UTMC-TS004.0064*bis*:2017

UTMC Objects Registry: Traffic signal interface

September 2017
Cover + 38 pages

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1 Introduction

1.1 General

1.1.1 UTMC TS004 defines standards for UTMC "common data" (i.e. data communicated between applications of a UTMC system, or between a UTMC system and an external system). These provide for the use of mainstream data transfer protocols, with an increasing recent focus being on XML schema.

1.1.2 This document provides a UTMC UML framework for traffic signal data, and an abstracted UML model alongside. It updates, extends and supersedes previous versions of UTMC-TS004, by direct reference as appropriate to sections of UTMC-TS004.0061:2010 Annex D.

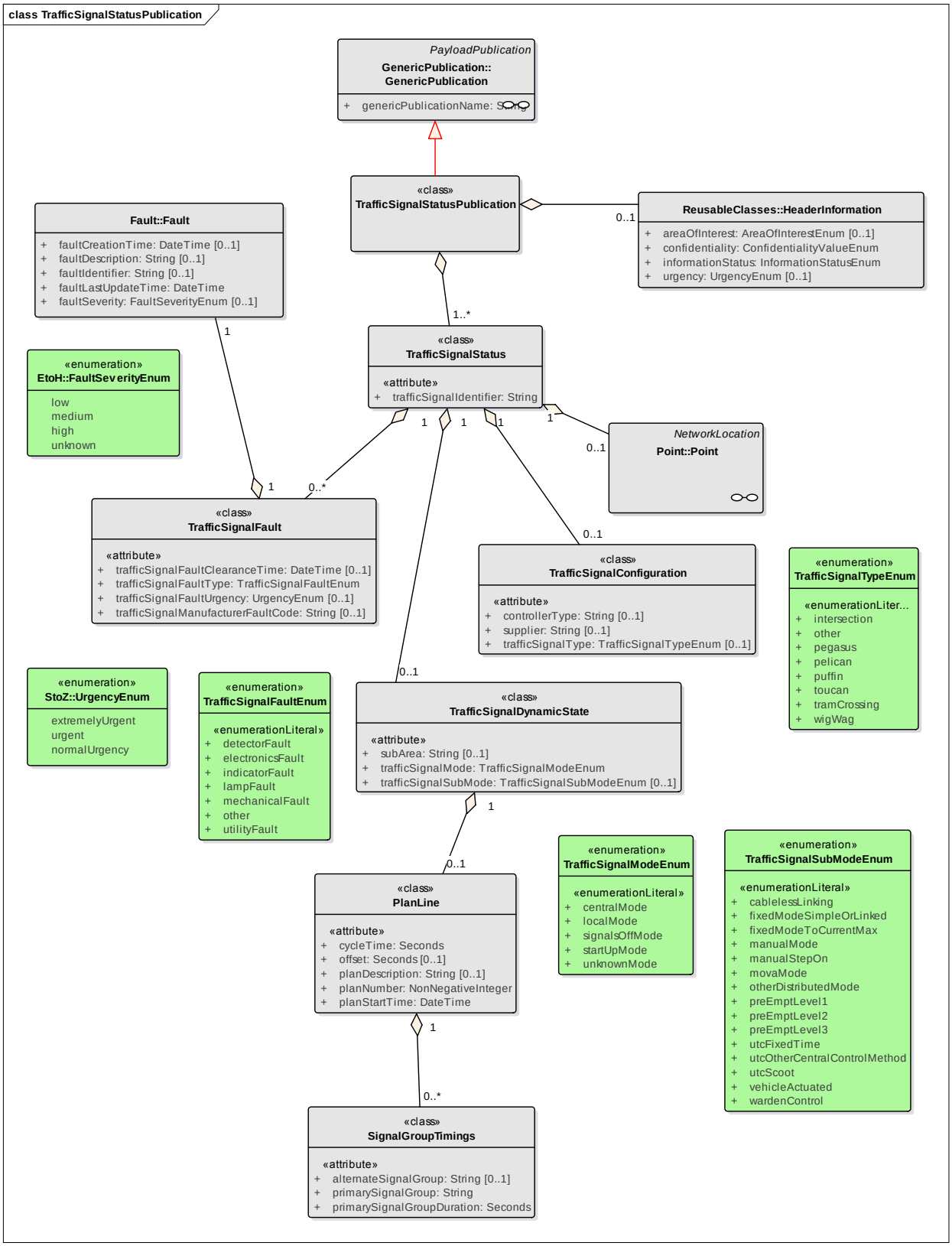
1.1.3 In addition, it provides an XML implementation of this model, which has been developed as a profile of curent DATEX II specifications. It has been registered as a profile/extension of the DATEX II TrafficSignalPublication.

1.1.4 For this document, a “Traffic Signal” is the control and monitoring equipment associated with a single intersection or crossing. This includes the signal heads, signal poles, pushbuttons, controller and communication equipment.

1.2 Acknowledgments

1.2.1 This document is based on the work of the Traffic Signal Working Group during the period 2014-2016. The work of the WG members – four suppliers (Dynniq, Telent, Mott Macdonald and Siemens) and one customer (Coventry) – is gratefully acknowledged.

2 UML model


class TrafficSignalStatusPublication
PayloadPublication
GenericPublication::
GenericPublication
+ genericPublicationName: String
«class»
TrafficSignalStatusPublication
ReusableClasses::HeaderInformation
+ areaOfInterest: AreaOfInterestEnum [0..1]
+ confidentiality: ConfidentialityValueEnum
+ informationStatus: InformationStatusEnum
+ urgency: UrgencyEnum [0..1]
Fault::Fault
+ faultCreationTime: DateTime [0..1]
+ faultDescription: String [0..1]
+ faultIdentifier: String [0..1]
+ faultLastUpdateTime: DateTime
+ faultSeverity: FaultSeverityEnum [0..1]
«enumeration»
EtoH::FaultSeverityEnum
low
medium
high
unknown
«class»
TrafficSignalStatus
«attribute»
+ trafficSignalIdentifier: String
NetworkLocation
Point::Point
«class»
TrafficSignalFault
«attribute»
+ trafficSignalFaultClearanceTime: DateTime [0..1]
+ trafficSignalFaultType: TrafficSignalFaultEnum
+ trafficSignalFaultUrgency: UrgencyEnum [0..1]
+ trafficSignalManufacturerFaultCode: String [0..1]
«class»
TrafficSignalConfiguration
«attribute»
+ controllerType: String [0..1]
+ supplier: String [0..1]
+ trafficSignalType: TrafficSignalTypeEnum [0..1]
«enumeration»
TrafficSignalTypeEnum
«enumerationLiter...
+ intersection
+ other
+ pegasus
+ pelican
+ puffin
+ toucan
+ tramCrossing
+ wigWag
«enumeration»
StoZ::UrgencyEnum
extremelyUrgent
urgent
normalUrgency
«enumeration»
TrafficSignalFaultEnum
«enumerationLiteral»
+ detectorFault
+ electronicsFault
+ indicatorFault
+ lampFault
+ mechanicalFault
+ other
+ utilityFault
«class»
TrafficSignalDynamicState
«attribute»
+ subArea: String [0..1]
+ trafficSignalMode: TrafficSignalModeEnum
+ trafficSignalSubMode: TrafficSignalSubModeEnum [0..1]
«enumeration»
TrafficSignalModeEnum
«enumerationLiteral»
+ centralMode
+ localMode
+ signalsOffMode
+ startUpMode
+ unknownMode
«enumeration»
TrafficSignalSubModeEnum
«enumerationLiteral»
+ cablelessLinking
+ fixedModeSimpleOrLinked
+ fixedModeToCurrentMax
+ manualMode
+ manualStepOn
+ movaMode
+ otherDistributedMode
+ preEmptLevel1
+ preEmptLevel2
+ preEmptLevel3
+ utcFixedTime
+ utcOtherCentralControlMethod
+ utcScoot
+ vehicleActuated
+ wardenControl
«class»
PlanLine
«attribute»
+ cycleTime: Seconds
+ offset: Seconds [0..1]
+ planDescription: String [0..1]
+ planNumber: NonNegativeInteger
+ planStartTime: DateTime
«class»
SignalGroupTimings
«attribute»
+ alternateSignalGroup: String [0..1]
+ primarySignalGroup: String
+ primarySignalGroupDuration: Seconds

3 Data Dictionary for TrafficSignalStatusPublication

3.1 TrafficSignalStatusPublication

Classes

Class name	Designation	Definition	Stereotype	Abstract
TrafficSignalStatusPublication	Traffic signal publication	Publicised data for traffic signals		
TrafficSignalStatus	Traffic Signal Status	Traffic Signal Status		

Association rules

Class Name	Role name	Designation	Definition	Multiplicity	Target
TrafficSignalStatusPublication	TrafficSignalStatus	Traffic signal status	Traffic Signal status	1..*	TrafficSignalStatus
	HeaderInformation	Header information	Header information	0..*	HeaderInformation

Attributes

Class Name	Attribute name	Designation	Definition	Multiplicity	Type
TrafficSignalStatusPublication	trafficSignalStatusReference	Traffic signal status reference	The version of this package. Currently “1.0”	1	VersionedReference

3.2 TrafficSignalStatus

Classes

Class name	Designation	Definition	Stereotype	Abstract
TrafficSignalStatus	Traffic Signal Status	Status of a traffic signal		
TrafficSignalFault	Traffic signal fault	Traffic signal faults		
TrafficSignalConfiguration	Traffic signal configuration	Configuration of a traffic signal		
TrafficSignalDynamicState	Traffic signal dynamicState	Traffic signal dynamic state		

Association roles

Class Name	Role name	Designation	Definition	Multiplicity	Target
TrafficSignalStatus	TrafficSignalFault	Traffic Signal Fault	Faults for this traffic signal	0..*	TrafficSignalFault
TrafficSignalStatus	Traffic Signal Configuration	Traffic Signal configuration	Configuration of this traffic signal	0..1	TrafficSignalConfiguration
TrafficSignalStatus	Traffic signal dynamic state	Traffic signal dynamic state	Dynamic state of this traffic signal	0..1	TrafficSignalDynamicState
TrafficSignalStatus	Point	Point	Location of traffic signal	0..1	Point

Attributes

Class Name	Attribute name	Designation	Definition	Multiplicity	Type
trafficSignalIdentifier	Traffic signal identifier	Traffic Signal Identifier	Human readable identifier for the Traffic Signal	1	String

3.3 TrafficSignalFault

Classes

Class name	Designation	Definition	Stereotype	Abstract
TrafficSignalFault	TrafficSignalFault	A fault record for a Traffic Signal		

Association roles

Class Name	Role name	Designation	Definition	Multiplicity	Target
TrafficSignalFault	Fault	Fault	General information about this fault	1	Fault

Attributes

Class Name	Attribute name	Designation	Definition	Multiplicity	Type
TrafficSignalFault	trafficSignalFaultClearanceTime	Traffic signal fault clearance time	Time fault was cleared	0..1	DateTime
	trafficSignalFaultUrgency	Urgency type	The urgency of this fault	0..1	UrgencyEnum
	trafficSignalFaultType	Traffic Signal Equipment Fault Type	The Traffic Signal fault type	1	TrafficSignalFaultEnum
	trafficSignalManufacturerFaultCode	Traffic Signal Manufacturer fault code	A supplier unique identifier for this specific fault	0..1	string

3.4 TrafficSignalConfiguration

Classes

Class name	Designation	Definition	Stereotype	Abstract
TrafficSignalConfiguration	Traffic Signal configuration	The configuration of this traffic signal		

Association rules

3.4.1 There are no defined association roles in “TrafficSignalConfiguration”.

Attributes

Class Name	Attribute name	Designation	Definition	Multiplicity	Type
TrafficSignalConfiguration	controllerType	Controller type	Textual description of controller type	0..1	String
	supplier	Supplier	Name of supplier	0..1	String
	trafficSignalType	Traffic Signal type	Type of the traffic signal	0..1	TrafficSignalTypeEnum

3.5 TrafficSignalDynamicState

Classes

Class name	Designation	Definition	Stereotype	Abstract
TrafficSignalDynamicState	Traffic Signal dynamic state	The dynamic, non-fault, state of this traffic signal		
SignalGroupTiming	Signal Group Timing	Details about the signal group timings for this plan		

Association roles

Class Name	Role name	Designation	Definition	Multiplicity	Target
TrafficSignalDynamicState	Traffic Signal plan	Traffic Signal plan	A plan for this traffic signal	0..1	PlanLine
PlanLine	TrafficSignalPlanDetails	Traffic Signal Plan Details	Signal group data for this plan	0..*	SignalGroupTimings

Attributes

Class Name	Attribute name	Designation	Definition	Multiplicity	Type
TrafficSignalDynamicState	PlanLine	Plan line	A plan line for this traffic signal. This is intended to provide information allowing the plan data to be displayed to an operator. It contains the current plan data and would be updated when the plan is changed. For adaptive central control, such as SCOOT, the information should be available periodically and contain the plan at that instant.	0..1	PlanLine
	subArea	Sub area	Name for the sub-area that identifies the group of signals to which the associated traffic signal equipment belongs.	0..1	string
	trafficSignalMode	Traffic Signal mode	The high level mode of the traffic signal	1	TrafficSignalModeEnum

Class Name	Attribute name	Designation	Definition	Multiplicity	Type
	trafficSignalSubMode	Traffic Signal sub mode	The detailed sub-mode of the traffic signal	0..1	TrafficSignalSubModeEnum
PlanLine	planNumber	Plan number	The currently active plan	1	NonNegativeinteger (1..99)
	planStartTime	Plan start time	The time the plan was started	1	DateTime
	cycleTime	Cycle Time	The current cycle time	0..1	Seconds (1..1,000)
	planDescription	Plan Description	A user entered description of the active plan	0..1	string (1..50)
	offset	Offset	The offset to the first SignalGroupTiming in the list. Must be present if SignalGroupTimingList is present	0..1	Seconds (0..cycleTime-1)
	SignalGroupTimingList	Signal Group list	The signal group data for the plan	0..1	SignalGroupTiming
SignalGroupTiming	primarySignalGroup	Primary signal group	A text representation of the primary signal group	1	string (1..20)
	alternateSignalGroup	Alternate signal group	A text representation of the alternatives to the primary signal group	0..1	string (1..20)
	primarySignalGroupDuration	Primary Signal Group Duration	The length of the primary signal group. Note that there is no timing data associated with the alternate signal group.	1	Seconds (2..998)

3.6 Explanation of PlanLine and SignalGroupTimings

3.6.1 This structure is intended to give enough information for a system to display the current plan line to an operator. For example, if the data is:

cycleTime	120
offset	7

primarySignalGroup	alternateSignalGroup	primarySignalGroupduration
A		40
B	A	20
C		30
D	C	30

this would be displayed as a plan line (using start times) with the following data:

Cycle time 120, (A 7), (BA 47), (C 67), CD (97)

4 Enumerations for TrafficSignalStatusPublication

4.1 TrafficSignalFaultEnum

Enumerated value name	Designation	Description
detectorFault	Detector fault	Fault in one or more detectors
electronicsFault	Electronics Fault	Fault internal to the traffic signal controller. For instance, conflict detected, invalid configuration loaded
indicatorFault	Indicator fault	Fault in a non-visual indicator, such as audible or mechanical
lampFault	Lamp fault	Fault in one or more signal heads
mechanicalFault	Mechanical fault	Fault in the physical installation. For instance, mechanically damaged signal head or signal pole
utilityFault	Utility fault	Fault in one of the utilities. For instance power or communication
other	Other	Fault other than as defined in this enumeration

4.2 TrafficSignalTypeEnum

Enumerated value name	Designation	Description
Intersection	Intersection	Traffic Signal controller primarily for vehicles
Pelican	Pelican	UK pedestrian crossing with pedestrian signals on far-side
Puffin	Puffin	UK pedestrian crossing with pedestrian signals on near side
Toucan	Toucan	UK pedestrian and cyclist crossing
Pegasus	Pegasus	UK pedestrian and horse crossing
TramCrossing	Tram Crossing	Traffic Signal for road and tram-lines
Wigwag	Wigwag	Flashing warning
Other	Other	Type other than as defined in this enumeration

4.3 TrafficSignalModeEnum

Enumerated value name	Designation	Description
localMode	Local mode	Traffic Signal operating autonomously
centralMode	Central mode	Traffic Signal operating under control from central system
signalsOffMode	Signals off mode	Traffic Signal off (either dark or flashing)
startupMode	Startup mode	Traffic Signal starting
unknownMode	Unknown mode	The mode of the traffic signal is not known

4.4 TrafficSignalSubModeEnum

Enumeration	Designation	Description
utcFixedTime	UTC fixed time	Traffic signal is operating a fixed time plan under central control
utcScoot	SCOOT	Traffic signal is operating under SCOOT control
utcOtherCentralControlMethod	Central Adaptive control	A central adaptive algorithm other than SCOOT
preEmptLevel1	Pre empt level 1	Traffic Signal Controller responding to high priority pre-emption
preEmptLevel2	Pre empt level 2	Traffic Signal Controller responding to medium priority pre-emption
preEmptLevel3	Pre empt level 3	Traffic Signal Controller responding to low priority pre-emption
fixedModeSimpleorLinked	Fixed mode simple or linked	Traffic signal is operating locally using a fixed plan, potentially coordinated with adjacent traffic signals
fixedModetoCurrentMax	Fixed mode to current max	Traffic signal is operating locally using a fixed sequence whose duration can extend to the signal group maximum
vehicleActuated	Vehicle actuated	Traffic signal is operating locally responding to demands
cablelessLinking	Cableless linked	Traffic signal is operating locally and is linked by time to adjacent traffic signals
movaMode	MOVA	Traffic signal is operating locally using MOVA
otherDistributedMode	Local adaptive control	A distributed adaptive algorithm,, other than MOVA
manualMode	Manual mode	Traffic Signal is under local control by operator at site
manualStepOn	Manual step on	Traffic Signal is moving to next step in plan under local control by operator at site.
wardenControl	Warden control	Traffic signal has been turned on by a warden

5 Mode/submode combinations

5.1 TrafficSignalModeEnum and TrafficSignalSubModeEnum

TrafficSignalModeEnum	TrafficSignalSubModeEnum
centralMode	utcFixedTime
centralMode	utcScoot
centralMode	utcOtherCentralControlMethod
centralMode	pre-emption
localMode	hurryCall
localMode	fixedModeSimpleOrLinked
localMode	fixedModeToCurrentMax
localMode	vehicleActuated
localMode	cablelessLinkingNonBaseTime
localMode	cablelessLinkingBaseTime
localMode	movaMode
localMode	otherDistributedMode
localMode	manualMode
localMode	manualStepOn
localMode	wardenControl
localMode	publicServiceVehiclePriority
localMode	lightRailTransitMode
signalsOffMode	(none)
startUpMode	(none)
unknownMode	(none)

6 XSD

```
<?xml version="1.0" encoding="utf-8" standalone="no"?>
<xs:schema elementFormDefault="qualified" attributeFormDefault="unqualified"
xmlns:D2LogicalModel="http://datex2.eu/schema/2/2_0" version="2.3"
targetNamespace="http://datex2.eu/schema/2/2_0"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:complexType name="_ExtensionType">
    <xs:sequence>
      <xs:any namespace="##any" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="_GenericPublicationExtensionType">
    <xs:sequence>
      <xs:element name="trafficSignalStatusPublication"
type="D2LogicalModel:TrafficSignalStatusPublication" minOccurs="0" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="_IntermediatePointOnLinearElement">
    <xs:sequence>
      <xs:element name="referent" type="D2LogicalModel:Referent" minOccurs="1"
maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="index" type="xs:int" use="required" />
  </xs:complexType>
  <xs:complexType name="_PointExtensionType">
    <xs:sequence>
      <xs:element name="openlrExtendedPoint"
type="D2LogicalModel:OpenlrExtendedPoint" minOccurs="0" />
      <xs:element name="pointExtended" type="D2LogicalModel:PointExtended"
minOccurs="0" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AlertCDirection">
    <xs:sequence>
      <xs:element name="alertCDirectionCoded"
type="D2LogicalModel:AlertCDirectionEnum" minOccurs="1" maxOccurs="1" />
      <xs:element name="alertCDirectionNamed" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="1" />
      <xs:element name="alertCDirectionSense" type="D2LogicalModel:Boolean"
minOccurs="0" maxOccurs="1" />
      <xs:element name="alertCDirectionExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="AlertCDirectionEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="both" />
      <xs:enumeration value="negative" />
      <xs:enumeration value="positive" />
      <xs:enumeration value="unknown" />
```

```
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="AlertCLocation">
    <xs:sequence>
      <xs:element name="alertCLocationName" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="1" />
      <xs:element name="specificLocation" type="D2LogicalModel:AlertCLocationCode"
minOccurs="1" maxOccurs="1" />
      <xs:element name="alertCLocationExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="AlertCLocationCode">
    <xs:restriction base="D2LogicalModel:NonNegativeInteger" />
  </xs:simpleType>
  <xs:complexType name="AlertCMethod2Point">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:AlertCPoint">
        <xs:sequence>
          <xs:element name="alertCDirection" type="D2LogicalModel:AlertCDirection" />
          <xs:element name="alertCMethod2PrimaryPointLocation"
type="D2LogicalModel:AlertCMethod2PrimaryPointLocation" />
          <xs:element name="alertCMethod2PointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="AlertCMethod2PrimaryPointLocation">
    <xs:sequence>
      <xs:element name="alertCLocation" type="D2LogicalModel:AlertCLocation" />
      <xs:element name="alertCMethod2PrimaryPointLocationExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AlertCMethod4Point">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:AlertCPoint">
        <xs:sequence>
          <xs:element name="alertCDirection" type="D2LogicalModel:AlertCDirection" />
          <xs:element name="alertCMethod4PrimaryPointLocation"
type="D2LogicalModel:AlertCMethod4PrimaryPointLocation" />
          <xs:element name="alertCMethod4PointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="AlertCMethod4PrimaryPointLocation">
    <xs:sequence>
      <xs:element name="alertCLocation" type="D2LogicalModel:AlertCLocation" />
      <xs:element name="offsetDistance" type="D2LogicalModel:OffsetDistance" />
      <xs:element name="alertCMethod4PrimaryPointLocationExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
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    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AlertCPoint" abstract="true">
    <xs:sequence>
      <xs:element name="alertCLocationCountryCode" type="D2LogicalModel:String"
minOccurs="1" maxOccurs="1" />
      <xs:element name="alertCLocationTableNumber" type="D2LogicalModel:String"
minOccurs="1" maxOccurs="1" />
      <xs:element name="alertCLocationTableVersion" type="D2LogicalModel:String"
minOccurs="1" maxOccurs="1" />
      <xs:element name="alertCPointExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
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  </xs:complexType>
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    <xs:restriction base="D2LogicalModel:NonNegativeInteger" />
  </xs:simpleType>
  <xs:simpleType name="AreaOfInterestEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="continentWide" />
      <xs:enumeration value="national" />
      <xs:enumeration value="neighbouringCountries" />
      <xs:enumeration value="notSpecified" />
      <xs:enumeration value="regional" />
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  </xs:simpleType>
  <xs:simpleType name="Boolean">
    <xs:restriction base="xs:boolean" />
  </xs:simpleType>
  <xs:complexType name="CatalogueReference">
    <xs:sequence>
      <xs:element name="keyCatalogueReference" type="D2LogicalModel:String"
minOccurs="1" maxOccurs="1" />
      <xs:element name="catalogueReferenceExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="ChangedFlagEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="catalogue" />
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    </xs:restriction>
  </xs:simpleType>
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    <xs:restriction base="xs:string">
      <xs:enumeration value="internalUse" />
      <xs:enumeration value="noRestriction" />
      <xs:enumeration value="restrictedToAuthorities" />
      <xs:enumeration value="restrictedToAuthoritiesAndTrafficOperators" />
      <xs:enumeration value="restrictedToAuthoritiesTrafficOperatorsAndPublishers" />
      <xs:enumeration value="restrictedToAuthoritiesTrafficOperatorsAndVms" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="CountryEnum">
```

```
    <xs:restriction base="xs:string">
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      <xs:enumeration value="be" />
      <xs:enumeration value="bg" />
      <xs:enumeration value="ch" />
      <xs:enumeration value="cs" />
      <xs:enumeration value="cy" />
      <xs:enumeration value="cz" />
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      <xs:enumeration value="es" />
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      <xs:enumeration value="sm" />
      <xs:enumeration value="tr" />
      <xs:enumeration value="va" />
      <xs:enumeration value="other" />
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  <xs:complexType name="D2LogicalModel">
    <xs:sequence>
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      <xs:element name="payloadPublication" type="D2LogicalModel:PayloadPublication"
minOccurs="0" />
```

```
      <xs:element name="d2LogicalModelExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
    <xs:attribute name="modelBaseVersion" use="required" fixed="2" />
    <xs:attribute name="extensionName" use="optional"
default="TrafficSignalStatusPublication" />
    <xs:attribute name="extensionVersion" use="optional" default="1" />
  </xs:complexType>
  <xs:simpleType name="DateTime">
    <xs:restriction base="xs:dateTime" />
  </xs:simpleType>
  <xs:simpleType name="DenyReasonEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="unknownReason" />
      <xs:enumeration value="wrongCatalogue" />
      <xs:enumeration value="wrongFilter" />
      <xs:enumeration value="wrongOrder" />
      <xs:enumeration value="wrongPartner" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="DirectionEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="allDirections" />
      <xs:enumeration value="bothWays" />
      <xs:enumeration value="clockwise" />
      <xs:enumeration value="anticlockwise" />
      <xs:enumeration value="innerRing" />
      <xs:enumeration value="outerRing" />
      <xs:enumeration value="northBound" />
      <xs:enumeration value="northEastBound" />
      <xs:enumeration value="eastBound" />
      <xs:enumeration value="southEastBound" />
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      <xs:enumeration value="outboundFromTown" />
      <xs:enumeration value="unknown" />
      <xs:enumeration value="opposite" />
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  </xs:simpleType>
  <xs:complexType name="DistanceAlongLinearElement" abstract="true">
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      <xs:element name="distanceAlongLinearElementExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
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  </xs:complexType>
  <xs:complexType name="DistanceFromLinearElementReferent">
    <xs:complexContent>
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        <xs:sequence>
```

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        <xs:element name="distanceAlong" type="D2LogicalModel:MetresAsFloat"
minOccurs="1" maxOccurs="1" />
        <xs:element name="fromReferent" type="D2LogicalModel:Referent" />
        <xs:element name="towardsReferent" type="D2LogicalModel:Referent"
minOccurs="0" />
        <xs:element name="distanceFromLinearElementReferentExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
       </xs:sequence>
     </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="DistanceFromLinearElementStart">
   <xs:complexContent>
     <xs:extension base="D2LogicalModel:DistanceAlongLinearElement">
       <xs:sequence>
        <xs:element name="distanceAlong" type="D2LogicalModel:MetresAsFloat"
minOccurs="1" maxOccurs="1" />
        <xs:element name="distanceFromLinearElementStartExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
       </xs:sequence>
     </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="Exchange">
   <xs:sequence>
     <xs:element name="changedFlag" type="D2LogicalModel:ChangedFlagEnum"
minOccurs="0" maxOccurs="1" />
     <xs:element name="clientIdentification" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
     <xs:element name="deliveryBreak" type="D2LogicalModel:Boolean" minOccurs="0"
maxOccurs="1" />
     <xs:element name="denyReason" type="D2LogicalModel:DenyReasonEnum"
minOccurs="0" maxOccurs="1" />
     <xs:element name="historicalStartDate" type="D2LogicalModel:DateTime"
minOccurs="0" maxOccurs="1" />
     <xs:element name="historicalStopDate" type="D2LogicalModel:DateTime"
minOccurs="0" maxOccurs="1" />
     <xs:element name="keepAlive" type="D2LogicalModel:Boolean" minOccurs="0"
maxOccurs="1" />
     <xs:element name="requestType" type="D2LogicalModel:RequestTypeEnum"
minOccurs="0" maxOccurs="1" />
     <xs:element name="response" type="D2LogicalModel:ResponseEnum" minOccurs="0"
maxOccurs="1" />
     <xs:element name="subscriptionReference" type="D2LogicalModel:String"
minOccurs="0" maxOccurs="1" />
     <xs:element name="supplierIdentification"
type="D2LogicalModel:InternationalIdentifier" />
     <xs:element name="target" type="D2LogicalModel:Target" minOccurs="0" />
     <xs:element name="subscription" type="D2LogicalModel:Subscription" minOccurs="0"
/>
     <xs:element name="filterReference" type="D2LogicalModel:FilterReference"
minOccurs="0" maxOccurs="unbounded" />
     <xs:element name="catalogueReference" type="D2LogicalModel:CatalogueReference"
minOccurs="0" maxOccurs="unbounded" />
```

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    <xs:element name="exchangeExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Fault">
   <xs:sequence>
    <xs:element name="faultIdentifier" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
    <xs:element name="faultDescription" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
    <xs:element name="faultCreationTime" type="D2LogicalModel:DateTime"
minOccurs="0" maxOccurs="1" />
    <xs:element name="faultLastUpdateTime" type="D2LogicalModel:DateTime"
minOccurs="1" maxOccurs="1" />
    <xs:element name="faultSeverity" type="D2LogicalModel:FaultSeverityEnum"
minOccurs="0" maxOccurs="1" />
    <xs:element name="faultExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="FaultSeverityEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="low" />
    <xs:enumeration value="medium" />
    <xs:enumeration value="high" />
    <xs:enumeration value="unknown" />
   </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="FilterReference">
   <xs:sequence>
    <xs:element name="deleteFilter" type="D2LogicalModel:Boolean" minOccurs="0"
maxOccurs="1" />
    <xs:element name="filterOperationApproved" type="D2LogicalModel:Boolean"
minOccurs="0" maxOccurs="1" />
    <xs:element name="keyFilterReference" type="D2LogicalModel:String" minOccurs="1"
maxOccurs="1" />
    <xs:element name="filterReferenceExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="Float">
   <xs:restriction base="xs:float" />
  </xs:simpleType>
  <xs:complexType name="GenericPublication">
   <xs:complexContent>
    <xs:extension base="D2LogicalModel:PayloadPublication">
     <xs:sequence>
      <xs:element name="genericPublicationName" type="D2LogicalModel:String"
minOccurs="1" maxOccurs="1" />
       <xs:element name="genericPublicationExtension"
type="D2LogicalModel:_GenericPublicationExtensionType" minOccurs="0" />
     </xs:sequence>
    </xs:extension>
   </xs:complexContent>
```

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  </xs:complexType>
  <xs:complexType name="GroupOfLocations" abstract="true">
    <xs:sequence>
      <xs:element name="groupOfLocationsExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="HeaderInformation">
    <xs:sequence>
      <xs:element name="areaOfInterest" type="D2LogicalModel:AreaOfInterestEnum"
minOccurs="0" maxOccurs="1" />
      <xs:element name="confidentiality" type="D2LogicalModel:ConfidentialityValueEnum"
minOccurs="1" maxOccurs="1" />
      <xs:element name="informationStatus"
type="D2LogicalModel:InformationStatusEnum" minOccurs="1" maxOccurs="1" />
      <xs:element name="urgency" type="D2LogicalModel:UrgencyEnum" minOccurs="0"
maxOccurs="1" />
      <xs:element name="headerInformationExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="HeightGradeEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="aboveGrade" />
      <xs:enumeration value="atGrade" />
      <xs:enumeration value="belowGrade" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="InformationStatusEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="real" />
      <xs:enumeration value="securityExercise" />
      <xs:enumeration value="technicalExercise" />
      <xs:enumeration value="test" />
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="InternationalIdentifier">
    <xs:sequence>
      <xs:element name="country" type="D2LogicalModel:CountryEnum" minOccurs="1"
maxOccurs="1" />
      <xs:element name="nationalIdentifier" type="D2LogicalModel:String" minOccurs="1"
maxOccurs="1" />
      <xs:element name="internationalIdentifierExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Junction">
    <xs:sequence>
      <xs:element name="junctionClassification"
type="D2LogicalModel:JunctionClassificationEnum" minOccurs="0" maxOccurs="1" />
      <xs:element name="junctionName" type="D2LogicalModel:MultilingualString"
minOccurs="1" maxOccurs="1" />
      <xs:element name="junctionNumber" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
```

```
      <xs:element name="motorway" type="D2LogicalModel:Road" minOccurs="0" />
      <xs:element name="destinationMotorway" type="D2LogicalModel:Road"
minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="junctionExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="JunctionClassificationEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="threeWayInterchange" />
      <xs:enumeration value="interchange" />
      <xs:enumeration value="motorwayConnection" />
      <xs:enumeration value="junction" />
      <xs:enumeration value="temporaryJunction" />
      <xs:enumeration value="borderCrossing" />
      <xs:enumeration value="junctionInOneDirection" />
      <xs:enumeration value="operationalServiceJunction" />
      <xs:enumeration value="other" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="Language">
    <xs:restriction base="xs:language" />
  </xs:simpleType>
  <xs:complexType name="LinearElement">
    <xs:sequence>
      <xs:element name="roadName" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="1" />
      <xs:element name="roadNumber" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
      <xs:element name="linearElementReferenceModel" type="D2LogicalModel:String"
minOccurs="0" maxOccurs="1" />
      <xs:element name="linearElementReferenceModelVersion"
type="D2LogicalModel:String" minOccurs="0" maxOccurs="1" />
      <xs:element name="linearElementNature"
type="D2LogicalModel:LinearElementNatureEnum" minOccurs="0" maxOccurs="1" />
      <xs:element name="linearElementExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="LinearElementByCode">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:LinearElement">
        <xs:sequence>
          <xs:element name="linearElementIdentifier" type="D2LogicalModel:String"
minOccurs="1" maxOccurs="1" />
          <xs:element name="linearElementByCodeExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="LinearElementByPoints">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:LinearElement">
```

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      <xs:sequence>
        <xs:element name="startPointOfLinearElement" type="D2LogicalModel:Referent" />
        <xs:element name="intermediatePointOnLinearElement"
type="D2LogicalModel:_IntermediatePointOnLinearElement" minOccurs="0"
maxOccurs="unbounded" />
        <xs:element name="endPointOfLinearElement" type="D2LogicalModel:Referent" />
        <xs:element name="linearElementByPointsExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
 </xs:complexType>
 <xs:simpleType name="LinearElementNatureEnum">
  <xs:restriction base="xs:string">
    <xs:enumeration value="road" />
    <xs:enumeration value="roadSection" />
    <xs:enumeration value="slipRoad" />
    <xs:enumeration value="other" />
  </xs:restriction>
 </xs:simpleType>
 <xs:simpleType name="LinearReferencingDirectionEnum">
  <xs:restriction base="xs:string">
    <xs:enumeration value="both" />
    <xs:enumeration value="opposite" />
    <xs:enumeration value="aligned" />
    <xs:enumeration value="unknown" />
  </xs:restriction>
 </xs:simpleType>
 <xs:complexType name="Location" abstract="true">
  <xs:complexContent>
    <xs:extension base="D2LogicalModel:GroupOfLocations">
      <xs:sequence>
        <xs:element name="locationExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
 </xs:complexType>
 <xs:simpleType name="MetresAsFloat">
  <xs:restriction base="D2LogicalModel:Float" />
 </xs:simpleType>
 <xs:simpleType name="MetresAsNonNegativeInteger">
  <xs:restriction base="D2LogicalModel:NonNegativeInteger" />
 </xs:simpleType>
 <xs:complexType name="MultilingualString">
  <xs:sequence>
    <xs:element name="values">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="value" type="D2LogicalModel:MultilingualStringValue"
maxOccurs="unbounded" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
```

```
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="MultilingualStringValue">
    <xs:simpleContent>
      <xs:extension base="D2LogicalModel:MultilingualStringValueType">
        <xs:attribute name="lang" type="xs:language" />
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
  <xs:simpleType name="MultilingualStringValueType">
    <xs:restriction base="xs:string">
      <xs:maxLength value="1024" />
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="NetworkLocation" abstract="true">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:Location">
        <xs:sequence>
          <xs:element name="networkLocationExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:simpleType name="NonNegativeInteger">
    <xs:restriction base="xs:nonNegativeInteger" />
  </xs:simpleType>
  <xs:complexType name="OffsetDistance">
    <xs:sequence>
      <xs:element name="offsetDistance"
type="D2LogicalModel:MetresAsNonNegativeInteger" minOccurs="1" maxOccurs="1" />
      <xs:element name="offsetDistanceExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="OpenlrBaseLocationReferencePoint" abstract="true">
    <xs:sequence>
      <xs:element name="openlrCoordinate" type="D2LogicalModel:PointCoordinates" />
      <xs:element name="openlrLineAttributes" type="D2LogicalModel:OpenlrLineAttributes"
/>
      <xs:element name="openlrBaseLocationReferencePointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="OpenlrBasePointLocation" abstract="true">
    <xs:sequence>
      <xs:element name="openlrSideOfRoad"
type="D2LogicalModel:OpenlrSideOfRoadEnum" minOccurs="1" maxOccurs="1" />
      <xs:element name="openlrOrientation" type="D2LogicalModel:OpenlrOrientationEnum"
minOccurs="1" maxOccurs="1" />
      <xs:element name="openlrPositiveOffset"
type="D2LogicalModel:MetresAsNonNegativeInteger" minOccurs="0" maxOccurs="1" />
      <xs:element name="openlrLocationReferencePoint"
type="D2LogicalModel:OpenlrLocationReferencePoint" />
```

```
    <xs:element name="openlrLastLocationReferencePoint"
type="D2LogicalModel:OpenlrLastLocationReferencePoint" />
    <xs:element name="openlrBasePointLocationExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:complexType name="OpenlrExtendedPoint">
   <xs:sequence>
    <xs:element name="openlrPointLocationReference"
type="D2LogicalModel:OpenlrPointLocationReference" />
   </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="OpenlrFormOfWayEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="undefined" />
    <xs:enumeration value="motorway" />
    <xs:enumeration value="multipleCarriageway" />
    <xs:enumeration value="singleCarriageway" />
    <xs:enumeration value="roundabout" />
    <xs:enumeration value="slipRoad" />
    <xs:enumeration value="trafficSquare" />
    <xs:enumeration value="other" />
   </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="OpenlrFunctionalRoadClassEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="FRC0" />
    <xs:enumeration value="FRC1" />
    <xs:enumeration value="FRC2" />
    <xs:enumeration value="FRC3" />
    <xs:enumeration value="FRC4" />
    <xs:enumeration value="FRC5" />
    <xs:enumeration value="FRC6" />
    <xs:enumeration value="FRC7" />
   </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="OpenlrGeoCoordinate">
   <xs:sequence>
    <xs:element name="openlrCoordinate" type="D2LogicalModel:PointCoordinates" />
    <xs:element name="openlrGeoCoordinateExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:complexType name="OpenlrLastLocationReferencePoint">
   <xs:complexContent>
    <xs:extension base="D2LogicalModel:OpenlrBaseLocationReferencePoint">
     <xs:sequence>
      <xs:element name="openlrLastLocationReferencePointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
     </xs:sequence>
    </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="OpenlrLineAttributes">
```

```
    <xs:sequence>
      <xs:element name="openlrFunctionalRoadClass"
type="D2LogicalModel:OpenlrFunctionalRoadClassEnum" minOccurs="1" maxOccurs="1" />
      <xs:element name="openlrFormOfWay"
type="D2LogicalModel:OpenlrFormOfWayEnum" minOccurs="1" maxOccurs="1" />
      <xs:element name="openlrBearing" type="D2LogicalModel:AngleInDegrees"
minOccurs="1" maxOccurs="1" />
      <xs:element name="openlrLineAttributesExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="OpenlrLocationReferencePoint">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:OpenlrBaseLocationReferencePoint">
        <xs:sequence>
          <xs:element name="openlrPathAttributes"
type="D2LogicalModel:OpenlrPathAttributes" />
          <xs:element name="openlrLocationReferencePointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:simpleType name="OpenlrOrientationEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="noOrientationOrUnknown" />
      <xs:enumeration value="withLineDirection" />
      <xs:enumeration value="againstLineDirection" />
      <xs:enumeration value="both" />
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="OpenlrPathAttributes">
    <xs:sequence>
      <xs:element name="openlrLowestFRCToNextLRPoint"
type="D2LogicalModel:OpenlrFunctionalRoadClassEnum" minOccurs="1" maxOccurs="1" />
      <xs:element name="openlrDistanceToNextLRPoint"
type="D2LogicalModel:NonNegativeInteger" minOccurs="1" maxOccurs="1" />
      <xs:element name="openlrPathAttributesExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="OpenlrPointAlongLine">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:OpenlrBasePointLocation">
        <xs:sequence>
          <xs:element name="openlrPointAlongLineExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="OpenlrPointLocationReference">
    <xs:sequence>
```

```
    <xs:element name="openlrGeoCoordinate"
type="D2LogicalModel:OpenlrGeoCoordinate" minOccurs="0" />
    <xs:element name="openlrPoiWithAccessPoint"
type="D2LogicalModel:OpenlrPoiWithAccessPoint" minOccurs="0" />
    <xs:element name="openlrPointAlongLine"
type="D2LogicalModel:OpenlrPointAlongLine" minOccurs="0" />
    <xs:element name="openlrPointLocationReferenceExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:complexType name="OpenlrPoiWithAccessPoint">
   <xs:complexContent>
    <xs:extension base="D2LogicalModel:OpenlrBasePointLocation">
     <xs:sequence>
      <xs:element name="openlrCoordinate" type="D2LogicalModel:PointCoordinates" />
      <xs:element name="openlrPoiWithAccessPointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
     </xs:sequence>
    </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:simpleType name="OpenlrSideOfRoadEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="onRoadOrUnknown" />
    <xs:enumeration value="right" />
    <xs:enumeration value="left" />
    <xs:enumeration value="both" />
   </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="OperatingModeEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="operatingMode0" />
    <xs:enumeration value="operatingMode1" />
    <xs:enumeration value="operatingMode2" />
    <xs:enumeration value="operatingMode3" />
   </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="PayloadPublication" abstract="true">
   <xs:sequence>
    <xs:element name="feedDescription" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="1" />
    <xs:element name="feedType" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
    <xs:element name="publicationTime" type="D2LogicalModel:DateTime"
minOccurs="1" maxOccurs="1" />
    <xs:element name="publicationCreator" type="D2LogicalModel:InternationalIdentifier"
/>
    <xs:element name="payloadPublicationExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
   </xs:sequence>
   <xs:attribute name="lang" type="D2LogicalModel:Language" use="required" />
  </xs:complexType>
  <xs:simpleType name="Percentage">
   <xs:restriction base="D2LogicalModel:Float" />
```

```
  </xs:simpleType>
  <xs:complexType name="PercentageDistanceAlongLinearElement">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:DistanceAlongLinearElement">
        <xs:sequence>
          <xs:element name="percentageDistanceAlong" type="D2LogicalModel:Percentage"
minOccurs="1" maxOccurs="1" />
          <xs:element name="percentageDistanceAlongLinearElementExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="PlanLine">
    <xs:sequence>
      <xs:element name="cycleTime" type="D2LogicalModel:Seconds" minOccurs="1"
maxOccurs="1" />
      <xs:element name="planDescription" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
      <xs:element name="offset" type="D2LogicalModel:Seconds" minOccurs="0"
maxOccurs="1" />
      <xs:element name="planNumber" type="D2LogicalModel:NonNegativeInteger"
minOccurs="1" maxOccurs="1" />
      <xs:element name="planStartTime" type="D2LogicalModel:DateTime" minOccurs="1"
maxOccurs="1" />
      <xs:element name="signalGroupTimings" type="D2LogicalModel:SignalGroupTimings"
minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="planLineExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Point">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:NetworkLocation">
        <xs:sequence>
          <xs:element name="tpegPointLocation" type="D2LogicalModel:TpegPointLocation"
minOccurs="0" />
          <xs:element name="alertCPoint" type="D2LogicalModel:AlertCPoint" minOccurs="0"
/>
          <xs:element name="pointAlongLinearElement"
type="D2LogicalModel:PointAlongLinearElement" minOccurs="0" />
          <xs:element name="pointByCoordinates"
type="D2LogicalModel:PointByCoordinates" minOccurs="0" />
          <xs:element name="pointExtension" type="D2LogicalModel:_PointExtensionType"
minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="PointAlongLinearElement">
    <xs:sequence>
      <xs:element name="administrativeAreaOfPoint"
type="D2LogicalModel:MultilingualString" minOccurs="0" maxOccurs="1" />
```

```
      <xs:element name="directionBoundAtPoint" type="D2LogicalModel:DirectionEnum"
minOccurs="0" maxOccurs="1" />
      <xs:element name="directionRelativeAtPoint"
type="D2LogicalModel:LinearReferencingDirectionEnum" minOccurs="0" maxOccurs="1" />
      <xs:element name="heightGradeOfPoint" type="D2LogicalModel:HeightGradeEnum"
minOccurs="0" maxOccurs="1" />
      <xs:element name="linearElement" type="D2LogicalModel:LinearElement" />
      <xs:element name="distanceAlongLinearElement"
type="D2LogicalModel:DistanceAlongLinearElement" />
      <xs:element name="pointAlongLinearElementExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="PointByCoordinates">
    <xs:sequence>
      <xs:element name="bearing" type="D2LogicalModel:NonNegativeInteger"
minOccurs="0" maxOccurs="1" />
      <xs:element name="pointCoordinates" type="D2LogicalModel:PointCoordinates" />
      <xs:element name="pointByCoordinatesExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="PointCoordinates">
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      <xs:element name="latitude" type="D2LogicalModel:Float" minOccurs="1"
maxOccurs="1" />
      <xs:element name="longitude" type="D2LogicalModel:Float" minOccurs="1"
maxOccurs="1" />
      <xs:element name="pointCoordinatesExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="PointExtended">
    <xs:sequence>
      <xs:element name="description" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="1" />
      <xs:element name="junction" type="D2LogicalModel:Junction" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Referent">
    <xs:sequence>
      <xs:element name="referentIdentifier" type="D2LogicalModel:String" minOccurs="1"
maxOccurs="1" />
      <xs:element name="referentName" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
      <xs:element name="referentType" type="D2LogicalModel:ReferentTypeEnum"
minOccurs="1" maxOccurs="1" />
      <xs:element name="referentDescription" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="1" />
      <xs:element name="pointCoordinates" type="D2LogicalModel:PointCoordinates"
minOccurs="0" />
      <xs:element name="referentExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
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  </xs:complexType>
  <xs:simpleType name="ReferentTypeEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="boundary" />
      <xs:enumeration value="intersection" />
      <xs:enumeration value="referenceMarker" />
      <xs:enumeration value="landmark" />
      <xs:enumeration value="roadNode" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="RequestTypeEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="catalogue" />
      <xs:enumeration value="filter" />
      <xs:enumeration value="requestData" />
      <xs:enumeration value="requestHistoricalData" />
      <xs:enumeration value="subscription" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="ResponseEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="acknowledge" />
      <xs:enumeration value="catalogueRequestDenied" />
      <xs:enumeration value="filterRequestDenied" />
      <xs:enumeration value="requestDenied" />
      <xs:enumeration value="subscriptionRequestDenied" />
    </xs:restriction>
  </xs:simpleType>
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      <xs:element name="nameOfRoad" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="1" />
      <xs:element name="roadIdentifier" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="1" />
      <xs:element name="typeOfRoad" type="D2LogicalModel:RoadTypeEnum"
minOccurs="0" maxOccurs="1" />
      <xs:element name="roadDestination" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="roadOrigination" type="D2LogicalModel:MultilingualString"
minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="distanceToThisRoad"
type="D2LogicalModel:MetresAsNonNegativeInteger" minOccurs="0" maxOccurs="1" />
      <xs:element name="roadExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="RoadNode">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:Road">
        <xs:sequence>
          <xs:element name="junctionName" type="D2LogicalModel:MultilingualString"
minOccurs="1" maxOccurs="1" />
          <xs:element name="roadNodeExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
```

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      </xs:sequence>
     </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:simpleType name="RoadTypeEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="motorway" />
    <xs:enumeration value="trunkRoad" />
    <xs:enumeration value="mainRoad" />
    <xs:enumeration value="other" />
   </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="Seconds">
   <xs:restriction base="D2LogicalModel:Float" />
  </xs:simpleType>
  <xs:complexType name="SignalGroupTimings">
   <xs:sequence>
    <xs:element name="alternateSignalGroup" type="D2LogicalModel:String"
minOccurs="0" maxOccurs="1" />
    <xs:element name="primarySignalGroupDuration" type="D2LogicalModel:Seconds"
minOccurs="1" maxOccurs="1" />
    <xs:element name="primarySignalGroup" type="D2LogicalModel:String"
minOccurs="1" maxOccurs="1" />
    <xs:element name="signalGroupTimingsExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="String">
   <xs:restriction base="xs:string">
    <xs:maxLength value="1024" />
   </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="Subscription">
   <xs:sequence>
    <xs:element name="deleteSubscription" type="D2LogicalModel:Boolean"
minOccurs="0" maxOccurs="1" />
    <xs:element name="deliveryInterval" type="D2LogicalModel:Seconds" minOccurs="0"
maxOccurs="1" />
    <xs:element name="operatingMode" type="D2LogicalModel:OperatingModeEnum"
minOccurs="1" maxOccurs="1" />
    <xs:element name="subscriptionStartTime" type="D2LogicalModel:DateTime"
minOccurs="1" maxOccurs="1" />
    <xs:element name="subscriptionState" type="D2LogicalModel:SubscriptionStateEnum"
minOccurs="1" maxOccurs="1" />
    <xs:element name="subscriptionStopTime" type="D2LogicalModel:DateTime"
minOccurs="0" maxOccurs="1" />
    <xs:element name="updateMethod" type="D2LogicalModel:UpdateMethodEnum"
minOccurs="1" maxOccurs="1" />
    <xs:element name="target" type="D2LogicalModel:Target" maxOccurs="unbounded"
/>
    <xs:element name="filterReference" type="D2LogicalModel:FilterReference"
minOccurs="0" />
    <xs:element name="catalogueReference" type="D2LogicalModel:CatalogueReference"
minOccurs="0" />
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minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="SubscriptionStateEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="active" />
    <xs:enumeration value="suspended" />
   </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="Target">
   <xs:sequence>
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maxOccurs="1" />
    <xs:element name="protocol" type="D2LogicalModel:String" minOccurs="1"
maxOccurs="1" />
    <xs:element name="targetExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TpegDescriptor" abstract="true">
   <xs:sequence>
    <xs:element name="descriptor" type="D2LogicalModel:MultilingualString"
minOccurs="1" maxOccurs="1" />
    <xs:element name="tpegDescriptorExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
   </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TpegFramedPoint">
   <xs:complexContent>
    <xs:extension base="D2LogicalModel:TpegPointLocation">
     <xs:sequence>
      <xs:element name="tpegFramedPointLocationType"
type="D2LogicalModel:TpegLoc01FramedPointLocationSubtypeEnum" minOccurs="1"
maxOccurs="1" />
       <xs:element name="framedPoint" type="D2LogicalModel:TpegNonJunctionPoint" />
       <xs:element name="to" type="D2LogicalModel:TpegPoint" />
       <xs:element name="from" type="D2LogicalModel:TpegPoint" />
       <xs:element name="tpegFramedPointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
     </xs:sequence>
    </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="TpegIlcPointDescriptor">
   <xs:complexContent>
    <xs:extension base="D2LogicalModel:TpegPointDescriptor">
     <xs:sequence>
      <xs:element name="tpegIlcPointDescriptorType"
type="D2LogicalModel:TpegLoc03IlcPointDescriptorSubtypeEnum" minOccurs="1"
maxOccurs="1" />
       <xs:element name="tpegIlcPointDescriptorExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
     </xs:sequence>
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    </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="TpegJunction">
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    <xs:extension base="D2LogicalModel:TpegPoint">
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      <xs:element name="pointCoordinates" type="D2LogicalModel:PointCoordinates" />
      <xs:element name="name" type="D2LogicalModel:TpegJunctionPointDescriptor"
minOccurs="0" />
      <xs:element name="ilc" type="D2LogicalModel:TpegIlcPointDescriptor"
maxOccurs="3" />
      <xs:element name="otherName" type="D2LogicalModel:TpegOtherPointDescriptor"
minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="tpegJunctionExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
     </xs:sequence>
    </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="TpegJunctionPointDescriptor">
   <xs:complexContent>
    <xs:extension base="D2LogicalModel:TpegPointDescriptor">
     <xs:sequence>
      <xs:element name="tpegJunctionPointDescriptorType"
type="D2LogicalModel:TpegLoc03JunctionPointDescriptorSubtypeEnum" minOccurs="1"
maxOccurs="1" />
      <xs:element name="tpegJunctionPointDescriptorExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
     </xs:sequence>
    </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:simpleType name="TpegLoc01FramedPointLocationSubtypeEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="framedPoint" />
   </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TpegLoc01SimplePointLocationSubtypeEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="intersection" />
    <xs:enumeration value="nonLinkedPoint" />
   </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TpegLoc03IlcPointDescriptorSubtypeEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="tpegIlcName1" />
    <xs:enumeration value="tpegIlcName2" />
    <xs:enumeration value="tpegIlcName3" />
   </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TpegLoc03JunctionPointDescriptorSubtypeEnum">
   <xs:restriction base="xs:string">
    <xs:enumeration value="junctionName" />
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    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TpegLoc03OtherPointDescriptorSubtypeEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="administrativeAreaName" />
      <xs:enumeration value="administrativeReferenceName" />
      <xs:enumeration value="airportName" />
      <xs:enumeration value="areaName" />
      <xs:enumeration value="buildingName" />
      <xs:enumeration value="busStopIdentifier" />
      <xs:enumeration value="busStopName" />
      <xs:enumeration value="canalName" />
      <xs:enumeration value="countyName" />
      <xs:enumeration value="ferryPortName" />
      <xs:enumeration value="intersectionName" />
      <xs:enumeration value="lakeName" />
      <xs:enumeration value="linkName" />
      <xs:enumeration value="localLinkName" />
      <xs:enumeration value="metroStationName" />
      <xs:enumeration value="nationName" />
      <xs:enumeration value="nonLinkedPointName" />
      <xs:enumeration value="parkingFacilityName" />
      <xs:enumeration value="pointName" />
      <xs:enumeration value="pointOfInterestName" />
      <xs:enumeration value="railwayStation" />
      <xs:enumeration value="regionName" />
      <xs:enumeration value="riverName" />
      <xs:enumeration value="seaName" />
      <xs:enumeration value="serviceAreaName" />
      <xs:enumeration value="tidalRiverName" />
      <xs:enumeration value="townName" />
      <xs:enumeration value="other" />
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="TpegNonJunctionPoint">
    <xs:complexContent>
      <xs:extension base="D2LogicalModel:TpegPoint">
        <xs:sequence>
          <xs:element name="pointCoordinates" type="D2LogicalModel:PointCoordinates" />
          <xs:element name="name" type="D2LogicalModel:TpegOtherPointDescriptor"
maxOccurs="unbounded" />
          <xs:element name="tpegNonJunctionPointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
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    <xs:complexContent>
      <xs:extension base="D2LogicalModel:TpegPointDescriptor">
        <xs:sequence>
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type="D2LogicalModel:TpegLoc03OtherPointDescriptorSubtypeEnum" minOccurs="1"
maxOccurs="1" />
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        <xs:element name="tpegOtherPointDescriptorExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
       </xs:sequence>
     </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="TpegPoint" abstract="true">
   <xs:sequence>
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minOccurs="0" />
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  </xs:complexType>
  <xs:complexType name="TpegPointDescriptor" abstract="true">
   <xs:complexContent>
    <xs:extension base="D2LogicalModel:TpegDescriptor">
     <xs:sequence>
      <xs:element name="tpegPointDescriptorExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
     </xs:sequence>
    </xs:extension>
   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="TpegPointLocation" abstract="true">
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    <xs:element name="tpegDirection" type="D2LogicalModel:DirectionEnum"
minOccurs="1" maxOccurs="1" />
    <xs:element name="tpegPointLocationExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
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  </xs:complexType>
  <xs:complexType name="TpegSimplePoint">
   <xs:complexContent>
    <xs:extension base="D2LogicalModel:TpegPointLocation">
     <xs:sequence>
      <xs:element name="tpegSimplePointLocationType"
type="D2LogicalModel:TpegLoc01SimplePointLocationSubtypeEnum" minOccurs="1"
maxOccurs="1" />
       <xs:element name="point" type="D2LogicalModel:TpegPoint" />
       <xs:element name="tpegSimplePointExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
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   </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="TrafficSignalConfiguration">
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    <xs:element name="controllerType" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
    <xs:element name="supplier" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
    <xs:element name="trafficSignalType" type="D2LogicalModel:TrafficSignalTypeEnum"
minOccurs="0" maxOccurs="1" />
    <xs:element name="trafficSignalConfigurationExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
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    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TrafficSignalDynamicState">
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      <xs:element name="subArea" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1" />
      <xs:element name="trafficSignalMode" type="D2LogicalModel:TrafficSignalModeEnum"
minOccurs="1" maxOccurs="1" />
      <xs:element name="trafficSignalSubMode"
type="D2LogicalModel:TrafficSignalSubModeEnum" minOccurs="0" maxOccurs="1" />
      <xs:element name="planLine" type="D2LogicalModel:PlanLine" minOccurs="0" />
      <xs:element name="trafficSignalDynamicStateExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TrafficSignalFault">
    <xs:sequence>
      <xs:element name="trafficSignalFaultClearanceTime" type="D2LogicalModel:DateTime"
minOccurs="0" maxOccurs="1" />
      <xs:element name="trafficSignalFaultType"
type="D2LogicalModel:TrafficSignalFaultEnum" minOccurs="1" maxOccurs="1" />
      <xs:element name="trafficSignalFaultUrgency" type="D2LogicalModel:UrgencyEnum"
minOccurs="0" maxOccurs="1" />
      <xs:element name="trafficSignalManufacturerFaultCode" type="D2LogicalModel:String"
minOccurs="0" maxOccurs="1" />
      <xs:element name="fault" type="D2LogicalModel:Fault" />
      <xs:element name="trafficSignalFaultExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="TrafficSignalFaultEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="detectorFault" />
      <xs:enumeration value="electronicsFault" />
      <xs:enumeration value="indicatorFault" />
      <xs:enumeration value="lampFault" />
      <xs:enumeration value="mechanicalFault" />
      <xs:enumeration value="utilityFault" />
      <xs:enumeration value="other" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TrafficSignalModeEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="centralMode" />
      <xs:enumeration value="localMode" />
      <xs:enumeration value="signalsOffMode" />
      <xs:enumeration value="startUpMode" />
      <xs:enumeration value="unknownMode" />
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="TrafficSignalStatus">
    <xs:sequence>
      <xs:element name="trafficSignalIdentifier" type="D2LogicalModel:String"
minOccurs="1" maxOccurs="1" />
```

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      <xs:element name="point" type="D2LogicalModel:Point" minOccurs="0" />
      <xs:element name="trafficSignalConfiguration"
type="D2LogicalModel:TrafficSignalConfiguration" minOccurs="0" />
      <xs:element name="trafficSignalDynamicState"
type="D2LogicalModel:TrafficSignalDynamicState" minOccurs="0" />
      <xs:element name="trafficSignalFault" type="D2LogicalModel:TrafficSignalFault"
minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="trafficSignalStatusExtension"
type="D2LogicalModel:_ExtensionType" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TrafficSignalStatusPublication">
    <xs:sequence>
      <xs:element name="headerInformation" type="D2LogicalModel:HeaderInformation"
minOccurs="0" />
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maxOccurs="unbounded" />
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      <xs:enumeration value="fixedModeToCurrentMax" />
      <xs:enumeration value="manualMode" />
      <xs:enumeration value="manualStepOn" />
      <xs:enumeration value="movaMode" />
      <xs:enumeration value="otherDistributedMode" />
      <xs:enumeration value="preEmptLevel1" />
      <xs:enumeration value="preEmptLevel2" />
      <xs:enumeration value="preEmptLevel3" />
      <xs:enumeration value="utcFixedTime" />
      <xs:enumeration value="utcOtherCentralControlMethod" />
      <xs:enumeration value="utcScoot" />
      <xs:enumeration value="vehicleActuated" />
      <xs:enumeration value="wardenControl" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TrafficSignalTypeEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="intersection" />
      <xs:enumeration value="pegasus" />
      <xs:enumeration value="pelican" />
      <xs:enumeration value="puffin" />
      <xs:enumeration value="toucan" />
      <xs:enumeration value="tramCrossing" />
      <xs:enumeration value="wigWag" />
      <xs:enumeration value="other" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="UpdateMethodEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="allElementUpdate" />
      <xs:enumeration value="singleElementUpdate" />
```

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      <xs:enumeration value="snapshot" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="UrgencyEnum">
    <xs:restriction base="xs:string">
      <xs:enumeration value="extremelyUrgent" />
      <xs:enumeration value="urgent" />
      <xs:enumeration value="normalUrgency" />
    </xs:restriction>
  </xs:simpleType>
</xs:schema>
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