

# Google Transit Feed Specification as a Transmodel based schema

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# GTFS & Transmodel

## Motivation:

- Simplify interoperability of GTFS & other systems
- Suggest best ways of enhancing GTFS
- Facilitate developing an XML model for GTFS to make it easier to encapsulate and validate PT data
- Validate Transmodel
  
- Pave the way for convergence of world Timetable exchange standards?

## Approach

1. Use a simple UML model to analyse GTFS
2. Establish GTFS/Transmodel equivalents
3. Rename to create a “Transmodel GTFS”
4. Suggest some small refinements

## GTFS

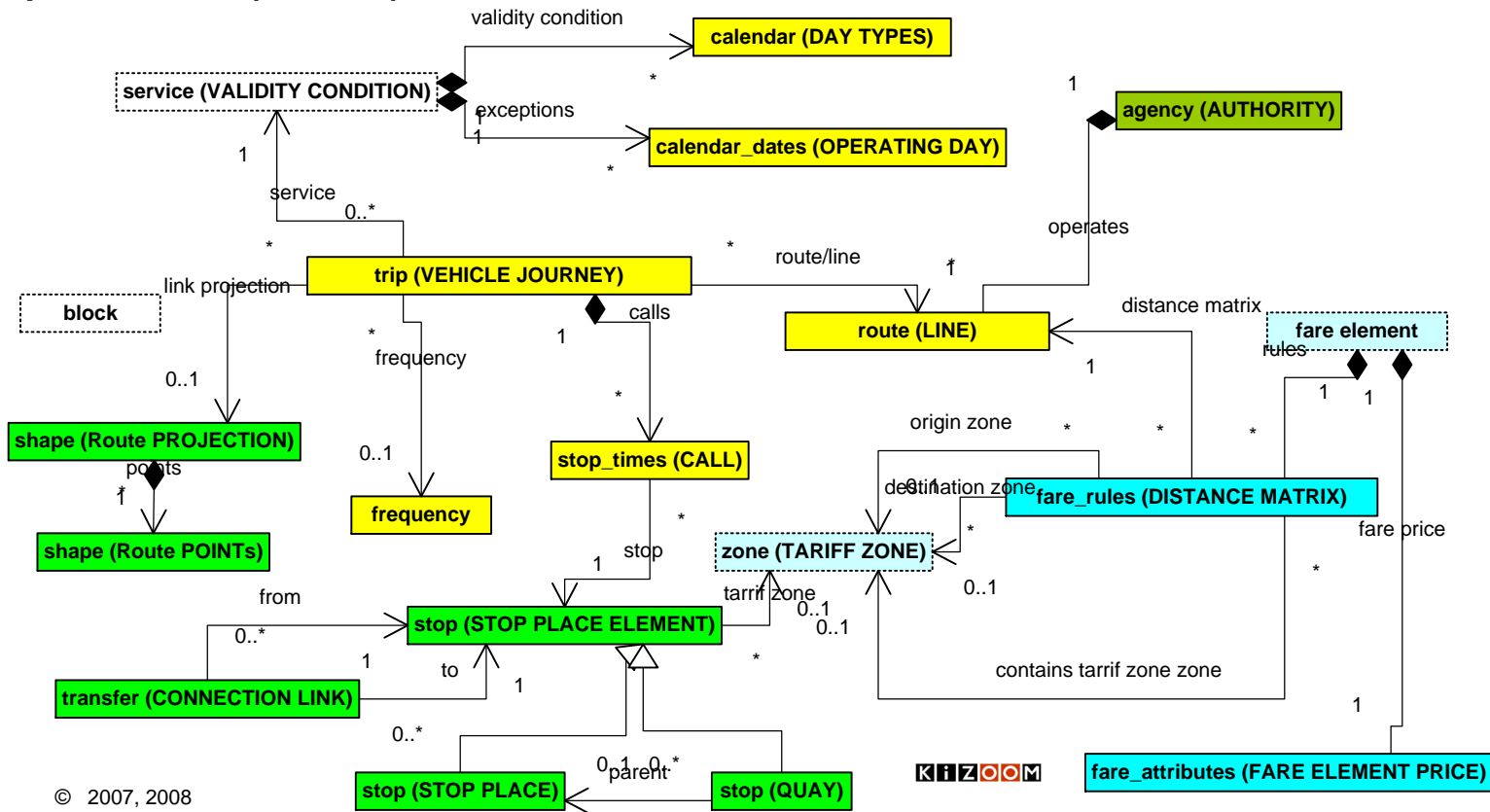
- Set of matching files in CVS format.
- One element type per file
- Single namespace
- Not all referenced entities described e.g. block

V1	agency.txt	Required
V1	stops.txt	Required
V1	routes.txt	Required
V1	trips.txt	Required
V1	stop_times.txt	Required
V1	calendar.txt	Required
V1	calendar_dates.txt	Optional
V1	fare_attributes.txt	Optional
V1	fare_rules.txt	Optional
V2	shapes.txt	Optional
V2	frequencies.txt	Optional
V3	transfers	Optional

# transport direct

## 1. GTFS implicit model

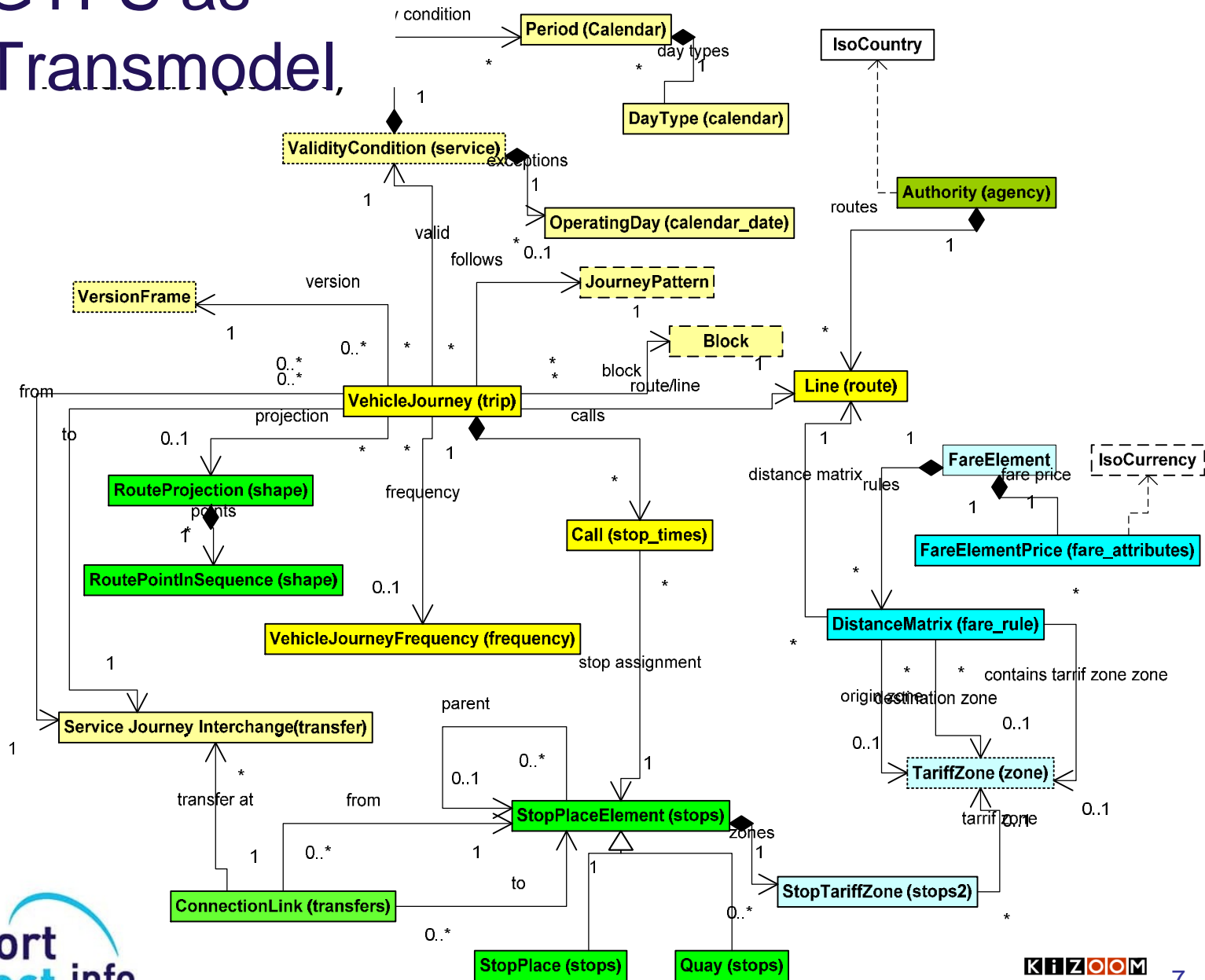
Google Transit Feed Specification (2008/08)



# Equivalences GTFS → Transmodel

- GTFS-agency → AUTHORITY
- GTFS-stop → STOP PLACE ELEMENT | SCHEDULED STOP POINT
- GTFS-transfer → CONNECTION LINK
- GTFS-route → LINE
- GTFS-trip → VEHICLE JOURNEY
- GTFS-stop\_time → Call (PASSING TIMES + STOP IN SEQUENCE)
- GTFS-shape → ROUTE PROJECTION
- GTFS-service → VALIDITY CONDITION
- GTFS-calendar → PERIOD + DAY TYPE
- GTFS-calendar-dates → OPERATING DAY
- GTFS-zone → TARIFF ZONE
- GTFS-fare\_rules → DISTANCE MATRIX
- GTFS-fare\_attrinutes → FARE ELEMENT PRICE

# GTFS as Transmodel



# Transform & Refinements

- Rename as above.
- Discussion points
  - ◆ GTFS-route vs Transmodel LINE
  - ◆ GTFS-shape vs Route Projection?
  - ◆ GTFS-stop vs station vs Transmodel SCHEDULED STOP POINT vs STOP PLACE
- Possible enhancements
  - ◆ GTFS-Transfer → CONNECTION LINK + SERVICE JOURNEY INTERCHANGE
  - ◆ GTFS-Stop → Stop Place Element + Stop Tariff Zone
  - ◆ GTFS-calender → PERIOD + DAY TYPE + new Day Types
  - ◆ Revise GTFS route\_types: MODEs



## Possible Further Enhancements (not shown in diagram)

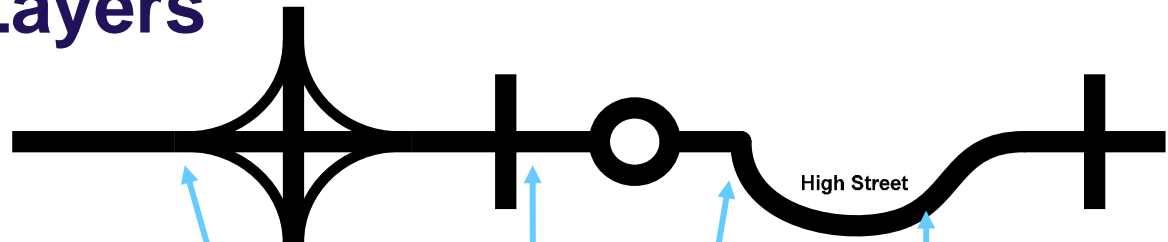
- Rail support
  - ◆ Add JOURNEY PART, COUPLED JOURNEY, TRAIN ELEMENT
  - ◆ Train Facilities
- Accessibility
  - ◆ IFOPT attributes to stop Model
- Holiday Types

# Levels Of Discourse – PT Layers versus MAP GIS Layers

transport direct



(Map Feature)



Route

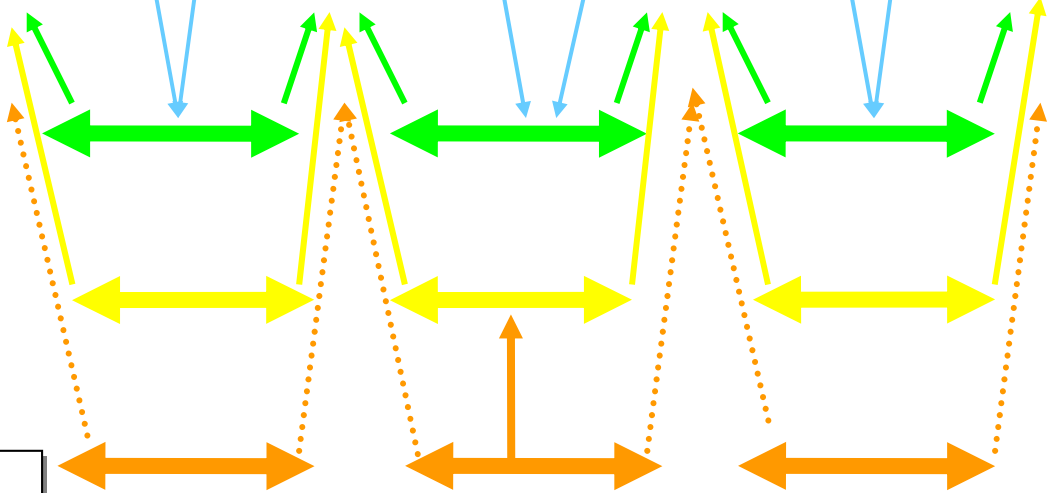


Stop Points

Service Pattern

Journey Pattern

Vehicle Journey



Links & Nodes

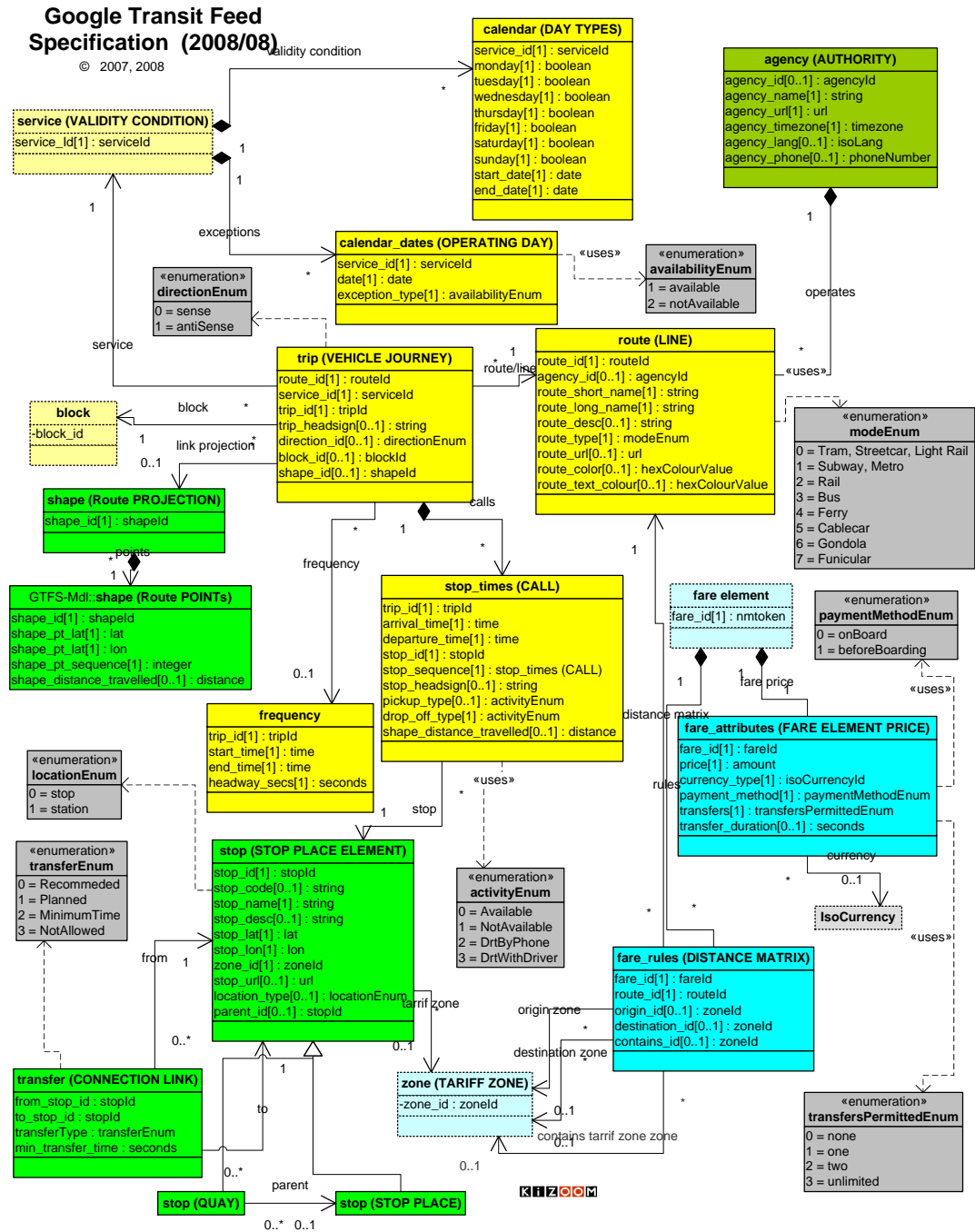


# TransModel Modelling Principles

- **Layered Semantic Models:** Models should be layered to represent different levels of discourse. For example, (i) the geospatial location (i.e. map) layer, (ii) the network topology layer, (iii) the service pattern layer, (iv) the timed vehicle journey layer, (v) the operational running layer, etc.
- **Projection:** To compute in useful ways over different data sets it should be possible to combine the different models, using a common frame of reference. For example, route links should map onto geospatial objects such as roads; timing links should map onto route links, etc. The establishment of equivalences between distinct model layers is termed *projection*.
- **Common Terminology:** Common conceptual entities should be used for the elements making up the models at each different layer, and a standard terminology should be used. For example, Line, Journey Pattern, Vehicle Journey and Location.
- **Point and Link Structures:** Public Transport Information System models typically involve complex networks which are modelled in computer systems by graphs as networks of nodes (points) and edges (links). Depending on the information of interest in a particular application, it may be appropriate to use ordered collections of links, ordered collections of points, or combinations thereof. Links of a given type should only connect to points of the corresponding semantic level of discourse.
- **Well-defined Data Systems.** Elements corresponding to external entities should be assigned unique identifiers from agreed data reference systems.

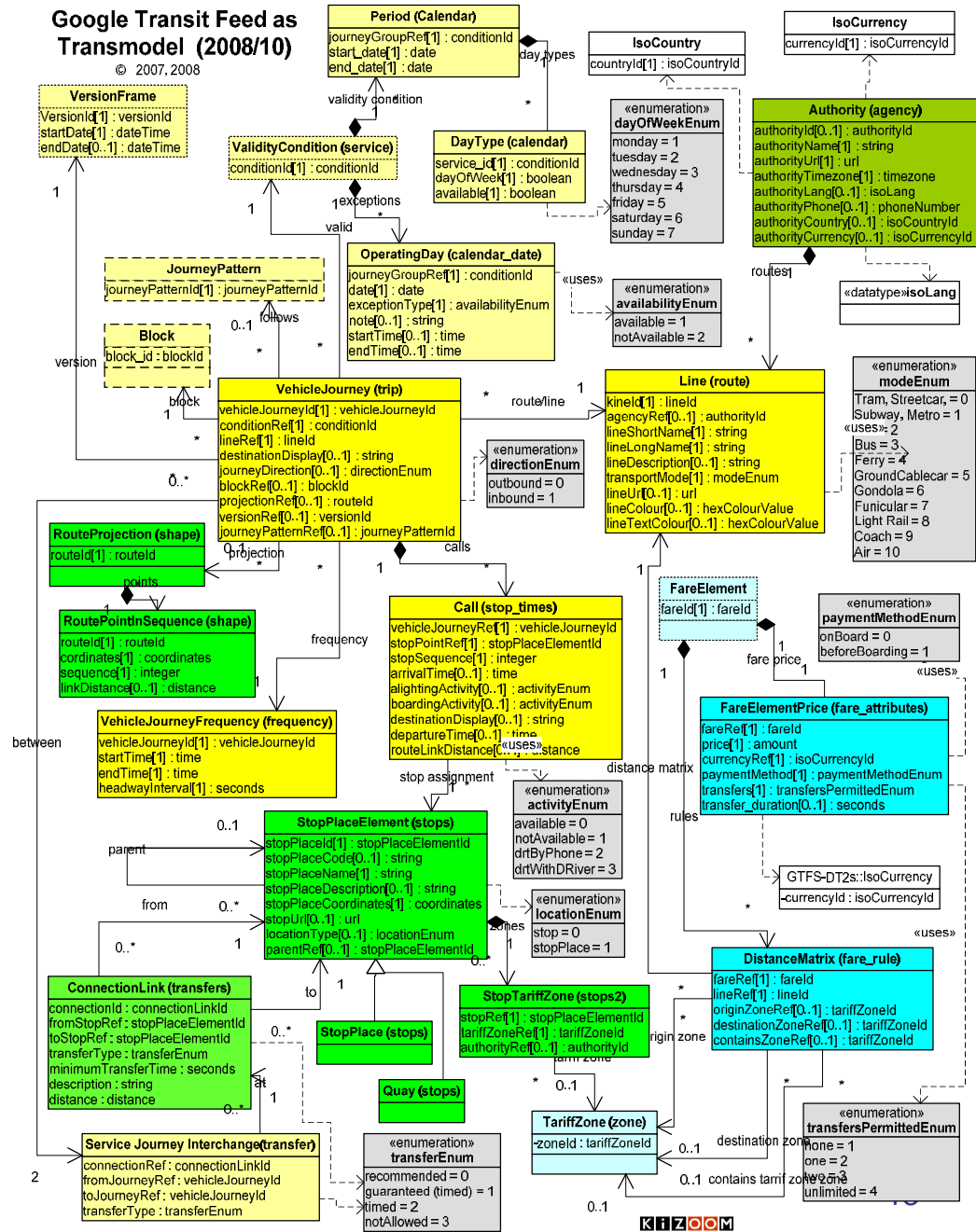
## GTFS in detail

- Fits on one Page!



## TM-GTFS

- Still fits on one page!



# A possible convergence path

