AISG:

XML Configuration Data Distribution

Standard No. XCD 1.0

10th of December, 2015

XML for ALD Configuration Data Distribution

Revision History

DATE	ISSUE	NOTES
10th December, 2015	1.0	First release

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1. FOREWORD

The ALD configuration data consist of a vendor specific block of data that a primary from a different vendor will send to the ALD without visibility on its content – unless a conversion from one vendor-specific format to another.

There is a need for primaries to be aware of the ALD capabilities and other relevant antenna configuration data file contents (i.e. ranges) as well as the ALD product number and the ALD software versions it matches.

There is also a need for vendors and operators to distribute the configuration data files for their antennas.

All these needs are met by this XML-based distribution format. A vendor can put any or all of their configuration data into one XML file. Likewise, an operator can create an XML file containing the configuration data for all the antennas they use.

2. SCOPE

This document contains XML schema definitions for ALD configuration data distribution.

3. REFERENCES

This AISG Extension Standard incorporates provisions from other publications. These are cited in the text and the referenced publications are listed below. Where references are listed with a specific version or release, subsequent amendments or revisions of these publications apply only when specifically incorporated by amendment or revision of this AISG extension. For references listed without a version or release, the latest edition of the publication referred to applies.

1	AISG Version 2.0, “Control Interface for Antenna Line Devices”
2	Remote azimuth steering extension specification, AISG ES-RAS v2.1.0
3	Remote azimuth beamwidth extension specification, AISG ES-RAB v2.1.0
4	3GPP TS 36.104 “Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception”
5	Vendor Codes list on http://www.aisg.org.uk

4. ABBREVIATIONS

Where abbreviations or acronyms are used in this document they have the following meanings:

ALD	Antenna Line Device
ASCII	American Standard Code for Information Interchange
ETN	East of True North
PNG	Portable Network Graphics
RAB	Remote Azimuth Beamwidth
RAS	Remote Azimuth Steering
RET	Remote Electrical Tilt
XML	Extensible Markup Language
XCD	XML Configuration Data Distribution
XSD	XML Schema Definition

5. TERMINOLOGY AND DEFINITIONS

Where the following terms are used in this document, they have the following meanings:

Azimuth beamwidth	The angle, measured in degrees, between the -3dB points on either side of the maximum of the azimuth radiation pattern of an antenna.
Azimuth bearing	The direction orthogonal to the axis of the antenna assembly, expressed in degrees East of True North (ETN)
Azimuth offset	The angle, expressed in degrees, between the azimuth bearing of an antenna and the maximum of its main beam in the azimuth plane. A positive azimuth offset means that the antenna beam is directed to a compass heading numerically greater than the azimuth bearing. An antenna has separate values for azimuth bearing and azimuth offset. The azimuth bearing is fixed by the geometry of the installation. The azimuth offset is remotely controllable and variable.
Base64	A binary to text encoding defined in section 5.2 in RFC 1341 (http://tools.ietf.org/html/rfc1341).
Tilt value	A signed integer used in elementary procedures to define the electrical tilt setting of the antenna. The tilt value is 10 times the antenna electrical tilt angle in degrees.

6. XSD FILE STRUCTURE AND CONTENT

The XML file can contain multiple configuration data definitions with matching rules to specify for which ALDs and antennas it applies.

The configurations file can also contain optional graphics of the ALDs and antennas.

6.1 XCD Regular Expressions

The compatibility fields (productNumber, hwVersion, swVersion, antennaFrequencyBand, antennaModelNumber) can include the following wildcards for a more compact definition of many compatible ALDs.

Table 6.1.1: XCD Regular Expressions in Elementary Procedures for LID

Pattern	Meaning
.	Any character
*	Any number (0 or infinite) of the previous character
.*	Any number of any character(s)
9*	Any number of 9:s
\	The next character loses its special meaning
\.	The period character
*	The asterisk character
\\	The backslash character

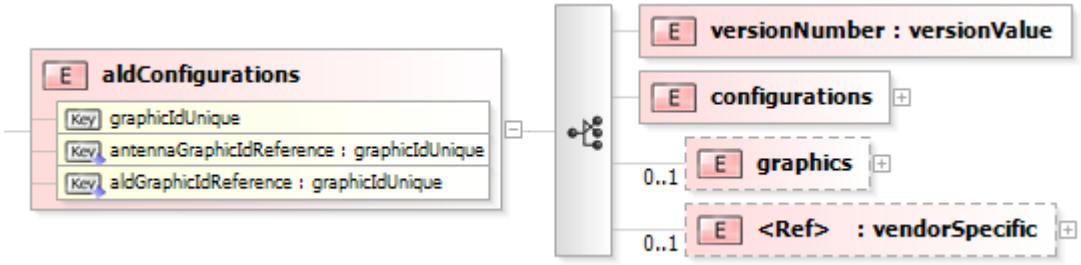
Examples:

- State <hwVersionPattern>0.7</hwVersionPattern> in the deviceInformation structure, to indicate compatibility with any 3-digit-version that starts with 0 and ends with 7, for example “017”.
- State <hwVersionPattern>0\.7</hwVersionPattern> in the deviceInformation structure, to indicate compatibility with “0.7”.
- State <hwVersionPattern>0\.7.*</hwVersionPattern> in the deviceInformation structure, to indicate compatibility with a version that starts with “0.7”. Some examples for matching versions are “0.7a”, “0.77”, “0.7.5” or “0.7”.
- State <hwVersionValue>027</hwVersionValue> in the deviceInformation structure, to indicate compatibility with “027”

6.2 XML File Structure

The XML file has two main parts, as shown in figure 6.2.1.

Figure 6.2.1: Sequence of ALD configurations



The following parts shall be listed in any order:

6.2.1 Element versionNumber

This is a mandatory field containing the version number of the XML encapsulation format in ASCII format (alphanumeric). This field is defined as 1 for the first release of the XML encapsulation.

6.2.2 Element configurations

This is a mandatory data structure containing one or more configuration definitions.

6.2.3 Element graphics

This is an optional data structure containing all graphic representations for ALDs and antennas. The graphics are defined as base64 encoded PNG images, each with a maximum size of 75 kB. Each graphic file has a unique ID.

The graphic file can be referenced by its ID at the various places in the document.

This structure allows for defining the relatively large PNG image data only once and its use at all applicable places in the file.

6.2.4 Element vendorSpecific

This is an optional structure containing vendor-specific additional XML data.

6.3 Vendor-specific data

The XML file format allows for vendor-specific additions at defined places in the XML file. These can be used to add additional information that is needed by vendor-specific tools.

The vendor-specific data contains arbitrary XML data. However, that data must be in a different XML namespace than the XML namespace of the AISG XML file. This allows for tools to ignore unknown vendor-specific data by ignoring all XML elements from unknown namespaces.

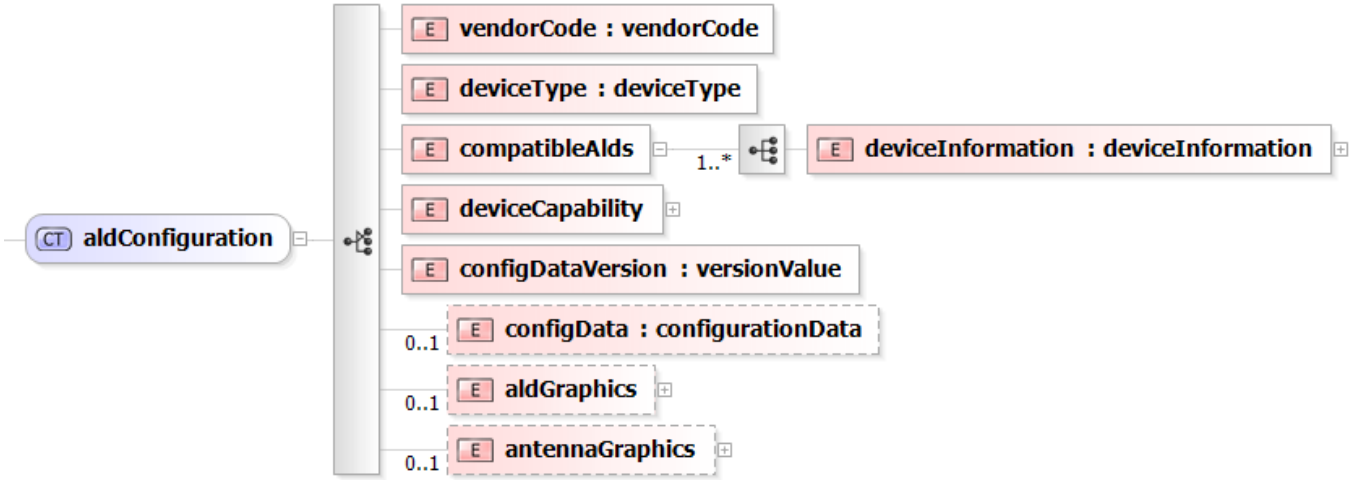
Thus, a vendor can add arbitrary additional data into the XML file without the risk of causing unexpected side-effects with the tools of other vendors.

6.4 ALD Configuration Section Structure

The configuration data structure has eight parts, as shown in figure 6.3.1.

The first device information entry that matches the ALD installed in the system is the one that shall be used. The limits specified on the deviceCapability entry are useful for the controller. The configuration data entry shall appear when the device supports loading of antenna configuration files. The schematics which might be included in ALD graphics are useful for physical recognition of these devices.

Figure 6.4.1: Structure of the configuration data section



The following parts shall be listed in any order order:

6.4.1 Element vendorCode

This is a mandatory field containing a vendor code.

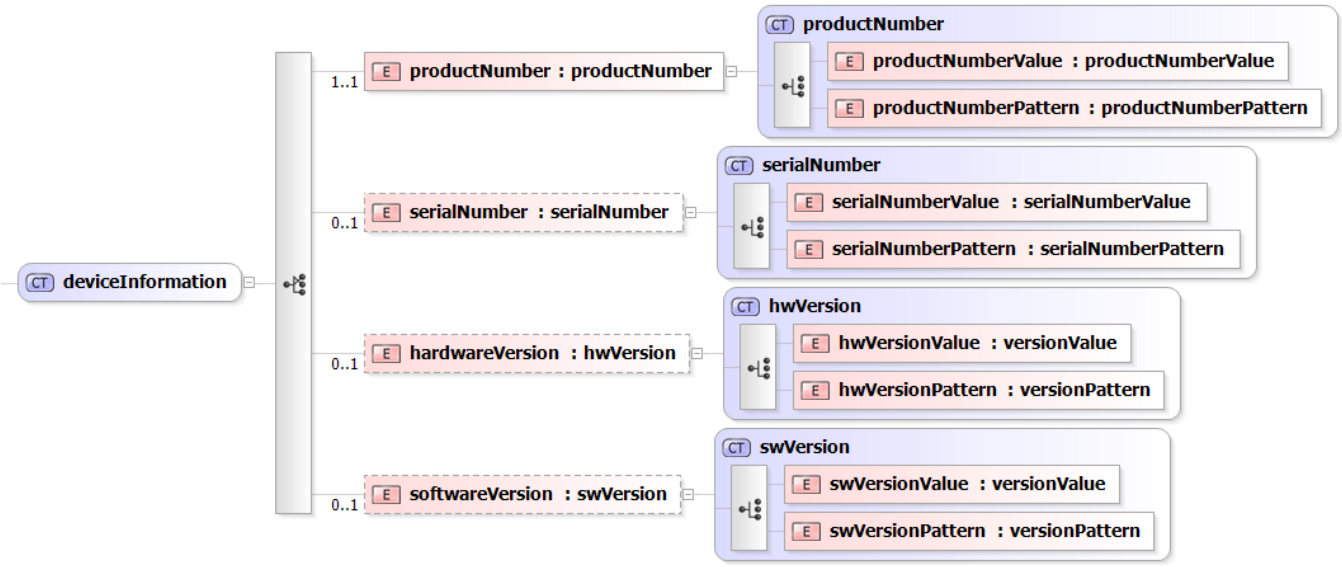
6.4.2 Element deviceType

This is a mandatory field containing the device type as three letter acronym (e.g. “RET” for RET devices).

6.4.3 Element compatibleAlds

This is a mandatory data structure containing one or more definitions of ALDs whose deviceType was stated on the deviceType mandatory field. All devices described on separate deviceInformation entries are compatible with the encapsulated configuration data.

Figure 6.4.3.1: Structure of the device information section



Compatibility is determined by comparing the Product Number, Hardware Version and Software Version values returned by GetInformation to the values listed in the compatibility definition.

The ALD is compatible if productNumber matches Product Number. It is optional to state hwVersion and swVersion and serialNumber. If any of them is stated compatibility means that hardwareVersion matches Hardware Version, softwareVersion matches Software Version and serialNumber matches Serial Number for any of the aldConfiguration sections.

The use of wildcards described in section 6 shall be indicated by the suffix “Pattern” while plain values are indicated by the suffix “Value”. It shall be noted that only one form can be used to describe these attributes (i.e. either state productNumberValue OR productNumberPattern, never both).

6.4.4 Element deviceCapability

This is a mandatory data structure that describes the functionality of the given device. The specific fields to be included in this mandatory data structure are dependent on deviceType. Refer to section 7 for deviceCapability definitions.

6.4.5 Element configurationDataVersion

This is a mandatory field containing the version number of the configuration data in ASCII format (alphanumeric).

6.4.6 Element configurationData

This is an optional field containing the configuration data coded as a base64 string. If the unit is not configurable, this field shall be filled with an empty string.

6.4.7 Element antennaGraphics

This is an optional data structure containing one or more antenna graphic representations.

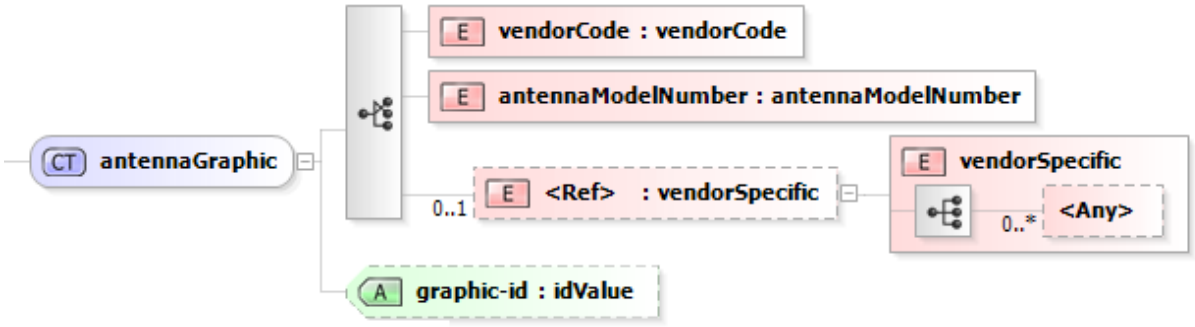
6.4.8 Element aldGraphics

This is an optional data structure containing one or more ALD graphic representations.

6.5 Antenna Graphic Section Structure

The antennaGraphic data structure is optional. When defined, it has three mandatory parts, as shown in figure 6.4.1.

Figure 6.5.1: Structure of the antenna graphic section



The following parts shall be listed in any order:

6.5.1 Element vendorCode

This is a mandatory field containing a vendor code.

6.5.2 Element antennaModelNumber

This is a mandatory field containing an antenna model number.

6.5.3 Element vendorSpecific

This is an optional strucutre containing vendor-specific additional XML data.

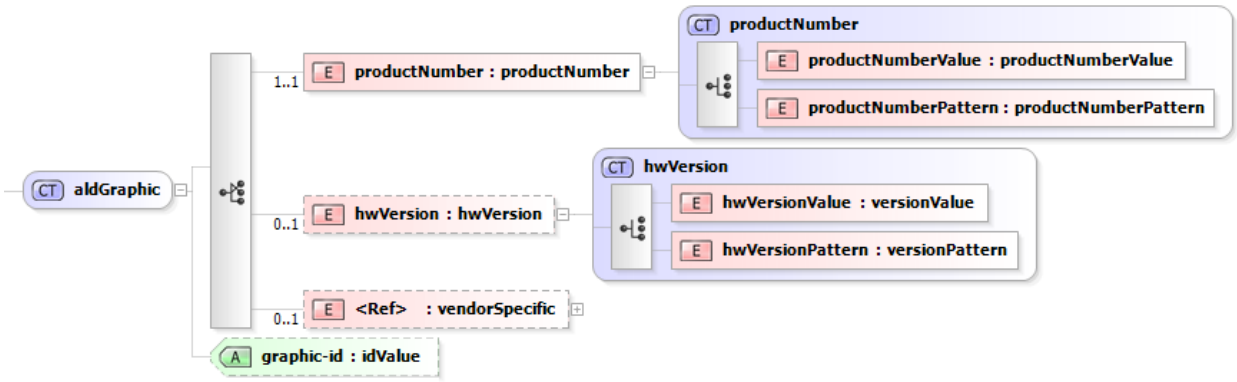
6.5.4 Attribute graphic-id

This is a mandatory attribute containing the unique ID of a graphic PNG image as defined in a graphic element.

6.6 ALD Graphic Section Structure

The aldGraphic data structure is optional. When defined, it has mandatory parts, as shown in figure 6.5.1.

Figure 6.6.1: The structure of the ALD graphic section



The following parts shall be listed in any order:

6.6.1 Element productNumber

This is a mandatory field containing a productNumber that matches the product number of the ALD, as returned by GetInformation.

6.6.2 Element hardwareVersion

This is a mandatory field containing a hardwareVersion that matches the hardware version of the ALD, as returned by GetInformation.

6.6.3 Element vendorSpecific

This is an optional structure containing vendor-specific additional XML data.

6.6.4 Tag graphic-id

This is a mandatory attribute containing the unique ID of a graphic PNG image as defined in a graphic elelemnt.

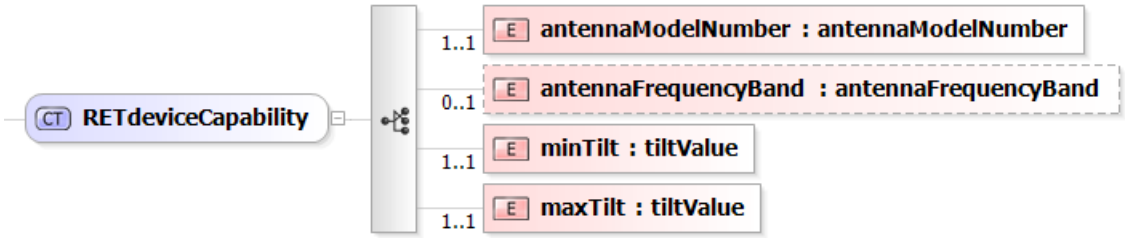
7. DEVICE CAPABILITY DATA STRUCTURE

This is a mandatory data structure that describes the functionality of the given device as well as some information which can be used to determine compatibility. When defined, it has one mandatory element, related to a single device type.

7.1 RET deviceCapability

This data structure is mandatory if and only if deviceType stated is "RET". When stated, it has three mandatory parts as shown below.

Figure 7.1.1: Structure of RET device capability structure



7.1.1 Element antennaModelNumber

This is a mandatory data structure containing one or more antenna model numbers. Compatibility is determined by comparing the antenna model number of the actual antenna to the values listed in the compatibility definition.

NOTE: The ALD may or may not be able to return a reliable antenna model number of the antenna. It may have to be determined some other way.

The antenna is compatible if the antennaModelNumber matches the antenna model number for any of the antennaModelNumber definitions.

7.1.2 Element antennaFrequencyBand

This is an optional data structure containing one antennaFrequencyBand. If stated, compatibility means that antennaFrequencyBand is identical to the antenna frequency band for any of the deviceInformation sections. The value is a decimal number as defined in [4].

NOTE: The ALD may or may not be able to return a reliable antenna frequency band. It may have to be determined some other way.

7.1.3 Element minTilt

This is a mandatory field for RETs containing the minimum tilt value (tenths of degree, 0.1º) defined by the configuration data. The tilt range is [-1799, 1800].

7.1.4 Element maxTilt

This is a mandatory field for RETs containing the maximum tilt value (tenths of degree, 0.1º) defined by the configuration data. The tilt range is [-1799, 1800].

7.2 RAS deviceCapability

This data structure is mandatory if and only if deviceType stated is "RAS". When stated, it has three mandatory parts as shown below.

Figure 7.2.1: Structure of RAS device capability structure

7.2.1 Element antennaModelNumber

This is a mandatory data structure containing one or more antenna model numbers. Compatibility is determined by comparing the antenna model number of the actual antenna to the values listed in the compatibility definition.

NOTE: The ALD may or may not be able to return a reliable antenna model number of the antenna. It may have to be determined some other way.

The antenna is compatible if the antennaModelNumber matches the antenna model number for any of the antennaModelNumber definitions.

7.2.2 Element antennaFrequencyBand

This is an optional data structure containing one antennaFrequencyBand. If stated, compatibility means that antennaFrequencyBand is identical to the antenna frequency band for any of the deviceInformation sections.

NOTE: The ALD may or may not be able to return a reliable antenna frequency band. It may have to be determined some other way.

7.2.3 Element minAzOffset

This is a mandatory field for RASs containing the minimum azimuth offset value (tenths of degree, 0.1°) defined by the configuration data. The steering range is limited to [-1799, 1800].

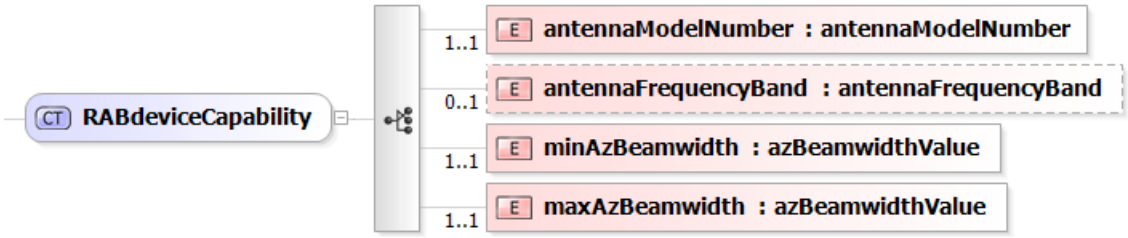
7.2.4 Element maxAzOffset

This is a mandatory field for RASs containing the maximum azimuth offset value (tenths of degree, 0.1°) defined by the configuration data. The steering range is limited to [-1799, 1800].

7.3 RAB deviceCapability

This data structure is mandatory if and only if deviceType stated is "RAB". When stated, it has three mandatory parts as shown below.

Figure 7.3.1: The structure of RAB device capability structure



7.3.1 Element antennaModelNumber

This is a mandatory data structure containing one or more antenna model numbers. Compatibility is determined by comparing the antenna model number of the actual antenna to the values listed in the compatibility definition.

NOTE: The ALD may or may not be able to return a reliable antenna model number of the antenna. It may have to be determined some other way.

The antenna is compatible if the antennaModelNumber matches the antenna model number for any of the antennaModelNumber definitions.

7.3.2 Element antennaFrequencyBand

This is an optional data structure containing one antennaFrequencyBand. If stated, compatibility means that antennaFrequencyBand is identical to the antenna frequency band for any of the deviceInformation sections.

NOTE: The ALD may or may not be able to return a reliable antenna frequency band. It may have to be determined some other way.

7.3.3 Element minAzBeamwidth

This is a mandatory field for RABs containing the minimum azimuth beamwidth value (tenths of degree, 0.1°) defined by the configuration data. The azimuth beamwidth range is limited to [0, 3599].

7.3.4 Element maxAzBeamwidth

This is a mandatory field for RABs containing the maximum azimuth beamwidth value (tenths of degree, 0.1°) defined by the configuration data. The azimuth beamwidth range is limited to [0, 3599].

7.4 RAE deviceCapability

This data structure is mandatory if and only if deviceType stated is "RAE". When stated, it has three mandatory parts as shown below.

Figure 7.4.1: The structure of RAE device capability structure

7.4.1 Element antennaModelNumber

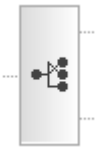
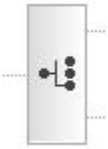
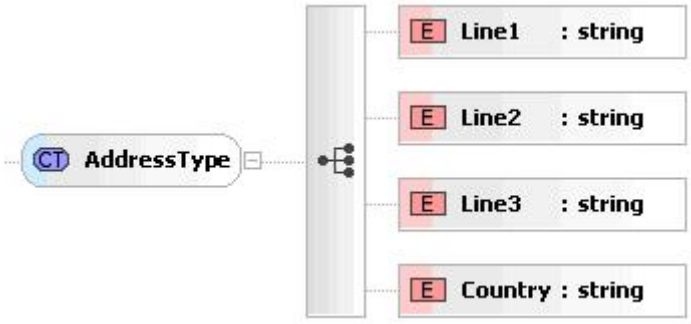
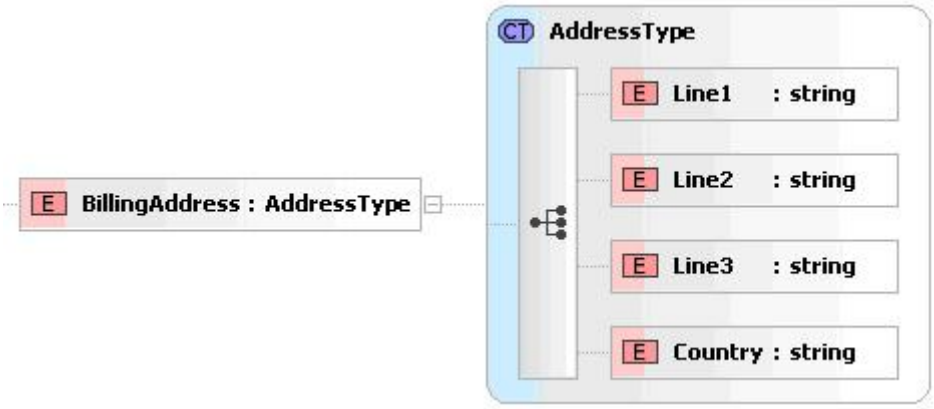
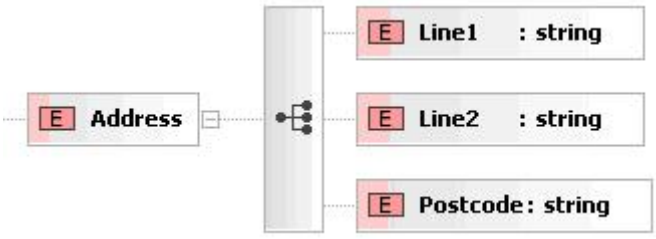
This is a mandatory data structure containing one or more antenna model numbers. Compatibility is determined by comparing the antenna model number of the actual antenna to the values listed in the compatibility definition.

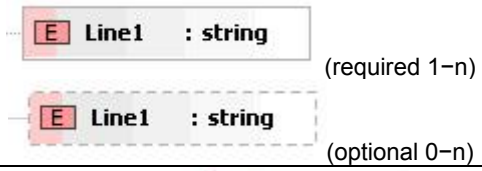
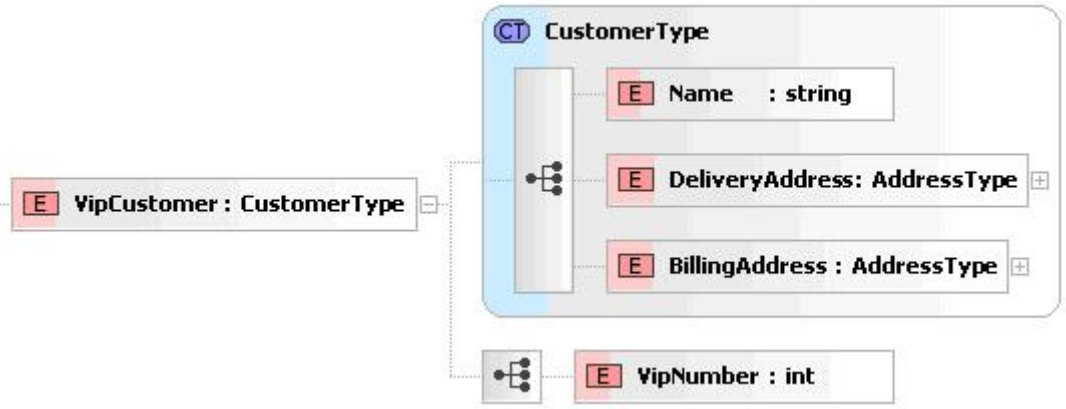
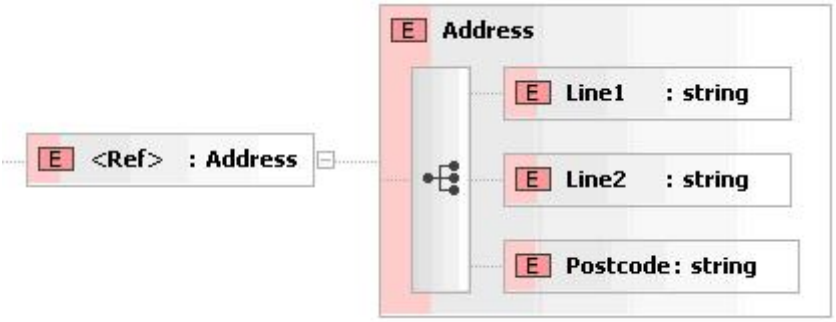
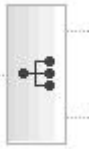
NOTE: The ALD may or may not be able to return a reliable antenna model number of the antenna. It may have to be determined some other way.

The antenna is compatible if the antennaModelNumber matches the antenna model number for any of the antennaModelNumber definitions.

Annex A: XML Graphical Notation Overview (Informative)

Table A.1: XML Graphical Notation Overview

Type	Symbol
All	
Choice	
Complex Type Definition	
Complex Type Reference	
Element Definition (Child Elements)	

Element Definition (Data)	
Element Definition (Complex Content)	
Element Reference	
Group Reference	
Sequence	
Simple Type