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Chapter 11: SDP Document Conformance Requirements

In This Chapter

- ▶ Learn about the requirements and tests required to ensure SDP Document Conformance; these include validity checks, XML validation, and conformance with document naming procedures.
- ▶ Learn about how to create a SDP Conformance Profile for a downstream application.
- ▶ Understand the issues related to extending or constraining the SDP XML Schema.

Conformance Definition

The act of meeting requirements or bringing about accord or compliance.

This chapter includes sections on:

- Scope of SDP Conformance Requirements
- SDP XML Document Conformance Requirements
- Conformant Profile Development

Scope of the SDP Conformance Requirements

Conformance requirements are the set of tests that must be met in order for the SDP Document to be conformant to the SDP. These conformance requirements incorporate the SDP XML Schema Document's well-formedness and validation requirements, that is, the SDP Document must comply with the organization and format of the SDP XML Schema. However, there are other requirements related to the data which must also be met. These include testing the referential integrity and consistency of the native data inserted into the SDP, and confirming that the SDP Document was named using the prescribed naming procedures.

The original SDP XML Schema, based on the SDP's Conceptual Data Reference Model (CDRM), ensures that a baseline set of requirements will be met that support many downstream applications. However, new applications may be developed and previously existing applications may need additional information to function properly over time. For example, a category of data may be present in the original SDP XML Schema as an optional element, but now it needs to be mandatory. Alternatively, the information may be available, but not in a format that is usable by the downstream application. The approach used to develop the SDP XML Schema is flexible; it allows a version of the schema to be constrained or extended to meet the changing needs of downstream applications.

This chapter discusses two topics on:

- How conformance is met, that is, the tests that must be implemented to achieve conformance (section 11.1); and
- How to create a Conformance Profile that meets downstream application data requirements within the semantic requirements of the conceptual data model (section 11.2).

Detailed examples are included or referenced in both sections to help understand how to apply the requirements.

Section 11.1: SDP XML Document Conformance Requirements

In This Section

- ▶ Learn about generic XML Schema standard conformance for SDP XML Documents.
- ▶ Learn about data validity checking for the content of the SDP XML Document.
- ▶ Understand the principles of naming a SDP XML Document.

Formal Conformance Requirements are composed of four statements:

- Definition of Conformance
- Conformance Situation
- Conformance Criteria
- Test Methods

Conformance Requirements

SDP Conformance is the set of requirements that must be set by an SDP XML Document. These requirements include:

- Checking for data validity and integrity;
- Validation of the SDP XML document for well-formedness and validity (against a valid SDP Schema);
- Adoption of SDP Document naming procedures.

The set of requirements that constitute conformance are included in *Definition of Conformance*. The statement typically references the set of requirements in the standard or specification. In the case of SDP, the SDP XML Schema and base standards define the requirements.

The *Conformance Situation* describes the constraints or extensions related to the set of requirements. These rules define specific situations where elements may be inserted or removed, and still be conformant to the specification.

Conformance Criteria describes specific rules that should be tested as part of the conformance requirements, as such, each criteria is associated with a specific Conformance Requirement (as listed in the Definition of Conformance).

Finally, *Test Methods* describes how the Conformance Criteria shall be tested.

Definition of Conformance

Conformance to the SDP XML Schema is defined as adopting the following major conformance requirements (CR):

- CR.1 The SDP XML Document shall be “well-formed” and “valid” as validated against an approved SDP XML Schema using two or more XML Schema Validation tools. “Well-formed” and “Valid” refer to the XML Schema 1.0 (or the latest version).
- CR.2 The SDP XML Document shall be checked for valid referential integrity among unique keys and referenced keys (e.g., primary and foreign keys).
- CR.3 The SDP XML Document shall conform to the SDP XML Document naming conventions.

Conformance Situation

A SDP XML Document may be extended or constrained and still be conformant if the SDP XML Schema does not abrogate or change any of the baseline (version 1.0 or latest version) mandatory schema requirements.

The following changes are **not** allowed:

- Change the order of parent or child elements
- Change a “mandatory” element to optional (i.e., change minOccurs value to “0”)
- Change a single occurrence of an element to multiple occurrences
- Remove or rename any of the elements in the baseline schema
- Change the type of each simpleType

The following changes are allowed:

- Restrict the size or range of an element type (e.g., from string to nine character string)
- Mask a string type
- Change an “optional” element to mandatory (i.e., change minOccurs=“0” to a number greater than zero)
- Extend the value list of an enumerated type (code)
- Add optional attributes to an element (i.e., use=“optional”)
- Under certain circumstances, include additional “optional” elements (with element definitions) at the end of a complex type description

Conformance Criteria

The conformance criteria describe procedures for testing the Definition of Conformance. Each Conformance Requirement is described in detail in Tables 11-1 through 11-3.

Table 11-1: Conformance Requirement #1: XML Schema Conformance

#	Description
CR.1	The SDP XML Document shall be “well-formed” and “valid” as validated against an approved SDP XML Schema using two or more XML Schema Validation tools. “Well-formed” and “Valid” refer to the XML Schema 1.1
CR.1.1	<p>The SDP Schema and documents shall meet the conformance requirements of the World Wide Web Consortium standards as described in the documents listed below:</p> <p>Worldwide Web Consortium (W3C). (04 February 2004). <u>W3C Recommendation: Extensible Markup Language (XML) 1.0 (Third Edition)</u>. Available from: http://www.w3.org/TR/REC-xml/</p> <p>Worldwide Web Consortium (W3C). (28 October 2004). <u>W3C Recommendation: XML Schema Part 1: Structures</u> (Second Edition). Available from: http://www.w3.org/TR/xmlschema-1/.</p> <p>Worldwide Web Consortium (W3C). (28 October 2004). <u>W3C Recommendation: XML Schema Part 2: Datatypes</u> (Second Edition). Available from: http://www.w3c.org/TR/xmlschema-2/.</p> <p>Although the current editions of the standards are cited, the most recent version of these standards will apply to the SDP.</p>

Table 11-1: Conformance Requirement #1: XML Schema Conformance

#	Description
CR.1.2	The SDP XML Document shall be checked by more than one industry-recognized XML Schema validator. The open source validator developed by the World Wide Web Consortium may be found at http://www.w3.org/2001/03/webdata/xsv .

Table 11-2: Conformance Requirement #2: Referential Integrity Checks

#	Description
CR.2	The SDP XML Document shall be checked for valid referential integrity among unique keys and referenced keys (e.g., primary and foreign keys).
CR.2.1	<p>The following keys (identifiers) shall be checked for uniqueness:</p> <ul style="list-style-type: none"> 2.1-1. amenityID.Amenity 2.1-2. blockID.Block 2.1-3. contactListID.agencyContact (within an Agency) 2.1-4. dayType.DayType 2.1-5. depotID.Depot 2.1-6. locationID.Location 2.1-7. noteID.Note 2.1-8. organizationUnitID.OrganizationUnit 2.1-9. passAccessID.PassengerAccessComponent 2.1-10. patternID.Pattern (by routeID) 2.1-11. plantComponentID.PlantComponent (within a TransitFacility) 2.1-12. portalID.Portal 2.1-13. revisionNumber.ScheduleRevision 2.1-14. routeDepotVersion.RouteDepotVersion (routeDepotChanges : ScheduleRevision) 2.1-15. routeDirection.routeDirectionList (by Route) 2.1-16. routeGroupingID.RouteGrouping 2.1-17. routeID.Route 2.1-18. seqNo.transitPathEvent (within a Pattern) 2.1-19. seqNo.transitPointEvent (within a Pattern) 2.1-20. stopID.TransitStop 2.1-21. timepointID.Timepoint 2.1-22. trackNo.Track 2.1-23. transferClusterName.TransferCluster 2.1-24. transitFacilityID.TransitFacility 2.1-25. transPathID.TransitPath 2.1-26. tripID.Trip (by routeID)
CR.2.2	<p>Key references (Keyref) shall be checked for existence against their key when the element with the key is present. The following key and keyref pairs shall be checked:</p> <ul style="list-style-type: none"> 2.2-1. key: amenityID.Amenity* (*when element is present) <ul style="list-style-type: none"> a. Keyref: componentID.amenityID.plantComponentList.TransitFacility 2.2-2. key: depotID.Depot* (*when element is present) <ul style="list-style-type: none"> a. KeyRef: depotID.routeDepotVersion.routeDepotChanges.ScheduleRevision 2.2-3. key: locationID.Location <ul style="list-style-type: none"> a. Keyref: locationID.Depot b. Keyref: locationBegin.Trip c. Keyref: locationEnd.Trip d. Keyref: locationID.tripTimeList.Trip e. Keyref: locationBegin.Block

Table 11-2: Conformance Requirement #2: Referential Integrity Checks

#	Description
	<ul style="list-style-type: none"> f. Keyref: locationEnd.Block g. Keyref: locationID.blockTimeList.Block h. Keyref: origin.Pattern i. Keyref: destination.Pattern j. Keyref: locationID.eventList.transitPointEvent.Pattern k. Keyref: origin.TransitPath l. Keyref: destination.TransitPath m. Keyref: physicalPoints.TransitPath n. Keyref: generalizeLocation.Location o. Keyref: location.Timepoint p. Keyref: locationID.TransferCluster q. Keyref: clusterLocations.TransferCluster r. Keyref: locationID.Amenity s. Keyref: locationID.PassengerAccessComponent t. Keyref: locationID.Portal u. Keyref: locationID.TransitStop v. Keyref: locationID.TransitFacility
2.2-4.	<ul style="list-style-type: none"> key: noteID.Note a. Keyref: noteList.Note b. Keyref: notes.tripTimeList.Trip
2.2-5.	<ul style="list-style-type: none"> key: organizationUnitID.OrganizationUnit*(*when element is present) a. Keyref: organizationID.routeDepotChanges.ScheduleRevision
2.2-6.	<ul style="list-style-type: none"> key: passAccessID.PassengerAccessComponent*(*when element is present) a. Keyref: componentID.passAccessID.plantComponentList.TransitFacility
2.2-7.	<ul style="list-style-type: none"> key: patternID.Pattern (by routeID) a. Keyref: patternID.Trip b. Keyref: patternID.patternSet.groupSetList.RouteGrouping
2.2-8.	<ul style="list-style-type: none"> key: portalID.Portal*(*when element is present) a. Keyref: componentID.portalID.plantComponentList.TransitFacility
2.2-9.	<ul style="list-style-type: none"> key: routeDirection (by Route).routeDirectionList a. Keyref: routeDirection.Pattern
2.2-10.	<ul style="list-style-type: none"> key: routeID.Route a. Keyref: routeID.routeDepotVersion.routeDepotChanges.ScheduleRevision b. Keyref: routeID.Pattern c. Keyref: routeID.Trip d. Keyref: routeID.EventConnection
2.2-11.	<ul style="list-style-type: none"> key: stopID.TransitStop a. Keyref: platformNo.tripTimeList.Trip [if this is a stopID] b. Keyref: stopID.transitPointEvent.eventList.Pattern c. Keyref: componentID.stopID.plantComponentList.TransitFacility
2.2-12.	<ul style="list-style-type: none"> key: trackNo.Track*(*when element is present) a. Keyref: trackNo.transitPointEvent.eventList.Pattern
2.2-13.	<ul style="list-style-type: none"> key: transferClusterName.TransferCluster a. Keyref: transferClusterName.EventConnection
2.2-14.	<ul style="list-style-type: none"> key: transitFacilityID.TransitFacility a. Keyref: transitFacilityID.Depot b. Keyref: partOf.TransitFacility
2.2-15.	transPathID.TransitPath

Table 11-2: Conformance Requirement #2: Referential Integrity Checks

#	Description
	a. Keyref: transPathID.Track b. Keyref: tranPathID.eventList.transitPathEvent.Pattern 2.2-16. tripID (by routeID) .Trip a. tripID.tripSet.groupSetList.RouteGrouping b. tripID.EventConnection
CR.2.3	The following dates shall be checked for inclusion within the schedule version date: Activation/deactivation dates: RouteDepotVersion → ScheduleRevision → ScheduleVersion (The route depot version activation/deactivation dates should fall within the schedule revision activation/deactivation dates which in turn should fall within the schedule version activation/deactivation dates.)

Table 11-3: Conformance Requirement #3: Document Naming Requirements

#	Description
CR.3	The SDP XML Document shall conform to the SDP XML Document naming conventions.
CR.3.1	The following naming convention should be used for a complete scheduled contained in the SDP XML Document: SDP_<agencyAcronym>_v<scheduleVersionID>.xml Example: SDP_LIB_v107.xml Where content of bracketed variables match the values of the elements within the SDP XML Document.
CR.3.2	The following naming convention should be used for a partial schedule contained in the SDP XML Document: SDP_< agencyAcronym >_<subset>_v< scheduleVersionID >.xml Example: SDP_NYCT_M1-M10_v01-04-07.xml Where the content of bracketed variables match the values of the elements within the SDP XML Document.

Test Methods

Test Methods describe the tests and procedures for ensuring SDP XML Document conformance to the specification. Several applications and validators are currently in place to test the SDP document. These include a SDP Checker application and the XML validator (see Part 3 SDP Guidance document for additional information on the SDP Checker application).

In the future, NYSDOT will implement a registration and testing web site / portal for transit service information. Additional testing methods and procedures will be specified at a later time.

Section 11.2: Conformant Profile Development

In This Section

- ▶ Learn what constitutes a conformant SDP Profile.
- ▶ Learn what SDP profiles are currently defined.
- ▶ Learn about how to create a conformant SDP Profile for a downstream application.
- ▶ Understand the issues related to extending or constraining the SDP XML Schema.

“Profile” Definition

A collection of one or more standards with applicable options, parameters and constraints within the standards, and if necessary, additional nonstandard functionalities needed to provide or support a particular function, application or platform. [ISO/IEC TR 10000-1:1998]

What is a Conformant SDP Profile?

A conformant SDP Profile identifies the options available for a particular use of a “standard” according the ISO/IEC TR 10000-1:1998 standard on developing “profiles” (see “Profile” Definition box). A profile documents how the requirements of a specification or standard are implemented. In the case of the SDP, the Conformance Situation specifies how an agency may restrict or augment the SDP. The Conformance Criteria describes the types of tests that must be passed. If the added or relaxed requirements of the SDP profile can meet those conditions, then it may become a “conformant” SDP Profile.

In summary, the SDP XML Schema may be changed so long as it follows the *Conformance Situation* described in Section 11.1. The conformance requirements, as stated in Section 11.1 *Conformance Criteria* will not change, although additional referential integrity and quality checks may be added. Furthermore, naming requirements may be added following approval by the organization(s) requesting the information.

Current Conformant SDP Profiles

The region has not yet adopted a governance process by which profiles are defined as conformant or approved. However, the specification for the SDP XML Schema Version 1.0 associated with this Guidance Document is the baseline set of requirements for the SDP. Several applications use or read the SDP Document. In particular, the regional trip planning application, TRIPS123, may soon be using the SDP Document to process all new data sets. In addition, the TSDEA project staff developed prototype interfaces to the SDP XML Document structure to drive the TriMet Timetable Publisher application (TTPub). Each of these downstream applications requires similar but different information to work properly.

The SDP XML Schema is found in Part 3 SDP Guidance document.