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Chapter 4: Agency Registration Branch Data Concepts

In This Chapter

- ▶ Understand the requirements related to the Agency Registration Branch and its major elements.
- ▶ Discover how Agency Registration branch and related data concepts are used.
- ▶ Learn how to apply the elements in the Agency Registration.

Purpose of a Agency Registration Branch Model

The Agency Registration Branch includes elements that define the version and history of the schedule data presented in the SDP XML Document by the submitting organization.

This chapter:

- Describes high level information about the schedule including elements that define the version and routes included in the SDP XML Document;
- Defines the agency and organizational type elements, such as Organization Unit or Depot, which refer to the organizational units that are related to defining the version of the operational schedule contained in the SDP XML Document. For example, NYCT Bus generates and versions its schedule by route-depot. To this end, definition of the route and depot are included in the registration branch.

Agency Registration

The agency registration branch includes the following major elements:

- Agency
- Schedule Revision and Route Depot Version
- Route
- Organization Unit
- Depot
- Route Grouping
- Day Type

Agency Registration Conceptual Data Reference Model (CDRM) Description

The Agency Registration CDRM describes the relationships among the entities in the General Agency information (or the Agency Registration branch of the XML Schema). Figure 4-1 describes the overall relationships among the data concepts that are included in the General Agency Information CDRM. The model is described by the following indented paragraphs:

“An Agency may generate one or more versioned schedules (Schedule_Version). An Agency may operate one or more Modes of service and an Agency may be composed of one or more Organizational_Units that compose Schedule_Versions. Moreover, the Agency may provide various ways in which customers may contact it (Additional_Contacts).

“A Schedule_Version may contain more than one Schedule_Revision. The Schedule_Revision is a set of Routes (which may be grouped by Depot or garage, or by a specific Organization_Unit) which are associated with it. These Route_Depot_Versions are characterized by their activation and deactivation date. The Route_Depot_Version activation/deactivation dates should fall within the Schedule_Revision activation/deactivation dates which in turn should be contained within the Schedule_Version activation/deactivation dates.

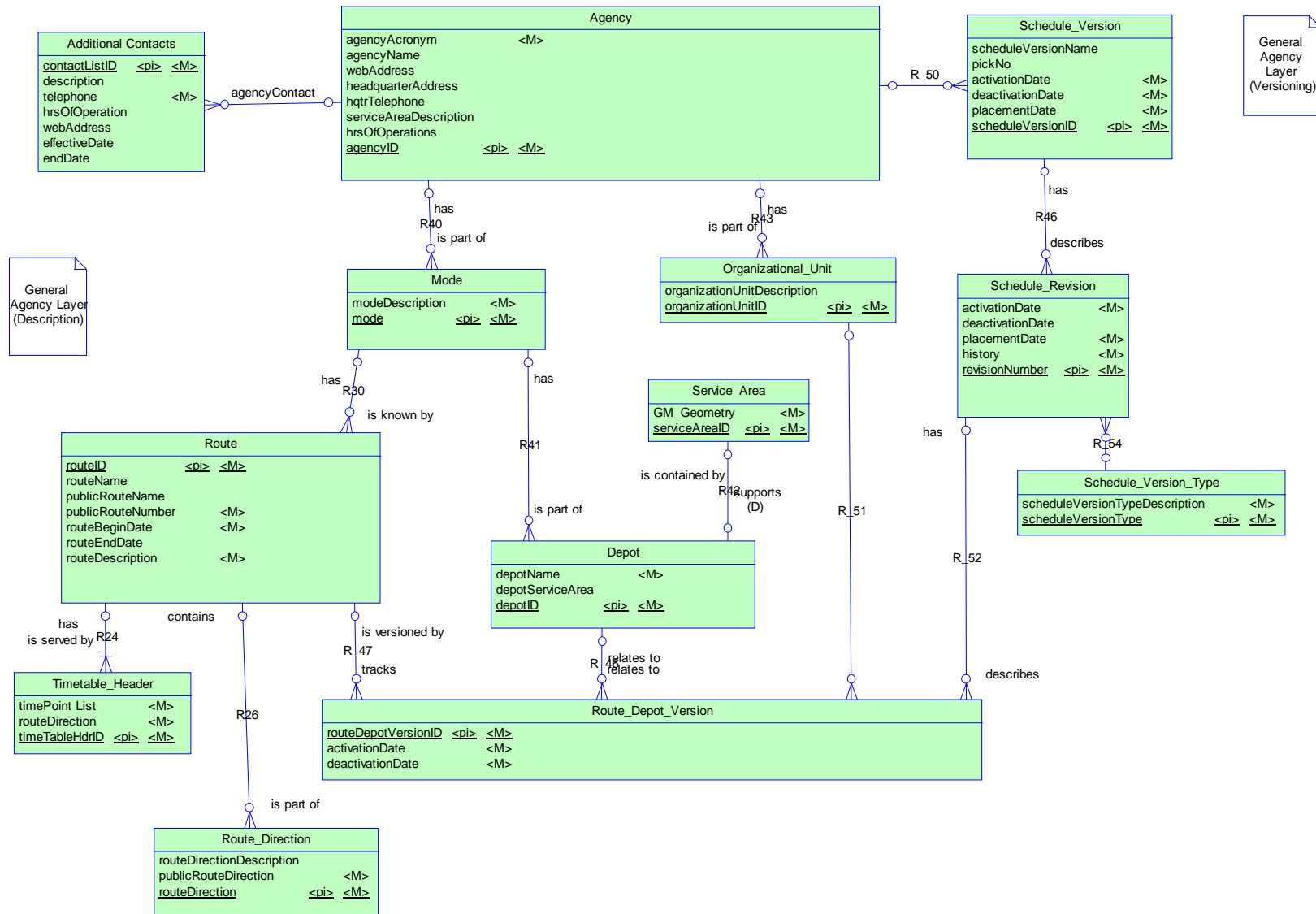


Figure 4-1: Agency Registration Conceptual Data Reference Model (Without Route Grouping)

“A Route has a public name and number known to the public, as well as a unique designator that is used for processing. The Route also includes a set of Route_Directions and may define a header form for use in a public timetable. The Timetable_Header is typically an edited (limited) set of events that occur across all patterns in the same direction. The header is used to describe the columns of the public timetable. The header may include the public location name or transit stop name, and a stop or location identifier.”

“The Route_Grouping entity describes a collection of Patterns or Trips that are grouped together for a particular purpose (Route_Grouping_Type). A set of patterns or trips may be grouped together operationally in order to closely coordinate their scheduled headways along a common alignment or carriageway. Public timetables group routes together to communicate the frequency of service of routes that share a common corridor before they branch.). [Figure 4-2 shows the relationship of entities used to describe Route_Grouping.] A Route_Grouping may group trips of more than one Route (e.g., Long Island Bus Route N20 and N21), or only include selected patterns from a Route, for example only the express trips for origin to destination.”

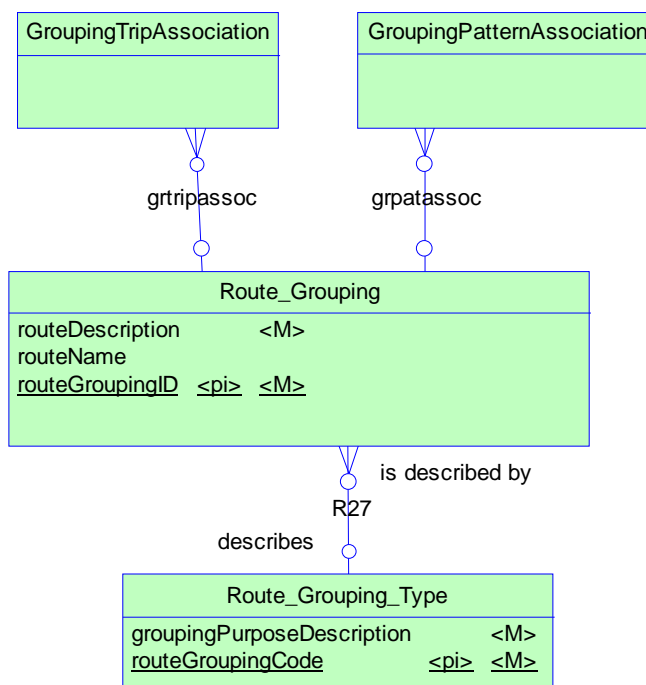


Figure 4-2: Route Grouping CDRM

SDP XML Schema Agency Registration Description

The CDRM’s transformation of the General Agency entities to the XML Schema Agency Registration Branch levels most of the entities to a flatter organization. Figure 4-3 depicts the Agency Registration branch from the SDP XML Schema.

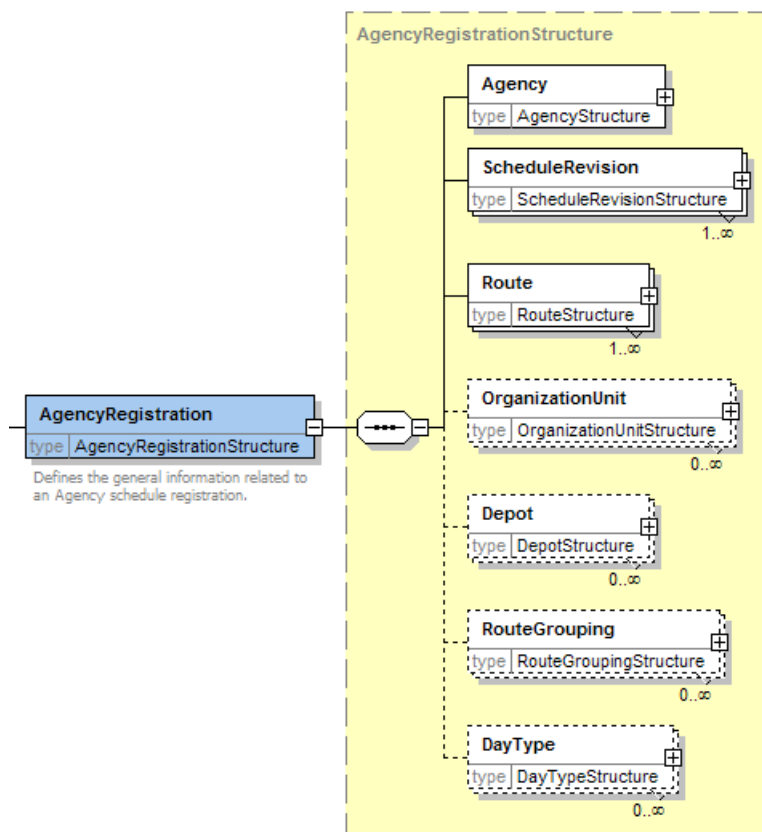


Figure 4-3: SDP XML Schema Fragment for the AgencyRegistration Branch

Although the CDRM includes Schedule_Version, it is not included in the Agency Registration Branch because the information is included as part of the SDP XML header attributes. Schedule Version attributes are discussed in more detail in Section 4.2.

Further Discussion and Relationship to SDP XML Schema

The data concepts depicted in the Agency Registration CDRM will be discussed in more detail later in this chapter, as well as key points pertaining to the CDRM's relationship to the SDP XML Schema.

Sections 4.1 through 4.4 describe the high level elements listed in the Agency Registration Branch, specifically (4.1) Agency, (4.2) Schedule Version, (4.3) Route and Route Direction, and (4.4) Organization Unit and Depot. Each section describes:

- Detailed functional requirements for the CDRM's data concepts.
- Additional rules applied (beyond those defined in Chapter 3) to migrate CDRM data concepts to the SDP XML Schema.
- Specific examples, such as showing the reader how business rules relate to translating native schedule data sets to the SDP XML Schema.

Section 4.1: Agency and Related Data Concepts

In This Section

- ▶ Learn the Agency Data Concept requirements and issues.
- ▶ Learn techniques on how to apply your native data to the Agency data concept.

Agency Definition

A transit agency is an organization that provides transportation services by bus, rail or other conveyance to the general public or special services on a regular, continuous basis.

Requirements for Agency Data Concept

Agency information needed by key downstate customer information applications typically is not stored in the schedule data. Unlike a single agency generated source or application, a regional source or application must differentiate among many agencies. To ensure that the information describes an agency according to its own policies, the SDP XML Document submittal requires current information pertaining to the organization that generates the schedule data set. Agency information may be inserted into a file once and read each time an SDP XML Document submittal is made. The basic agency information needed by various agencies and applications must describe the following:

- Agency name (doing business as)
- How the public refers to the agency
- Public contact for the agency
- Customer information contact channels (telephone, email, web site)
- Other channels/contacts for different types of customer information (e.g., service information, fare media purchase, lost and found, etc.)
- Hours of operation for service
- Geographical area covered by the agency's service
- Types of public transport (fixed) service (modes)

The SDP XML Schema makes provision for all these types of data, although they are not all required. Their status as either optional or mandatory is described in Table 4.1-2.

Specific requirements that drive the SDP XML Schema are listed in Table 4.1-1.

Table 4.1-1: Agency Requirements

#	Category	Requirements
1	Name and Identity	<ul style="list-style-type: none"> Agency name and affiliation. Description (may include a reference or incorporate documents on the operational statistics, inventory and performance measures, such as contained on MTA website “MTA Facts”).
2	Contact	<ul style="list-style-type: none"> Web address (e.g., http://beelinebus.westchestergov.com/). Headquarter address/telephone number, for example: The Department of Transportation is located at: 100 East 1st Street Mount Vernon, N.Y. 10550 (914) 813-7777 between 7 a.m. to 7 p.m. weekdays TTY for the Hearing impaired is: (914) 813-7711 Agencies may also support additional customer service contact numbers, e.g., customer information and lost & found.
3	Modes	<ul style="list-style-type: none"> The modes offered by a transit agency, for example, bus, subway, light rail (LRT), commuter rail or ferry.
4	Service Area and Operations	<ul style="list-style-type: none"> Narrative description of service area. Hours of operation/schedule day. These characteristics may differ based on mode, division, depot or organizational unit. For example, Coach has several motorbus services assigned to different areas; NYCT operates different modes, routes and schedule versions from different depots.
5	Operations Association With Other “Roles”	<ul style="list-style-type: none"> Operations (and thus schedules) may be associated with specific organizational units, for example, contractor may issue schedules for the routes they service. An agency should be able to include a reference to an internally designated organizational unit. Organizational unit (user defined identification and description).
6	Schedule Owner and Schedule Version Custodian	<ul style="list-style-type: none"> Within the context of the SDP, the transit agency may designate the “owner” of a schedule. In some cases, there are schedule version custodians that are defined in order to distinguish schedule versions. These custodians may also be associated with an agency.

Conceptual Data Reference Model Description for Agency

The agency-related requirements may be described in the CDRM depicted in Figure 4-4.

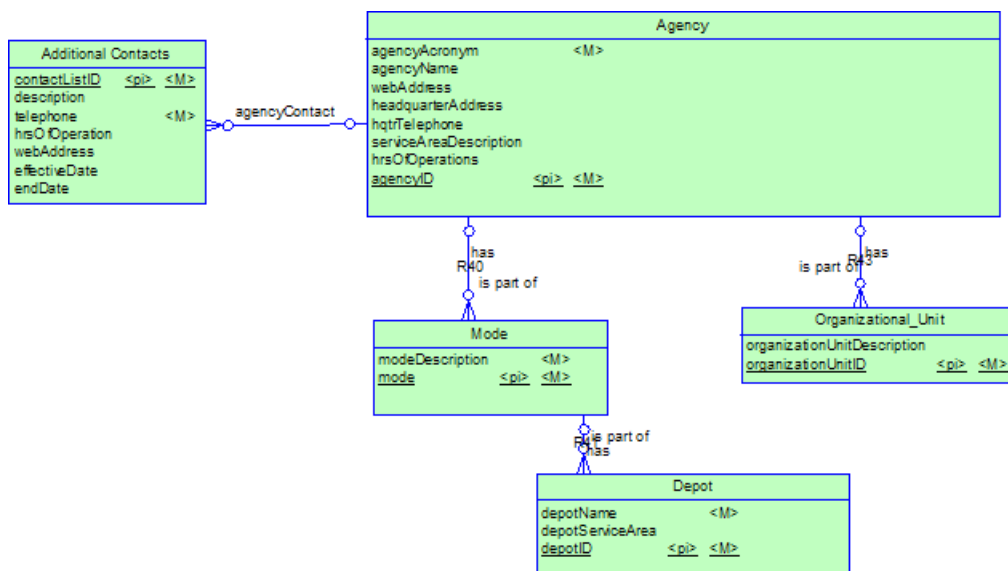


Figure 4-4: Agency Entity in the Conceptual Data Reference Model

The CDRM is described by the following:

An Agency offers one or more Modes of service. Each Mode may require one or more Depots (garages, divisions or yards) to meet the operational demand in the area serviced by the Depot. In addition, an Agency may support one or more Organizational_Units¹ that are responsible for providing service. An Agency may support multiple customer service contact channels (Additional_Contacts), such as customer information and lost & found.

Note: A shortcut is used to define the agency address for the Agency entity in Figure 4-4. It is defined as an Address element in the XML Schema and an entity in the physical database implementations.

High Level Agency XML Schema Model Description

The Agency element in the SDP XML Schema Model includes nine child elements, two of which reference other complex type elements (i.e., headquarterAddress and agencyContact). The Agency fragment from the SDP XML Schema is depicted in Figure 4-5. In implementing the CDRM into the XML Schema, a number of rules were used.

¹ This is a restrictive definition of “organizational unit”. See Business Rule in next Section which discusses the scope of this data concept within the reference model.

- As a multi-element data type, the headquarterAddress element references the AddressStructure, an embedded complex type.
- The Additional_Contacts is also a child element of Agency. It is tagged in Agency as agencyContact. It is tagged in Agency as agencyContact.
- The “attribute” notations attached to Agency and agencyContact consists of an effectiveDate and endDate. The effectiveDate refers to the placement date of the record. The endDate refers to the date the contact or agency information is obsolete or has been superseded. This artifact supports archiving and repository update functions. These attributes were assigned to most XML elements even if the requirement was not explicitly stated in the CDRM.

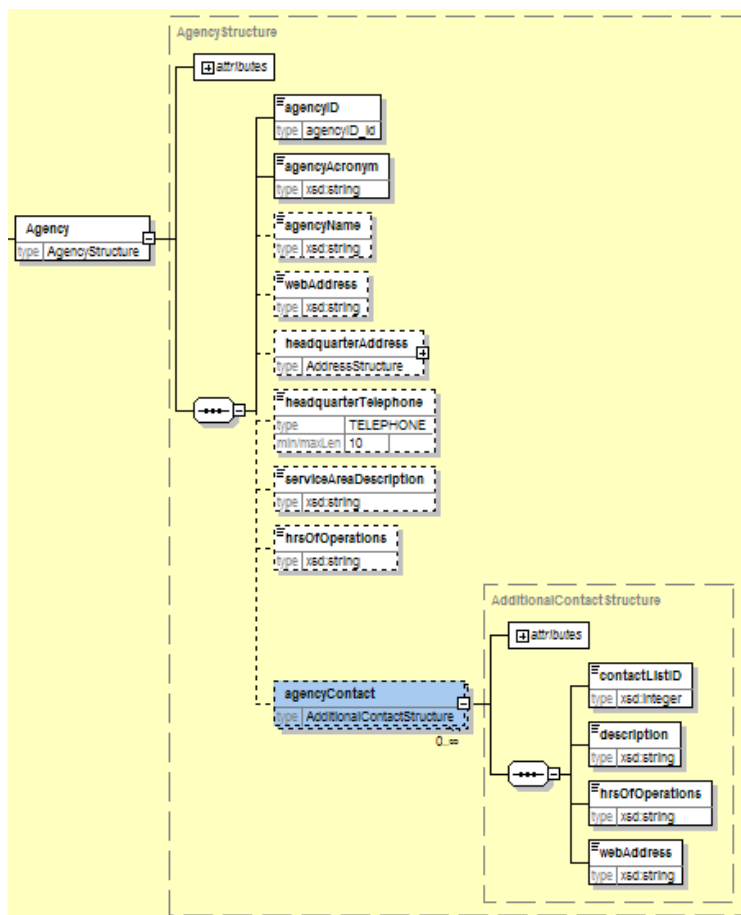


Figure 4-5: Agency Element in SDP XML Schema

- The agencyID is unique among all agencies, and thus should be assigned by the regional repository.
- The contactListID is an arbitrary index to distinguish each agencyContact.

Detailed Agency Data Descriptions and Guidance

This section provides data type information and guidance associated with the Agency and Additional Contacts elements described above. The guidance for each element is consolidated into a table with the following column headings: Requirement status (M for mandatory and O for optional), the element name, the data type and guidance related to the element. The guidance attempts to bring additional clarity to the data definition. The first column of each table identifies the baseline requirements as driven by the SDP XML Schema version 1.0.

A downstream application may further restrict these requirements in order for the data set to meet the application's data needs. The XML Schema element name corresponds to the related CDRM entities and attributes descriptions (although the capitalization and spacing may differ slightly). The type may refer to a native XML type, or a declared type in the XML schema. The Guidance column is called “Questions to Ask.” These questions direct the analyst to a similar or

equivalent concept in their own schedule data set. In addition, some comments describe the impact of the data structures on the SDP XML document deployment.

Table 4.1-2 incorporates Agency Guidance and Table 4.1-3 incorporates Additional Contact Guidance.

Table 4.1-2: Agency Guidance

	Element Name	Type	Questions to Ask
M	agencyID	agencyID_id UNIQUE	This designator is assigned by SDP/TSDEA registration. (if not available, use agencyAcronym.)
M	agencyAcronym	String	Acronym that is known by the public, for example LIRR or MTA LIRR.
O	agencyName	String	Full name of agency, for example “Metropolitan Transportation Authority New York City Transit” or “MTA New York City Transit.”
O	webAddress	String	The universal resource link or home page web address of the agency.
O	hdqtTelephone	TELEPHONE	The general information number or a general customer information telephone number. Format should be: aaa-ttt-tttt (where aaa refers to the area code followed by seven digits).
O	headquarterAddress	ADDRESS	See address structure guidance in Part 3 SDP Schema Guidance Template.
O	serviceAreaDescription	String	A description of service area. The description is used to present to the public. As such the description should avoid abbreviations and excessive capitalization.
O	hrsOfOperations	String	A basic description of the hours of operation, for example: “5:30 a.m. to 10 p.m.” or “24 hours.”
O	agencyContact	Additional Contacts	Are there other places where customers may contact the agency? (e.g., customer help line, lost and found, complaints, etc.). If yes, then complete a new Additional Contact element for each the contact type.
O	@ effectiveDate	date	[attribute] format: yyyy-mm-dd
O	@ endDate	Date	[attribute] format: yyyy-mm-dd; if no end date, use 9999-12-31

Table 4.1-3: Additional_Contact Guidance

	Element Name	Type	Questions to Ask
M	contactListID	Autonumber	Assign a unique number for each Additional Contact.
M	description	String	Describe the type of contact (e.g., lost and found).
O	telephone	TELEPHONE	The contact information number or a general customer information telephone number. Format should be: aaa-ttt-tttt (where aaa refers to the area code followed by seven digits).
O	hrsOfOperations	string	The hours of operation for the contact information, for example: if a customer service representative telephone line is open from “5:30 a.m. to 10 p.m.” or “24 hours.”
O	webAddress	String	The universal resource link or home page web address of the agency.

Example for Populating the Agency Structure

Table 4.1-4 provides an example of how Agency elements might be submitted by the Long Island Rail Road. For training purposes, the table includes the element’s status as mandatory or optional, the element name, the element definition and the data value from LIRR. The headquarter’s address is not listed, which is acceptable, since it is an optional element that is not needed at the moment by any applications. The “pi” implies that the element is a **primary identifier**, and is unique and mandatory.

Table 4.1-4: Agency Element Definition and Examples

	Element	Definition	Example
pi	agencyID	A unique identifier that designates a transit operator.	300
M	agencyAcronym	An abbreviation for the Transit Agency’s name that is known by the public	LIRR
O	agencyName	The complete name of the Transit Agency	Long Island Rail Road
O	webAddress	The universal resource location (URL) for the Agency’s web site	www.lirr.org
O	headquarterAddress	The physical address for the Transit Agency’s headquarter facility	
O	headquarterTelephone	The telephone numbers that may be used to contact the Transit Agency headquarter facility.	718-217-5477 (LIRR) 516-822-5477 (LIRR) 631-231-5477 (LIRR)

Table 4.1-4: Agency Element Definition and Examples

	Element	Definition	Example
O	serviceAreaDescription	A short description of the service area covered by an Operator.	“The LIRR system is comprised of over 700 miles of track on 11 different branches, stretching from Montauk—on the eastern tip of Long Island—to the refurbished Penn Station in the heart of Manhattan, approximately 120 miles away. Along the way, the LIRR serves 124 stations in Nassau, Suffolk, Queens, Brooklyn and Manhattan.”
O	hrsOfOperation	The hours of operations of revenue service as presented to the public. The maximum number of hours is 24.	24

Agency Example From a SDP XML Document

A typical example, which incorporates agency information, from a SDP XML Document with dummy data is listed below:

```

<Agency endDate="1967-08-13" effectiveDate="1967-08-13">
  <agencyID>String</agencyID>
  <agencyAcronym>String</agencyAcronym>
  <agencyName>String</agencyName>
  <webAddress>String</webAddress>
  <headquarterAddress>
    <addressID>String</addressID>
    <addressSegID>String</addressSegID>
    <recordDate>1967-08-13</recordDate>
    <addressNumber>0</addressNumber>
    <directionPrefix>0</directionPrefix>
    <typePrefix>String</typePrefix>
    <streetName>String</streetName>
    <typeSuffix>String</typeSuffix>
    <directionSuffix>0</directionSuffix>
    <completeName>String</completeName>
    <unitType>0</unitType>
    <unitDesignation>String</unitDesignation>
    <secondLine>String</secondLine>
    <postalCommunity>String</postalCommunity>
    <postalState>0</postalState>
    <postalCode>String</postalCode>
    <status>0</status>
  </headquarterAddress>
  <headquarterTelephone>aaaaaaaa</headquarterTelephone>
  <serviceAreaDescription>String</serviceAreaDescription>
  <hrsOfOperations>String</hrsOfOperations>

```

```

    <agencyContact endDate="1967-08-13" effectiveDate="1967-08-13">
      <contactListID>0</contactListID>
      <description>String</description>
      <hrsOfOperations>String</hrsOfOperations>
      <webAddress>String</webAddress>
    </agencyContact>
    <agencyContact endDate="1967-08-13" effectiveDate="1967-08-13">
      <contactListID>0</contactListID>
      <description>String</description>
      <hrsOfOperations>String</hrsOfOperations>
      <webAddress>String</webAddress>
    </agencyContact>
  </Agency>

```

An example of Agency information that might appear in the NYCT Bus SDP XML Document is:

```

<Agency effectiveDate="2006-11-01" endDate="9999-12-31">
  <agencyID>100.2</agencyID>
  <agencyAcronym>NYCT</agencyAcronym>
  <agencyName>New York City Transit Bus</agencyName>
  <webAddress>http://www.mta.nyc.ny.us/nyct/bus/index.html</webAddress>
</Agency>

```

Section 4.2: Schedule Version and Related Data Concepts

In This Section

- ▶ Learn about the Schedule Version CDRM and its relationship to the SDP XML Schema.
- ▶ Discover how schedule version and related data concepts are used.
- ▶ Learn how to apply Schedule Version, Schedule Revision and Route Depot Version.

Schedule Version Definition

The time period, described by the start date and time and optionally end date and time, when an agency service provision is valid. Due to the nature of transit schedules, different routes, depots and organizational units may implement various versions that operate during the same time period.

Typical Schedule Version Practice

The scheduling process follows a typical cycle no matter the locale, mode or organization. As a human resource-driven service, a transit schedule release (when all the schedule components are checked and approved) is typically driven by the operators' selection of work or "pick." The operator pick typically has an effective start and end date of service that spans three, four or sometimes six months. Different organizations have different naming conventions for pick numbers, for example, many concatenate the last two digits of the year with a number referring to a pick period that occurs during the year, 305 for the Fall (3rd) pick in 2005, others may use the season as an indicator of the pick, e.g., Fall 2005. Pick numbers define the high level *schedule version identifier*. As such, the pick period number does not change even if elements of the schedule do change.

A *revision number* may indicate that one or more changes were made to various components of the schedule version. Examples of revisions that affect scheduled service are listed below:

- A construction project starts during the middle of the schedule period and service must be changed to accommodate a detour or delay.
- A trip starting time (and possibly all subsequent trip times) was changed to start two minutes later due to increased running times.
- Special holiday service is initiated two weeks before the holiday every weekday.

Many agencies implement schedule revisions without altering the original pick number because an error was found in the data set. In such cases, the data set may be completely replaced with a new revision. The original data set will not be kept or archived due to the error. Yet it is still judicious to track the revision or generation version that is used. To this end, the Schedule Revision keeps track of the changes made to all or part of the schedule data set.

Schedule Revision

Records the state and manages the changes to the designated schedule version.

Route Depot Version

Characteristics of the schedule version that applies to a route that operates from a specific depot, or that is generated by a specific organizational unit. In the case where there is no distinction on specific organizational unit, the depotID or organizationUnitID is a non-identifying foreign key.

Some changes are only temporary and depend on environmental conditions, time of the year, or external circumstances. For example,

- A change may occur only during a specified period of time and only affect a few trips or trains, e.g., the five weeks before Christmas;

- An exception may apply to an entire route or patterns of a route, e.g., major construction that was not incorporated into the Pick schedule;
- An exception may describe the extra trains that are needed on a periodic basis, for example, when the Mets play at Shea stadium at 5 p.m. versus when they play at 7 p.m.; or
- A template for emergency service operations for severe weather conditions (a.m./p.m./mid-day evacuation) is another type of exception based schedule.

Temporary changes are not well documented in current industry practice. They may be documented as an exception in a special file, as is typically the current practice. The temporary change may be associated with an entire set of route schedules, or designated within a standard schedule as specific “special” day types, service keys, or as extra or exception service that run on certain days.

Different modes reduce their schedule exception types to different levels of resolutions. For example, rail systems, because they run fewer trains than bus trips may schedule their service and exception service on a train by train basis, while bus service may package their schedule and exception service on a route level. Rail systems plan physical changes to the location of their stops several years in advance, while bus stops on average change 10 percent annually.

Requirements for Schedule Version Data Concept

The requirements that drive the Schedule Version Data Concept are described in Table 4.2-1.

Table 4.2-1: Requirements for Schedule Version and Related Data

#	Category	Requirements
1	Schedule version coverage and identification	<ul style="list-style-type: none"> • A schedule version number is used to group all the schedule components for a specified period of time (activation to deactivation dates). The number should not change over that period (although the deactivation date may be changed). • The schedule components related to a specific schedule version may be submitted to the TSDEA in separate SDP documents. The TSDEA can accommodate changes to the schedule only if all the submittals include a common schedule version number. • A schedule version applies to all the components of an agency's schedule that are active during a schedule version period. Those components include routes/branches/lines, trips/trains, patterns and those elements that compose trips and patterns (e.g., timepoints, stop points, notes). • A unique identifier or description (e.g., time period) describes a schedule version for each Transit Agency at the level a schedule component is versioned. • The schedule version is typically related to the schedule components from which operator's pick their work assignments over the proposed operational period. For that reason, the schedule version may be the same as the "pick" number. • A schedule version description shall also include the status of the schedule version including all revisions.
2	Schedule Types	<p>A schedule may be categorized as follows:</p> <ul style="list-style-type: none"> • Original: the base schedule assigned to the schedule version number. • Revision: a change to part of a schedule for a specified period. <ul style="list-style-type: none"> - <i>Permanent (revision):</i> a change to part of a schedule whose duration may be after the activation date, but whose deactivation date is the same as the original schedule version. Note: a temporary revision that overlaps two schedule version periods may be considered a permanent change to the first schedule version. - <i>Temporary (revision):</i> a change to part of a schedule whose duration may fall within the original schedule version period, or for non-sequential days that fall within the original schedule version period. • Suspended: A schedule version that is no longer valid. A suspended schedule version renders all schedule components and files that use the schedule version number as invalid.
3	Packaging Schedule Components	<p>At a minimum, schedule components shall be packaged at a route/depot level in an SDP document. This may imply that every route is contained in a separate package. This requirement does not restrict an agency from submitting an SDP document with its entire schedule for all routes.</p>

Table 4.2-1: Requirements for Schedule Version and Related Data

#	Category	Requirements
4	Rules for file submissions for original schedule version schedule components	<p>An original schedule version submission must contain all the schedule components and related libraries that apply to that schedule version. The information is the baseline information. Once a schedule version is suspended, all data pertaining to that schedule version is removed from the TSDEA.</p> <ul style="list-style-type: none"> • A set of integrity checks will be developed that validate the logical consistency of the data set as a whole.
5	Rules for including schedule components to a revision file	<p>A revised schedule version submission must contain the affected <i>route</i> and all the route schedule components. If the change was part of the SDP library, then the selected library entries should also be included.</p> <ul style="list-style-type: none"> • The permanent changes will be applied to the previous, valid schedule. This will entail replacing the entire route description and related entities. Integrity checks will be used to validate the logical consistency of the revised data set as a whole (all routes and schedule components). When the data set passes the tests, the permanent changes will be incorporated into the production level data set. If not, the resulting errors will be detailed and sent to the data producer. • Temporary changes will be stored in a separate file and apply to specific dates in the service calendar. The SDP documents that contain temporary schedules should be self contained and include all applicable SDP library entries.
6	Rules for schedule version suspensions	<p>A SDP document that is designated as a suspended schedule version does not need to contain any schedule components or libraries. As a result of its receipt, all data and files related to the schedule version shall be purged from the TSDEA.</p>
7	Deactivation date	<ul style="list-style-type: none"> • A schedule version need not specify the deactivation date when the scheduled service is first activated. The most significant date available (on most computing platforms is 31 December 9999) should be used to designate the schedule version deactivation date if it is unknown. The SDP should be updated with the closing date when it is known. • When a deactivation date is updated by the SDP registrant, the TSDEA will be responsible for updating all SDP document's schedule components.

Schedule Version Conceptual Data Reference Model Description

A Schedule Version defines the activation time period of a schedule. Specifically, a scheduleVersionID is a unique identifier associating the collection of service provision components that are valid for a period of time. The schedule version is typically defined as the services selected by operators as their work assignments during a period during the year. Different organizational units or operator/depot units may generate the schedule components to form a mode-, organization- or route/depot-based schedule version. A revision number will track changes to the service provision specifically the routes associated with an organizational unit or depot. Figure 4-6 shows the CDRM for Schedule Version.

A Schedule Version is generated once a scheduling period. (The Schedule Revision associated with an original scheduleVersionType defaults to zero.) An original schedule and scheduling

components (i.e., routes as generated by either a depot or organizational unit) may be revised several times over its activation period, and is assigned a unique, sequential revision number for each revision. Depending on the type of revision, the Schedule Revision version may have a different activation and deactivation date for multiple route schedules. A Schedule Revision version that is of type “temporary” should include the valid dates of operation and be associated with the Service Calendar Date. [The schedule calendar date and day type data concepts are described in greater detail in Chapter 9: Schedule Calendar Date Data Concept.]

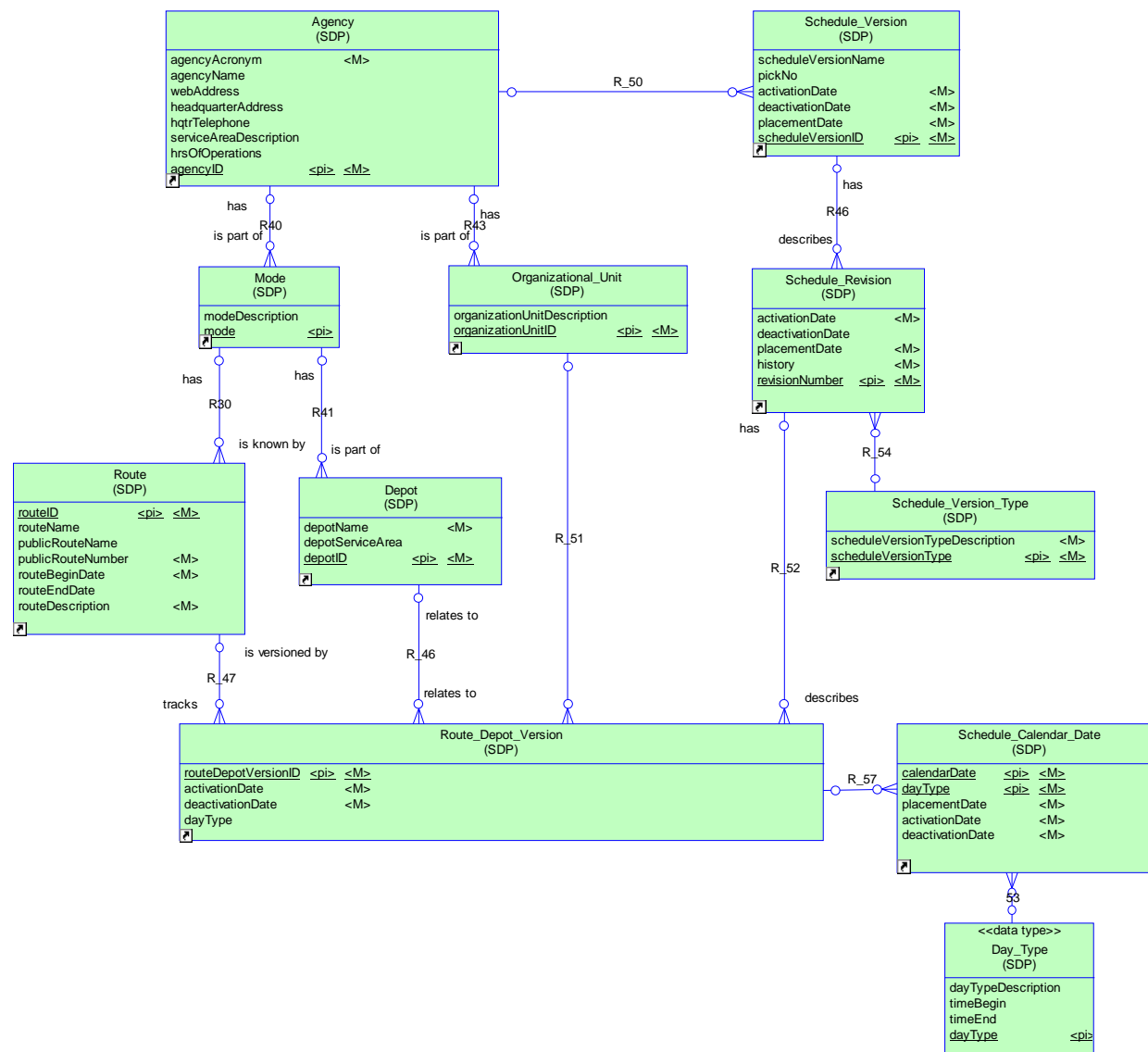


Figure 4-6: Schedule Version Conceptual Data Reference Model

XML Schema Descriptions for Schedule Version and Revision, Route Depot Version Elements

There are specific assumptions and requirements associated with the Schedule Version and Schedule Revision elements that are migrated from the CDRM to the SDP XML Schema. These requirements are described in the following subsections.

Schedule Version. The Schedule Version concept is implemented in the SDP XML Schema as an attribute group.² As such, an SDP XML Document represents only one schedule version of a single agency. Schedule Version attribute group contains six attributes. Although optional attributes are present, they *must be* included in the SDP Document header section (even if left empty) for validation. An illustration of the attribute group may be viewed in the top right hand box in Figure 4-7.

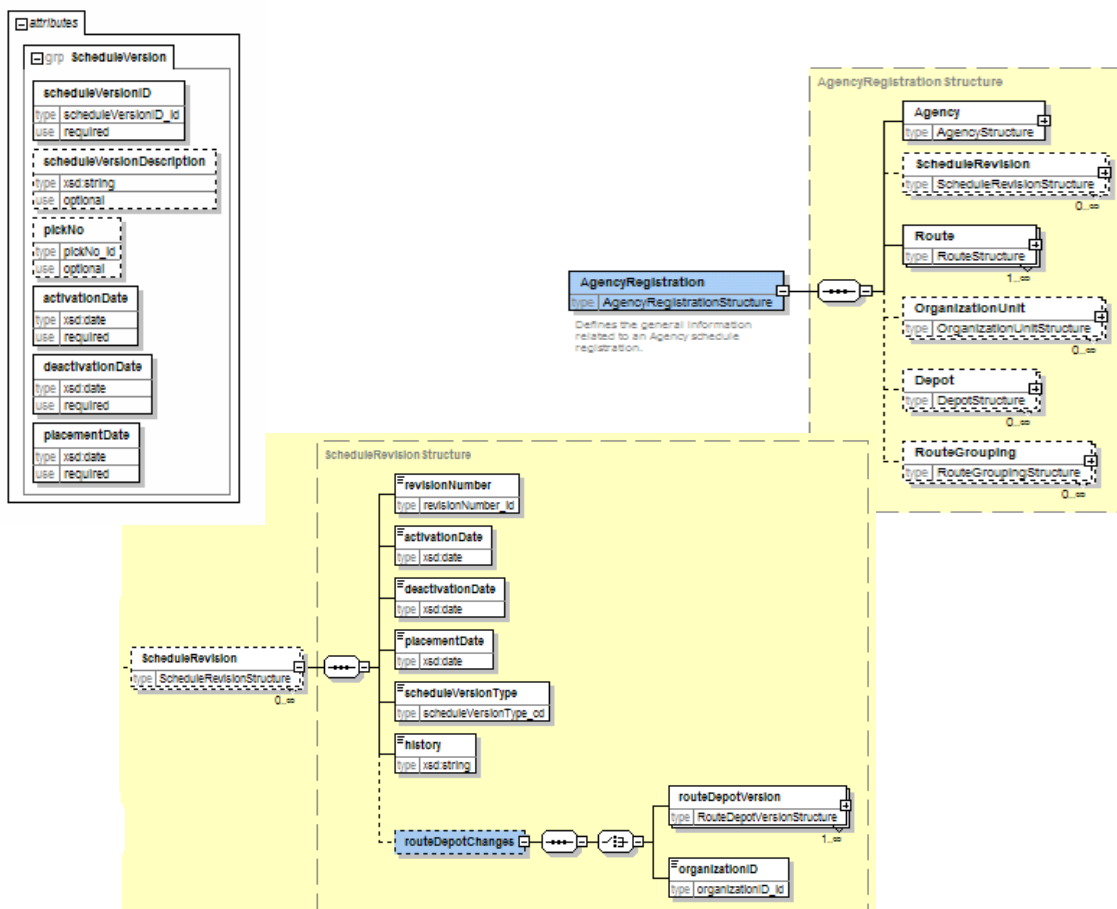


Figure 4-7: Schedule Version and Schedule Revision Elements from SDP XML Schema

Schedule Revision. The Schedule Revision is represented as an element in the Agency Registration branch. Zero or more Schedule Revisions may be included in the document. The element contains seven elements, the first six are mandatory and the last element, `routeDepotChanges`, is optional. The `routeDepotChanges` element embeds the Route Depot Version elements or the associated organization unit (`organizationUnitID`) that generates or changes the schedule.

The `routeDepotChanges` is an optional element, which, when included, must be composed of one or more Route Depot Versions or a single `organizationUnitID`. The `routeDepotChanges` is inserted when:

² Attribute and Attribute Group as defined by the XML Schema standard.

- An Agency assigns version numbers to each route or group of routes generated for a specific depot (routeDepotVersion elements are required) or organizational unit (organizationID is required), or
- An agency submits a partial update of their schedule. Then routeDepotVersion elements are submitted for each route that was changed under this revision number and is included in the file.

The first SDP Document submission for service should include Schedule Revision where schedule version is an “original” scheduleVersionType and the revisionNumber is equal to “0.”

Figure 4-8 shows excerpts of elements of Schedule Revision and RouteDepot Version data concepts in the SDP XML Schema. These elements are illustrated in the bottom yellow shaded box.

Route Depot Version. As mentioned in Schedule Revision, the Route Depot Version element is referenced as one or more elements in the routeDepotChanges element of the Schedule Revision element. The element, as illustrated in Figure 4-8, should be included when the SDP consists of only a partial list of routes, an update of a select number of routes, or when an Agency groups its routes by depot. For example, the NYCT will register its data by route depot version in order to group its routes by depot and day type.

The Route Depot Version consists of only two mandatory elements, routeDepotVersion and routeID. Inclusion of the Route Depot Version structure provides a listing of the routes that are included in the document.

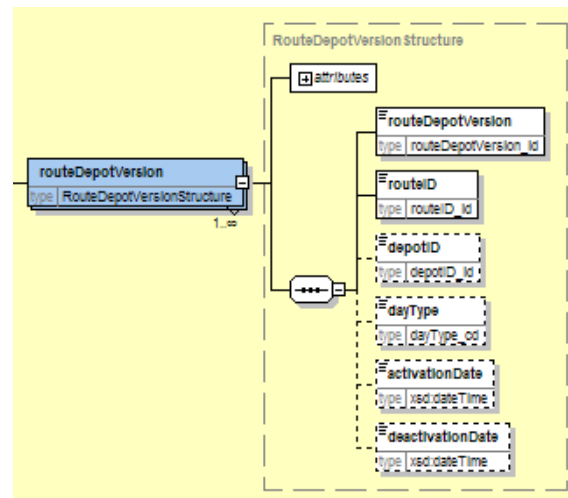


Figure 4-8: Route Depot Version Element in the SDP XML Schema

The activation and deactivation dates, although not required, may be needed to ensure that the routeDepotVersion is consistent with the Schedule Version and Revision dates. For example, the route depot version dates should be bounded by the revision dates and the revision dates should be bounded by the schedule version dates.

Furthermore, there are cases when changes to a route result in a Route element with the same designator appearing more than once in a data set. For example, the patterns (and consequently trips) associated with a route may change for a week due to construction on the route pattern. As such, the routeDepotVersion activationDate and deactivationDate should be included and match the Route element routeBeginDate and routeEndDate to associate the correct Route and Route Depot Version.

Schedule Version Detailed Data Descriptions and Guidance

This section describes the format and guidance associated with the ScheduleVersion attribute group and ScheduleRevision and RouteDepotVersion elements in the data concepts described above. The guidance for each element is consolidated into a table with the following column headings: Requirement Status (M for mandatory and O for optional), the element name, the data type and guidance related to the element. The guidance attempts to bring additional clarity to the data definition. The first column of each table identifies the baseline requirements as driven by the SDP XML Schema version 1.0. A downstream application may further restrict these requirements in order for the data set to meet the application's data needs. The XML Schema element name corresponds to the related CDRM entities and attributes descriptions (although the capitalization and spacing may differ slightly). The type may refer to a native XML type, or a declared type in the XML schema. The Guidance column is called "Questions to Ask." These questions direct the analyst to a similar or equivalent concept in their own schedule data set. In addition, some comments describe the impact of the data structures on the SDP XML document deployment.

The following tables provide data descriptions and guidance:

- Table 4.2-2 addresses Schedule Version Attribute Group Guidance
- Table 4.2-3 addresses Schedule Revision Guidance
- Table 4.2-4 addresses Route Depot Version Guidance

Table 4.2-2: Schedule Version Attribute Group Guidance

	Attribute Name	Type	Questions to Ask
M	scheduleVersionID	scheduleVersionID_id	Is there a special identifier used to designate a schedule?
O	scheduleVersionDescription	string	Is there a special field that describes the schedule version?
O	pickNo	string	What operator sign up or pick number was this schedule associated with? This element may be the same as the scheduleVersionID.
M	activationDate	date	When does this schedule begin? [yyyy-mm-dd]
M	deactivationDate	date	When does this schedule end? If unknown then use default value of 9999-12-31.
M	placementDate	date	Date on which schedule was generated or developed (if no date is available then use date compiled into SDP format).

Table 4.2-3: Schedule Revision Guidance

	Element Name	Type	Questions to Ask
M	revisionNumber	revisionNumber_id UNIQUE	If there is no revision number this may be set to "0" and incremented whenever a change is made.
M	activationDate	date	If corresponds to schedule version, then it is assigned the same date; if this version is temporary (for example a long term detour routing), then start date of revised schedule is used.
M	deactivationDate	date	See activationDate comment. If unknown then use default value of 9999-12-31.
M	placementDate	date	Date schedule revision was generated or placed. Use date of SDP document generation if the revision date is not known.
M	scheduleVersionType	scheduleVersionType_cd	Codes include [original, rev-permanent, rev-temporary, suspended].
M	history	string	Use a standard convention for generating the history, for example "1-original; 2-updated routes 2, 10, 12;" etc.
O	routeDepotChanges	CHOICE of organizationID or Route Depot Version	<p>If the element is included, one of these elements must be included. The organizationID may refer to an arbitrary, unique identifier that designates an organization.</p> <p>Because this is a choice element, the organizationID and one or more routeDepotVersion elements are wrapped in <routeDepotChanges> tags.</p>

Table 4.2-4: Route Depot Version Guidance

	Element Name	Type	Questions to Ask
M	routeDepotVersion	routeDepotVersion_id UNIQUE	If there is no version number to trace to at the agency (e.g., file name for STIF/RTIF files, or route version), then assign unique sequential number.
M	routeID	routeID_id	Unique identifier for routeID that is used throughout the document. This identifier is validated against the set of primary routeIDs in the Route element.
O	depotID	depotID_id	Although a unique identifier linked to Depot.depotID, this identifier is not needed unless the route number and set of trips are unique only for the route associated with a specific depot or garage (e.g., like NYCT).
O	dayType	dayType_cd	Because many scheduling systems output data by route and day type, schedule data may be packaged in an SDP document by route and day type. The dayType element provides a means to trace the information in this document to a specific file.
O	activationDate	date	This is the date the route-depot version is activated. This field may be redundant with the Revision, Route or ScheduleVersion activationDate. If a single routeID is designated more than once in the data set because its service runs on mutually exclusive dates, then the activationDate must match the ROUTE element's routeBeginDate.
O	deactivationDate	date	Same as activationDate.
O	effectiveDate	date	[attribute name] use to record placement of record.
O	endDate	date	[attribute name] use to record when this record will become obsolete.

Examples of Schedule Version and Revision

This example illustrates how a progression of changes may occur over the schedule version lifecycle. The following bullets provide background for the example:

- Long Island Bus may submit 49 files that contain the original schedule components for the Fall 2006 version (306).
- Several routes may need to be changed in October due to coordination of specific routes with Long Island Railroad. These are contained in Revision 1.
- Later that month, damage occurs to a major arterial and the road is closed. Several routes will be affected for at least three weeks while the county deals with the problem. LIB revises the patterns, by removing certain stops and adding new ones at different locations.

- Several times later that year, transit stops are removed or added, and slight changes are made to the schedule.
- The routes and library entries that are affected are included in a SDP document and a new revision number is created to track the submittals. Finally, on 2 January 2007, the new schedule becomes active (107) and the existing schedule version 306 is removed.

The progression of changes to the schedule version (sign up) 306 is illustrated in Figure 4-9.

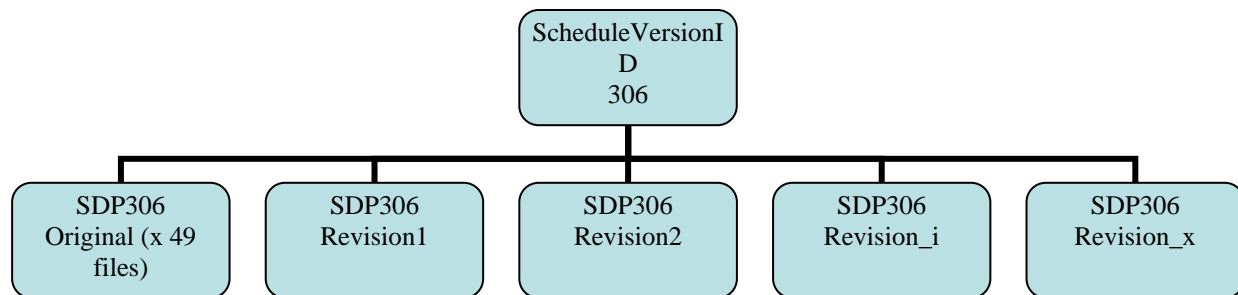


Figure 4-9: Example of SDP Schedule Version Submittals

For the suspension case, the schedule version number is withdrawn and may be reused by an agency. Assume that an agency produces and submits a schedule that must later be rewritten due to unforeseen circumstances. The entire schedule and schedule components may be purged from the TSDEA with the schedule version type “Suspend” code as shown in Figure 4-10. In order for the TSDEA to track this set of file submittals, temporal information such as activation and deactivation dates are needed, and should be associated with the description of the schedule version.

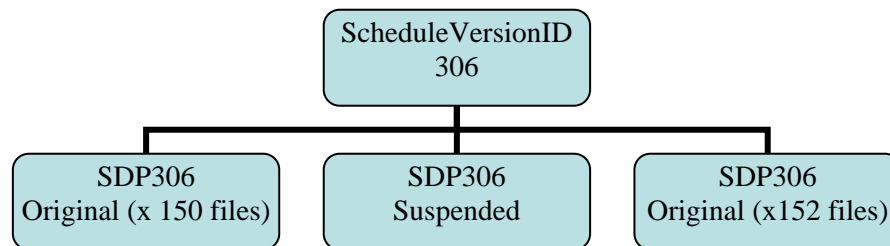


Figure 4-10: Example of SDP Schedule Version Suspension

Example of Typical Schedule Version Attribute Group

The Schedule Version identifier is stored in the header. An excerpt from the Long Island Bus SDP XML document might appear as follows:

```

scheduleVersionID="107"
scheduleVersionDescription=""
pickNo="107"
activationDate="2007-01-07"
deactivationDate="9999-12-31"
placementDate="2006-12-28"
  
```

Example of Typical Schedule Revision with routeDepotChanges

The NYCT Bus SDP XML Document will include a routeDepotChanges element for each file it includes in the SDP XML document. In this example, the Schedule Revision element is included with six routeDepotChange elements, one for each route-depot-day type for routes BX1 and BX2.

```

<ScheduleRevision>
  <revisionNumber>0</revisionNumber>
  <activationDate>2006-11-02</activationDate>
  <deactivationDate>2006-11-30</deactivationDate>
  <placementDate>2006-11-01</placementDate>
  <scheduleVersionType>original</scheduleVersionType>
  <history>1-original</history>
  <routeDepotChanges>
    <routeDepotVersion>
      <routeDepotVersion> BX1_206273</routeDepotVersion>
      <routeID>BX1</routeID>
      <depotID>KB</depotID>
      <dayType>weekday</dayType>
    </routeDepotVersion>
    <routeDepotVersion>
      <routeDepotVersion> BX1_206274</routeDepotVersion>
      <routeID>BX1</routeID>
      <depotID>KB</depotID>
      <dayType>sat</dayType>
    </routeDepotVersion>
    <routeDepotVersion>
      <routeDepotVersion> BX1_206275</routeDepotVersion>
      <routeID>BX1</routeID>
      <depotID>KB</depotID>
      <dayType>sun</dayType>
    </routeDepotVersion>
    <routeDepotVersion>
      <routeDepotVersion> BX2_206273</routeDepotVersion>
      <routeID>BX2</routeID>
      <depotID>KB</depotID>
      <dayType>weekday</dayType>
    </routeDepotVersion>
    <routeDepotVersion>
      <routeDepotVersion> BX2_206274</routeDepotVersion>
      <routeID>BX2</routeID>
      <depotID>KB</depotID>
      <dayType>sat</dayType>
    </routeDepotVersion>
    <routeDepotVersion>

```

```
<routeDepotVersion> BX2_206275</routeDepotVersion>
<routeID>BX2</routeID>
<depotID>KB</depotID>
<dayType>sun</dayType>
</routeDepotVersion>
</routeDepotChanges>
</ScheduleRevision>
```

Section 4.3: Route and Route Direction Data Concepts

In This Section

- ▶ Learn about the Route Data Concept.
- ▶ Learn how to apply the elements in the Route data concept.
- ▶ Learn about the need for and application of the Timetable Header concept.

This section covers the definitions for Route and Route Direction. The elements Route Grouping and Timetable Header are directly related to Route, but are advanced concepts that are covered in Chapter 10: Advanced Data Concepts.

Route Definition

A collection of patterns and trips in revenue service with a common identifier or name.

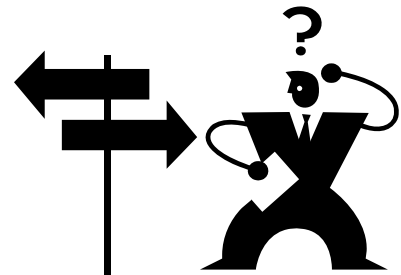
Route Direction Definition

A description or name of the route direction that is recognized by the public.

Typical Route Definition Practice in Transit

The Route, described by the physical path and the traversal of service over that path, constitutes one of the key pieces of schedule information. The purpose of the SDP Route data concept (designated by a route identifier and name) is to describe a critical aspect of transit service primarily from the perspective of the customer or transit rider. As such, the content of the Route services is the collection of patterns and trips that service the customer, as opposed to the operator, scheduler or other internal staff. The Route Grouping data concept (Chapter 10: Advanced Data Concepts) includes details for developing a collection of patterns and trips that serve an alternative target audience, and may be known by a different common name or number.

Route direction is signified by a variety of sometimes overlapping methods across the transit industry. Many transit providers describe Route Direction as one of opposite directions, East versus West, or inbound versus outbound. These opposites may be abstracted to be “first” and “second” direction. Alternatively, some transit providers will use the station name or city near the final destination of the route to signify the route direction (e.g., Babylon and New York City). Furthermore, some providers use codes for their destinations. In some cases, transit agencies use different codes for direction as well as indicating “bound” (in or out).



The SDP was designed to provide flexibility to transit providers so they could use any of these approaches and still meet the requirements of the SDP. The CDRM supports the ability to implement a “lookup” table for each route direction, namely the Route Direction element which is embedded in the Route element.

Requirements for Route Data Concept

The requirements associated with the Route Data Concept are listed in Table 4.3-1.

Table 4.3-1: Route Requirements

#	Category	Requirements
1	Uniqueness and identity	<ul style="list-style-type: none"> • A route has a schedule name and identifier as well as a public name and identifier. (Names and identifiers may be identical.) • A route is a collection of patterns and associated trips. Combined the patterns represent a branching set of paths over which a revenue vehicle traverses in up to two directions. • A route is valid for a specified schedule version. • A route has a designated validity period (or begin date) for all its associated records (see Associations) that compose the route. The validity period in most cases is the same as the schedule version activation/deactivation dates, and the validity period should fall within the schedule version period.
2	Route name	<p>A route identifier/name may be different based on the user or type of route.</p> <ul style="list-style-type: none"> • Schedulers identify a route by an identifier and name (e.g., M 0001, FIFTH-MADISON-PARK AV). • The public may recognize a route by a known number and name (e.g., M1, Fifth and Madison Avenues) • A route will include a description of its service provision, e.g., regular or express.
3	Route Type	<p>The collection of service provision (trips and patterns) grouped by a route number may differ depending on the route type. Several types supported by NYCT include public route, curtain route (headsign), timetable, schedule route (group of routes that operate on the same corridor), statistical route (operator routes).</p> <ul style="list-style-type: none"> • The SDP requires the most basic route type. In most cases the public and scheduler route service provision are identical. In which case in designating the scheduler's route number, the publicly known route number may be substituted. However there are exceptions to this rule when the public route number is used to collect multiple scheduler routes or in more complicated cases, when a scheduler's route description must be separated into multiple route numbers that the public understands. In the latter case, NYCT generates a Route 6191, which the public knows as two separate "curtain" routes, although they are scheduled together and displayed in a single timetable as the S61 and S91. • This may necessitate the ability to version routes by a schedule route number and a public route number. [A route grouping artifact can support this requirement.]

Table 4.3-1: Route Requirements

#	Category	Requirements
4	Associations	<p>The route may be associated with key service and transit network descriptions including:</p> <ul style="list-style-type: none"> • List of patterns categorized by route direction (or general direction of travel) • Stick map with designated stop/timepoints • Schedule Notes • Set of valid trips associated with each pattern • Information on route designation of accessibility (assumes access at all stops and vehicles) • General fare information • Connections with other routes
5	Route Hierarchy	<ul style="list-style-type: none"> • Service by Route Direction • Service by Day Type
6	Attributes	<ul style="list-style-type: none"> • Notes on service. This should only be used to support customers or provide information to schedulers. Other attributes, type descriptions and codes should be used prior to using a note. • Mode type

Conceptual Data Reference Model Description for Route

The Route requirements that are from Table 4.3-1 may be implemented in a CDRM as depicted in Figure 4-11. The data model description (as excerpted from the *Functional Requirements* document) follows.

“A Route is a collection of patterns classified by their route direction in scheduled service with a common identifier. As shown, Route is an entity associated with patterns and related trips. One or more directed patterns may optionally be associated with a Route, and one Route categorizes one or more patterns through a route direction. One or more trips may optionally be associated with each pattern.

“A Route contains attributes that support a transit customer. The Timetable_Header is a summary of published timepoints (or transit stops used as timing points) contained in a group of Patterns oriented in the same route direction, and is used to generate timetables. A Route is valid during its designated period (routeBeginDate to routeEndDate) that falls within a valid schedule version.

“Similar to a Route, a Route Grouping is a collection of patterns, trips or both. A route grouping is assembled for a specific purpose other than a typical Route definition.”

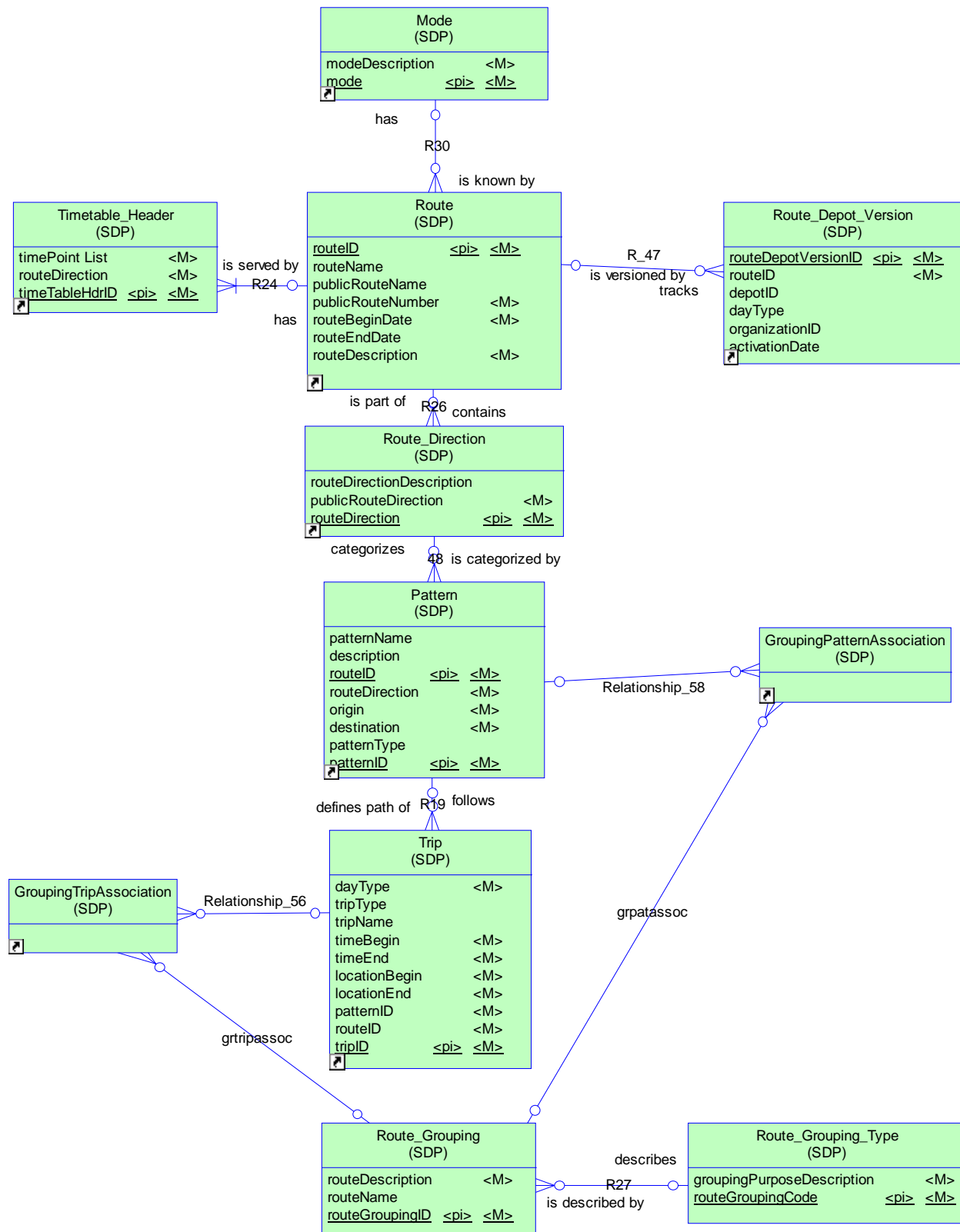


Figure 4-11: Route Conceptual Data Reference Model

Route Excerpt of XML Schema Model

The following rules and assumptions were used to implement the CDRM Route Data Concept as the Route element in the SDP XML Schema:

- The Mode entity is transformed to a code value, for example, use “CR” for commuter rail, “HR” for subway, “MB” for bus, and “FR” for ferry.
- Route Direction and Timetable Header entities are embedded as a list of routeDirectionList and timetableHdrList elements, respectively.
- Mandatory elements include routeID, mode, publicRouteName, publicRouteNumber.
- Attributes effectiveDate and endDate refer to the date when the record was placed, while the elements—routeBeginDate and routeEndDate—represent the dates when service begins and ends for this particular collection of patterns and trips.

Figure 4-12 depicts the Route element portion of the SDP XML Schema as it was derived from the CDRM.

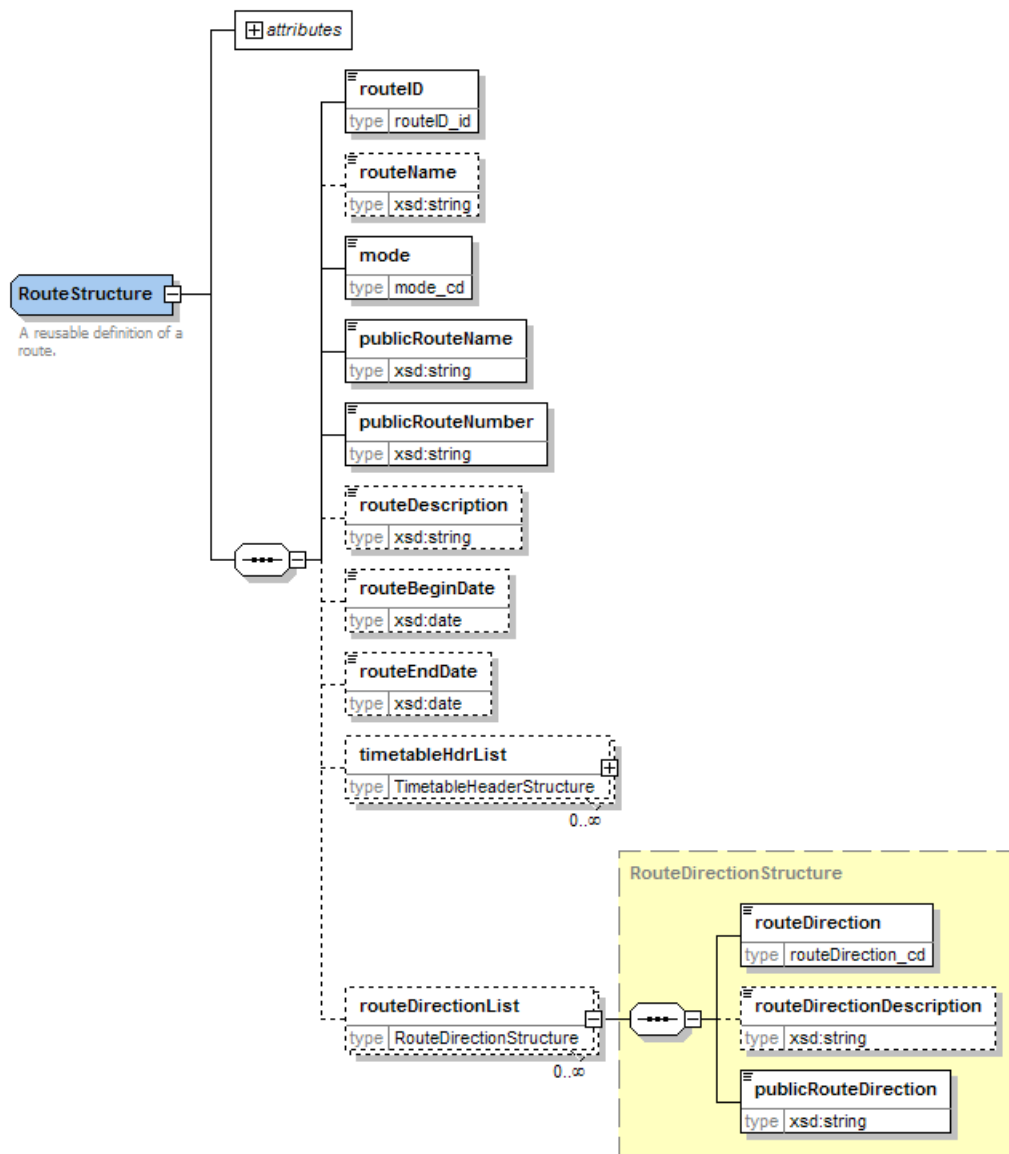


Figure 4-12: Route Element Fragment in SDP XML Schema

As listed in Table 4.3-1, the Route Data Concept governs the requirements for the SDP XML Schema elements in the Route element. In particular, the publicRouteName and publicRouteNumber are used by applications that display information to a customer, as such, these are mandatory elements.

The Route Direction data concept is directly implemented from the CDRM. Table 4.3-2 lists the Route Direction data elements from the CDRM requirements. The specific rules and assumptions include:

- routeDirection is the enumerated code value that is used to match the routeDirection element in the Pattern element. Typically, this is “first” or “second” direction. Care should be taken that the translation from native data follows a conventions such as:

North, West, inbound, circular (clockwise) are translated as “first”, and South, East, outbound, (counter clockwise) are translated as “second.”

- `publicRouteDirection` is the direction that a customer knows from a timetable. Because a route contains patterns that do not always contain the same end location, using destination information is not always the best practice.

The `routeDirectionDescription` field should be used by the schedule providers to support internal or specific application needs. For example, some agencies may use the `routeDirectionDescription` as a source for translating from their native route direction codes to TCIP SCH-RouteDirectionName. TRIPS123 uses the TCIP SCH-RouteDirectionName enumeration, which may not be represented using the “first”/“second” or in the `publicRouteDirection` fields. To support the mapping to TRIPS123, the content of the `routeDirectionDescription` may store the TCIP code value using the following notation TCIP=“north” (where enumerated type “north”—note spelling and capitalization) may be used to tag the TCIP value.

Table 4.3-2: Route Direction Element Description

Element Name	Definition	Examples
<code>routeDirection</code>	A unique identifier for a route direction. Codes: “first” or “second”	first
<code>publicRouteDirection</code>	A name known to the public as the direction of the route, e.g., inbound, outbound.	North
<code>routeDirectionDescription</code>	Describes the direction as known to the scheduling group or other key stakeholder. Headsign information may be contained in this field.	1N17 HEMPSTEAD DIRECTION North

A best practice related to generating the `routeDirectionList` is to adopt and document a set of conventions used to translate native route direction codes or values to first or second `routeDirection` enumerated types. Conventions might be:

- “first”—N, W, NW, SW, Clockwise, Circular, Inbound
- “second”—S, E, SE, NE, Counter-Clockwise, Outbound

Detailed Data Descriptions and Guidance for Route and Route Direction

This section describes the format and guidance associated with Route and RouteDirection elements in the data concepts described above. The guidance for each element is consolidated into two tables—Table 4.3-3: Route Guidance and Table 4.3-4: Route Direction Guidance. Each table has the following column headings: Requirement status (M for mandatory and O for optional), the element name, the data type and guidance related to the element. The guidance attempts to bring additional clarity to the data definition. The first column of each table identifies the baseline requirements as driven by the SDP XML Schema version 1.0. A downstream application may further restrict these requirements in order for the data set to meet the application’s data needs. The XML Schema element name corresponds to the related CDRM entities and attributes descriptions (although the capitalization and spacing may differ slightly). The type may refer to a native XML type, or a declared type in the XML schema. The Guidance column is called “Questions to Ask.” These questions direct the analyst to a similar or

equivalent concept in their own schedule data set. In addition, some comments describe the impact of the data structures on the SDP XML document deployment.

Table 4.3-3: Route Guidance

Required	Element Name	Type	Questions to Ask
M	routeID	routeID_id UNIQUE	What designation for route is unique within your data source?
O	routeName	String	What field is used to name the route?
M	mode	Mode_cd	List mode code from mode_cd; e.g., MB for bus, CR for commuter rail, HR for subway (heavy rail), FR for ferry, etc.
M	publicRouteName	string	What field represents the route name recognized by the public?
M	publicRouteNumber	string	What field represents the route number recognized by the public?
O	routeDescription	string	Is there a field that describes the route? This field is not needed if it is redundant with publicRouteName. The field may be used to describe the physical path of the route, or if it contains abbreviations for other internal or machine-to-machine data transfer.
O	routeBeginDate	date	Do all routes start and end on the same dates as the schedule version? y/n <ul style="list-style-type: none"> If no: are there fields that indicate the dates a route begins and ends?
O	routeEndDate	date	If no end date is present in a native route record, then use one of these default values (1) schedule end date or (2) default end date 9999-12-31
O	timetableHdrList	TimetableHdr	Is there a set of fields that is used for a published timetable header? The complete TimetableHeader record.
O	routeDirectionList	RouteDirection	First and second directions are used for route direction. This record is used to customize and provide a public name for the specific route route-direction. Complete RouteDirection record for the number of route directions that are listed by the patterns in this route.
O	@effectiveDate		
O	@endDate		

Table 4.3-4: Route Direction Guidance

Required	Element Name	Type	Questions to Ask
M	routeDirection	routeDirection_cd	Enumerated index used to match routeDirection in Pattern element.
O	routeDirectionDescription	string	The name or code used in the native data. Content is determined by the user, and may be used to support downstream applications.
M	publicRouteDirection	string	The route direction name known and viewed by the public.

Examples Using Route

Long Island Bus Route N1 Jamaica-Elmont-Hewlett

This example shows how the SDP XML Schema allows for the simultaneous use of two different route designators for the same route, and the use of two different types of codes to indicate route direction.

The Long Island Bus uses different route designators for their identifier and public number or name. Furthermore, they may use different conventions when documenting the route number, for example N01 versus N1. Their native data includes a data construct called “bound” which is assigned a zero (0) or one (1). Their direction code refers to compass directions (North, South, East and West).

```

<Route>
  <routeID>3210</routeID>
  <routeName>N01</routeName>
  <mode>MB</mode>
  <publicRouteName>N1 Jamaica-Elmont -Hewlett</publicRouteName>
  <publicRouteNumber>N01</publicRouteNumber>
  <routeDescription>N1 Jamaica-Elmont -Hewlett</routeDescription>
  <routeDirectionList>
    <routeDirection>first</routeDirection>
    <routeDirectionDescription>bound=0 direction=3 tcip=1</routeDirectionDescription>
    <publicRouteDirection>North</publicRouteDirection>
  </routeDirectionList>
  <routeDirectionList>
    <routeDirection>second</routeDirection>
    <routeDirectionDescription>bound=1 direction=4 tcip=2</routeDirectionDescription>
    <publicRouteDirection>South</publicRouteDirection>
  </routeDirectionList>
</Route>

```

New York City Transit Rapid Rail (RTIF)

This example shows how the SDP XML Schema allows for the exclusion of optional elements, such as when agency data are not available for the routeDescription element.

The native data set from which the MTA NYCT Line 2 SDP XML Document was derived does not have more information for the public about the route beyond a simple publicRouteName and publicRouteNumber. Therefore, there is limited information to insert in those fields and only redundant information to include in the routeName or routeDescription fields; since these latter two elements are optional, we chose to only include the routeName.

The native data set only included North/South directional pairs. As a result, in the data conversion process to the SDP XML Document, the recommended convention for coding “first” and “second” was used (e.g., first for North and second for South).

```
<Route>
  <routeID>2</routeID>
  <routeName>Line 2</routeName>
  <mode>HR</mode>
  <publicRouteName>Line 2</publicRouteName>
  <publicRouteNumber>2</publicRouteNumber>
  <routeDirectionList>
    <routeDirection>first</routeDirection>
    <routeDirectionDescription>N</routeDirectionDescription>
    <publicRouteDirection>North</publicRouteDirection>
  </routeDirectionList>
  <routeDirectionList>
    <routeDirection>second</routeDirection>
    <routeDirectionDescription>S</routeDirectionDescription>
    <publicRouteDirection>South</publicRouteDirection>
  </routeDirectionList>
</Route>
```

Section 4.4: Organization Unit and Depot and Related Data Concepts

In This Section

- ▶ Explore the Organization Unit and Depot Data Concepts pertaining to the Agency Registration Branch.
- ▶ Learn when and how to apply the elements in the Organization Unit and Depot data concepts.

Purpose of the Organization Unit and Depot in the SDP

The Organization Unit and Depot data concepts may optionally be included in a SDP XML Document submittal. The Organizational Unit is included in the SDP CDRM to reference the responsible party that generates or submits a schedule data set. Sometimes, a large transit provider may generate schedules by Organizational Unit. For example, bus and rail operations generate schedules at different times of the year, and so may have different schedule versions.

Organization Unit Definition

An administrative entity or agent (e.g., contractor) of a transit agency. The unit may be a department or service area. An organizational unit may be part of a larger organizational unit, for example, a contracting service may be overseen by the agency's operations department.

Depot Definition

A storage facility operated by a transit agency or its agent where transit vehicles park overnight and are maintained.

The Depot data concept is included because a provider with a large bus fleet or with varied work rules by garage may generate schedules by routes and trips originating from a specific Depot. The Organizational Unit and Depot data concepts provide descriptions of the group for which generated a specific schedule data set. To date, formal descriptions of depot and organization unit are not needed by current downstream applications, however, the concepts are included in order to be comprehensive and meet potential future needs.

Please note that these SDP data concepts are not used to describe **who** submitted the SDP XML Document; submitter contact information is incorporated in the Metadata information. (See Part 3 SDP Guidance for more information on Metadata.) Organizational Unit and Depot elements are used to describe their association to the schedule contained in the SDP XML Document.

Requirements for Organization Unit and Depot Data Concepts

The requirements associated with the Depot and Organization Unit Data Concepts are listed in Tables 4.4-1 and 4.4-2, respectively.

Table 4.4-1: Depot Requirements

#	Category	Requirements
1	Uniqueness and identity	<ul style="list-style-type: none"> A depot is assigned a unique identifier. The identifier may be a part of a collection of identifier just for the depot or garage, or it may be a facility identifier that is a transit facility identifier.
2	Depot Name	<ul style="list-style-type: none"> A depot has a name, usually informal and formal names.
3	Depot Type	<ul style="list-style-type: none"> The primary purpose of the depot may be a vehicle garage or maintenance center, operator base or other type of vehicle storage center. Furthermore, the operators and vehicles in the garage may provide service in one or more modes, however, there is typically a primary mode associated with the depot. The primary mode is used to designate the mode.
4	Associations	<ul style="list-style-type: none"> A depot is associated with a location and may be associated with transit facility.
5	Attributes	<ul style="list-style-type: none"> The vehicles and operators assigned to a depot usually cover a specific service area. The service area may be described with words or may be designated by geographic features that circumscribe their boundaries.

Table 4.4-2: Organization Unit Requirements

#	Category	Requirements
1	Uniqueness and identity	<ul style="list-style-type: none"> An organization unit is assigned a unique identifier. This identifier will be used to index routes by organization.
2	Organization Unit Name or Description	<ul style="list-style-type: none"> An organization unit may be named or described. Some agencies procure contracting agents for their service provision. The agents develop schedules and may be responsible for submitting the data sets. Information about the responsible party generating the schedule data set may be needed by the Agency.

Conceptual Data Reference Model Description for Organization Unit and Depot

The above requirements may be described in the CDRM for Organization Unit and Depot depicted in Figure 4-13. The CDRM model is described by the following:

All or part of an Agency's schedule, the Route Depot Version, may be associated with a Depot or an Organization Unit. A Depot consists of one or more modes and its service typically covers a specific geographic area. The Organization Unit belongs to an Agency.

In addition to Organization Unit and Depot, this CDRM identifies two other data concepts that are nested in the SDP XML Schema (and are described as entities in the CDRM). The Mode and Services Area are defined below:

Mode is "[a] transit service type category characterized by specific right-of-way, technological and operational features." [NTCIP 1401:2000] The values used are based

on the U.S. DOT National Transit Database
[<http://www.ntdprogram.gov/ntdprogram/Glossary.htm>] values for mode.

Service Area is “[a] geographic area where transit service is provided.” The area is described as a polygon circumscribed by a series of points. The Geographic Markup Language (GML) is used to define a service area feature. GML allows a polygon type to be instantiated as one of several geometries (e.g., point, polygon, multipolygon, etc.). GML is a reference to ISO 19101 standard.

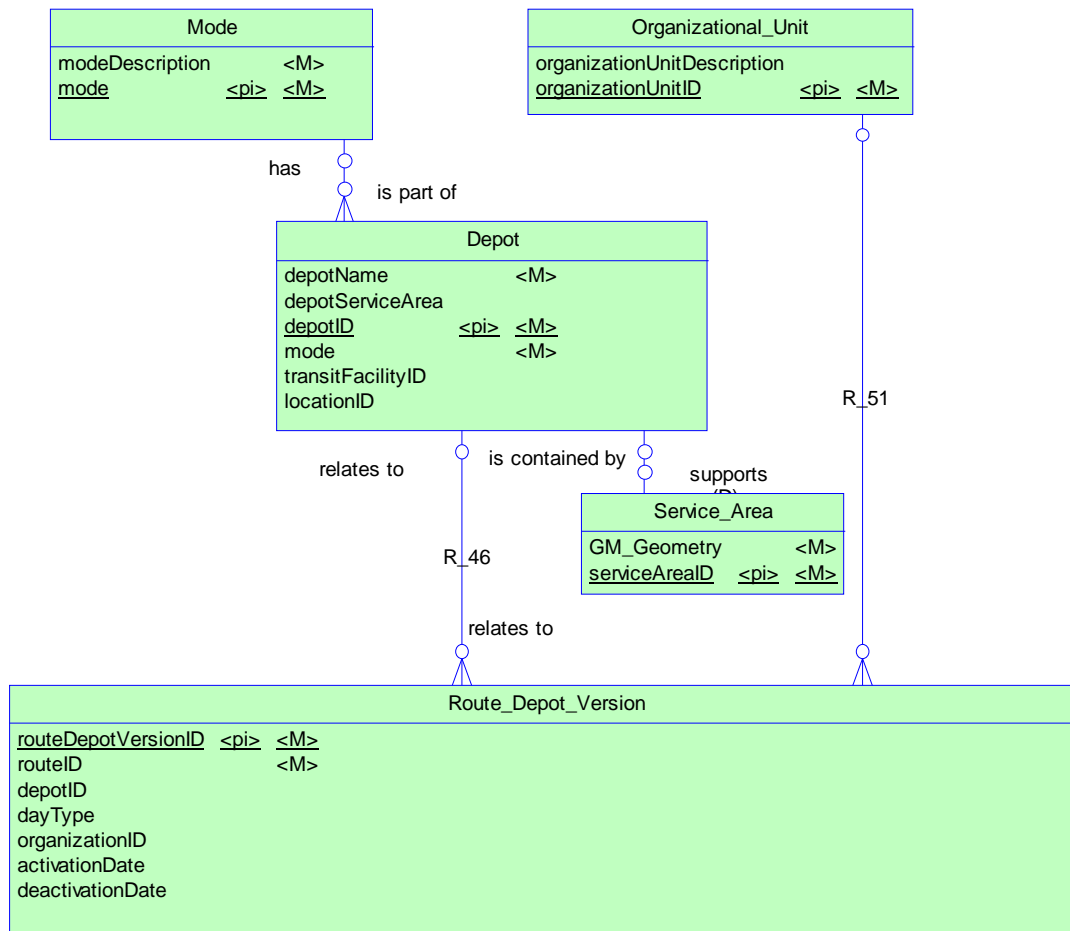


Figure 4-13: Conceptual Data Reference Model for Organization Unit and Depot

XML Schema Descriptions for Organization Unit and Depot

In implementing the CDRM into the XML Schema as shown in Figure 4-14, the following rules were applied.

- In the Depot data concept, the rules included:
 - The Mode data concept is embedded as an element that cites a value from an enumerated type.
 - locationID refers to a Transit Gazetteer branch Location identifier.
 - transitFacilityID refers to a Transit Facility branch Transit Facility identifier.
 - depotServiceArea may be instantiated as a GML polygon (see example below).
- No special rules were imposed on Organization Unit.

Depot and OrganizationUnit are optional child elements of Agency Registration. Zero or more of these elements may be included in the SDP XML Document. Both elements may be assigned effectiveDate and endDate as attributes.

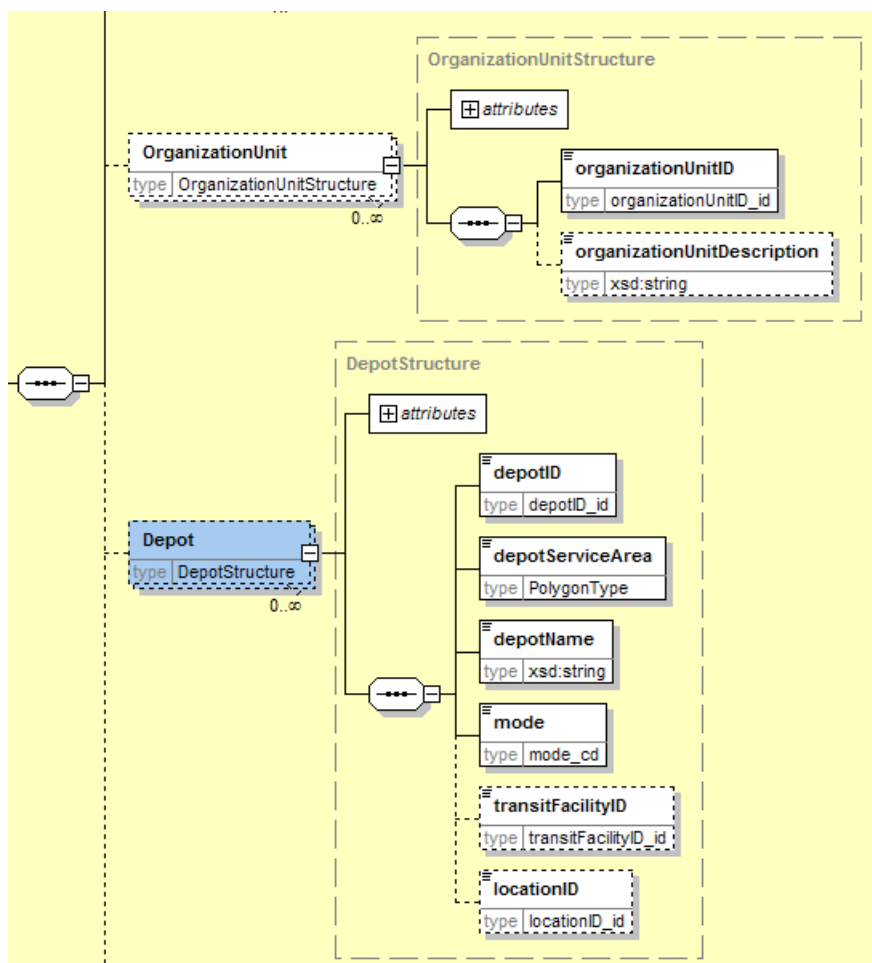


Figure 4-14: SDP XML Schema Excerpt of Organization Unit and Depot

Detailed Data Formats and Guidance for Organizational Unit and Depot

This section describes the description and guidance associated with OrganizationalUnit and Depot elements in the data concepts described above. Table 4.4-3 provides guidance on Organizational Unit and Table 4.4-4 provides guidance on Depot. The guidance for each element is consolidated into a table with the following column headings: Requirement status (M for mandatory and O for optional), the element name, the data type and guidance related to the element. The guidance attempts to bring additional clarity to the data definition. The first column of each table identifies the baseline requirements as driven by the SDP XML Schema version 1.0. A downstream application may further restrict these requirements in order for the data set to meet the application's data needs. The XML Schema element name corresponds to the related CDRM entities and attributes descriptions (although the capitalization and spacing may differ slightly). The type may refer to a native XML type, or a declared type in the XML schema. The Guidance column is called "Questions to Ask." These questions direct the analyst

to a similar or equivalent concept in their own schedule data set. In addition, some comments describe the impact of the data structures on the SDP XML document deployment.

Table 4.4-3: Organization Unit Guidance

Required	Element Name	Type	Questions to Ask
M	organizationUnitID	organizationUnitID_id UNIQUE	Is there a field that designates the organization? Yes: <<field name>> No: assign number (e.g., "1")
O	organizationUnitDescription	string	Is there a description, name or value associated with the organizational unit?
O	effectiveDate	date	[attribute]
O	endDate	date	[attribute]

Table 4.4-4: Depot Guidance

Required	Element Name	Type	Questions to Ask
M	depotID	depotID_id UNIQUE	Is there a field that designates the depot? Yes: <<field name>> No: assign number (e.g., "1")
O	depotServiceArea	gml:PolygonType	This is a set of one or more sets of latitude and longitude that outline the service area. The schema for gml:PolygonType is included in GML_Geometry.xsd
M	depotName	string	Is there a name for the depot?
O	mode	mode_cd	Is there a field for the mode serviced by the depot? Are all the routes in this file of one mode? (then use a default value)
O	transitFacilityID	transitFacilityID_id	Is the depot associated with a transit facility?
O	locationID	locationID_id	Are there fields indicating the location of the depot? [trigger Location Table input]
O	effectiveDate	date	[attribute]
O	endDate	date	[attribute]

Usage and Examples of Organization Unit and Depot

Organization Unit

Within the scope of the SDP, the Organizational Unit is used as an index to an internal unit or mechanism that may initiate or produce a schedule. Examples of potential Organizational Units include:

- New Jersey Transit produces two schedule sets, one for rail and the other for bus and light rail. The bus and light rail schedule version may be aggregated by using the Organizational Unit entity. The Rail schedule version may still be associated solely with Mode.
- Bee-line (Westchester County) contractors each produce a detailed schedule. The Organizational_Unit may represent each contractor that produces a schedule.

The Organizational Unit entity may be used as an internal agency mechanism to classify schedule versions for roles other than agency, route, depot or route/depot. The association of organizationUnitID and its description should be maintained by the submitting agency, and as such, is included in the SDP as an internal reference; however, the element will not be used by the TSDEA at this point in time.

When the agency issues a single schedule for all organizational units, such as Long Island Bus, a direct relationship is established between the Schedule Version and Agency (and the organizational unit is not needed).

The example below shows how an Organization Unit would appear if the Metro-North Railroad bus operations issued their bus schedules for the Hudson Rail Link.

```
<AgencyRegistration>
...
  <OrganizationUnit>
    <organizationUnitID>1</organizationUnitID>
    <organizationUnitDescription>Hudson Rail Link </organizationUnitDescription>
  </OrganizationUnit>
...
</AgencyRegistration>
```

DEPOT

The example SDP XML Document fragment used as an example below is translated from the NYCT schedule data files based on their internal exchange format. The NYCT Bus files are generated and versioned by Depot. The Depot is assigned a location identifier. The depotID and transitFacilityID in this case are identical.

```
<AgencyRegistration>
...
  <Depot>
    <depotID>KB</depotID>
    <depotName>Kingsbridge</depotName>
    <mode>MB</mode>
    <transitFacilityID>KB</transitFacilityID>
    <locationID>3eac</locationID>
  </Depot>
...
</AgencyRegistration>
```

Service Area (an nested element of Depot)

The example of a GML Polygon, “a closed region of space”, is of a box with four points. The polygon, by definition may contain as many points as needed to define the region. The major requirement is that the points are ordered and the first and last points are the same. Since the SDP specifies the use of WGS '84, the coordinates should use the same datum. The GML polygon example is defined as follows:

[from <http://geoweb.blog.com/278606/> and cited in the GML 1.0 and 2.0 standards]

```
<gml:Polygon>
  <gml:outerBoundaryIs>
    <gml:LinearRing>
      <gml:coordinates>0,0 100,0 100,100 0,100 0,0</gml:coordinates>
    </gml:LinearRing>
  </gml:outerBoundaryIs>
</gml:Polygon>
```