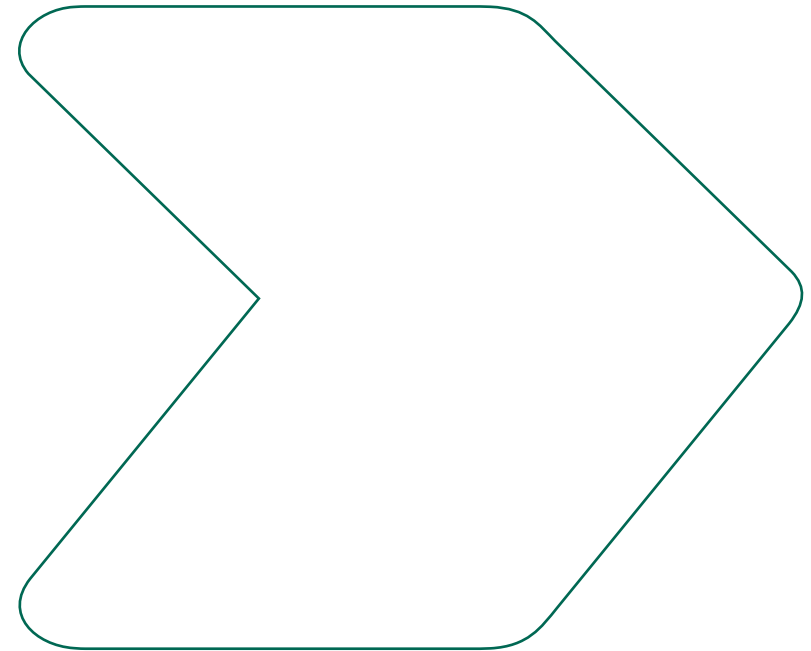
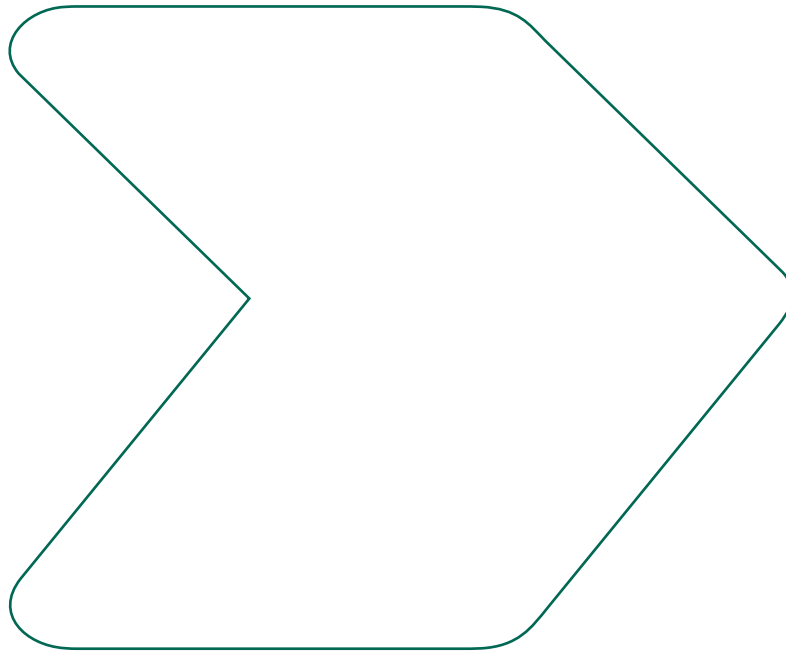
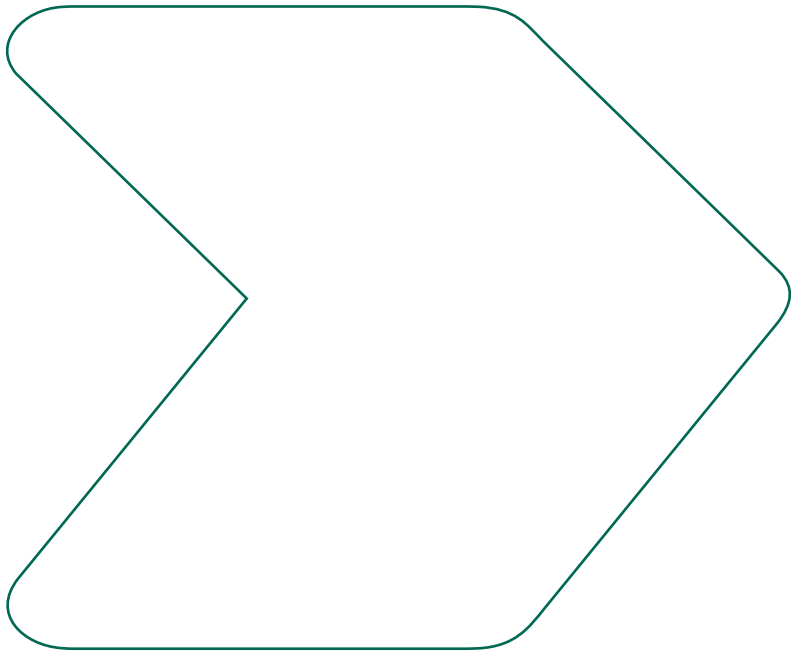


TransXChange: Public Transport Information Profile

Version 1.1 (Final)



Introduction





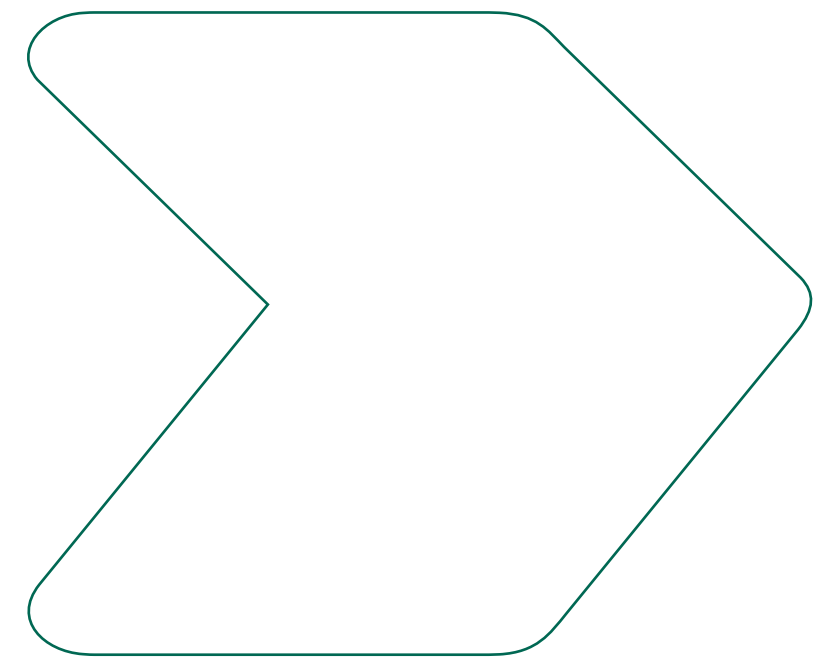
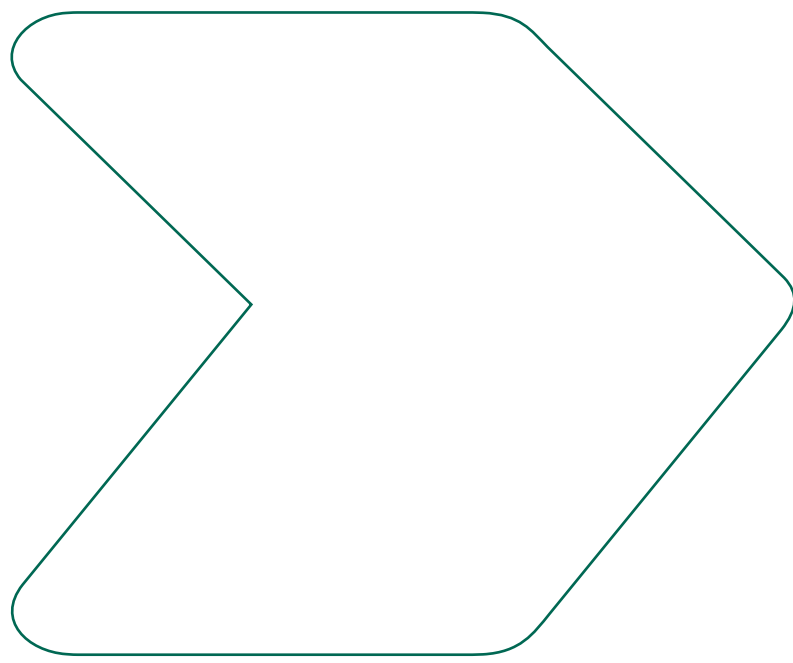
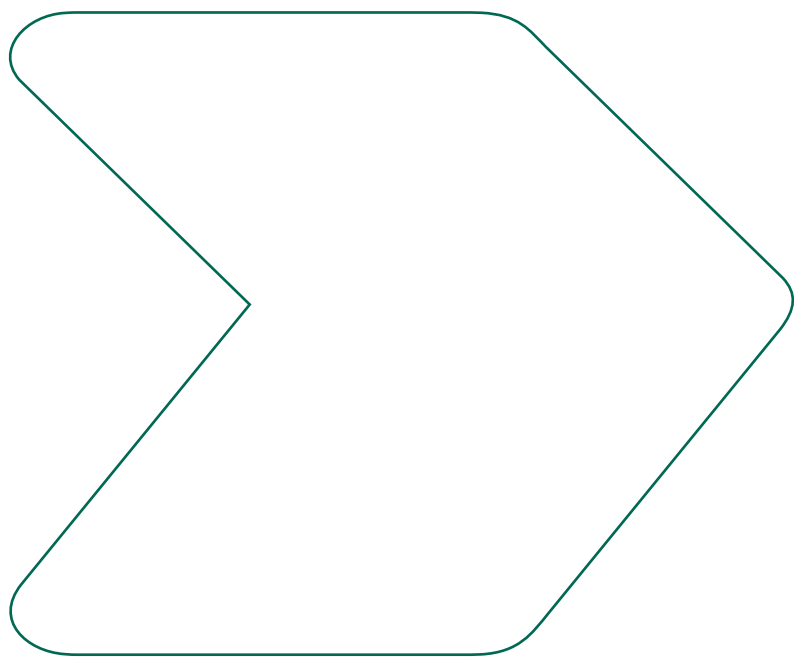
Aim of the TransXChange PTI Profile

- Perception that TXC is too complicated
 - Too many different ways of encoding the same data
 - ⇒ errors in creation and/or interpretation
- Aim is to create a simplified profile
 - Used consistently by all systems / operators.
 - Clear, unambiguous data, backed up by simpler, focussed, guidance.
 - More readily understood by downstream open data users.
 - Higher take-up ⇒ better applications.
 - Easier diagnostics / fault finding.
- Business case for change and proposed changes validated by survey.
 - Avoid “adding cost” to a business ⇒ changes minimised



The PTI Profile

Summary of usage and/or restrictions from full schema





The PTI Profile : Operators (1)

- A file shall contain only one operator.
- `OperatorShortName` is mandated by the schema
 - Where possible, match “Operator Public Name” in National Operator Code (NOC) database
 - Has to be 24 characters or fewer, though ⇒ Operator choice as to how to shorten
- The use of `NationalOperatorCode` is mandatory.
 - Use as reference ⇒ take name of operator from “Operator Public Name” in NOC
 - Operators will need to check their NOC entries, and maybe edit or correct them.
 - NOC to remain a system maintained and hosted by Traveline (contact noc@traveline.info)
- `OperatorCode` is not required but may be populated for compatibility with historic systems.
- `TradingName`, where different to `OperatorShortName`, shall be provided.





The PTI Profile : Operators (2)

- `LicenceNumber` shall be provided, where appropriate
 - Use as reference ⇒ links to external systems e.g. NOC, DVSA
 - `OperatorNameOnLicence` can be included in the TXC for readability, but should be fully identified from other sources using the `LicenceNumber`
- `id` attribute is an internal reference. It is recommended that this be the NOC, too
- Other elements in `Operator` should not be provided.
 - In particular, contact information shall be taken from fields in NOC, referenced by `NationalOperatorCode`, and not included in the TXC.

```
<Operators>
  <Operator id="NCTR">
    <NationalOperatorCode>NCTR</NationalOperatorCode>
    <OperatorShortName>NCT</OperatorShortName>
    <TradingName>Nottingham City Transport</TradingName>
    <LicenceNumber>PB0002362</LicenceNumber>
  </Operator>
</Operators>
```





The PTI Profile : Services and lines (1)

- A **LINE** is a collection of vehicle journeys (trips) that share some high degree of commonality of route and timings, and are all known by the same **LINE NAME**.
 - For example : “1”, “1B”, “100”, “calverton connection”
- A **SERVICE** is a collection of **LINEs** that together make up a coherent set of vehicle journeys.
 - For example : “1/1A”, where “1” might be “A to B” and “1A” might be “A to B via C”, which together make up the complete service between A and B.
- Note: This is just the definition and examples to illustrate the concept – there is no requirement for an operator to submit e.g. “1” and “1A” as two lines within the same service grouping if they do not wish to do so.





The PTI Profile : Services and lines (2)

- There shall be one `Service` element per file, and no more.
 - The `Service` element may hold one or more lines, so long as the lines are related
- `ServiceCode` shall be unique for the group of lines
 - It shall not include a version number
 - For registered services this shall be the TAN registration number with “/” replaced with “:”
 - e.g. PF0000459:140
 - It must remain consistent between versions
- A line shall have a unique `id` attribute which comprises:
 - The most granular NOC for the operator (e.g. FESX for First Group’s bus operations in Essex)
 - The `ServiceCode` (to assist in linking to other lines in the same group of lines)
 - The line Name
 - The components shall be separated by colons “:”
 - The `id` shall not include the version number





The PTI Profile : Services and lines (3)

- To link timetables for multi-operator routes (e.g. commercial / tendered) use `Service/ToBeMarketedWith`
 - The `Description` field of the `ToBeMarketedWith` element shall refer to the (external) line ID

Examples (two service 8s, one operator):

```
<Service RevisionNumber="1">
  <ServiceCode>PF0000599:41</ServiceCode>
  <Lines>
    <Line id="FESX:PF0000599:41:8">
      <LineName>8</LineName>
    </Line>
  </Lines>
  ...
  <RegisteredOperatorRef>FESX</RegisteredOperatorRef>
  ...
</Services>
```

```
<Service RevisionNumber="4">
  <ServiceCode>PF0000599:75</ServiceCode>
  <Lines>
    <Line id="FESX:PF0000599:75:8">
      <LineName>8</LineName>
    </Line>
  </Lines>
  ...
  <RegisteredOperatorRef>FESX</RegisteredOperatorRef>
  ...
</Services>
```





The PTI Profile : Service version numbering

- Services shall be given version numbers using the `RevisionNumber` attribute of `Service`.
 - Lines may also have versions numbers using the `RevisionNumber` attribute of `Line`, but this isn't required.
 - Two versions of the same service shall never appear in the same TXC document, as this would require duplication of keys.
- It is permissible to have separate timetables for the same line (e.g. seasonal variations) in the same version. These may only be encoded as:
 - One service / two lines
 - Unique line ids extended appropriately (consistent between versions)
 - E.g. `FESX:PF0000599:75:8:summer`, `FESX:PF0000599:75:8:winter`
 - A single line
 - In both cases, `VehicleJourneys` shall be encoded to the right operating dates (as `OperatingProfile` is defined in `VehicleJourney` – see later).

```
<Service RevisionNumber="1">
  <ServiceCode>PF0000599:41</ServiceCode>
  <Lines>
    <Line id="FESX:PF0000599:41:8">
      <LineName>8</LineName>
    </Line>
  </Lines>
  ...
  <RegisteredOperatorRef>FESX</RegisteredOperatorRef>
  ...
</Services>
```

```
<Service RevisionNumber="4">
  <ServiceCode>PF0000599:75</ServiceCode>
  <Lines>
    <Line id="FESX:PF0000599:75:8">
      <LineName>8</LineName>
    </Line>
  </Lines>
  ...
  <RegisteredOperatorRef>FESX</RegisteredOperatorRef>
  ...
</Services>
```





The PTI Profile : Direction flags and line descriptions

- Direction of a particular JourneyPattern shall be defined in StandardService/JourneyPattern, and not elsewhere.
- Each Line shall have an OutboundDescription and/or an InboundDescription that describes each direction of the service for public consumption. For example, “Oxford – Milton Keynes – Bedford – Cambridge” and “Cambridge – Bedford – Milton Keynes – Oxford”.
- Direction enumeration clockwise shall map to OutboundDescription and anti-clockwise to InboundDescription
- Other description elements shall be omitted where permitted. In particular, Service/Description is intended for registrations and does not contain public-facing information.





The PTI Profile : Links to services in legacy systems

- The PTI Profile links to OTC Registration numbers for checking & comparison by using `ServiceCode` (see earlier)
- Using the `Registrations` block is not recommended, however, because it contains significant extraneous, inappropriate information (see image)
- If a link to another legacy systems is required, use `Service/PrivateCode` to hold the legacy reference.

```
<Registrations>
  <Registration>
    <ServiceRef></ServiceRef>
    <SubmissionDate></SubmissionDate>
    <VosaRegistrationNumber>
      <TanCode></TanCode>
      <LicenceNumber></LicenceNumber>
      <RegistrationNumber></RegistrationNumber>
    </VosaRegistrationNumber>
    <ApplicationClassification></ApplicationClassification>
    <VariationNumber></VariationNumber>
    <SubmissionAuthor>
      <Position></Position>
      <Title></Title>
      <Forename></Forename>
      <Surname></Surname>
    </SubmissionAuthor>
    <TrafficAreas>
      <TrafficArea>
        <TrafficAreaName></TrafficAreaName>
      </TrafficArea>
    </TrafficAreas>
    <CirculatedAuthorities>
      <CirculatedAuthority>
        <AuthorityName></AuthorityName>
      </CirculatedAuthority>
    </CirculatedAuthorities>
    <SubsidyDetails>
      <NoSubsidy></NoSubsidy>
    </SubsidyDetails>
  </Registration>
</Registrations>
```





The PTI Profile : Other aspects of services and lines

- To minimise over-ridden data, `OperatingProfile` shall not be used in `Service` but shall be declared in full in each `VehicleJourney`
- The `PublicUse` flag shall be mandatory.
 - For services which are not open to the general public but have some restriction, e.g. school services requiring passes, it shall have the value `False`
 - Other services shall have the value `True`
- Registration information, such as `ServiceClassification`, `StopRequirements` and `CommercialBasis` is of little use in passenger information and is not required in `Service`.
- Each standard bus service shall have a `StandardService` element.
- There shall be as many `JourneyPattern` elements as required to fully represent the different patterns of operation.
- Services that run “until further notice” shall not have an end date in the `OperatingPeriod`.
 - End dates long into the future shall be avoided, as this implies that the service ends.





The PTI Profile : Stops

- `AnnotatedStopRef` elements are mandated when there is an appropriate, active stop in NaPTAN;
- A `StopPoint` element may only be used as referenced in the BODS Guidance
- `CommonName`, `Indicator`, `LocalityName` and `LocalityQualifier`, if present, are for readability only – the actual values shall be taken from NaPTAN. Other additional elements for `AnnotatedStopPointRef` shall not be used.
- Stop points shall be appropriate to the mode, i.e. bus stops and not rail or ferry stops





The PTI Profile : Routes and tracks

- Route (**and** RouteSections / RouteLinks) shall be mandatory
- Tracks (RouteLink/Track elements) are recommended but not mandatory at this time
 - However, operators should strive to provide at least one point per road as per EBSR / registrations





The PTI Profile : Journey pattern sections and timing links (1)

- The “to” stop of a `JourneyPatternTimingLink` and the “from” stop of the following link shall have exactly the same information:
 - `StopPointRef` is mandatory in the schema
 - `TimingPointStatus` and `Activity` shall be mandatory for the profile
 - `WaitTime` is optional, as required
 - `DynamicDestinationDisplay` is recommended
 - Aids the depiction of “towards” type messages on e.g. circulars.
 - Use of abbreviated names shall be minimised and, where used, readily understandable and consistently applied.
- For `TimingPointStatus`, only the newer descriptive enumerations shall be used:
 - `principalTimingPoint` (note spelling) for timing points
 - `otherPoint` for non-timing points.
- As information is duplicated, pick up and set down activity shall be coded as `pickUpAndSetDown`





The PTI Profile : Journey pattern sections and timing links (2)

- TXC allows many elements to have defaults, and to be over-ridden by more precise elements. This can lead to errors when merging from different places.
- The profile is therefore recommending that over-riding shall be eliminated as far as possible by defining an element fully in the most appropriate place.
- This implies that journey timings should be in `VehicleJourneys`. Cannot eliminate `JourneyPatternTimingLinks` though.

```
<ServiceRef>703</ServiceRef>
<LineRef>2</LineRef>
<JourneyPatternRef>1</JourneyPatternRef>
<DepartureTime>06:45:00</DepartureTime>
<VehicleJourneyTimingLink id="19">
  <JourneyPatternTimingLinkRef>4</JourneyPatternTimingLinkRef>
  <RunTime>PT1M53S</RunTime>
</VehicleJourneyTimingLink>
<VehicleJourneyTimingLink id="20">
  <JourneyPatternTimingLinkRef>5</JourneyPatternTimingLinkRef>
  <RunTime>PT1M47S</RunTime>
</VehicleJourneyTimingLink>
<VehicleJourneyTimingLink id="21">
  <JourneyPatternTimingLinkRef>6</JourneyPatternTimingLinkRef>
  <RunTime>PT2M39S</RunTime>
</VehicleJourneyTimingLink>
<VehicleJourneyTimingLink id="22">
  <JourneyPatternTimingLinkRef>7</JourneyPatternTimingLinkRef>
  <RunTime>PT0M51S</RunTime>
</VehicleJourneyTimingLink>
```



The PTI Profile : Journey pattern sections and timing links (3)

- Profile will therefore mandate that *either* :
 - All `RunTimes` shall be fully defined within `JourneyPatternTimingLinks`, which shall be used in `JourneyPatterns`, and no `VehicleJourneyTimingLinks` shall be used; or
 - All `RunTimes` in `JourneyPatternTimingLinks` shall be `PT0M` (i.e. no time), and all actual run times shall be defined within `VehicleJourneyTimingLinks`.
- In the latter case, the list and order of `VehicleJourneyTimingLinks` shall match exactly the `JourneyPatternTimingLinks` in the referenced `JourneyPattern`, with a run time provided for each.
- This also applies to other detail within ‘to’ and ‘from’ elements in links – if it is to be defined in `VehicleJourneyTimingLinks`, then all elements are to be defined there.



The PTI Profile : Journey pattern sections and timing links (4)

- There is a desire for TXC files to be more helpful to publishers, to assist in making a timetable readable. It is therefore mandated that JourneyPatternTimingLink elements shall use the SequenceNumber attribute.

Seq No	Name	AtcoCode	Trip 1	Trip 2
1	One	1580ABCD	08:00	08:15
2	Two	1580EFGH	08:02	08:17
3	Three	1580IJKL		08:23
4	Four	1580MNPQ	08:07	-

```

<JourneyPatternSection id="ABC1_jps1">
  <JourneyPatternTimingLink id="ABC1_jps1_t11">
    <From SequenceNumber="1">
      <StopPointRef>1580ABCD</StopPointRef>
    </From>
    <To SequenceNumber="2">
      <StopPointRef>1580EFGH</StopPointRef>
    </To>
    <RunTime>PT2M</RunTime>
  </JourneyPatternTimingLink>
  <JourneyPatternTimingLink id="ABC1_jps1_t12">
    <From SequenceNumber="2">
      <StopPointRef>1580EFGH</StopPointRef>
    </From>
    <To SequenceNumber="4">
      <StopPointRef>1580MNPQ</StopPointRef>
    </To>
    <RunTime>PT5M</RunTime>
  </JourneyPatternTimingLink>
</JourneyPatternSection>

```

```

<JourneyPatternSection id="ABC1_jps2">
  <JourneyPatternTimingLink id="ABC1_jps2_t11">
    <From SequenceNumber="1">
      <StopPointRef>1580ABCD</StopPointRef>
    </From>
    <To SequenceNumber="2">
      <StopPointRef>1580EFGH</StopPointRef>
    </To>
    <RunTime>PT2M</RunTime>
  </JourneyPatternTimingLink>
  <JourneyPatternTimingLink id="ABC1_jps2_t12">
    <From SequenceNumber="2">
      <StopPointRef>1580EFGH</StopPointRef>
    </From>
    <To SequenceNumber="3">
      <StopPointRef>1580IJKL</StopPointRef>
    </To>
    <RunTime>PT6M</RunTime>
  </JourneyPatternTimingLink>
</JourneyPatternSection>

```





The PTI Profile : Journey pattern sections and timing links (5)

- **Direction shall not be specified on the `JourneyPatternTimingLink`. A set of sections making up a `JourneyPattern` will all have a common direction, and this shall be specified in the `JourneyPattern` definition.**
- **It is common practice to have a single `JourneyPatternSection` in any given `JourneyPattern`, even though this can result in multiple definitions of common parts of a timetable. It is considered good practice to define any section of route once only, and then to link these together with multiple `JourneyPatternSectionRefs` elements within the `JourneyPattern`**





The PTI Profile : Serviced organisations (1)

- Having serviced organisations aids in explaining date restrictions to the travelling public (e.g. “College of West Anglia days only”), and is encouraged over simple date restrictions.
- However, operators have expressed significant reservations about maintaining `ServicedOrganisation` dates.
- `ServiceOrganisation` is, therefore, **not** a mandatory element in the PTI Profile.
- However, it is nevertheless a requirement that the TXC files specify precisely when a given `VehicleJourney` operates and when it does not – even if it is achieved by date records in `OperatingProfile` elements
 - ⇒ This is information that an operator must know.





The PTI Profile : Serviced organisations (2)

- Where a `ServicedOrganisation` is used, it shall:
 - have a meaningful `OrganisationCode` (e.g. “DerbsCC”, “CoWA”);
 - have a name that describes the organisation (e.g. “Hermitage Academy”, “The De Montfort School”); and
 - define just `WorkingDays` dates. Holidays will be assumed to be all non-working days.
- Trips shall be declared in a `VehicleJourney` either as `DaysOfOperation | WorkingDays` for operating day (e.g. schoolday) trips or `DaysOfNonOperation | WorkingDays` for trips when the organisation is closed (e.g. school holidays).
- Regardless of the coding of the trip, is recommended that display to the public is positive, i.e. “this trip only runs when School X is closed” rather than a literal interpretation of the TXC i.e. “this trip does not run when School X is open”.





The PTI Profile : Serviced organisations (3)

```
<ServicedOrganisation>
  <OrganisationCode>BurCol</OrganisationCode>
  <Name>Burnley College</Name>
  <WorkingDays>
    <DateRange>
      <StartDate>2019-04-22</StartDate>
      <EndDate>2019-05-03</EndDate>
    </DateRange>
    <DateRange>
      <StartDate>2019-05-07</StartDate>
      <EndDate>2019-05-24</EndDate>
    </DateRange>
    <DateRange>
      <StartDate>2019-06-03</StartDate>
      <EndDate>2019-06-28</EndDate>
    </DateRange>
  </WorkingDays>
</ServicedOrganisation>
```

```
<VehicleJourney SequenceNumber="1">
  <PrivateCode>120MFBP03:0:1</PrivateCode>
  <OperatingProfile>
    <RegularDayType>
      <DaysOfWeek>
        <MondayToFriday />
      </DaysOfWeek>
    </RegularDayType>
    <ServicedOrganisationDayType>
      <DaysOfOperation>
        <WorkingDays>
          <ServicedOrganisationRef>BurCol</ServicedOrganisationRef>
        </WorkingDays>
      </DaysOfOperation>
    </ServicedOrganisationDayType>
    <BankHolidayOperation>
      <DaysOfNonOperation>
        <AllBankHolidays />
      </DaysOfNonOperation>
    </BankHolidayOperation>
  </OperatingProfile>
  ...
</VehicleJourney>
```





The PTI Profile : Vehicle journey / Operating profile (1)

- `OperatingProfile` elements shall be fully defined within the `VehicleJourney` and shall not inherit from anywhere else.
- `RegularDayType` shall be completed so as to minimise the use of `SpecialDaysOperation`.
- The “Not” enumerations (e.g. `NotMonday`) shall not be used, as there is some confusion as to their meaning in the schema.
- For example, a trip that runs Monday to Thursday but does not run on a Friday:
 - shall be coded with each of `Monday` through `Thursday` and omit the days when it does not run.
 - shall not be coded `MondayToFriday` with `SpecialDaysNonOperation` to remove Fridays. Nor should it use `NotFriday`.

```
<OperatingProfile>  
  <RegularDayType>  
    <DaysOfWeek>  
      <Monday/>  
      <Tuesday/>  
      <Wednesday/>  
      <Thursday/>  
    </DaysOfWeek>  
  </RegularDayType>  
</OperatingProfile>
```





The PTI Profile : Vehicle journey / Operating profile (2)

- Journeys which operate on periodic days e.g. 1st Wednesday of each month shall use the `PeriodicDayType` in addition to the `RegularDayType` in order to define when the journey operates.
 - Allows a file to be defined once, rather than requiring continual updates to refresh the dates on which the trip operates.
 - Also more readable for the public.
- `SpecialDaysOperation` shall not be used to define regular periodic days.

```
<OperatingProfile>
  <RegularDayType>
    <DaysOfWeek>
      <Wednesday/>
    </DaysOfWeek>
  </RegularDayType>
  <PeriodicDayType>
    <WeekOfMonth>
      <WeekNumber>first</WeekNumber>
    </WeekOfMonth>
  </PeriodicDayType>
</OperatingProfile>
```





The PTI Profile : Vehicle journey / Operating profile (3)

- Journeys which operate according to a serviced organisation shall use the `ServicedOrganisationDayType`.
 - “Working day” operation shall use `DaysOfOperation/WorkingDays`
 - “Holiday” operation shall use `DaysOfNonOperation/WorkingDay`
- Dates for serviced organisations are ANDed with regular days e.g. Mondays to Fridays in a set of date ranges. This means simple ranges can be defined, and avoids having to define each Monday to Friday period separately.
 - E.g. dates for half term, expressed simply

```
<VehicleJourney SequenceNumber="1">
  <PrivateCode>120MFBP03:0:1</PrivateCode>
  <OperatingProfile>
    <RegularDayType>
      <DaysOfWeek>
        <MondayToFriday />
      </DaysOfWeek>
    </RegularDayType>
    <ServicedOrganisationDayType>
      <DaysOfOperation>
        <WorkingDays>
          <ServicedOrganisationRef>BurCol</ServicedOrganisationRef>
        </WorkingDays>
      </DaysOfOperation>
    </ServicedOrganisationDayType>
    <BankHolidayOperation>
      <DaysOfNonOperation>
        <AllBankHolidays />
      </DaysOfNonOperation>
    </BankHolidayOperation>
  </OperatingProfile>
  ...
</VehicleJourney>
```



The PTI Profile : Vehicle journey / Operating profile - Bank holidays

- Bank holiday enumerations (e.g. `SpringBank`) shall be used wherever possible.
 - Dates are either predictable, calculatable (e.g. Easter), or published (May Day change in 2020, Royal Wedding in 2012)
 - Public prefer text presentation (“Does not run Easter Monday”)
- All bank holidays shall be explicitly stated and “groups” (e.g. `HolidayMondays`) shall not be used.
 - Unwanted holidays are often wrapped into groups (a particular problem in Scotland)
 - If a holiday was cancelled and replaced by another holiday, then group would become incorrect
- Additional or amended holidays can be defined and given names and dates if required.
 - This may be a preferable solution for Scotland, although where a holiday retains the same name as an enumerated type then using the enumeration is better (potential duplication / confusion) or add additional info to name e.g. “Easter Public Holiday (Fife)”



The PTI Profile : Vehicle journeys after midnight

- Journeys which take place after midnight but which should be with the previous operational day (e.g. early Saturday morning trips on the Monday to Friday timetable) shall use `DepartureDayShift`:

```
<VehicleJourney>
  <!-- Trip runs operationally on Sunday (and shall be displayed on the Sunday timetable bed) -->
  <!-- Trip physically runs at 00:15 on a Monday morning -->
  <OperatingProfile>
    <RegularDayType>
      <DaysOfWeek>
        <Sunday/>
      </DaysOfWeek>
    </RegularDayType>
  </OperatingProfile>
  <VehicleJourneyCode>VJ1</VehicleJourneyCode>
  <ServiceRef>S1</ServiceRef>
  <LineRef>L1</LineRef>
  <JourneyPatternRef>JP1</JourneyPatternRef>
  <DepartureTime>00:15:00</DepartureTime>
  <DepartureDayShift>+1</DepartureDayShift>
</VehicleJourney>
```

```
<VehicleJourney>
  <!-- Trip runs operationally on weekdays (and shall be displayed on the Monday to Friday timetable bed) -->
  <!-- Trip physically runs at 00:25 on Tuesday to Saturday mornings -->
  <OperatingProfile>
    <RegularDayType>
      <DaysOfWeek>
        <MondayToFriday/>
      </DaysOfWeek>
    </RegularDayType>
  </OperatingProfile>
  <VehicleJourneyCode>VJ1</VehicleJourneyCode>
  <ServiceRef>S1</ServiceRef>
  <LineRef>L1</LineRef>
  <JourneyPatternRef>JP1</JourneyPatternRef>
  <DepartureTime>00:25:00</DepartureTime>
  <DepartureDayShift>+1</DepartureDayShift>
</VehicleJourney>
```





The PTI Profile : Vehicle journey information to support Real Time

- Information to support real time information shall be included where available. This may include `Garages`, `TicketMachine`, `Block`, `DutyCrew`, **etc.**
- In common with the principle of explicit declarations, where these are included they shall be fully declared as part of `VehicleJourney` elements, if possible, and nowhere else.
- There is merit in including dead runs and vehicle positioning information, as this helps real time systems estimate times for following trips. However this has been known to cause confusion in downstream systems and should be avoided unless a specific need to include it.



Comments and Questions

Any further comments or questions, please contact

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THANK YOU

