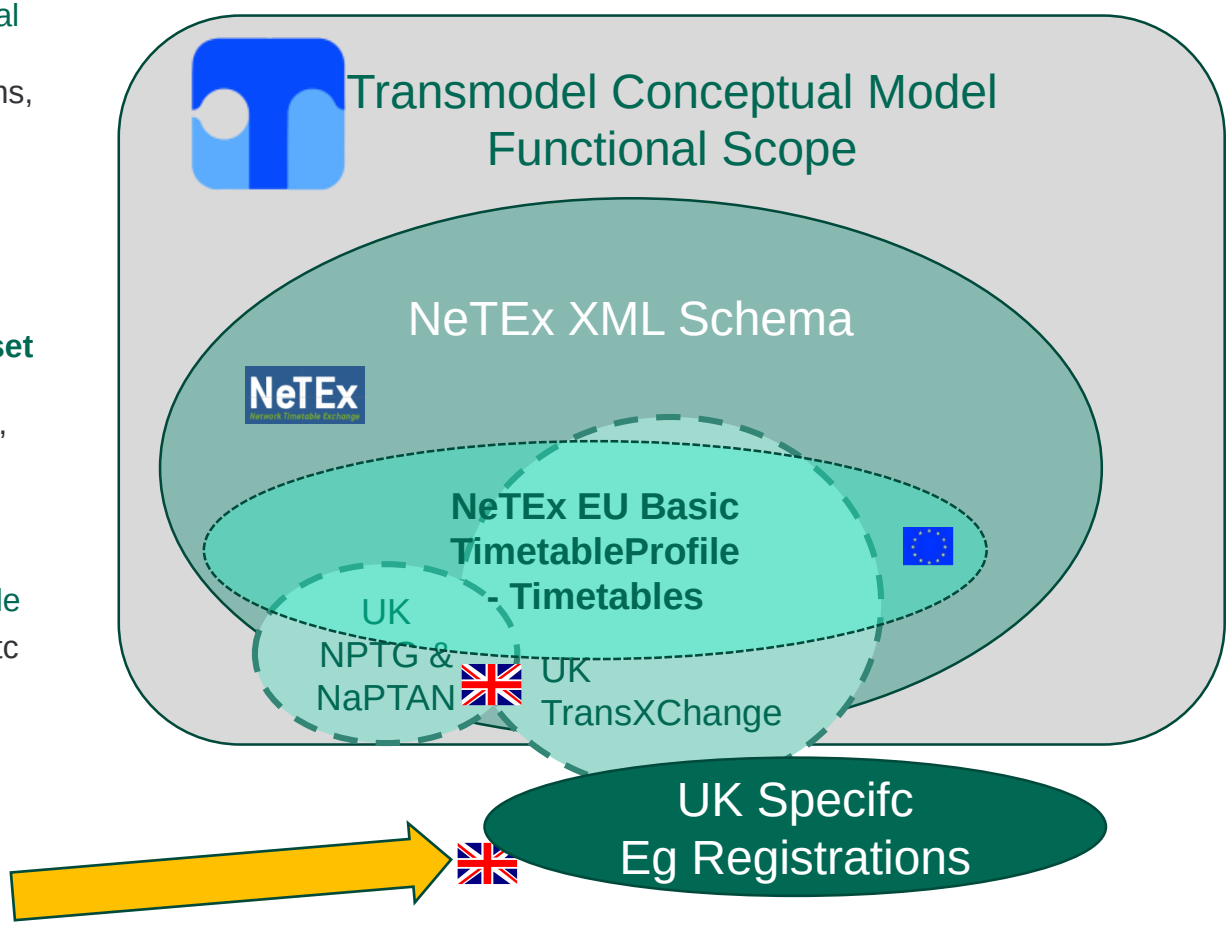
# Comparing TransModel, NeTEx and NPTG/ NaPTAN / TransXChange

- Transmodel covers many PT functional domains
  - Networks, Scheduling, Operations, Fare Management, Driver management, etc
- NeTEx implements just a **subset** of Transmodel
  - **Stops, Timetables, Fares**, etc
- EU Basic NeTEx profile covers a **subset** of NeTEx
  - Stops, Timetables, Interchanges, etc
- TransXChange covers timetables
- TransXChange includes some TM NeTEx elements not in EU Basic Profile
  - Data elements for Operations, etc
  - Operations, etc
  - Calls, Sections, tc
- TransXChange includes some UK specific concepts not in Transmodel or NeTEx
  - EBSR registration info, etc



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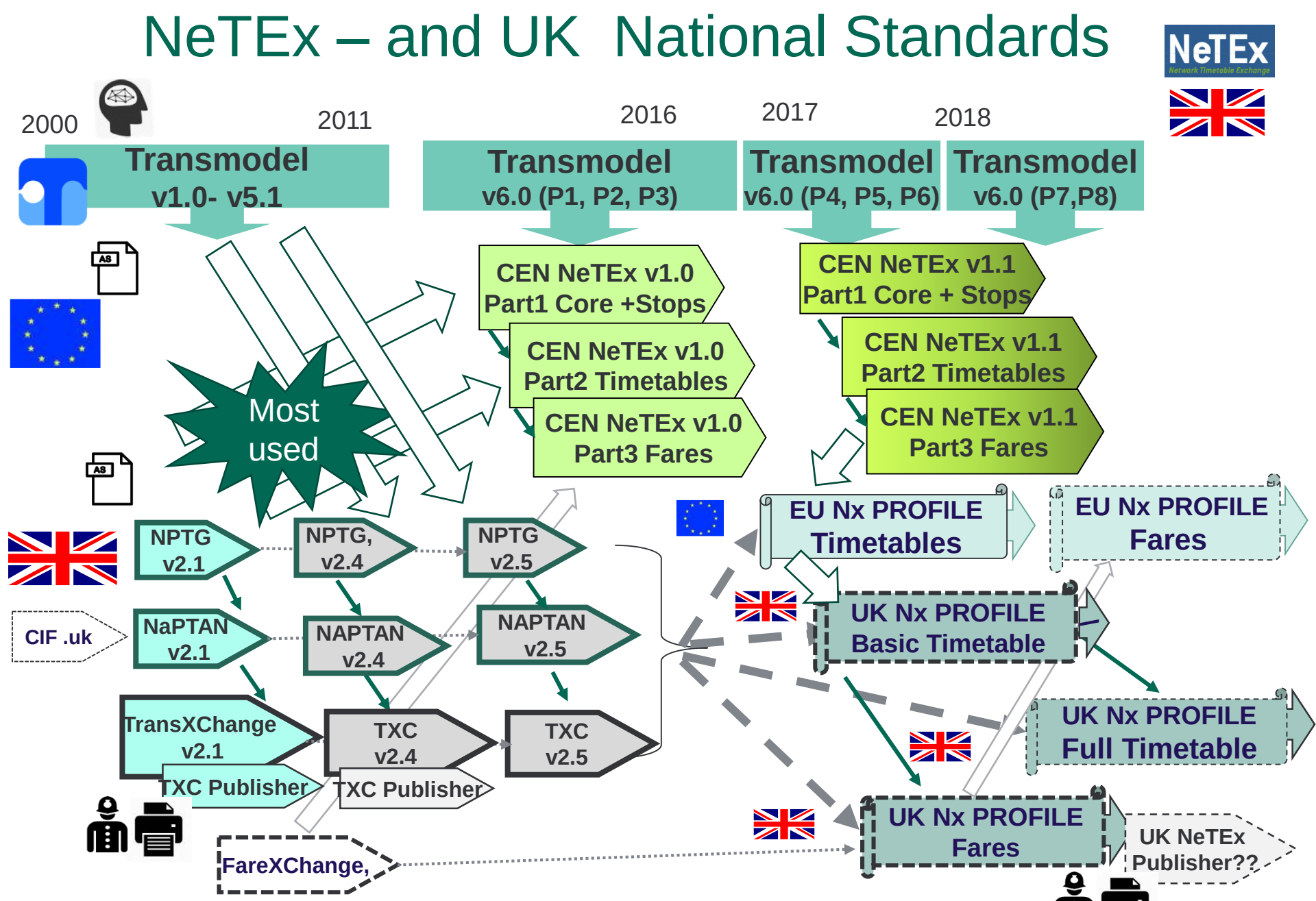
# Likely Phasing

1. UK Basic Fares Profile (2018/19)
   - Use of NaPTAN, NPTG & TXC data as needed in a UK NeTEx Timetable profile
2. UK Basic Timetable Profile (2018/19)
   - A basic mapping of NaPTAN & TransXChange into the EU NeTEx Minimum timetable profile
3. UK Strategic Timetable Mapping (2019/20)
   - A full mapping of TransXChange into a UK NeTEx **Timetable profile** as a strategic representation for UK Stop & Timetable data

# NeTEx – and UK National Standards



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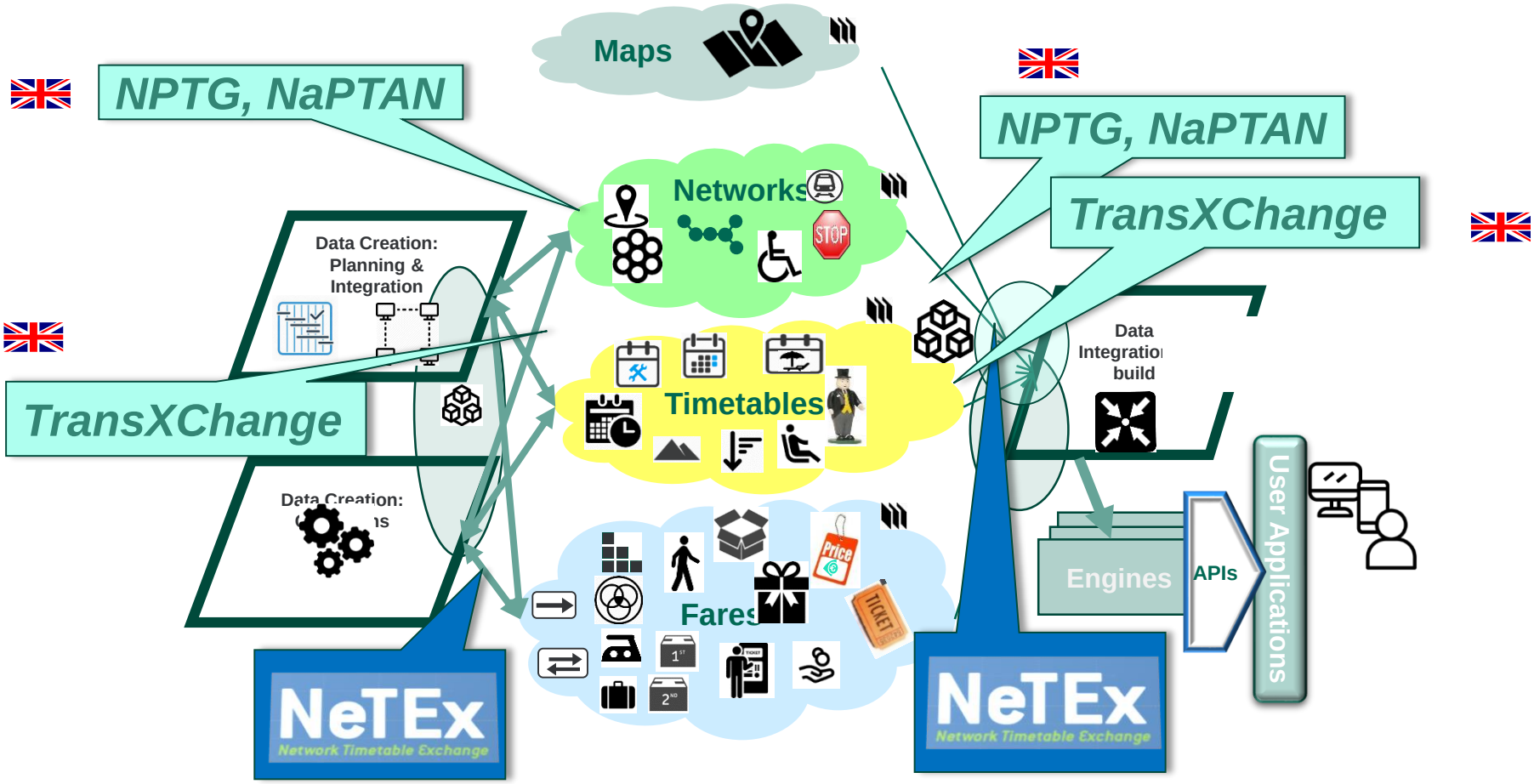
# A gradual Transition – can interoperate NaPTAN / TXC & NeTEx, both Upstream and Downstream



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# Representation of Journeys

- **Use of CALLS**
  - EU NeTEx Timetable Profile is fully normalised – diffuses data over several places
    - Does not use CALLS (Although NeTEx has these
  - TransXChange uses CALLs – a view to combine several data elements together
    - More convenient for consuming applications.
  - Should we completely denormalise (have separate PASSING TIMEs, POINTs IN JOURNEY PATTERN etc)?
    - Should we still use CALLs? Should we exchange routes
- **Use of LINKs IN SEQUENCE vs POINTs IN SEQUENCE**
  - TransXChange represents journeys and patterns as LINKs IN PATTERN; this is more complex to understand than POINTs in PATTERN - should we changeover?
    - Same overall content
- **Use of TIMING INFORMATION**
  - TransXChange mapping is slightly denormalised (e.g. use of combined timing and journey pattern links), so we need separate timing patterns, or just JOURNEY PATTERN
  - TransXChange uses detailed Link Projection references between layers (Mainly to ensure validity conditions are inherited correctly) – not needed ?
- TransXChange uses SECTIONs to reduce volume of JOURNEY PATTERNs
  - Complex - should we drop? (Many users don't use)

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# Developing a Full Timetable profile Technical options

- Technical Considerations
  - All TXC data **can** be represented in NeTEx (except UK EBSR Registrations)
    - But Not all TXC data is covered by EU **Basic** profile
  - Some TXC data structures **need** to be transformed to a revised model in NeTEx
  - Some TXC data structures **could or should** be represented differently in NeTEx
- Practical considerations
  - If we are changing anyway, we should review and simplify TXC overall
- Goals for a full UK profile
  - Where possible, keep close to current TXC
  - Where possible drop unused elements from TXC
  - **Where useful, simplify representation from TXC ?**
  - Where required include new function

# EU Basic Timetable Profile

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# EU Basic Timetable Profile

- Minimal: Can be summarised on seven diagrams
  - **Network**: (2)
    - Stops, Lines & Routes, Service Patterns
  - **Timetables**: (3)
    - Vehicle Journeys (As Points in pattern), +Compound Journeys
    - Day Types . Service Calendars:
  - **Accessibility**: (1)
- Key Differences from  TransXChange representation
  - No TIMING PATTERNS, just the passing times
  - No operational data
    - DEAD RUNs, LAYOVER POINTS, BLOCKs, VEHICLE TYPE, DUTY CREWs, REVERSING MANOEVREs, etc
  - Added capability:
    - Accessibility, COUPLED JOURNEYS

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# EU Basic Timetable Profile - Key Differences from TXC representation

- Functional
  - No TIMING PATTERNs, timings, just the resolved passing times
  - No operational data
    - DEAD RUNs, LAYOVER POINTS, BLOCKs, DUTY CREWs, Ticket Machine Codes, etc
  - No EBSR Registration elements
    - Registration, VOA numbers, Licences etc, Service Classifcation, Service Infor, etc,
- Representational
  - POINT IN PATTERN representation of Service patterns, journey patterns, journeys
    - (No CALLs, POINTs rather than LINKS, etc)
  - No use of SECTIONs to reduce volume
  - Separation of Time and Frequency/Headway based Journeys
  - Simpler DAY Types
- Some Terminology differences, e.g.
  - TXC Service ➔ TM TIMETABLE
  - TXC:Route → TM SERVICE PATTERN (And directiona)

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# EU Profile – 1. Stops

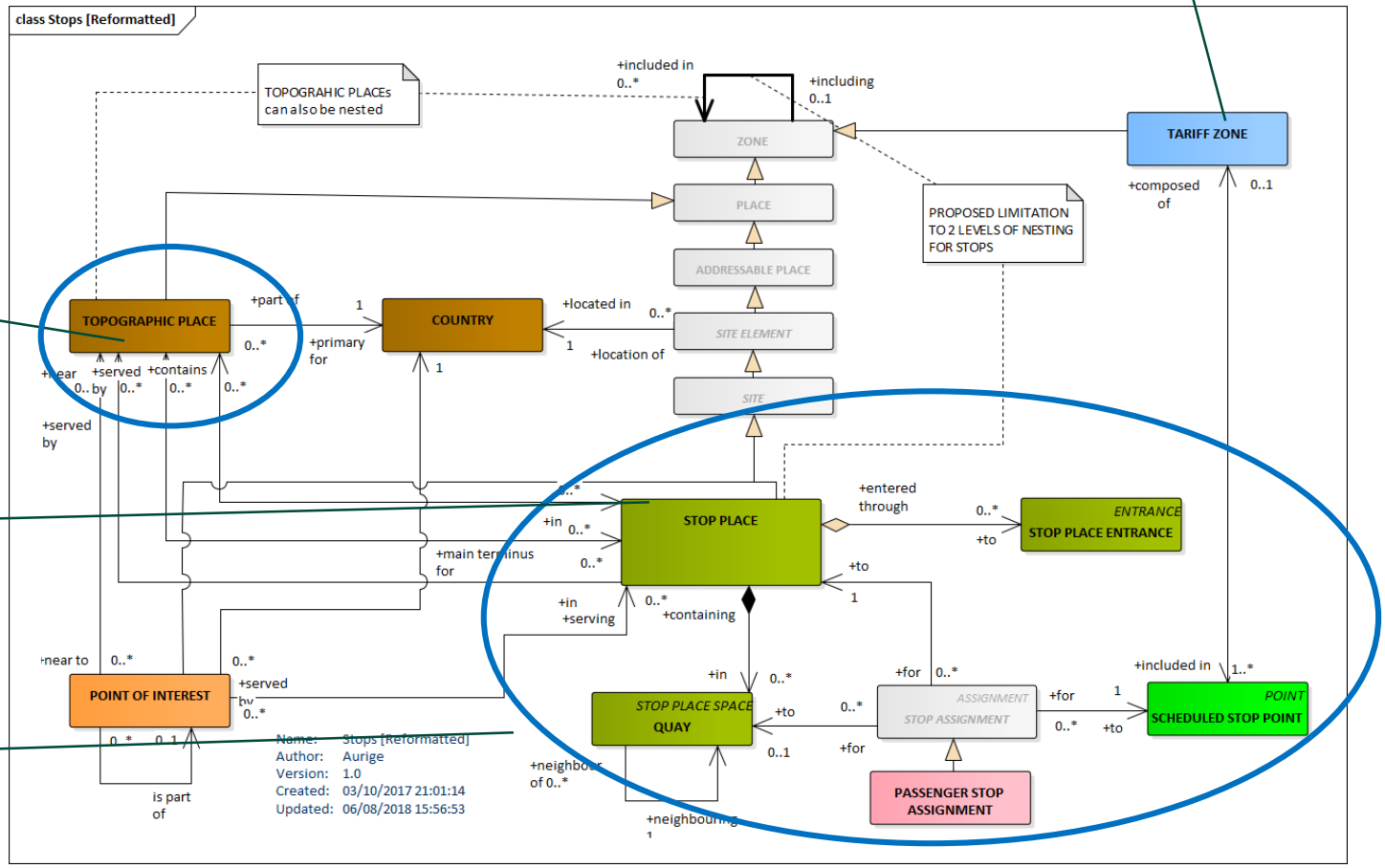
- Similar to NPTG NaPTAN

**NPTG: PlusBusZone(**

**NPTG: Locality**

**Naptan: StopArea**

**Naptan: StopPoint**



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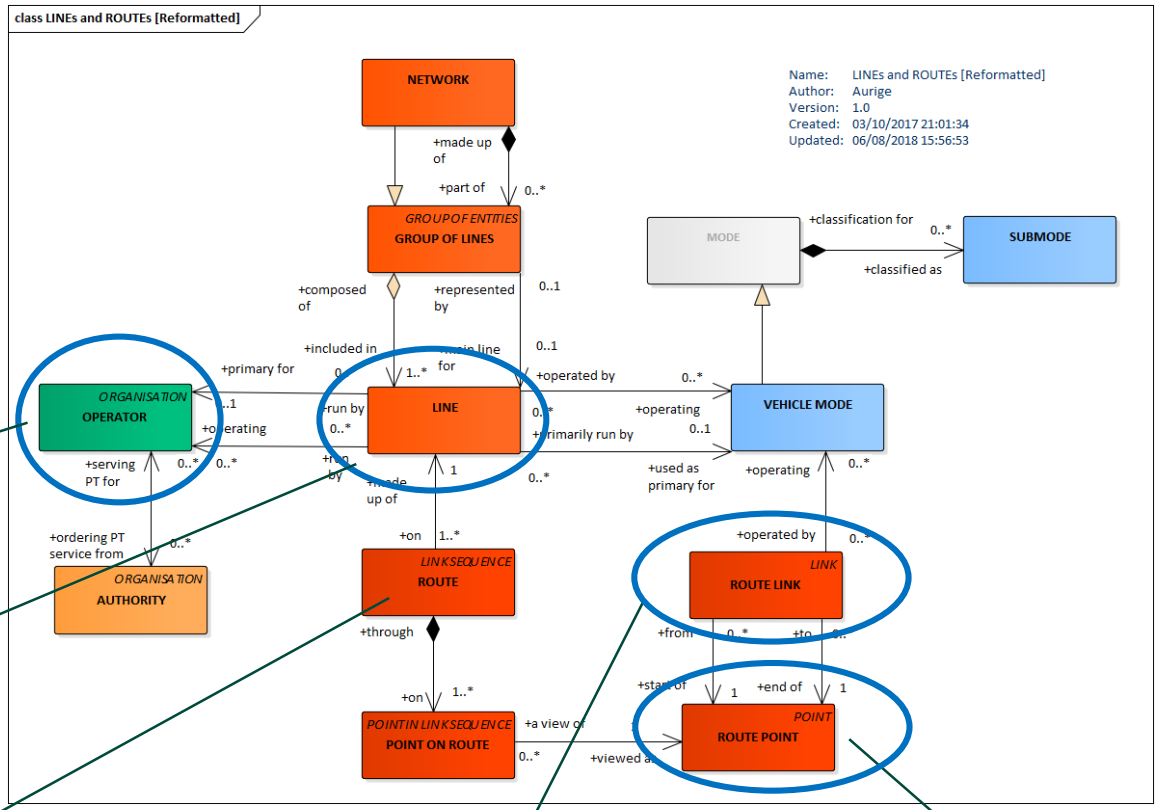
# EU Basic Profile – 2. Lines and routes

- Similar to TransXChange
  - POINTs IN PATTERN rather than LINK IN PATTERN




**TXC: Operator**

**TXC: Line**

**TXC: Route**

**TXC: RouteLink**

**TXC: RoutePoint**

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# EU Profile – 3. Service Patterns

- Similar to NPTG NaPTAN
- DESTINATION DISPLAY is a reusable heading

**TXC: Line**

**TXC: Direction**

**TXC:Route**

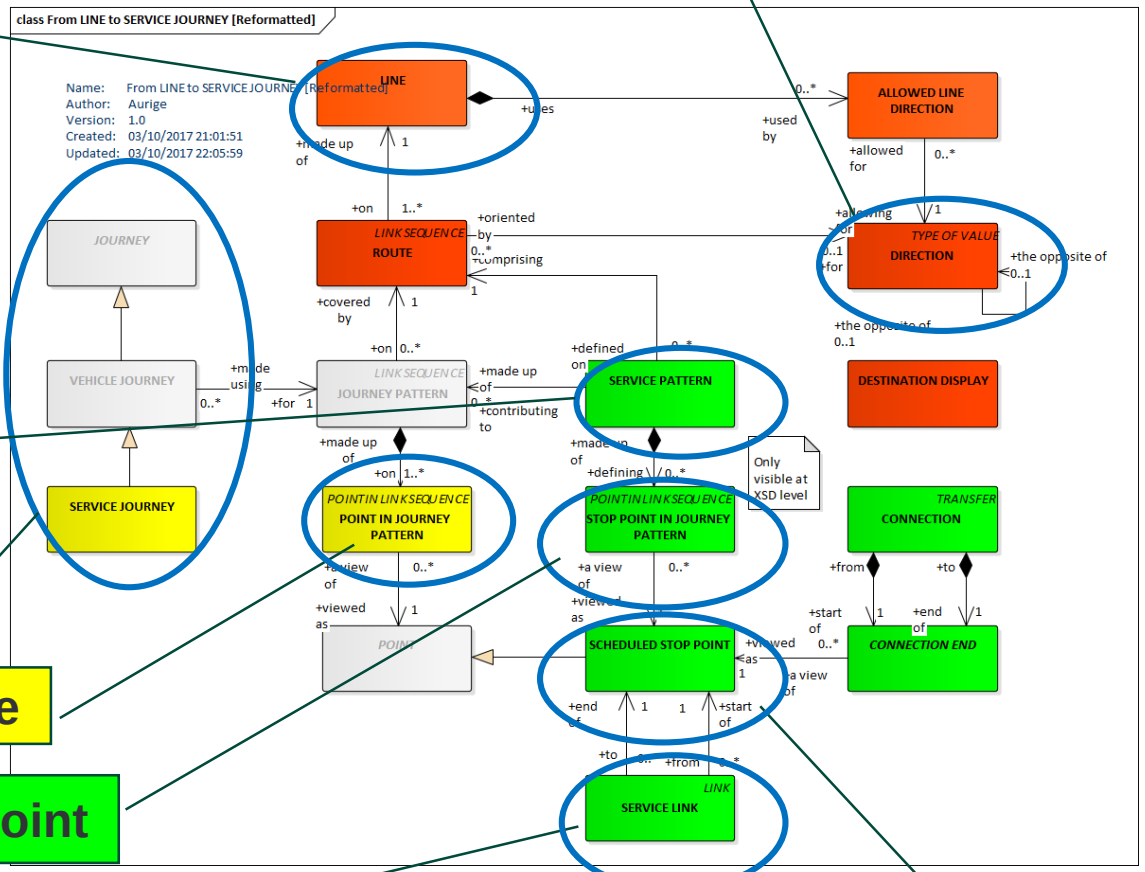
**TXC:VehicleJourney**

**TXC:Call + StopUsage**

**TXC:RoutePoint**

**TXC:RouteLink**

**TXC: StopPoint**



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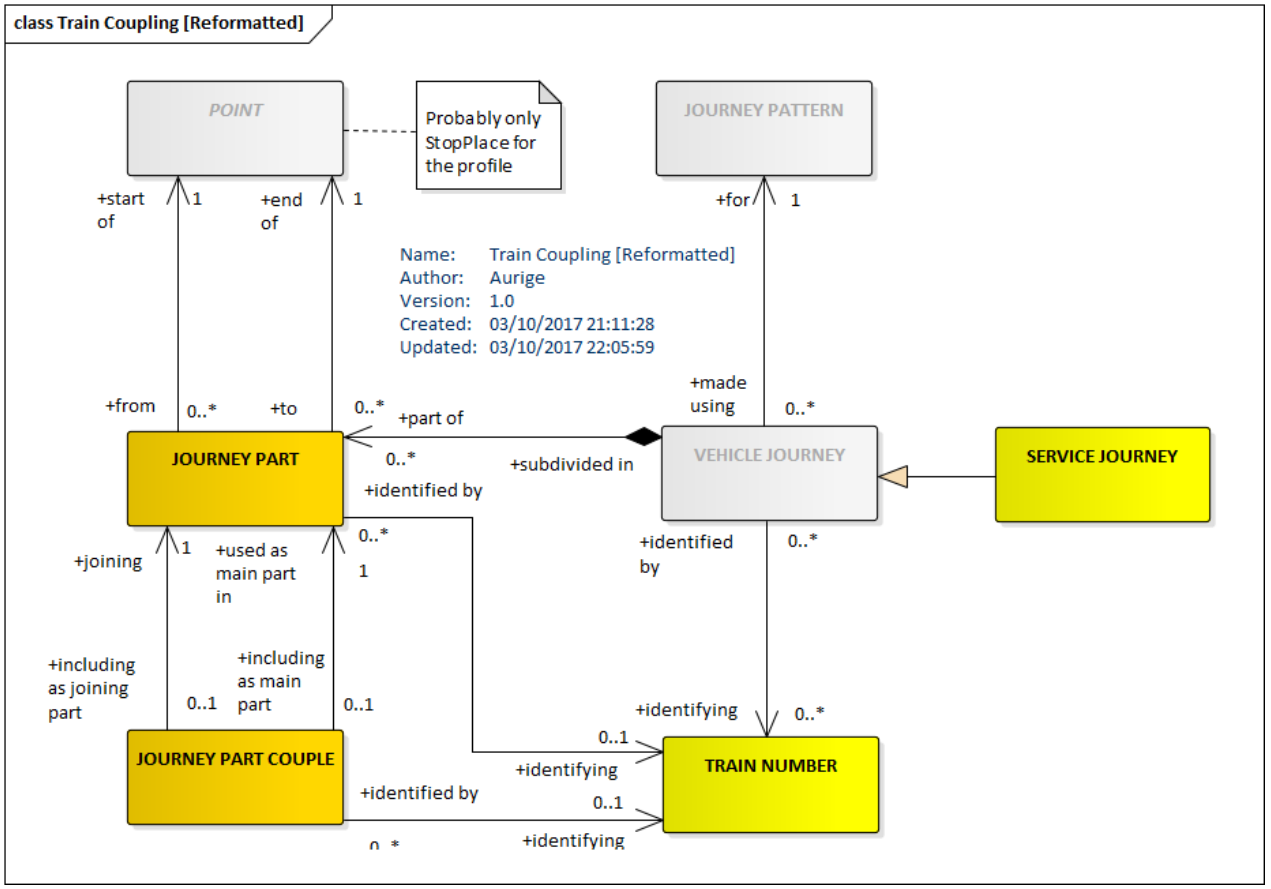
# EU Basic Profile – 5. Train Coupling

- Not In TXC



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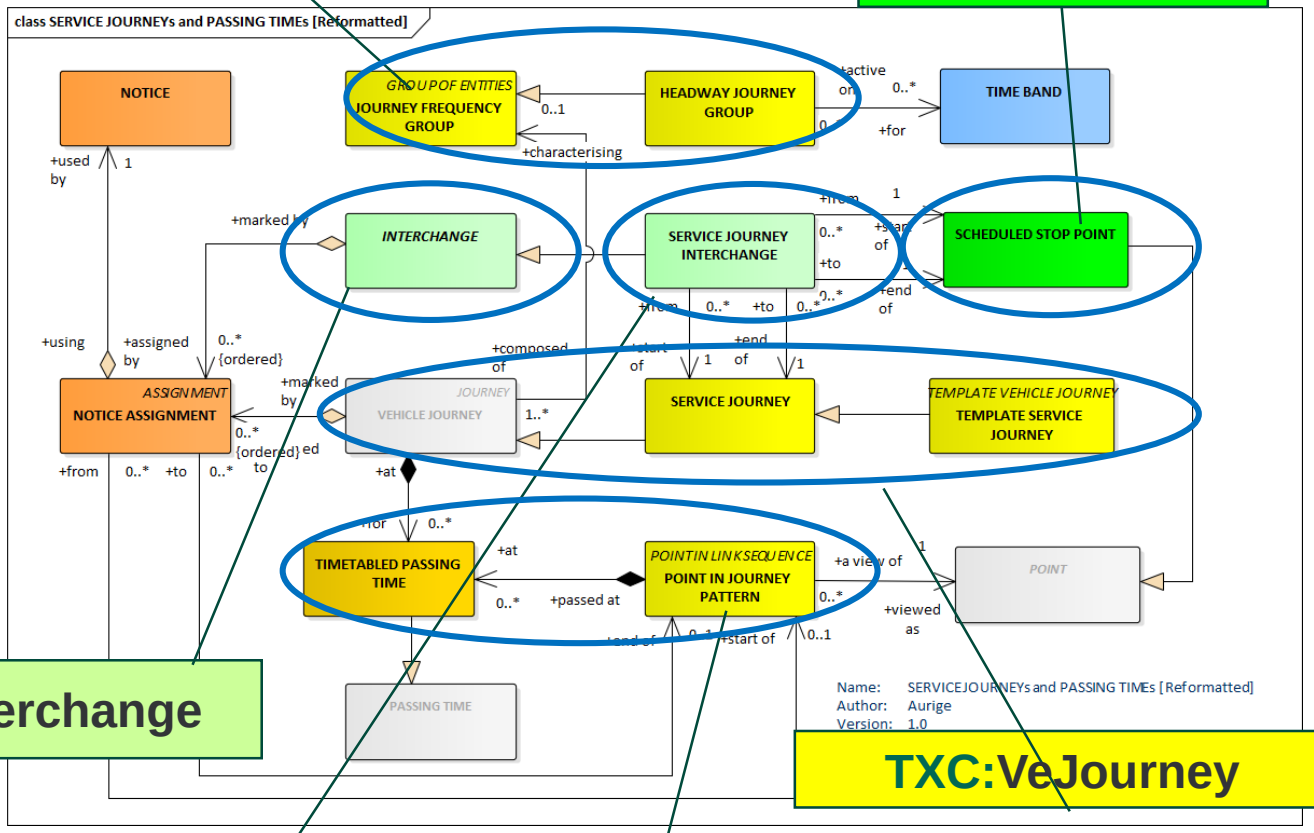
# EU Basic Profile – 5. Journeys & Passing times

- Uses POINTs IN JOURNEY PATTERN rather than CALLs
- NeTEx has Generic mechanism for notices



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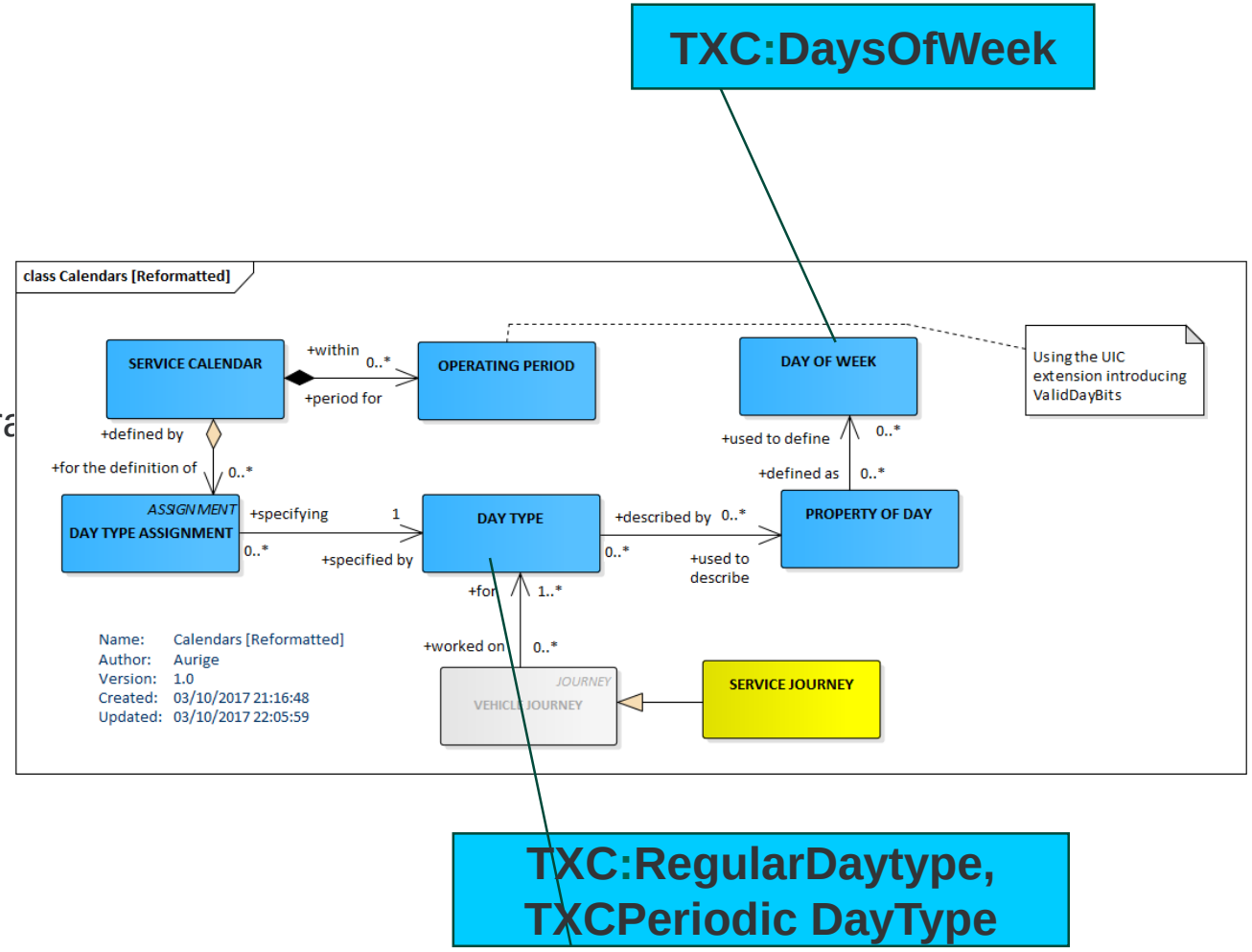
# EU Basic Profile – 6. Day Types & Service Calendar

- Defines day types and mapping to calendar
- Equivalent to TXC opera profile elements
-



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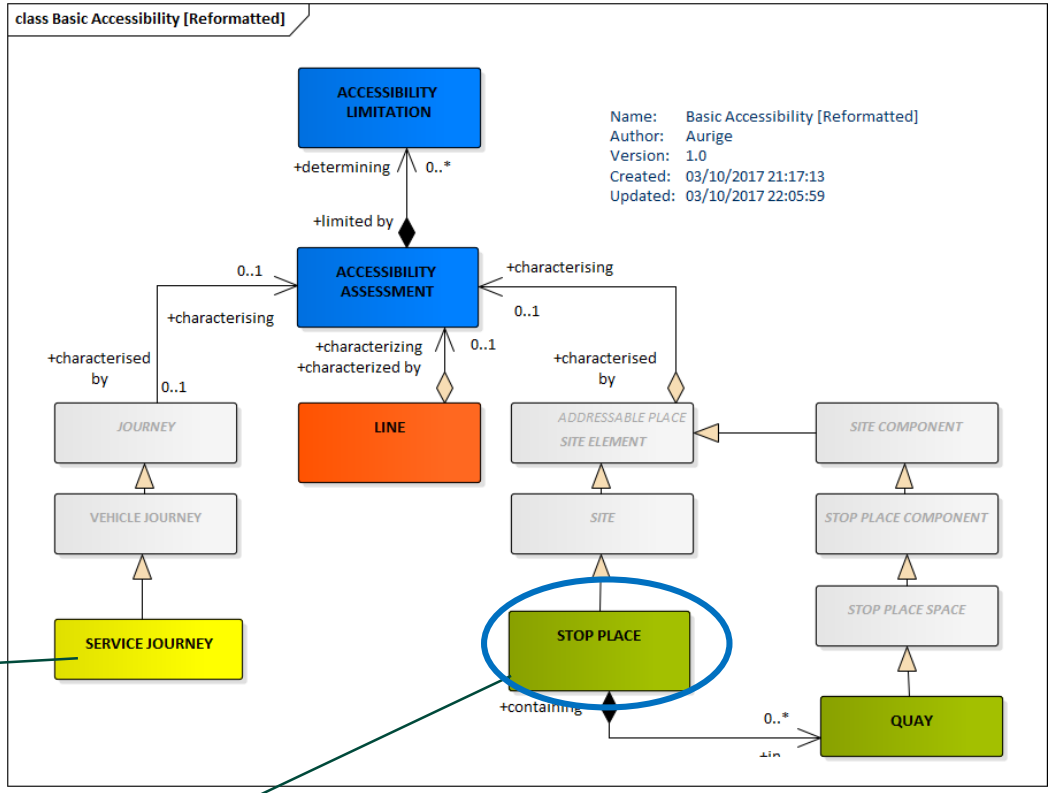
# EU Basic Profile – 7. Accessibility

- Allows accessibility of Services, stop places and lines to be described
- Not in TXC 2.1,
- Some in NapTAN & TXC 2.5 but not populated?




**TXCv2.:5 StopPoint**

**NaPTANv2.:5 StopPoint**

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# Key Equivalences NPTG & NaPTAN to NeTEx TM

| UK NPTG/ Naptan/TXC | Transmodel / NeTEx | Notes |
|---|---|---|
| ***Nptg:AdminArea*** | ADMINISTRATIVE ZONE + ORGANISATION PART | Link to any element using Responsibility |
| ***Nptg:NptgLocality*** | TOPOGRAPHICAL PLACE | |
| ***Nptg:PlusBusZone*** | FARE ZONE | |
| ***Naptan:StopPoint*** | STOP PLACE + QUAY + ACCESSIBILITY | Assigned to SCHEDULED STOP POINT for TXC |
| ***Naptan:StopArea*** | STOP PLACE | Assigned to SCHEDULED STOP POINT for TXC |
| | | |

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# Some Key Equivalences – TXC Network elements to NeTEx/TM Network elements

| UK NPTG/ Naptan/TXC | Transmodel / NeTEx | Notes |
|---|---|---|
| ***Txc:StopPoint*** | SCHEDULED STOP POINT ( STOP ASSIGNMENT + STOP PLACE + QUAY) | Revised representation st logical + Physical stop |
| ***Txc:StopArea*** | STOP AREA + STOP PLACE | |
| ***Txc:Operator*** | OPERATOR / AUTHORITY | Operator UK licences for Registration |
| ***Txc:Line*** | LINE | |
| ***Txc:Service (Standard Service, FlexibleService)*** | TIMETABLE FRAME | |
| ***(Service direction)*** | GROUP OF SERVICEs + DIRECTION + DAY TYPE | |
| ***Txc:OperatingProfile*** | DAY TYPE + PROPERTY OF DAY SERVICE + SERVICE CALENDAR + DAY TYPE ASSIGNMENT | Revised representation |
| ***Txc:LavoverPoint*** | | |
| INCOMPLETE - NEEDS FURTHER DETAILS | | |
| | | |

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# Key Equivalences – TXC: Journey Patterns to NeTEx/TM Journey Patterns

| UK NPTG/ Naptan/TXC | Transmodel / NeTEx | Comment |
|---|---|---|
| ***Txc:Track*** | ROUTE LINK | |
| ***Txc:Route*** | SERVICE PATTERN | Named changed from TM 5.1 |
| ***Txc:RouteSection*** | GENERAL SECTION | Could Drop Sections? |
| ***Txc:RouteLink*** | SERVICE LINK | |
| ***Txc:JourneyPattern*** | JOURNEY PATTERN + TIMING PATTERN | |
| ***Txc:JourneyPatternSection*** | GENERAL SECTION | Could Drop Sections? |
| ***Txc:JourneyPatternTimingLink + StopUsage*** | TIMING LINK + RUN TIME + WAIT TIME | |
| ***Txc:JourneyPatternInterchange*** | INTERCHANGE | |

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# Key Equivalences – TXC:Journeys to NeTEx/TM Journeys

| UK NPTG/ Naptan/TXC | Transmodel / NeTEx | Comment |
|---|---|---|
| ***Txc:VehicleJourney*** | VEHICLE JOURNEY | |
| ***Txc:VehicleJourneyTimingLink + StopUsage*** | SERVICE LINK + RUN TIME + WAIT TIME | Or use absolute passing times |
| ***Txc:VehicleJourneyStopUsage*** | CALL / ARRIVAL, CALL DEPARTURE | Or use POINT IN JOURNEY PATTERN + PASSING TIME |
| ***Txc:VariableStopAllocation*** | STOP ASSIGNMENT | |
| ***Txc:DefaultStopAllocation*** | STOP ASSIGNMENT | |
| ***Txc:Interval*** | JOURNEY FREQUENCY GROUP, HEADWAY FREQUENCY GROUP, RHYTHMICAL FREQUENCY | Use with TEMPLATE vehicle Journey |
| ***Txc:VehicleJourneyInterchange*** | SERVICE JOURNEY INTERCHANGE | |
| | | |
| | | |
| | | |

# Technical detail

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# Mapping of Stops

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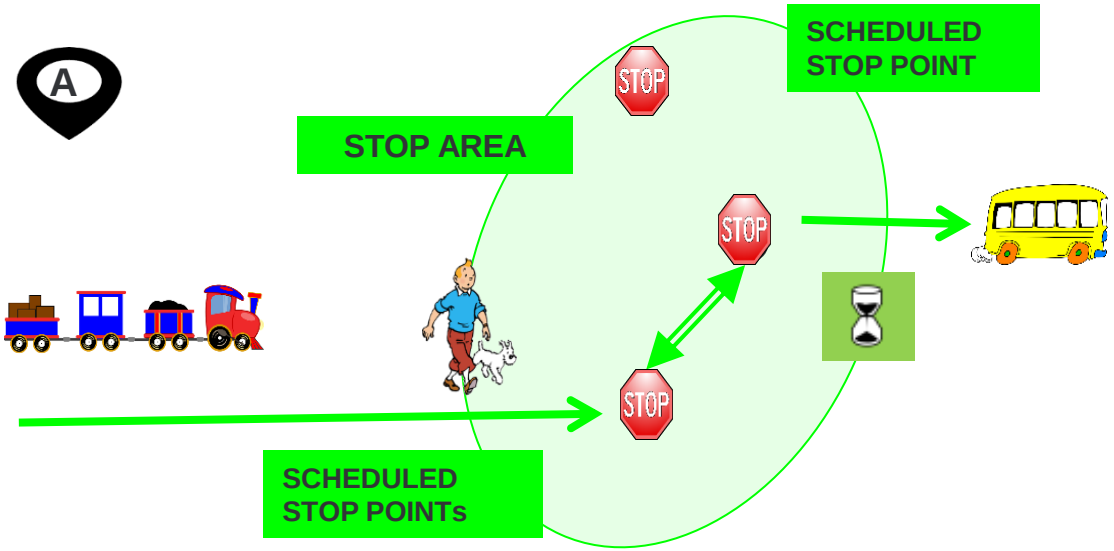
# Connections & Interchanges in the timetable




- Classical representation of an interchange is just as Station / Stops – NAPTAN has just STOP POINTs STOP AREA

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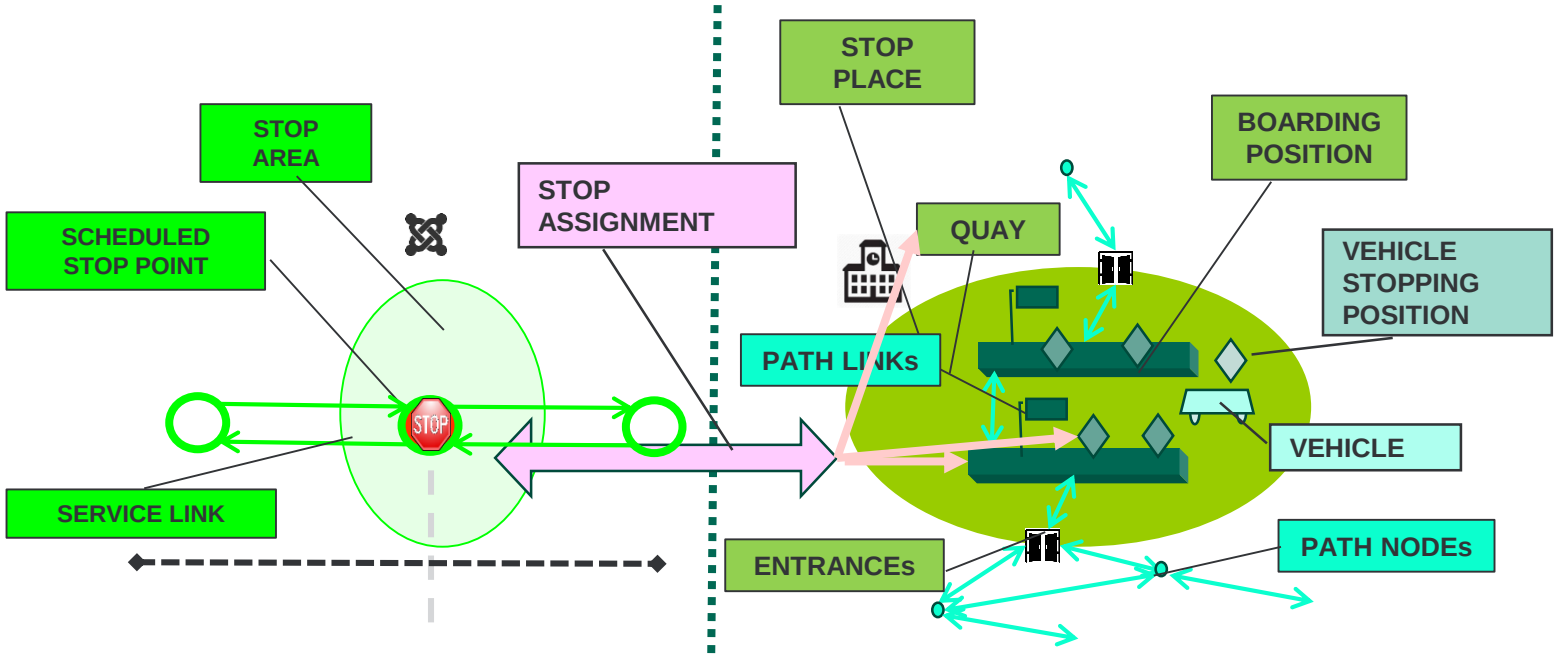
# Timetabled Stop vs Physical Stop




- Use Cases
  - Scheduling
  - Trip Planning

- Use Cases
  - Physical Orientation
  - Passenger Navigation
  - Vehicle Positioning
  - Trip Planning including detailed transfer times & Accessibility

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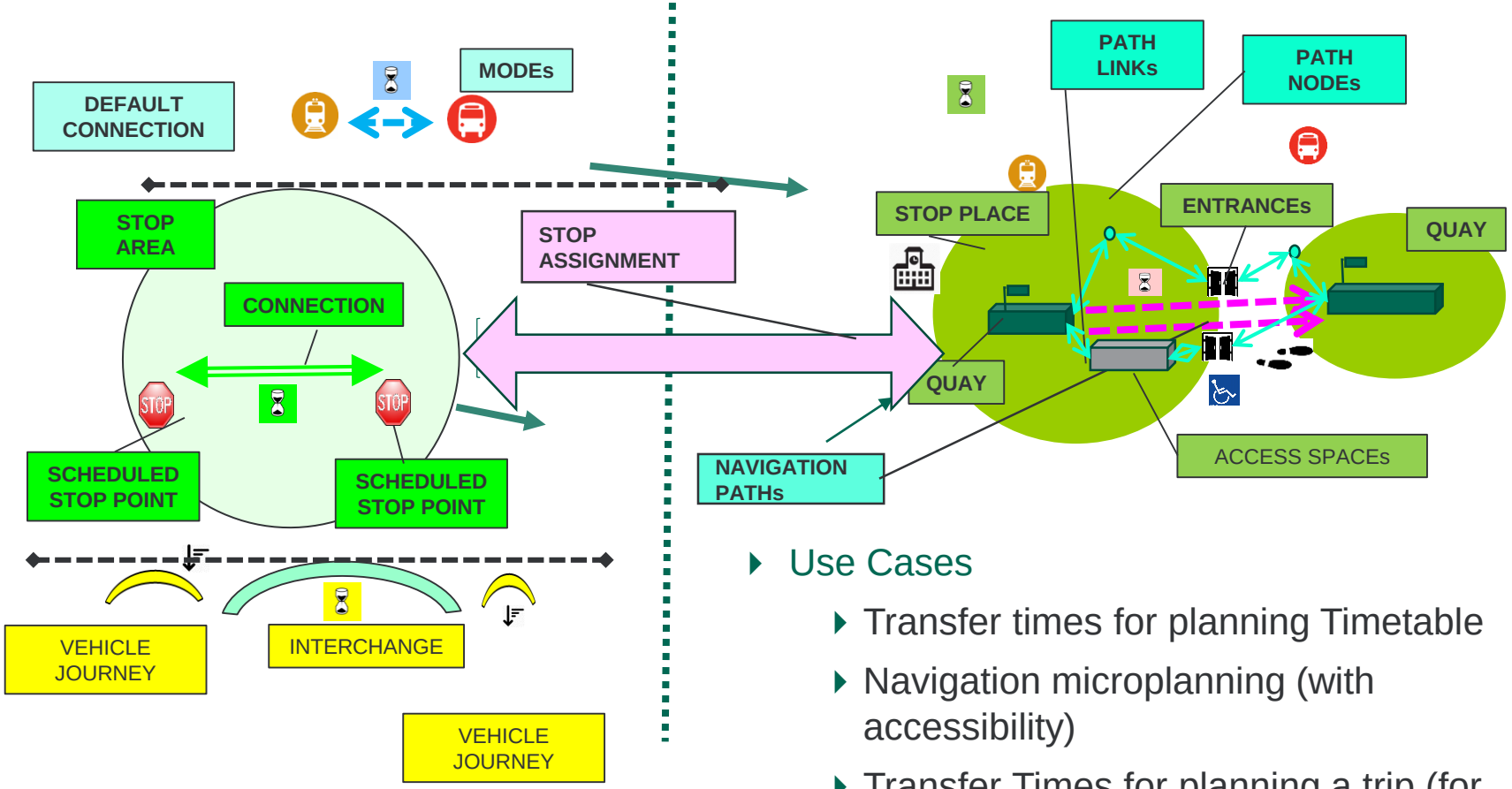
# Timetable Connection

# Physical Connection




- Use Cases
  - Transfer times for planning Timetable
  - Navigation microplanning (with accessibility)
  - Transfer Times for planning a trip (for given accessibility)

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# Example XML mapping from NAPTAN to NeTEx – a NaPTAN Stop Point

- Straightforward mapping of stop data
  - Physical data from NaPTAN:StopPoint ➔ NeTEx:QUAY
  - Schedule data from NaPTAN:StopPoint ➔ NeTEx:SCHEDULED STOP POINT
  - Can use STOP ASSIGNMENT to group together
  - Can use same id
  - Use Naptan Namespace
  - Can annotate with legacy NaPTAN Stop type codes to facilitate round trip export
- In NeTEx timetables can just use STOP POINT REF
- In NeTEx Stop definitions - group as all three

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# NapTan Stop in NeTEx -XML Code Snippet

```
<PassengerStopAssignment version="any" … order="0">
    <ScheduledStopPoint version="any" created="2004-06-09T14:20:00-05:00" responsibilitySetRef="nptgUkAdministrativeArea:060"
id="naptStop:260010966">
        <Name>Netherley Road</Name>
        <TimingPointStatus>timingPoint</TimingPointStatus>
        <AllowedForWaitTime>PT0M</AllowedForWaitTime>
        <stopAreas>
            <StopAreaRef version="0" ref="naptArea:060G000001"/>
        </stopAreas>
        <StopType>onstreetBus</StopType>
        <VehicleModes>bus</VehicleModes>
    </ScheduledStopPoint>
    <StopPlace version="any" id="naptStop:260010966" responsibilitySetRef="nptgUkAdministrativeArea:060">
        <Name>Netherley Road</Name>
        <TopographicPlaceView>
            <TopographicPlaceRef ref="nptgUkLocality:E0000004"/>  <Name>Aberdeen</Name>
        </TopographicPlaceView>
        <quays>
            <Quay id="naptStop:260010966" version="1">
                <Centroid>  <Location><gml:pos srsName="UKOS">442914</gml:pos> </Location> </Centroid>
                <placeTypes>
                    <TypeOfPlaceRef version="napt:v2.1" ref="napt:StopClassification@BCT"/>
                    <TypeOfPlaceRef version="napt:v2.1" ref="napt:StopType@MKD"/>
                </placeTypes>
                <RoadAddress version="any" id="naptStop:260010966@address">
                    <RoadName>Netherley Road</RoadName>
                    <BearingCompass>N</BearingCompass>
                </RoadAddress>
                <TransportMode>bus</TransportMode>
                <QuayType>busStop</QuayType>
            </Quay>
        </quays>
    </StopPlace>
</PassengerStopAssignment>
```

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# Mapping of Journey Patterns, Timing Patterns & Journeys

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# Networks Layers and Patterns

- Transmodel separates concerns into different layers of network, represented using PATTERNs of POINTs & LINKs ("i.e. directed graphs of nodes and edges")
  - ROUTEs, SERVICE PATTERNs, TIMING PATTERN, JOURNEY PATTERNs, etc
  - Allows rapid, reusable specification f, easy propagation of changes, compact description of many journeys, sharing of common reference data
- **POINTs Vs LINKs**
  - For many purposes, either a sequence of points (POINTs in PATTERN) or a sequence of links (LINKs in PATTERN) is sufficient to describe
  - For some purposes, both are needed,
    - E.g. TIMING PATTERN; to attach RUN TIMEs (on LINK) and WAIT TIMEs (on POINT)
- Exchanging: When designing an exchange format, use only one sequence (To avoid conflicting data)
  - **TransXChange**: →Series of LINKs
  - **GTFS** → Series of POINTs
  - **NeTEx** Either, depending on profile
  - **NeTEx** EU Profile → Series of Points

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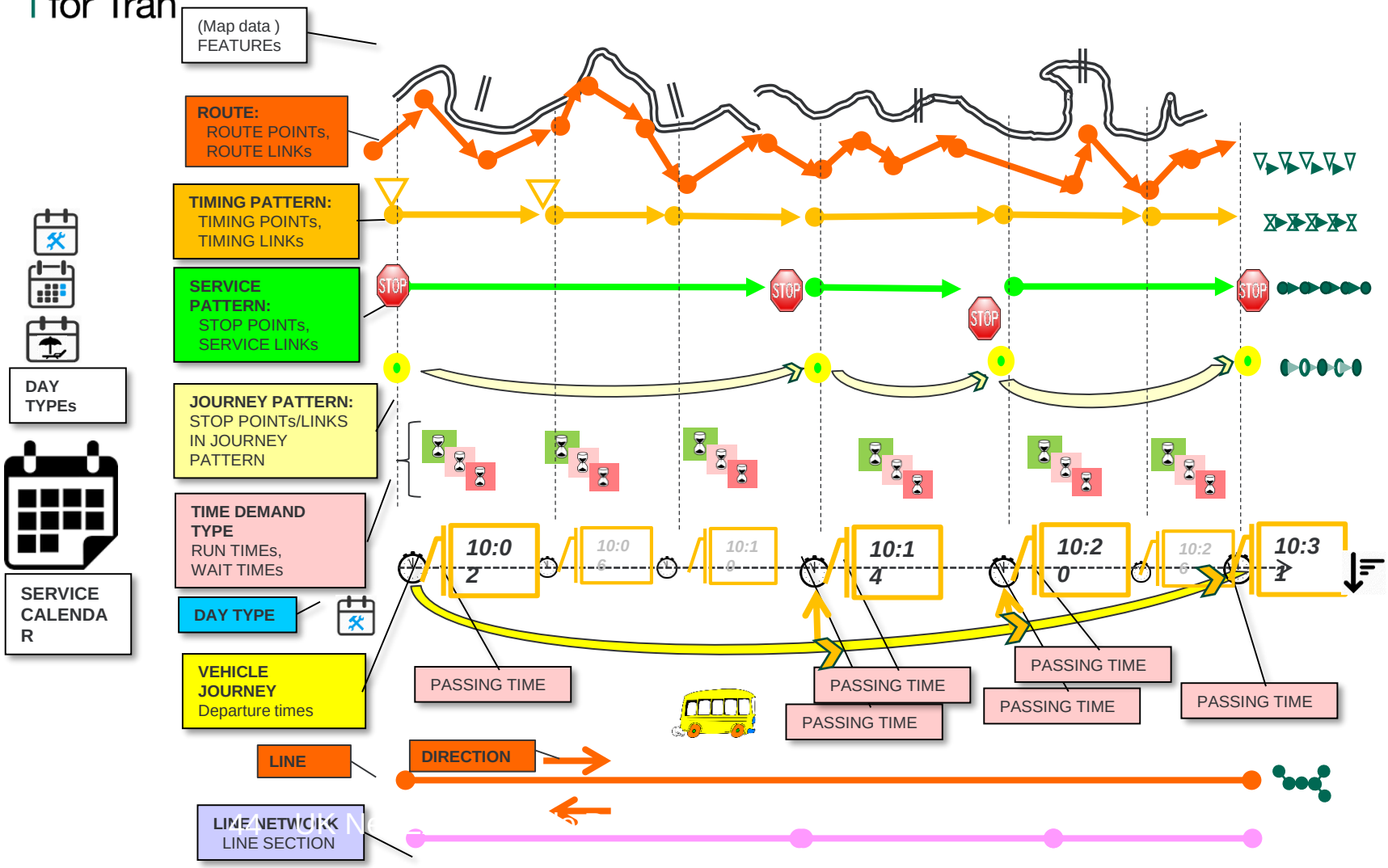
# A VEHICLE JOURNEY follows a JOURNEY PATTERN, to a TIMING PATTERN, over a SERVICE PATTERN, along a ROUTE



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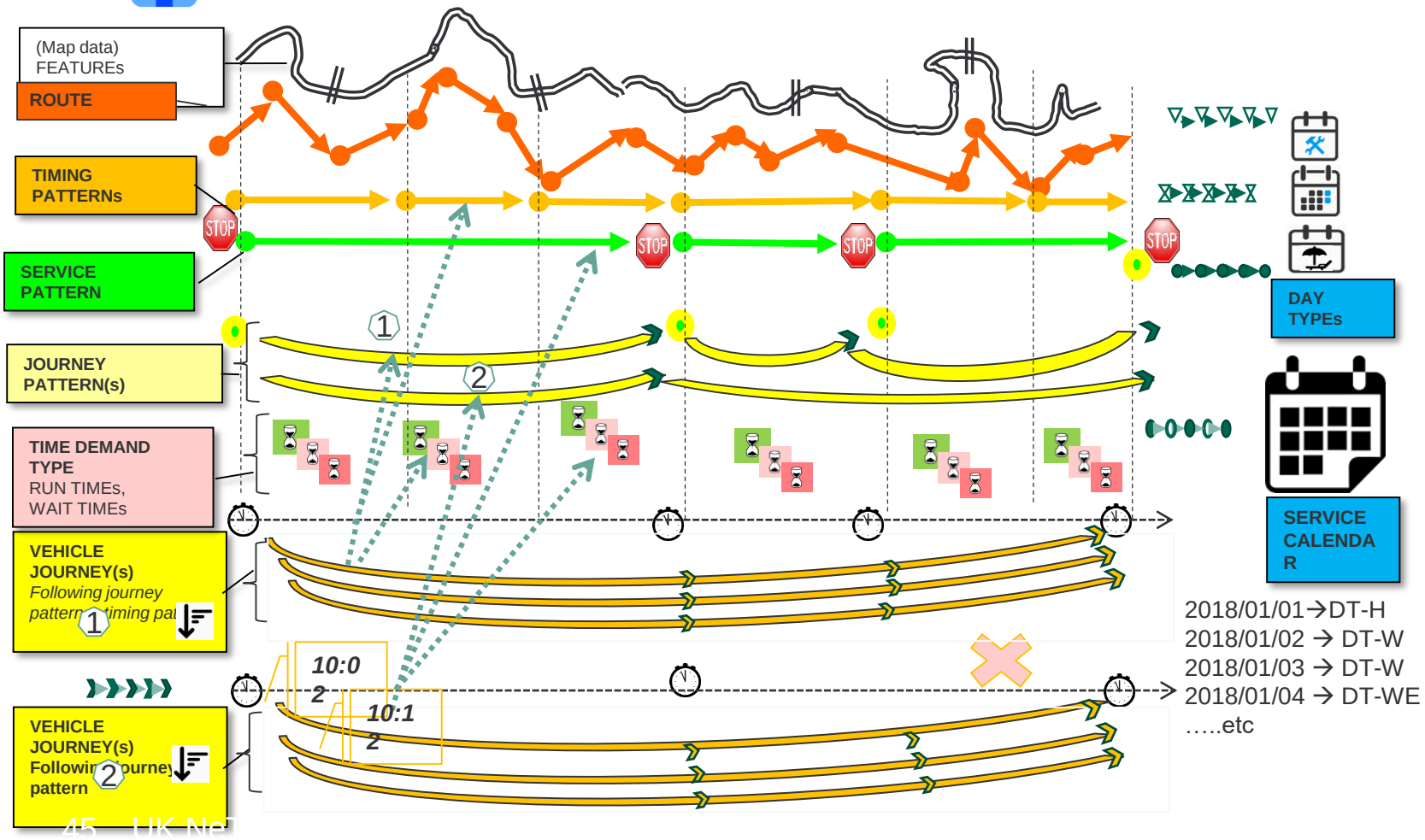
# TM- A VEHICLE JOURNEY follows a JOURNEY PATTERN to a TIMING PATTERN over a SERVICE PATTERN along a ROUTE

- Separate levels of abstraction for each concept
- Spatial & temporal aspects
- Reuse



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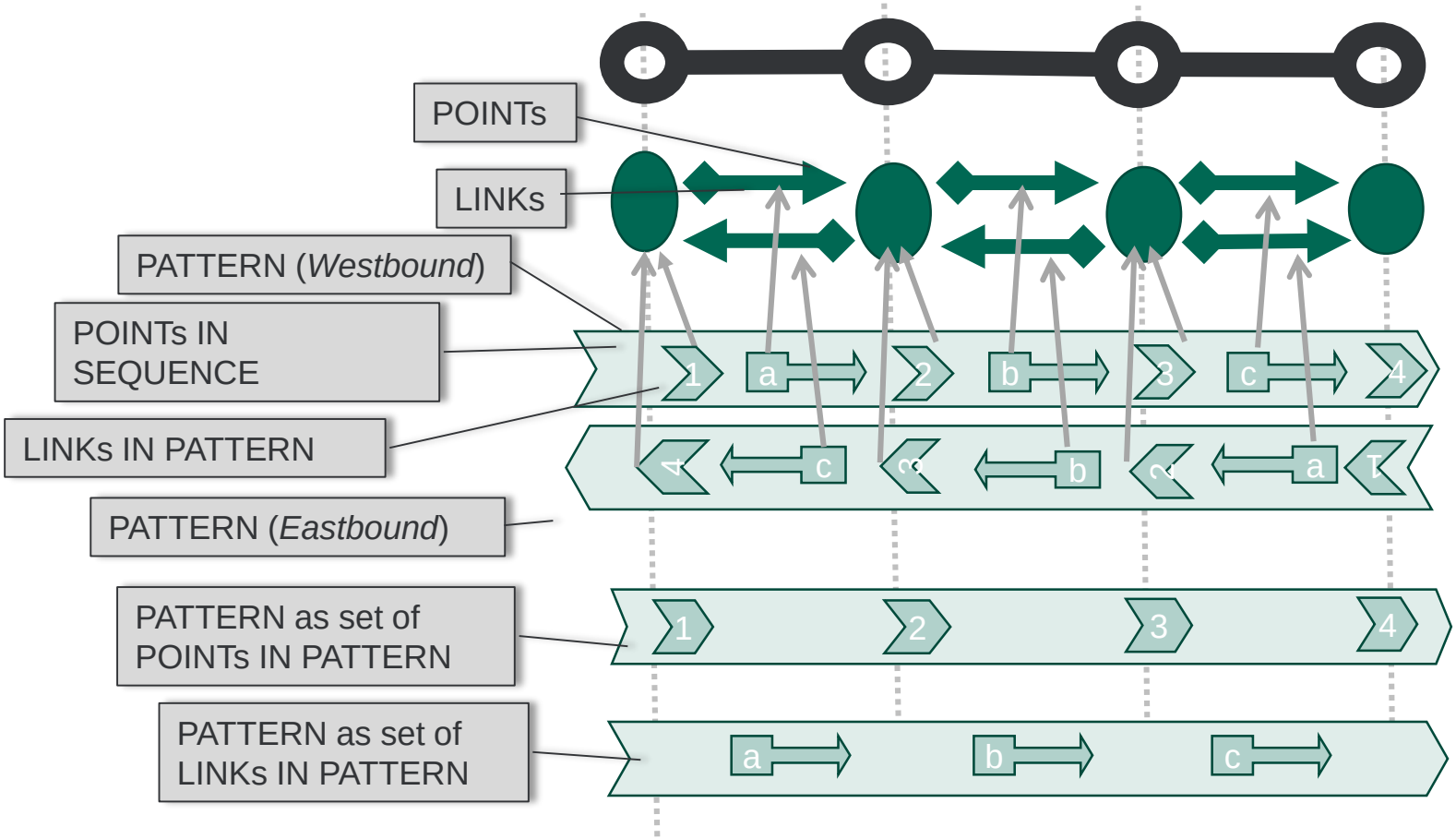
# Modelling a transport network layer – Patterns: Sequences of Points / Links




- Functionally equivalent

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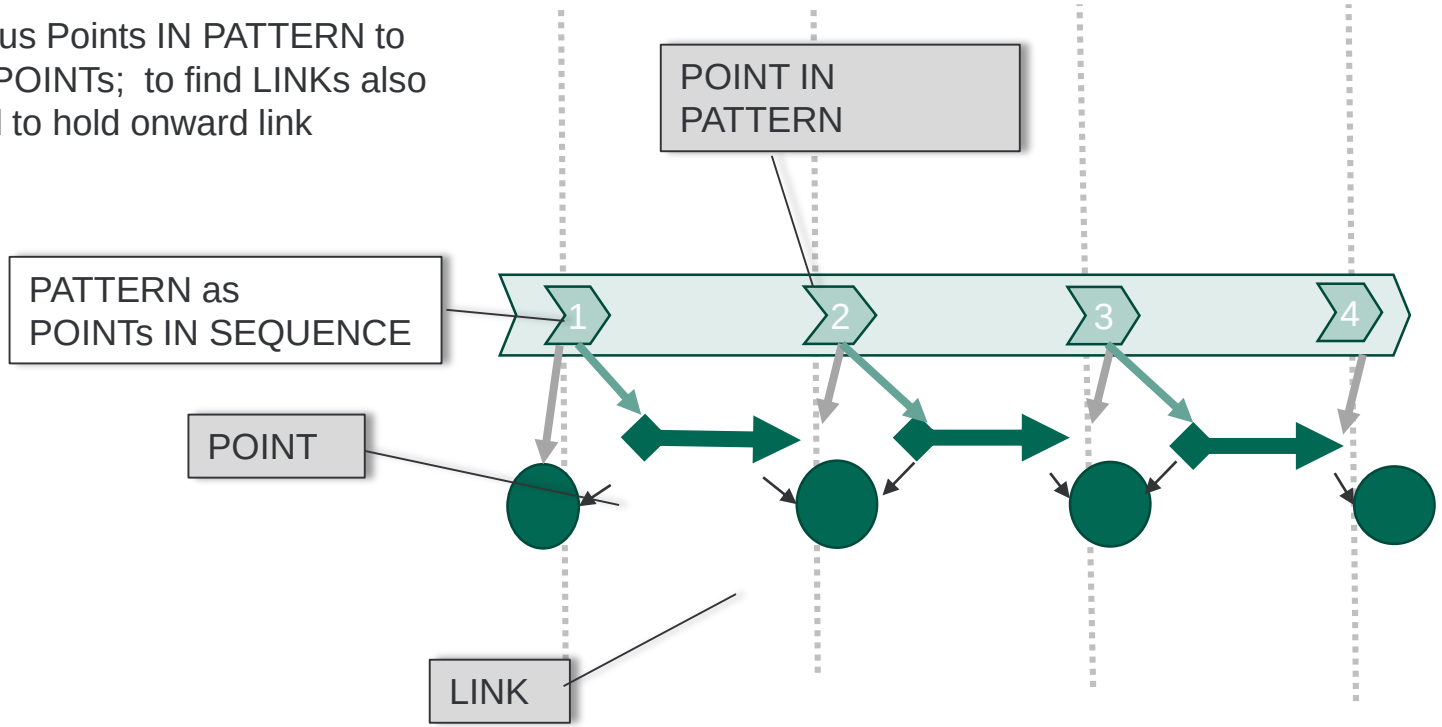
# Patterns as sequences of Points

- Can us Points IN PATTERN to find POINTs;  to find LINKs also need to hold onward link



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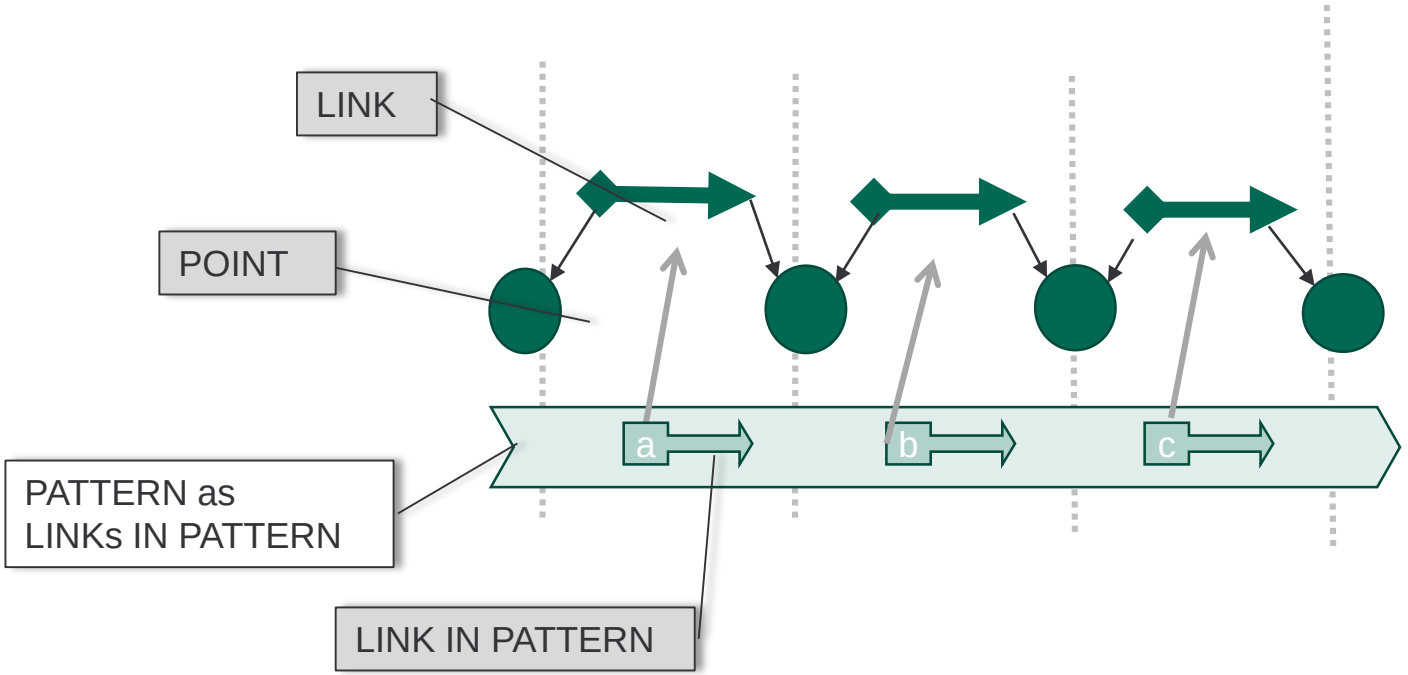
# Patterns as sequences of Links

- TransXChange uses sequence of LINKs for




- Functionally equivalent

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# Timing Patterns

- Timings for traversing links and waiting at stops /timing points are held separately
  - RUN TIME, WAIT TIME, for each stop and link
  - May have different sets for different times of day / day types (TIME DEMAND TYPES)
- Timings for a journey may be specified by a start time, then applying timings
- Allows rapid specification, easy propagation of changes, compact description of many journeys

| Run | Link | Wait | Stop | J1 | J2 | J3 |
|---|---|---|---|---|---|---|
| | | 0 | A | d10:00 | d10:30 | d11:00 |
| 2 min | A→B | | B | a10:02 | a10:32 | a11:02 |
| | | 1min | | d10:03 | d10:33 | d11:03 |
| 4 min | B→C | | C | a10:07 | a10:37 | a11:07 |
| | | 3min | | d10:10 | d10:40 | d11:10 |
| 10 min | C→D | | D | a10:20 | a10:50 | a11:20 |
| | | 1min | | d10:03 | d10:33 | d11:03 |

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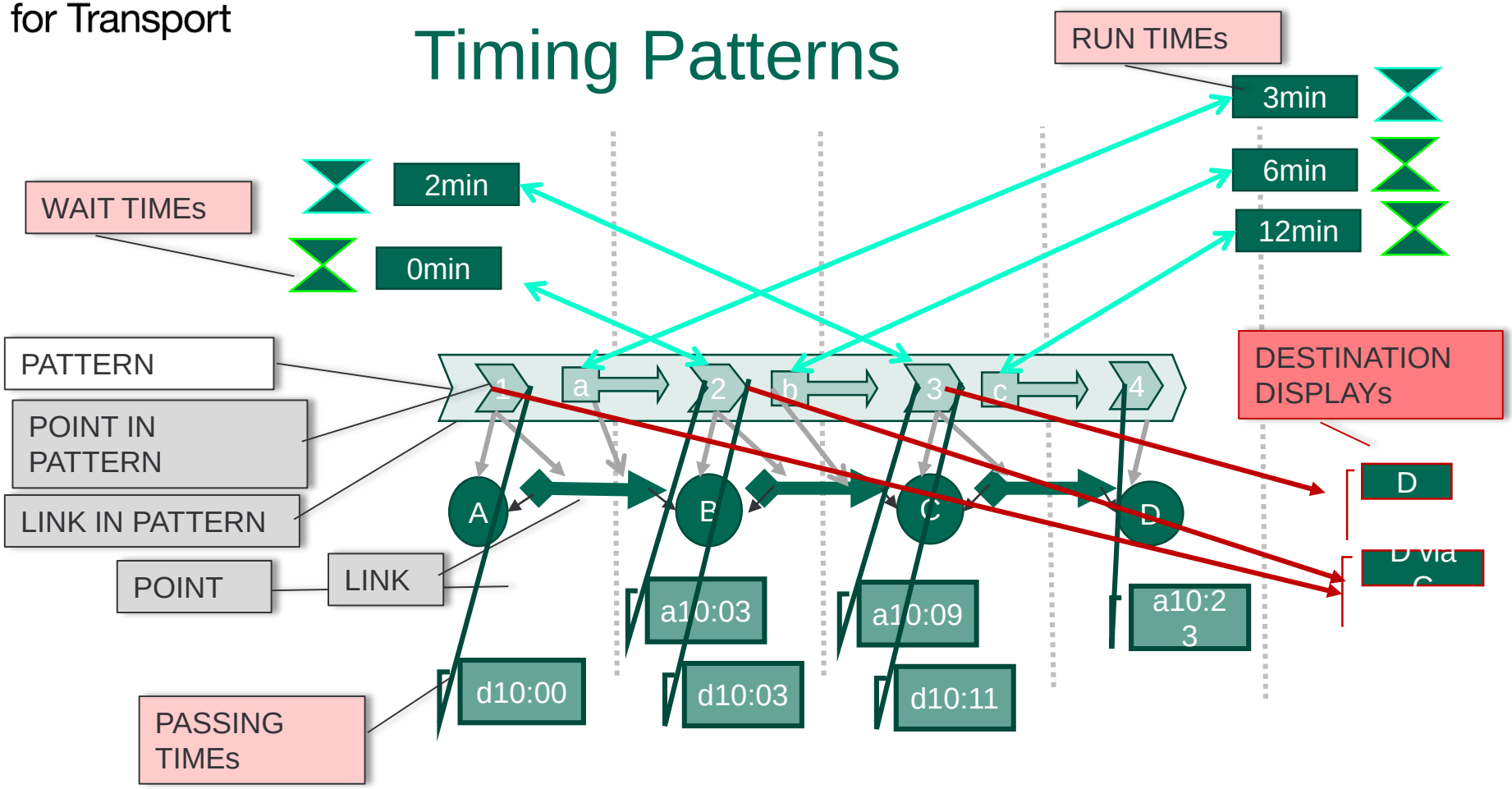
# Timing Patterns



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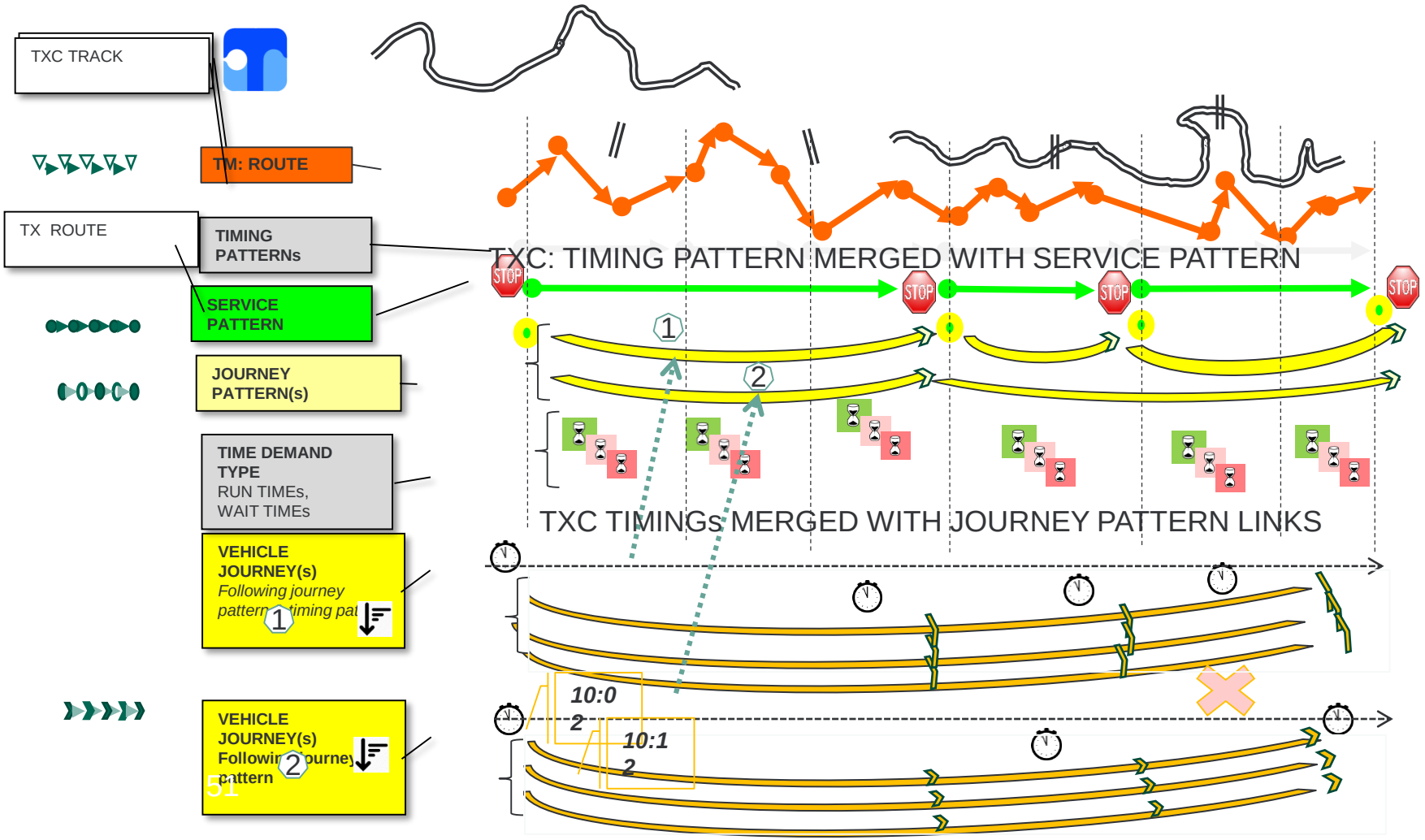
# TransXChange: Transmodel 5.1 Layers / and options were reduced by use of Views



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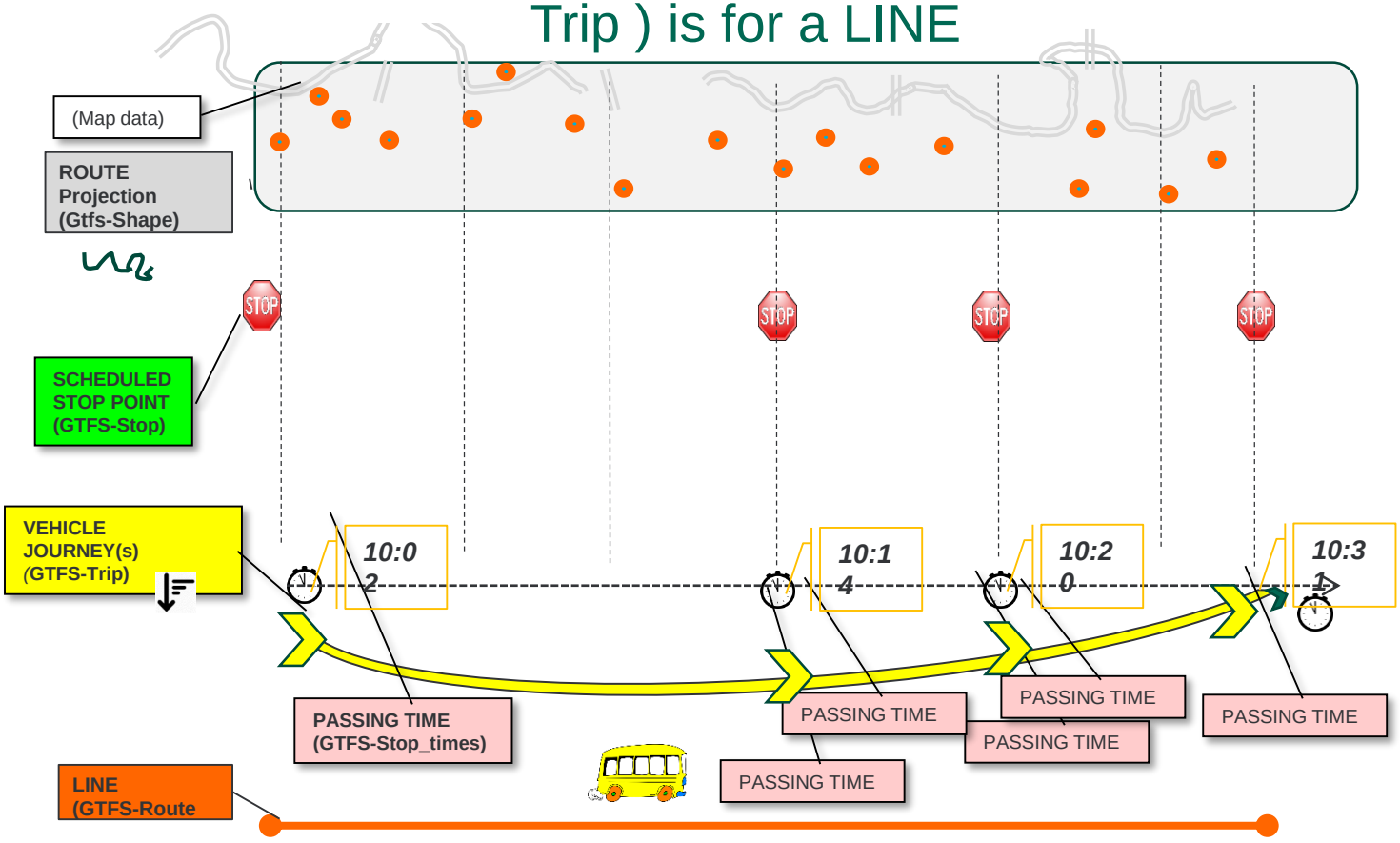
# GTFS

## A VEHICLE JOURNEY (Gtfs-Trip ) is for a LINE

- Only stops are reused
- Timing is absolute and repeated on each journey
- No info on [illegible] n



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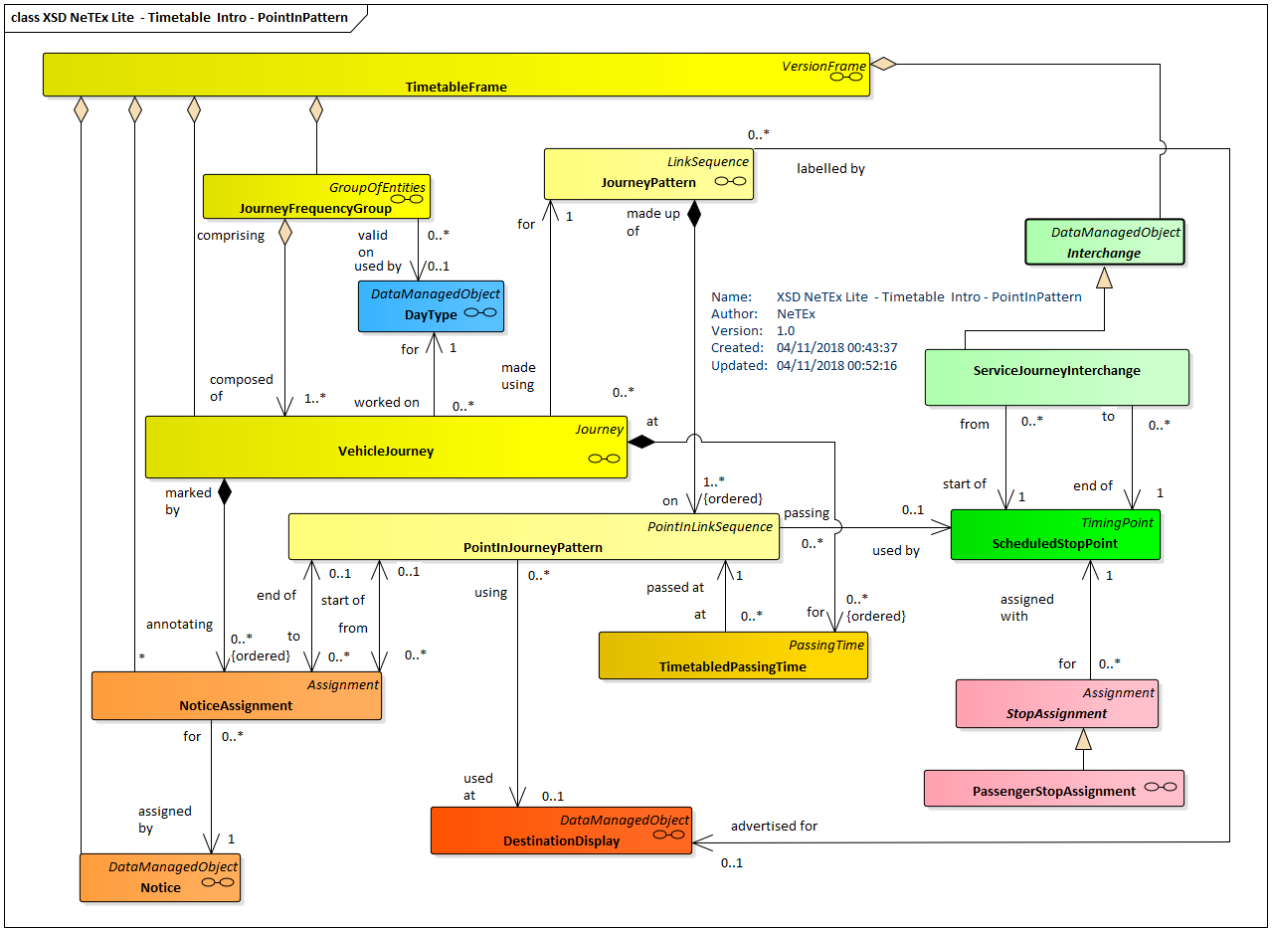
# Representation of a Timetable in NeTEx using POINT IN PATTERN



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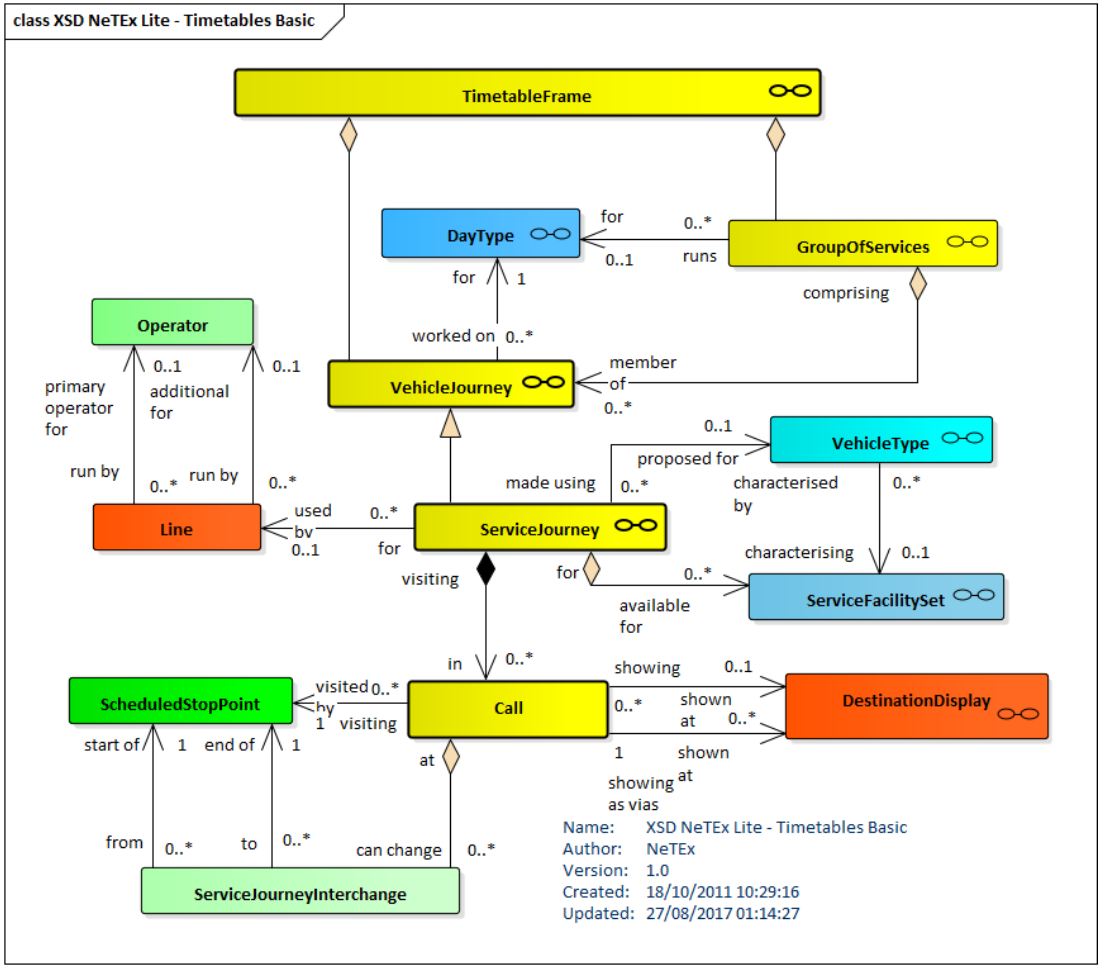
# Representation of a Timetable in NeTEx using CALLs

- A Call is a view element assembling data from several normalised components to make timetable descriptions simple – lots of attributes



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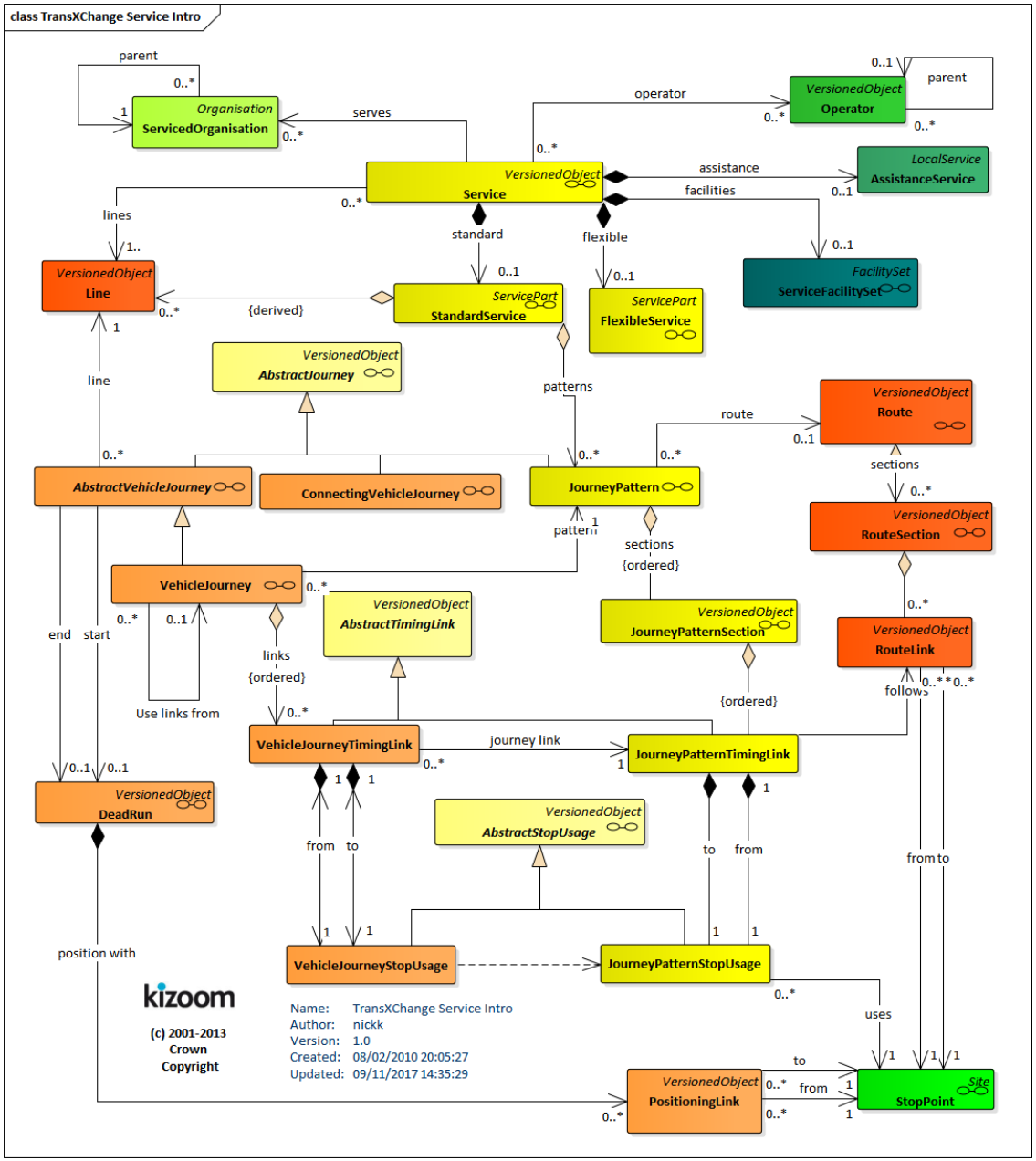
# TXC Service Journey model



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# Mapping of Day Types

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# Temporal conditions in TransXChange vs NeTEx

- TransXChange ,
  - Temporal conditions specified on “OperationalProfile”
    - Days of Week and holidays, also specific dates
  - Can be specified on Timetable, Journey Pattern, Vehicle journey level
    - Automatically Combined to specify conditions for each individual journey
    - Optimised for presentation
  - Complex / Error prone to implement. May contradict
- In TXC 2.5 SERVICE CALENDAR calendar allowed for Schools etc

- Simpler to do explicitly (as in NeTEx!) – Same end result
  - Temporal and spatial more clearly separated:
    - Undated Timetables (DAY TYPEs) vs Dated Timetables (+ SERVICE CALENDAR )
  - DAY TYPEs, PROPERTIES OF DAYS
    - Can have predefined common UK set assigned to UK holidays
  - Each VEHICLE JOURNEY specifies DAY TYPEs
  - SERVICE CALENDAR to assign DAY TYPE to dates if desired

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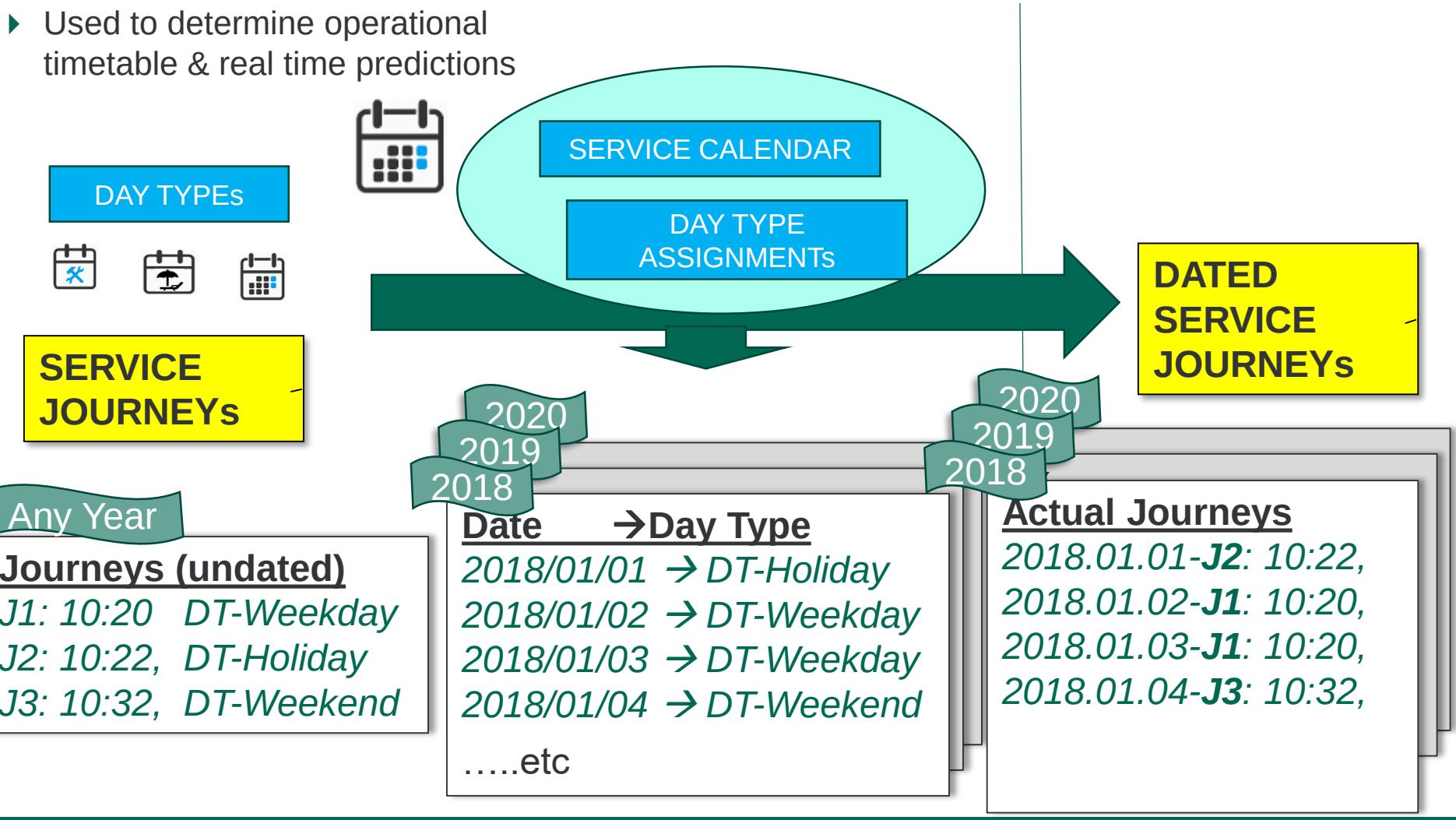
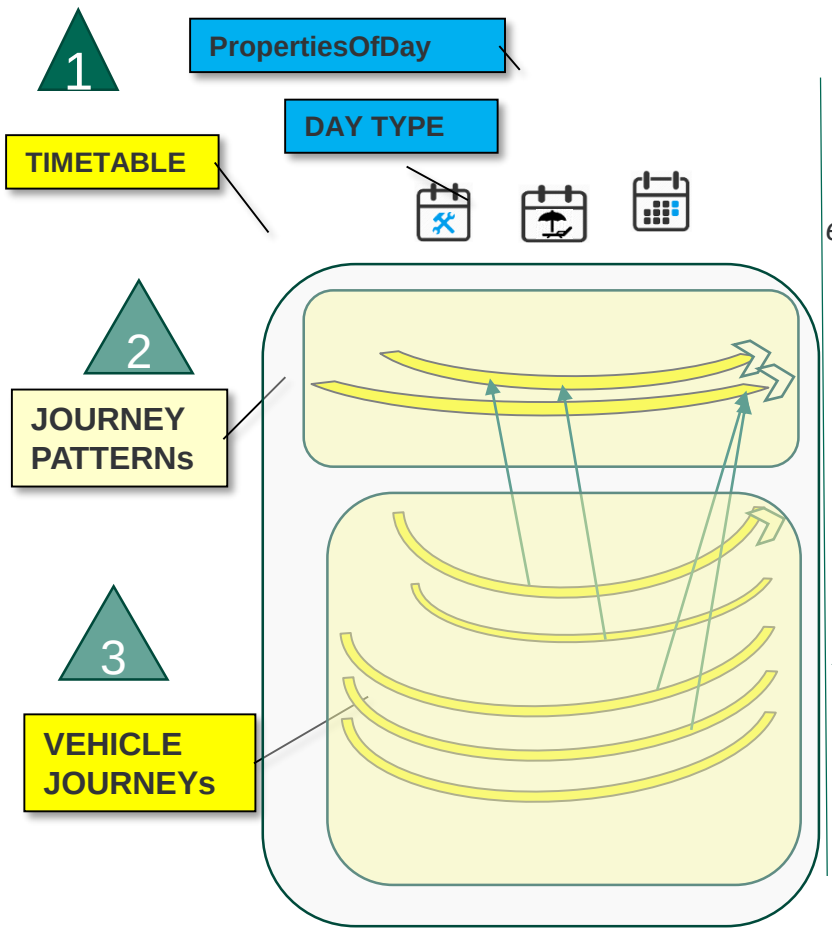
# Day types and Service Journeys

- Used to determine operational timetable & real time predictions



# Day Types & Validity conditions Inheritance vs Direct reference




1

Txc:OperationalProfile (Service)

*e.g. Everyday except Public Holidays*

2

*e.g. Market days*

Txc:Operational Profile (JourneyPattern)

3

Txc:Operational Profile (VehicleJourney)

*e.g. Market days in Winter*

- Better to require specific reference?

NeTEx:Day Type

*e.g. Everyday except Public Holidays and Market days in Winter*

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# Mapping of Sections

# Coding similar Journey Patterns

A-D – (Dense)

| | 10:00 | 10:12 | 10:20 | 1023 | |
|---|---|---|---|---|---|
| A | h:m | h:m | -- | -- | S1 |
| B | h:m | h:m | | | |
| C | h:m | h:m | h:m | h:m | S2 |
| C | h:m | h:m | h:m | h:m | |
| D | h:m | h:m | h:m | h:m | |
| A | h:m | h:m | h:m | h:m | |
| B | h:m | h:m | h:m | h:m | |
| C | h:m | h:m | h:m | h:m | |
| C | h:m | h:m | -- | -- | S3 |
| D | h:m | h:m | -- | -- | |

TXC always use of sections

- More concise if there are variations on a pattern, not otherwise
- Added complexity

NeTEx supports

Options

- Always use
- Drop (Would lose round trip info)
- Allow optional use

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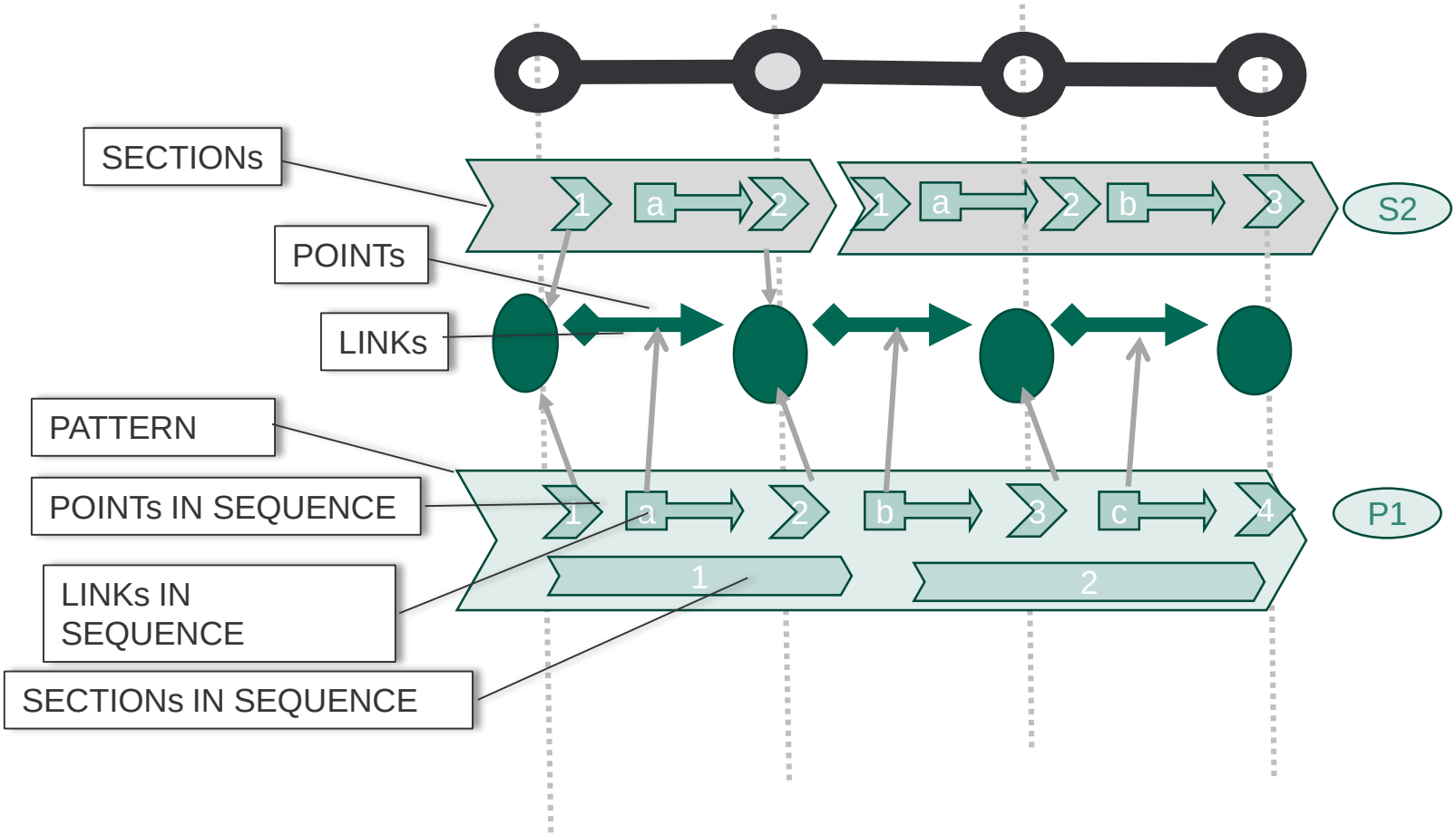
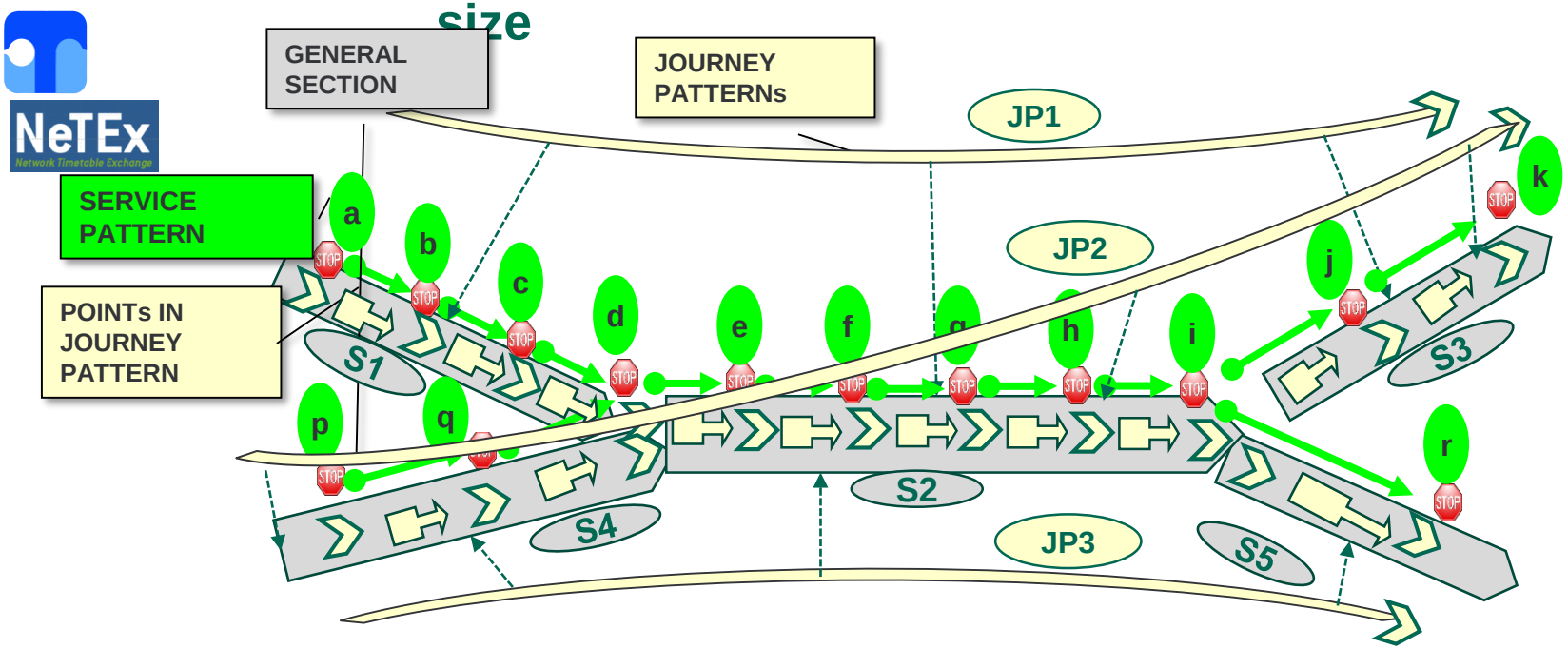
# Modelling a network - Sections



# SECTIONs: Reusable sequences of points & Links – Used in TransXChange to reduce pattern size




- Often many different route variants, similar but with slight differences
  - Routes can be very long (150 stops +)
- A SECTION allows reuse of sequences of points or links in multiple Patterns
  - Less verbose, because reuse of section definitions

**JOURNEY PATTERNs**

*JP1 = S1 + S2 + S3 = a, b, c, d, e, f, g, h, i, j, k*
*JP2 = S4 + S2 + S3 = p, q, e, f, g, h, i, j, k*
*JP3 = S4 + S2 + S5 = p, q, e, f, g, h, i, r*

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# Mapping of Journey Groupings

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# Presentation of Journeys for PI

- TransXChange, allows a subgrouping of journeys within a timetable
  - Important for visualisation of timetables for a line : which journeys should be grouped together?
  - Needed for EBSR
  - Needs to be optimised to avoid "sparse" timetables from dissimilar patterns (artefact of EBSR?)
- In TXC 2.1 the grouping is only automatic - inferred by publisher
  - Up to six combinations ➔ [Weekdays, Sat, Sun ] x [Inbound , Outbound]
- In TXC 2.5, arbitrary groupings also allowed
  - Still doesn't handle sparse timetables very well (where there is judgement needed)
- Simpler to do explicitly (as in NeTEx!)
  - Any arbitrary named grouping
  - Create "Built in" groupings corresponding to existing TXC Publisher use

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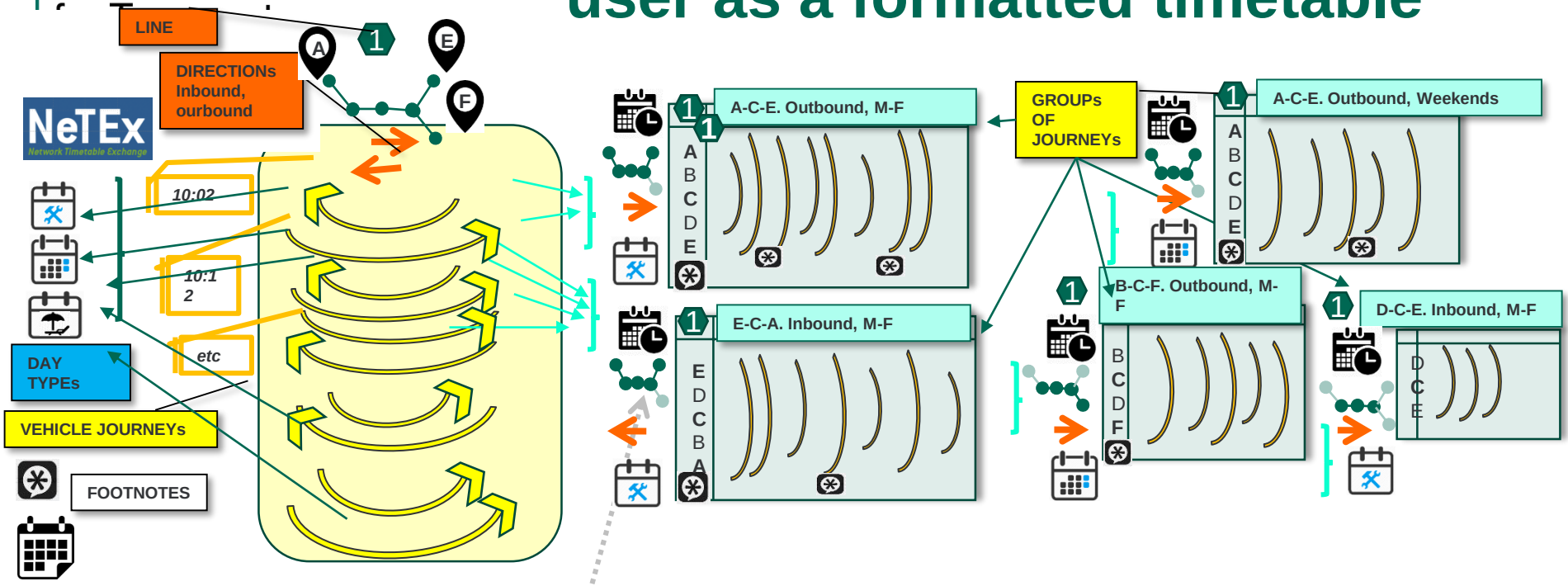
# Presentation of Journeys for Passenger Information and verification

- **Grouping of Services** TransXChange, (unlike GTFs) allows a subgrouping of journeys within a timetable
  - Important for visualisation of timetables for a line : which journeys should be grouped together to present?
    - *Outbound Journeyneys A to B , Monday to Friday, Inbound journeys B to A*
  - Needed for EBSR manual verification (TXC Publisher uses)
  - Needs to be optimised to avoid "sparse" timetable layouts arising from journeys with very from dissimilar patterns
    - This may be an artefact of EBSR licensing costs: Ooerators incentivised operators to bundle together as many joruneys as posisbel on the same registration
- **In TXC 2.1 the grouping is only automatic** - inferred by publisher
  - Up to six combinations ➔ [Weekdays, Sat, Sun ] x [Inbound , Outbound]
- **In TXC 2.5 the grouping arbitrary user defined groupings also allowed**
  - Still doesn't handle sparse timetables very well (where there is
- Simpler to do explicitly (as in NeTEx!)
  - Any arbitrary named grouping can be specified as a GROUP OF SERVICES

# Presenting journeys to the user as a formatted timetable




- A set of timetable data for a given line may include journeys following many different patterns, in different directions and subject to different validity conditions
- To the user this is usually presented in subsets of similar data by direction, etc
  - E.g. *Weekday outbound, Weekday inbound, Saturday outbound, Sunday outbo*und, etc
  - E.g. Journeys for Patterns *A-B-C-E, A-D-C-E, A-B-F, B-C-E,* etc
- Number of useful sub groupings depends on size & complexity of data set
- If journey patterns are disimilar get verbose “Sparse” timetables

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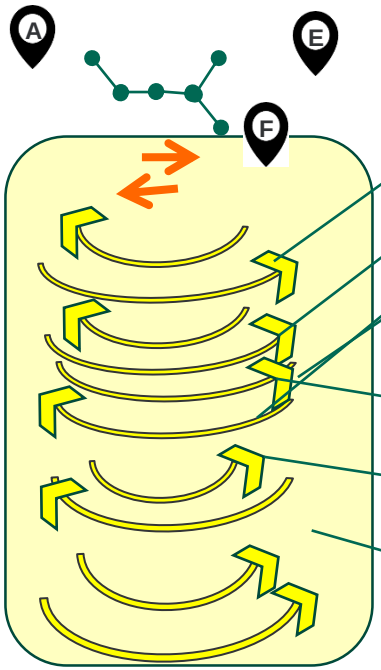
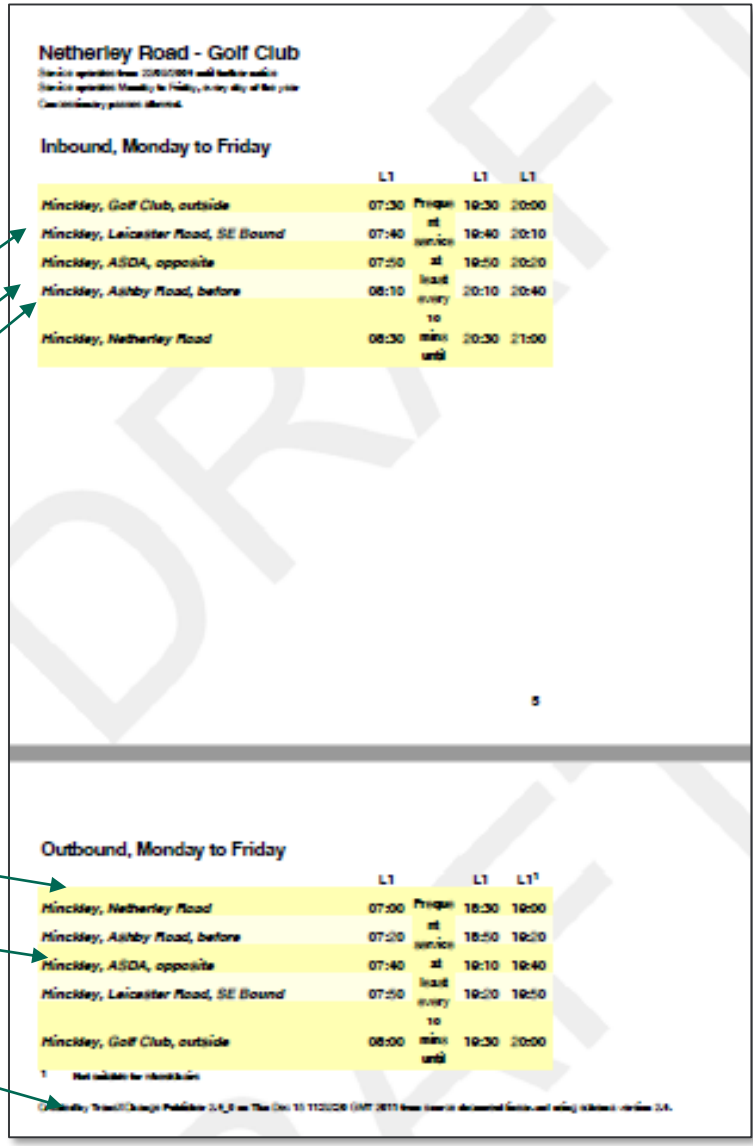
# TXC: Assignment of journeys to service groups for presentation

DAY TYPEs



Netherley Road - Golf Club

Inbound, Monday to Friday

| | L1 | | L1 | L1 |
|---|---|---|---|---|
| *Hinckley, Golf Club, outside* | 07:30 | Frequent service at least every 10 mins until | 19:30 | 20:00 |
| *Hinckley, Leicester Road, SE Bound* | 07:40 | | 19:40 | 20:10 |
| *Hinckley, ASDA, opposite* | 07:50 | | 19:50 | 20:20 |
| *Hinckley, Ashby Road, before* | 08:10 | | 20:10 | 20:40 |
| *Hinckley, Netherley Road* | 08:30 | | 20:30 | 21:00 |

Outbound, Monday to Friday

| | L1 | | L1 | L1[1] |
|---|---|---|---|---|
| *Hinckley, Netherley Road* | 07:00 | Frequent service at least every 10 mins until | 18:30 | 19:00 |
| *Hinckley, Ashby Road, before* | 07:20 | | 18:50 | 19:20 |
| *Hinckley, ASDA, opposite* | 07:40 | | 19:10 | 19:40 |
| *Hinckley, Leicester Road, SE Bound* | 07:50 | | 19:20 | 19:50 |
| *Hinckley, Golf Club, outside* | 08:00 | | 19:30 | 20:00 |

1 Not suitable for wheelchairs

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# Grouping Journeys

- For optimum readability and use of space, journeys need to be :
  - Rows ordered vertically by common journey pattern
  - Columns ordered horizontally by time
  - Grouped by JOURNEY PATTERN
  - Grouped by DAY TYPE

A-D – (Dense)

| | 10:00 | 10:12 | 10:20 |
|---|---|---|---|
| A | h:m | h:m | -- |
| B | h:m | h:m | h:m |
| C | h:m | h:m | h:m |
| C | h:m | h:m | ---- |
| D | h:m | h:m | h:m |

A-G (Sparse!)

| | 10:00 | 11:00 | 12:00 |
|---|---|---|---|
| A | h:m | h:m | ---- |
| B | h:m | h:m | ---- |
| C | h:m | h:m | ---- |
| D | h:m | h:m | |
| E | ---- | ---- | h:m |
| F | ---- | ---- | h:m |
| G | ---- | ---- | h:m |

A-D

| | 10:00 | 11:00 |
|---|---|---|
| A | h:m | h:m |
| B | h:m | h:m |
| C | h:m | h:m |

D-G

| | 12:00 |
|---|---|
| D | h:m |
| E | h:m |
| F | h:m |
| G | h:m |

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# Mapping of EBSR data elements

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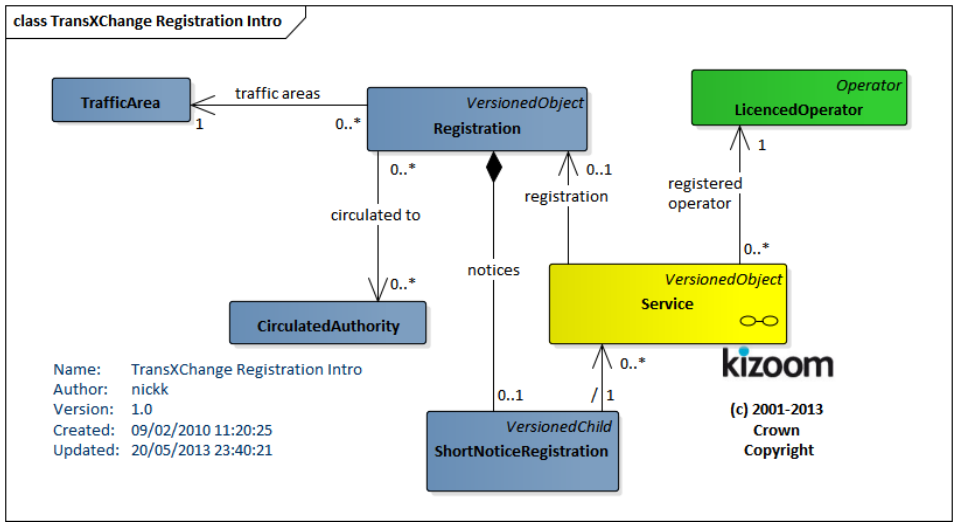
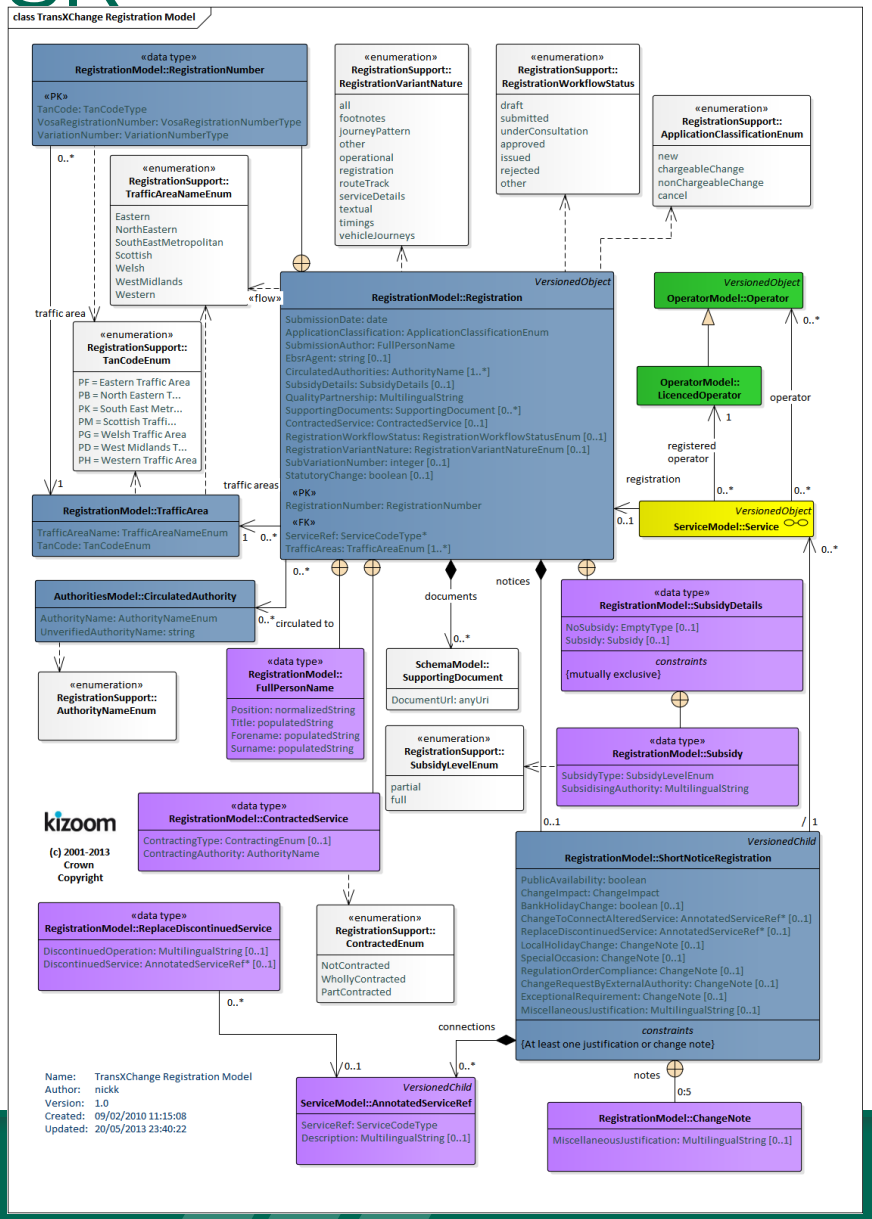
# TXC Registration – UK specific Function for EBSR

- Registration has elements UK specific to UK processes
  - ***Registration, Short Notice Registration,***
  - ***TrafficArea, Circulated Authority***
  - ***Subsidy, Supporting documents*** etc
- Some of these are in ***TxC:Registration,*** others are spread around ***Txc:Service, , Txc:Operator, Txc:VehicleJourney*** and elsewhere
  - E.g. VOSA licences, subsidy basis, etc



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# Summary