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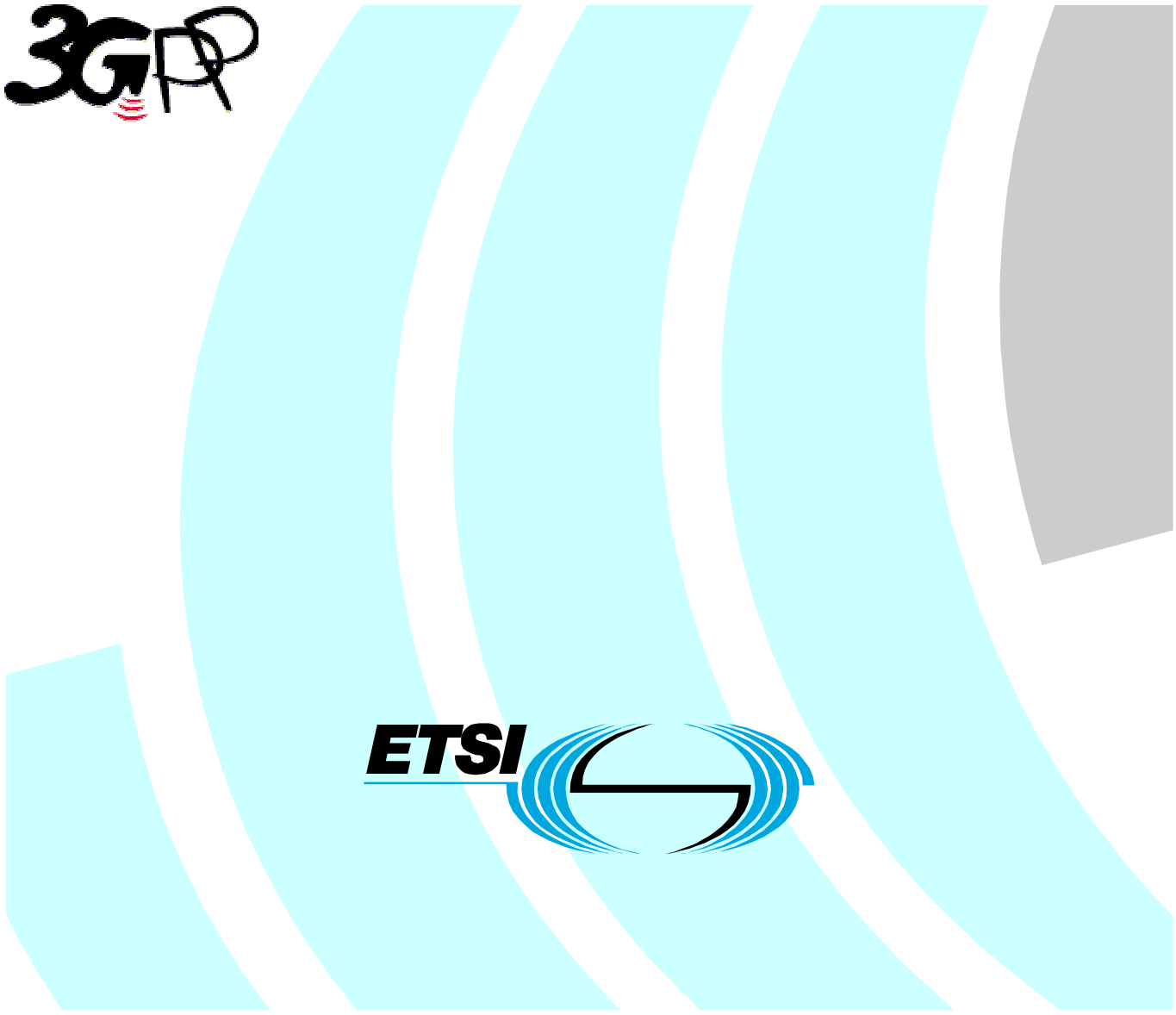
Technical Specification

Universal Mobile Telecommunications System (UMTS);
Telecommunication management;
Configuration management;
3G configuration management:
Bulk configuration management IRP: XML file format definition
(3GPP TS 32.615 version 4.1.0 Release 4)



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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.302	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.303	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.304	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.602	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.603	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.604	Basic CM IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.611	**Bulk CM IRP**: Requirements
-	-	32.612	Bulk CM IRP: Information Service
-	-	32.613	Bulk CM IRP: CORBA SS
-	-	32.614	Bulk CM IRP: CMIP SS
		32.615	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.621	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.622	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.623	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.624	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.631	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.632	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.633	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.634	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.641	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.642	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.643	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.644	UTRAN Network Resources IRP: CMIP SS
		32.651	**GERAN Network Resources IRP**: Requirements
		32.652	GERAN Network Resources IRP: NRM
		32.653	GERAN Network Resources IRP: CORBA SS
		32.654	GERAN Network Resources IRP: CMIP SS

1 Scope

The present document defines the XML file formats for the configuration data files and session log files of Bulk CM IRP IS [1].

Those file formats are based on XML [2], XML Schema [3] [4] [5] and XML Namespace [6] standards.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.612: "3G Configuration Management; Bulk Configuration Management IRP: Information Service".

[2] W3C REC-xml-20001006: "Extensible Markup Language (XML) 1.0 (Second Edition)".

[3] W3C REC-xmlschema-0-20010502: "XML Schema Part 0: Primer".

[4] W3C REC-xmlschema-1-20010502: "XML Schema Part 1: Structures".

[5] W3C REC-xmlschema-2-20010502: "XML Schema Part 2: Datatypes".

[6] W3C REC-xml-names-19990114: "Namespaces in XML".

[7] 3GPP TS 32.300: "3G Configuration Management; Name convention for Managed Objects".

[8] 3GPP TS 32.622: "3G Configuration Management; Generic Network Resources IRP: Network Resource Model".

[9] 3GPP TS 32.642: "3G Configuration Management; UTRAN Network Resources IRP: Network Resource Model".

[10] 3GPP TS 32.652: "3G Configuration Management; GERAN Network Resources IRP: Network Resource Model".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

XML file: a file containing an XML document.

XML document: see [2]; in the scope of this specification, an XML document is composed of the succession of an optional XML declaration followed by a root XML element.

XML declaration: see [2]; it specifies the version of XML being used.

XML element: see [2]; an XML element has a type, is identified by a name, may have a set of XML attribute specifications and is either composed of the succession of an XML start-tag followed by the XML content of the XML element followed by an XML end-tag, or composed simply of an XML empty-element tag; each XML element may contain other XML elements.

empty XML element: see [2]; an XML element having an empty XML content; an empty XML element still possibly has a set of XML attribute specifications; an empty XML element is either composed of the succession of an XML start-tag directly followed by an XML end-tag, or composed simply of an XML empty-element tag.

XML content (of an XML element): empty if the XML element is simply composed of an XML empty-element tag; otherwise the part, possibly empty, of the XML element between its XML start-tag and its XML end-tag.

XML start-tag: see [2]; the beginning of a non-empty XML element is marked by an XML start-tag containing the name and the set of XML attribute specifications of the XML element.

XML end-tag: see [2]; the end of a non-empty XML element is marked by an XML end-tag containing the name of the XML element.

XML empty-element tag: see [2]; an empty XML element is composed simply of an empty-element tag containing the name and the set of XML attribute specifications of the XML element.

XML attribute specification: see [2]; an XML attribute specification has a name and a value.

DTD: see [2]; a DTD defines structure and content constraints to be respected by an XML document to be valid with regard to this DTD.

XML schema: see [3], [4] and [5]; more powerful than a DTD, an XML schema defines structure and content constraints to be respected by an XML document to conform with this XML schema; through the use of XML namespaces several XML schemas can be used together by a single XML document; an XML schema is itself also an XML document that shall conform with the XML schema for XML schemas.

XML namespace: see [6]; in the scope of this specification, enables qualifying element and attribute names used in XML documents by associating them with namespaces identified by different XML schemas.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
DTD	Document Type Definition
DN	Distinguished Name
EDGE	Enhanced Data for GSM Evolution
GERAN	GSM/EDGE Radio Access Network
GSM	Global System for Mobile communication
IRP	Integration Reference Point
IS	Information Service
NRM	Network Resource Model
RDN	Relative Distinguished Name

UMTS	Universal Mobile Telecommunications System
UTRAN	Universal Terrestrial Radio Access Network
XML	eXtensible Markup Language

4 Structure and content of configuration data XML files

The present clause defines the file format of configuration data XML files exchanged between an IRPManager and an IRPAgent as part of `upload` and `download` operations of the Bulk CM IRP IS (see [1]).

Upload and download configuration data XML files share a common file format defined by the XML schemas in Annex A and B and by the following subclauses.

Additionally, vendor-specific XML schemas shall be provided to enable configuration data XML files to carry vendor-specific data (see subclause 4.5).

The use of XML schemas enables to ensure configuration data XML files have the proper structure and to some extent the proper content, and in particular to ensure:

- for a given NRM instance, it is properly named/positioned with regard to the global NRM naming tree
- for a given NRM instance, only attributes of the corresponding NRM class are present
- for a given NRM attribute, its value is of the proper type

Location of the XML schemas used for configuration data XML files is outside the scope of this document.

4.1 Global structure

The content of a configuration data XML file is the succession of:

- the standard XML declaration with specification of the version of XML and of the character encoding being used (see [2])
- a `bulkCmConfigDataFile` XML element; this is the root XML element of configuration data XML files

The definition of the allowed character encoding(s) is outside the scope of this document.

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
  <element name="bulkCmConfigDataFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
[…]
        </element>
        <element name="configData" maxOccurs="unbounded">
[…]
        </element>
        <element name="fileFooter">
[…]
        </element>
      </sequence>
    </complexType>
  </element>
```

the XML content of a `bulkCmConfigDataFile` XML element is the succession of:

- a `fileHeader` XML element (see subclause 4.2)
- one or several `configData` XML elements (see subclause 4.3)
- a `fileFooter` XML element (see subclause 4.2)

XML elements `fileHeader` and `fileFooter` are empty XML elements (see subclause 4.2).

The `bulkCmConfigDataFile` XML element shall also have all the XML attribute specifications that declare the XML namespaces (see [6]) used in the XML file.

The following XML namespaces are potentially used in configuration data XML files:

- the default XML namespace is associated with the configuration data files base XML schema `bulkCmConfigDataFile.xsd` (see Annex A)
- the XML namespace prefix `xn` is defined for the XML namespace associated with the NRM specific XML schema `genericNrm.xsd` for the Generic Network Resources IRP NRM (see Annex B)
- the XML namespace prefix `un` is defined for the XML namespace associated with the NRM specific XML schema `utranNrm.xsd` for the UTRAN Network Resources IRP NRM (see Annex B)
- the XML namespace prefix `gn` is defined for the XML namespace associated with the NRM specific XML schema `geranNrm.xsd` for the GERAN Network Resources IRP NRM (see Annex B)
- XML namespaces prefixes starting with `vs`, e.g. `vsRHO11`, are reserved for the XML namespaces associated with the vendor-specific XML schemas (see clause 4.5)

Each `configData` XML element (see subclause 4.3) carries:

- NRM instances with or without their NRM attribute values in a NRM naming tree organized structure together with `modifier` XML attribute specification (see subclause 4.4)
- possibly vendor-specific data (see subclause 4.5)

A `configData` XML element can carry an entire tree of NRM instances with their NRM attribute values and the related vendor-specific data or any subset of it.

The following is an example of a configuration data XML file, without presentation of the XML attribute specifications and XML content of `fileHeader`, `configData` and `fileFooter` XML elements (replaced by […]; see subclauses 4.2, 4.3, 4.4 and 4.5):

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
[…]
>
  <fileHeader […]/>
  <configData […]>
[…]
  </configData>
  <configData […]>
[…]
  </configData>
  <fileFooter […]/>
</bulkCmConfigDataFile>
```

4.2 XML elements `fileHeader` and `fileFooter`

4.2.1 XML element `fileHeader`

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
<element name="fileHeader">
  <complexType>
    <attribute name="fileFormatVersion" type="string"/>
    <attribute name="senderName" type="string" use="optional"/>
    <attribute name="vendorName" type="string" use="optional"/>
  </complexType>
</element>
```

a `fileHeader` XML element:

- has the following XML attribute specifications:
  - a `fileFormatVersion` XML attribute specification; this attribute specification carries the abridged number and version of this 3GPP document (see below); this identifies the version of the file format used for assembling the XML file
  - a conditional `senderName` XML attribute specification; this attribute specification shall be present only in XML files generated by the IRPAgent; it carries the DN of the IRPAgent that assembled the XML file, i.e. the value of the `systemDN` NRM attribute of the `IRPAgent` NRM instance (see [8])
  - a conditional `vendorName` XML attribute specification; this attribute specification shall be present only in XML files generated by the IRPAgent; it carries the name of the vendor of the IRPAgent that assembled the XML file
- and has an empty XML content

The abridged number and version of a 3GPP document is constructed from its version specific full reference "3GPP […] (yyyy-mm)" by:

- removing the leading "3GPP TS"
- removing everything including and after the version third digit, representing editorial only changes, together with its preceding dot character
- from the resulting string, removing leading and trailing white space, replacing every multi character white space by a single space character and changing the case of all characters to uppercase

The following is an example of a `fileHeader` XML element:

```
<fileHeader
  fileFormatVersion="32.615 V4.1"
  senderName="DC=a1.companyNN.com,SubNetwork=1,IRPAgent=1"
  vendorName="Company NN"
/>
```

4.2.2 XML element `fileFooter`

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
<element name="fileFooter">
  <complexType>
    <attribute name="dateTime" type="dateTime"/>
  </complexType>
</element>
```

a `fileFooter` XML element:

- has a `dateTime` XML attribute specification; this attribute specification carries the date and time the XML file was assembled
- and has an empty XML content

The following is an example of a `fileFooter` XML element:

```
<fileFooter dateTime="2001-05-07T12:00:00+02:00"/>
```

4.3 XML element `configData`

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
<element name="configData" maxOccurs="unbounded">
  <complexType>
    <attribute name="dnPrefix" type="string" use="optional"/>
    <choice>
      <element ref="xn:SubNetwork"/>
      <element ref="xn:MeContext"/>
      <element ref="xn:ManagedElement"/>
    </choice>
  </complexType>
</element>
```

a `configData` XML element:

- has an optional `dnPrefix` XML attribute specification; this attribute specification carries the DN Prefix information as defined in Annex C of 32.300 [7]
- and its XML content is an instance of the specific type of XML element (see below) corresponding to one of the NRM classes SubNetwork, MeContext or ManagedElement (see [8]); depending on the System Context of the IRP (see [1]) the used NRM class shall be:
  - in case of System Context A, only SubNetwork NRM class, or
  - in case of System Context B, only MeContext or ManagedElement NRM class

As defined by XML schemas `genericNrm.xsd`, `utranNrm.xsd` and `geranNrm.xsd` (see Annex B):

- to each NRM class corresponds a specific type of XML element having the following characteristics:
  - its name is the name of the NRM class
  - it has the following XML attribute specifications:
    - an `id` XML attribute specification; this attribute specification carries the attribute value part of the RDN of the NRM instance carried by the XML element, i.e. the value of the naming attribute of this NRM instance
    - an optional `modifier` XML attribute specification (see subclause 4.4)
  - and its XML content is the succession of:
    - zero or more specific XML elements (see below) corresponding to attributes of the NRM class
    - zero or more similar specific XML elements corresponding to direct subordinate NRM classes of the NRM class to which the current XML element corresponds

- to each NRM attribute of each NRM class, except for the following NRM attributes:
  - the naming NRM attribute of each NRM class, whose value is already carried by the `id` XML attribute specification of the specific XML element corresponding to the NRM class
  - the conditional `dnPrefix` NRM attribute of `SubNetwork`, `MeContext` and `ManagedElement` NRM classes (see [8]), whose value is already carried by the `dnPrefix` XML attribute specification of the `configData` XML element

  corresponds a specific type of XML element having the following characteristics:
  - its name is constructed from the name of the NRM attribute by removing any contained dash character
  - and it has an XML content; this XML content carries the value of the NRM attribute

For example for the `SubNetwork` NRM class (see [8]), the corresponding extract of XML schema `genericNrm.xsd` (see Annex B) is the following:

```
<element name="SubNetwork">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="userLabel" minOccurs="0"/>
          <element name="userDefinedNetworkType" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:SubNetwork"/>
          <element ref="xn:ManagedElement"/>
          <element ref="xn:MeContext"/>
          <element ref="xn:ManagementNode"/>
          <element ref="xn:IRPAgent"/>
          <element ref="un:ExternalUtranCell"/>
          <element ref="gn:ExternalGsmCell"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>
```

supported by the following extract of XML schema `genericNrm.xsd` (see Annex B):

```
  <complexType name="NrmClassXmlType" abstract="true">
    <attribute name="id" type="string"/>
    <attribute name="modifier" use="optional">
[…]
    </attribute>
  </complexType>
```

The following is an example of a `configData` XML element in a configuration data XML file (in **bold**):

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1">
      <xn:userLabel>Paris SN1</xn:userLabel>
      <xn:userDefinedNetworkType>UMTS</xn:userDefinedNetworkType>
      <xn:ManagementNode id="1">
        <xn:userLabel>Paris MN1</xn:userLabel>
        <xn:vendorName>Company NN</xn:vendorName>
        <xn:userDefinedState>commercial</xn:userDefinedState>
        <xn:locationName>Montparnasse</xn:locationName>
      </xn:ManagementNode>
      <xn:ManagedElement id="1">
        <xn:managedElementType>RNC</xn:managedElementType>
        <xn:userLabel>Paris RN1</xn:userLabel>
        <xn:vendorName>Company NN</xn:vendorName>
        <xn:userDefinedState>commercial</xn:userDefinedState>
        <xn:locationName>Champ de Mars</xn:locationName>
      </xn:ManagedElement>
      <xn:ManagedElement id="2">
        <xn:managedElementType>RNC</xn:managedElementType>
        <xn:userLabel>Paris RN2</xn:userLabel>
        <xn:vendorName>Company NN</xn:vendorName>
        <xn:userDefinedState>commercial</xn:userDefinedState>
        <xn:locationName>Concorde</xn:locationName>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

4.4 XML attribute specification `modifier`

As defined by the following extract of XML schema `genericNrm.xsd` (see Annex B):

```
    <attribute name="modifier" use="optional">
      <simpleType>
        <restriction base="string">
          <enumeration value="create"/>
          <enumeration value="delete"/>
          <enumeration value="update"/>
        </restriction>
      </simpleType>
    </attribute>
```

the value of the optional `modifier` XML attribute specification of the specific XML elements corresponding to the classes of the NRM is one of the following: `create`, `delete`, or `update`.

The semantic carried by a `modifier` XML attribute specification applies only to the NRM instance corresponding to the containing XML element and not to any explicit or implicit subordinate NRM instances of this NRM instance.

The following rules apply for the `modifier` XML attribute specification:

- in upload XML configuration files, no `modifier` XML attribute specification should be present; on the contrary those are to be considered as meaningless and shall be ignored
- in download XML configuration files:
  - if an XML element carrying an NRM instance has a `modifier` XML attribute specification of value `create`, then all directly or indirectly contained XML element carrying NRM instances, if any, shall also have a `modifier` XML attribute specification of value `create`
  - if an XML element carrying an NRM instance has a `modifier` XML attribute specification of value `delete`, then all directly or indirectly contained XML element carrying NRM instances, if any, shall also have a `modifier` XML attribute specification of value `delete`
  - if an XML element carrying an NRM instance has a `modifier` XML attribute specification of value `update`, then all directly contained XML element carrying NRM instances, if any, may also have a `modifier` XML attribute specification, this one being of either value `create`, `delete`, or `update`
  - if an XML element carrying an NRM instance has no `modifier` XML attribute specification or a `modifier` XML attribute specification of value `delete`, then it shall not directly contain XML elements corresponding to attributes of the NRM class

A tree of XML elements corresponding to a tree of NRM instances with all XML elements having a `modifier` XML attribute specification of value `create` is considered to be in accordance with the following rule from Bulk CM IRP IS 32.612 [1]:

> "When part or a whole NRM subtree is to be created, in the configuration data file the IRPManager shall first action the create action of parents MO instances before actioning the create of any child MO instances contained in the NRM subtree i.e. create actions on MO instances shall be specified in recursive manner following the NRM hierarchy subtree from the highest MO instances to the lowest MO instances the IRPManager requires to be created."

In such a tree of NRM instances, the XML element carrying a given NRM instance does not accurately appear before XML elements carrying subordinate NRM instances. The latter XML elements rather appear as the last part of the XML content of the former XML element.

Nevertheless, XML parsing of such a tree of NRM instances can still enable the above Bulk CM IRP IS rule to be fully respected. Example of an XML parsing enabling such compliance is one effectively actioning the creation of each NRM instance when having parsed the XML start-tag of the XML element carrying the NRM instance and the contained XML elements carrying attributes of the NRM instance.

A tree of XML elements corresponding to a tree of NRM instances with all XML elements having a `modifier` XML attribute specification of value `delete` is considered to be in accordance with the following rule from Bulk CM IRP IS 32.612 [1]:

> "When part or whole NRM subtree is to be deleted, in the configuration data file the IRPManager shall first action delete of all associated child instances contained in the NRM subtree before actioning delete of MO parents instances i.e. delete actions on MO instances shall be specified in a recursive manner following the NRM hierarchy subtree from the lowest MO instances to the highest MO instances the IRPManager requires to be deleted."

In such a tree of NRM instances, the XML elements carrying subordinate NRM instances do not appear before the XML element carrying the parent NRM instance. The former XML elements rather appear as the XML content of the latter XML element.

Nevertheless, XML parsing of such a tree of NRM instances can still enable the above Bulk CM IRP IS rule to be fully respected. Example of an XML parsing enabling such compliance is one effectively actioning the delete of each NRM instance when parsing the XML end-tag of the XML element carrying the NRM instance.

The following are examples of legal `configData` XML element with regard to `modifier` XML attribute specification (in **bold**) in configuration data XML files:

- example 1:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1" modifier="create">
      <xn:userLabel>Paris SN1</xn:userLabel>
      <xn:userDefinedNetworkType>UMTS</xn:userDefinedNetworkType>
      <xn:ManagementNode id="1" modifier="create">
        <xn:userLabel>Paris MN1</xn:userLabel>
[…]
        <xn:locationName>Montparnasse</xn:locationName>
      </xn:ManagementNode>
      <xn:ManagedElement id="1" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Champ de Mars</xn:locationName>
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Concorde</xn:locationName>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

- example 2:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1">
      <xn:ManagedElement id="1" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Champ de Mars</xn:locationName>
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Concorde</xn:locationName>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

- example 3:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1" modifier="delete">
      <xn:ManagementNode id="1" modifier="delete">
      </xn:ManagementNode>
      <xn:ManagedElement id="1" modifier="delete">
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="delete">
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

- example 4:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1">
      <xn:ManagedElement id="1" modifier="delete">
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="delete">
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

- example 5:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
  xmlns:un="utranNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1" modifier="update">
      <xn:userLabel>Paris SN1</xn:userLabel>
      <xn:ManagementNode id="1" modifier="update">
        <xn:userLabel>Paris MN1</xn:userLabel>
      </xn:ManagementNode>
      <xn:ManagedElement id="1" modifier="delete">
        <un:RncFunction id="1" modifier="delete">
        </un:RncFunction>
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Concorde</xn:locationName>
        <un:RncFunction id="2" modifier="create">
          <un:userLabel>Paris RF2</un:userLabel>
[…]
          <un:rncId>2</un:rncId>
        </un:RncFunction>
      </xn:ManagedElement>
      <xn:ManagedElement id="3">
        <un:RncFunction id="3" modifier="update">
          <un:userLabel>Paris RF3</un:userLabel>
        </un:RncFunction>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

4.5 XML elements `VsDataContainer`, `vsData` and `vsDataFormatVersion`

As all XML element types corresponding to NRM classes (see subclause 4.3), the `VsDataContainer` XML element type corresponds to the `VsDataContainer` NRM class defined in 32.622 [8].

Contained in a `VsDataContainer` XML element, as all XML element types corresponding to NRM attributes (see subclause 4.3), the `vsData` and `vsDataFormatVersion` XML elements corresponds to the `vsData` and `vsDataFormatVersion` NRM attributes defined in 32.622 [8].

Unlike all the other XML element types corresponding to NRM attributes, the `vsData` XML element has an empty XML content.

Each vendor-specific XML schema shall define one ore more vendor-specific XML elements that:

- have a name starting with `vsData`, e.g. `vsDataRHO`
- derive by extension (see [3], [4] and [5]) the `vsData` XML element defined in the XML schema `genericNrm.xsd`
- are designated as members of the substitution group (see [3], [4] and [5]) headed by the `vsData` XML element

Beyond the above statement, the definition of vendor-specific XML schemas is outside the scope of this document.

The XML content of those vendor-specific XML elements carry vendor-specific data.

The XML content of the `vsDataFormatVersion` XML element shall be the filename, without the ".xsd" file extension and without any path specification, of the vendor-specific XML schema used for the related `VsDataContainer` XML element.

See Annex C for an example of a vendor-specific XML schema.

The following is an example of a vendor-specific XML element (in **bold**) deriving and extending the `vsData` XML element in a configuration data XML file:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
  xmlns:un="utranNrm.xsd"
  xmlns:vsRHO11="NNRncHandOver.1.1.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1">
      <xn:ManagedElement id="1">
        <un:RncFunction id="1">
          <xn:VsDataContainer id="1">
            <xn:vsDataType>RncHandOver</xn:vsDataType>
            <vsRHO11:vsDataRHO>
              <vsRHO11:abcMin>12</vsRHO11:abcMin>
              <vsRHO11:abcMax>34</vsRHO11:abcMax>
            </vsRHO11:vsDataRHO>
            <xn:vsDataFormatVersion>NNRncHandOver.1.1</xn:vsDataFormatVersion>
          </xn:VsDataContainer>
        </un:RncFunction>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

5 Structure and content of session log XML files

The present clause defines the file format of session log XML files exchanged between an IRPManager and an IRPAgent as part of `getSessionLog` operation of the Bulk CM IRP IS (see [1]).

This file format is defined by the XML schema in Annex D and by the following subclauses.

The use of an XML schema enables to ensure session log XML files have the proper structure and to some extent the proper content.

Location of the XML schemas used for session log XML files is outside the scope of this document.

5.1 Global structure

The content of a session log XML file is the succession of:

- the standard XML declaration with specification of the version of XML and of the character encoding being used (see [2])
- a `bulkCmSessionLogFile` XML element; this is the root XML element of session log XML files

The definition of the allowed character encoding(s) is outside the scope of this document.

As defined by the following extract of XML schema `bulkCmSessionLogFile.xsd` (see Annex D):

```
  <element name "bulkCmSessionLogFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
[…]
        </element>
        <element name="activity" maxOccurs="unbounded">
[…]
        </element>
        <element name="fileFooter">
[…]
        </element>
      </sequence>
    </complexType>
  </element>
```

the XML content of a `bulkCmSessionLogFile` XML element is the succession of:

- a `fileHeader` XML element (see subclause 5.2)
- one or several `activity` XML elements (see subclause 5.3)
- a `fileFooter` XML element (see subclause 5.2)

XML elements `fileHeader` and `fileFooter` are empty XML elements (see subclause 5.2).

The `bulkCmSessionLogFile` XML element shall also have all the XML attribute specifications that declare the XML namespaces (see [6]) used in the XML file.

Only the default XML namespace is used in session log XML files. It is associated with the session log file XML schema `bulkCmSessionLogFile.xsd` (see Annex D).

The following is an example of a session log XML file, without presentation of the XML attribute specifications and XML content of `fileHeader`, `activity` and `fileFooter` XML elements (replaced by […]; see subclauses 5.2 and 5.3):

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmSessionLogFile xmlns="bulkCmSessionLogFile.xsd">
  <fileHeader […]/>
  <activity […]>
[…]
  </activity>
  <activity […]>
[…]
  </activity>
  <fileFooter […]/>
</bulkCmSessionLogFile>
```

5.2 XML elements `fileHeader` and `fileFooter`

The XML elements `fileHeader` and `fileFooter` for session log XML files have the same definition, structure and content as the XML elements `fileHeader` and `fileFooter` for configuration data XML files (see subclause 4.2).

5.3 XML element `activity`

As defined by the following extract of XML schema `bulkCmSessionLogFile.xsd` (see Annex D):

```
        <element name="activity" maxOccurs="unbounded">
          <complexType>
            <sequence>
              <element name="log" maxOccurs="unbounded">
[…]
              </element>
            </sequence>
            <attribute name="dateTime" type="dateTime"/>
            <attribute name="type">
              <simpleType>
                <restriction base="string">
                  <enumeration value="upload"/>
                  <enumeration value="download"/>
                  <enumeration value="activate"/>
                  <enumeration value="fallback"/>
                </restriction>
              </simpleType>
            </attribute>
          </complexType>
        </element>
```

an `activity` XML element:

- has the following XML attribute specifications:
  - a `dateTime` XML attribute specification; this attribute specification carries the date and time the Bulk CM activity was started
  - a `type` XML attribute specification; this attribute specification carries the type of the Bulk CM activity triggered by the IRPManager, `upload`, `download`, `activate` or `fallback`
- and its XML content is the succession of one or several `log` XML elements

As defined by the following extract of XML schema `bulkCmSessionLogFile.xsd` (see Annex D):

```
<element name="log" maxOccurs="unbounded">
  <complexType>
    <restriction base="string"/>
    <attribute name="time" type="time"/>
    <attribute name="type">
      <simpleType>
        <restriction base="string">
          <enumeration value="informative"/>
          <enumeration value="error"/>
        </restriction>
      </simpleType>
    </attribute>
    <attribute name="dn" type="string" use="optional"/>
    <attribute name="modifier" use="optional">
      <simpleType>
        <restriction base="string">
          <enumeration value="create"/>
          <enumeration value="delete"/>
          <enumeration value="update"/>
        </restriction>
      </simpleType>
    </attribute>
  </complexType>
</element>
```

a `log` XML element:

- has the following XML attribute specifications:
  - a `time` XML attribute specification; this attribute specification carries the time the logged Bulk CM internal event occurred
  - a `type` XML attribute specification; this attribute specification carries the type of the logged Bulk CM internal event, being either `informative` or `error`
  - an optional `dn` XML attribute specification; this attribute specification carries the DN of the NRM instance associated with the logged Bulk CM internal event, if any
  - an optional `modifier` XML attribute specification; this attribute specification carries the value of the `modifier` (see subclause 4.4) associated with the NRM instance, if any
- and it has an XML content; this XML content carries the description of the logged Bulk CM internal event

The following is an example of an `activity` XML element (in **bold**) in a session log XML file:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmSessionLogFile xmlns="bulkCmSessionLogFile.xsd">
[…]
  <activity dateTime="2001-05-07T12:00:00+02:00" type="download">
    <log time="12:00:01+02:00" type="informative">
      Download requested with:
        downloadDataFileReference="ftp://a1.companyNN.com/data/upld123.xml"
    </log>
    <log time="12:00:02+02:00" type="error"
      dn="DC=a1.companyNN.com,SubNetwork=1"
      modifier="update"
    >
      No such instance
    </log>
  </activity>
[…]
</bulkCmSessionLogFile>
```

Annex A (normative): Configuration data file base XML schema

The following XML schema `bulkCmConfigDataFile.xsd` is the base schema for configuration data XML files:

```
<!--
  3GPP TS 32.615 Bulk CM IRP
  Configuration data file base XML schema
  bulkCmConfigDataFile.xsd
-->

<schema
  targetNamespace="bulkCmConfigDataFile.xsd"
  xmlns="XMLSchema"
  xmlns:xn="genericNrm.xsd"
>

  <!-- Configuration data file root XML element -->

  <element name="bulkCmConfigDataFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
          <complexType>
            <attribute name="fileFormatVersion" type="string"/>
            <attribute name="senderName" type="string" use="optional"/>
            <attribute name="vendorName" type="string" use="optional"/>
          </complexType>
        </element>
        <element name="configData" maxOccurs="unbounded">
          <complexType>
            <attribute name="dnPrefix" type="string" use="optional"/>
            <choice>
              <element ref="xn:SubNetwork"/>
              <element ref="xn:MeContext"/>
              <element ref="xn:ManagedElement"/>
            </choice>
          </complexType>
        </element>
        <element name="fileFooter">
          <complexType>
            <attribute name="dateTime" type="dateTime"/>
          </complexType>
        </element>
      </sequence>
    </complexType>
  </element>

</schema>
```

Annex B (normative): Configuration data file NRM specific XML schemas

The following XML schemas are the NRM specific schemas for configuration data XML files.

The following XML schema `genericNrm.xsd` is the NRM specific schema for the Generic Network Resources IRP NRM defined in 32.622 [8]:

```
<!--
  3GPP TS 32.615 Bulk CM IRP
  Configuration data file Generic Network Resources IRP NRM XML schema
  genericNrm.xsd
-->

<schema
  xmlns:xn="genericNrm.xsd"
  targetNamespace="genericNrm.xsd"
  xmlns="XMLSchema"
  xmlns:un="utranNrm.xsd"
  xmlns:gn="geranNrm.xsd"
>

  <!-- Abstract base type for all NRM class associated XML elements -->

  <complexType name="NrmClassXmlType" abstract="true">
    <attribute name="id" type="string"/>
    <attribute name="modifier" use="optional">
      <simpleType>
        <restriction base="string">
          <enumeration value="create"/>
          <enumeration value="delete"/>
          <enumeration value="update"/>
        </restriction>
      </simpleType>
    </attribute>
  </complexType>

  <!-- Generic Network Resources IRP NRM class associated XML elements -->

  <element name="SubNetwork">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="userDefinedNetworkType" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:SubNetwork"/>
            <element ref="xn:ManagedElement"/>
            <element ref="xn:MeContext"/>
            <element ref="xn:ManagementNode"/>
            <element ref="xn:IRPAgent"/>
            <element ref="un:ExternalUtranCell"/>
            <element ref="gn:ExternalGsmCell"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>
```

```
<element name="ManagedElement">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="managedElementType" minOccurs="0"/>
          <element name="userLabel" minOccurs="0"/>
          <element name="vendorName" minOccurs="0"/>
          <element name="userDefinedState" minOccurs="0"/>
          <element name="locationName" minOccurs="0"/>
          <element name="swVersion" minOccurs="0"/>
          <element name="managedBy" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:IRPAgent"/>
          <element ref="un:RncFunction"/>
          <element ref="un:NodeBFunction"/>
          <element ref="gn:BssFunction"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="MeContext">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:ManagedElement"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="ManagementNode">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="userLabel" minOccurs="0"/>
          <element name="vendorName" minOccurs="0"/>
          <element name="userDefinedState" minOccurs="0"/>
          <element name="locationName" minOccurs="0"/>
          <element name="manages" minOccurs="0"/>
          <element name="swVersion" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:IRPAgent"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="IRPAgent">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="systemDN" minOccurs="0"/>
```

```
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:NotificationIRP"/>
          <element ref="xn:AlarmIRP"/>
          <element ref="xn:BasicCmIRP"/>
          <element ref="xn:BulkCmIRP"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="NotificationIRP">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="irpVersion" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="AlarmIRP">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="irpVersion" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="BasicCmIRP">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="irpVersion" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="BulkCmIRP">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="irpVersion" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="VsDataContainer">
  <complexType>
    <extension base="xn:NrmClassXmlType">
```

```
        <sequence>
          <all>
            <element name="vsDataType" minOccurs="0"/>
            <element ref="xn:vsData" minOccurs="0"/>
            <element name="vsDataFormatVersion" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

<!-- VsDataContainer NRM class vsData attribute associated empty XML element -->

  <element name="vsData">
    <complexType/>
  </element>

</schema>
```

The following XML schema `utranNrm.xsd` is the NRM specific schema for the UTRAN Network Resources IRP NRM defined in 32.642 [9]:

```
<!--
  3GPP TS 32.615 Bulk CM IRP
  Configuration data file UTRAN Network Resources IRP NRM XML schema
  utranNrm.xsd
-->

<schema
  xmlns:un="utranNrm.xsd"
  targetNamespace="utranNrm.xsd"
  xmlns="XMLSchema"
  xmlns:xn="genericNrm.xsd"
  xmlns:gn="geranNrm.xsd"
>

  <!-- UTRAN Network Resources IRP NRM class associated XML elements -->

  <element name="RncFunction">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="mcc" minOccurs="0"/>
            <element name="mnc" minOccurs="0"/>
            <element name="rncId" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="un:UtranCell"/>
            <element ref="un:IubLink"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="NodeBFunction">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="nodeBFunctionIubLink" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="UtranCell">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="cId" minOccurs="0"/>
            <element name="localCellId" minOccurs="0"/>
```

```
          <element name="uarfcnUl" minOccurs="0"/>
          <element name="uarfcnDl" minOccurs="0"/>
          <element name="primaryScramblingCode" minOccurs="0"/>
          <element name="primaryCpichTxPower" minOccurs="0"/>
          <element name="maximumTransmissionPower" minOccurs="0"/>
          <element name="primarySchPower" minOccurs="0"/>
          <element name="secondarySchPower" minOccurs="0"/>
          <element name="bchPower" minOccurs="0"/>
          <element name="lac" minOccurs="0"/>
          <element name="rac" minOccurs="0"/>
          <element name="sac" minOccurs="0"/>
          <element name="ura" minOccurs="0"/>
          <element name="utranCellIubLink" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="un:UtranRelation"/>
          <element ref="gn:GsmRelation"/>
          <element ref="xn:VsDataContainer"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="IubLink">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="userLabel" minOccurs="0"/>
          <element name="iubLinkUtranCell" minOccurs="0"/>
          <element name="iubLinkNodeBFunction" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="UtranRelation">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="relationType" minOccurs="0"/>
          <element name="adjacentCell" minOccurs="0"/>
          <element name="uarfcnUl" minOccurs="0"/>
          <element name="uarfcnDl" minOccurs="0"/>
          <element name="primaryScramblingCode" minOccurs="0"/>
          <element name="primaryCpichTxPower" minOccurs="0"/>
          <element name="lac" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:VsDataContainer"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="ExternalUtranCell">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
```

```
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="cId" minOccurs="0"/>
            <element name="mcc" minOccurs="0"/>
            <element name="mnc" minOccurs="0"/>
            <element name="rncId" minOccurs="0"/>
            <element name="uarfcnUl" minOccurs="0"/>
            <element name="uarfcnDl" minOccurs="0"/>
            <element name="primaryScramblingCode" minOccurs="0"/>
            <element name="primaryCpichTxPower" minOccurs="0"/>
            <element name="lac" minOccurs="0"/>
            <element name="rac" minOccurs="0"/>
          </all>
        </sequence>
      </extension>
    </complexType>
  </element>

</schema>
```

The following XML schema `geranNrm.xsd` is the NRM specific schema for the GERAN Network Resources IRP NRM defined in 32.652 [10]:

```
<!--
  3GPP TS 32.615 Bulk CM IRP
  Configuration data file GERAN Network Resources IRP NRM XML schema
  geranNrm.xsd
-->

<schema
  xmlns:gn="geranNrm.xsd"
  targetNamespace="geranNrm.xsd"
  xmlns="XMLSchema"
  xmlns:xn="genericNrm.xsd"
  xmlns:un="utranNrm.xsd"
>

  <!-- GERAN Network Resources IRP NRM class associated XML elements -->

  <element name="BssFunction">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="gn:BtsSiteMgr"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="BtsSiteMgr">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="latitude" minOccurs="0"/>
            <element name="longitude" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="gn:GsmCell"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="GsmCell">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="cellIdentity" minOccurs="0"/>
            <element name="cellAllocation" minOccurs="0"/>
            <element name="ncc" minOccurs="0"/>
            <element name="bcc" minOccurs="0"/>
```

```
            <element name="lac" minOccurs="0"/>
            <element name="mcc" minOccurs="0"/>
            <element name="mnc" minOccurs="0"/>
            <element name="rac" minOccurs="0"/>
            <element name="racc" minOccurs="0"/>
            <element name="tsc" minOccurs="0"/>
            <element name="rxLevAccessMin" minOccurs="0"/>
            <element name="msTxPwrMaxCCH" minOccurs="0"/>
            <element name="hoppingSequenceNumber" minOccurs="0"/>
            <element name="plmnPermitted" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="gn:GsmRelation"/>
            <element ref="un:UtranRelation"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="GsmRelation">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="relationType" minOccurs="0"/>
            <element name="adjacentCell" minOccurs="0"/>
            <element name="bcchFrequency" minOccurs="0"/>
            <element name="ncc" minOccurs="0"/>
            <element name="bcc" minOccurs="0"/>
            <element name="lac" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="ExternalGsmCell">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="cellIdentity" minOccurs="0"/>
            <element name="bcchFrequency" minOccurs="0"/>
            <element name="ncc" minOccurs="0"/>
            <element name="bcc" minOccurs="0"/>
            <element name="lac" minOccurs="0"/>
            <element name="mcc" minOccurs="0"/>
            <element name="mnc" minOccurs="0"/>
            <element name="rac" minOccurs="0"/>
            <element name="racc" minOccurs="0"/>
          </all>
        </sequence>
      </extension>
    </complexType>
  </element>

</schema>
```

Annex C (informative): Configuration data file vendor-specific XML schema example

The following XML schema is an example of vendor-specific schema for configuration data XML files:

```
<!--
  Configuration data file vendor-specific XML schema example
  NNRncHandOver.1.1.xsd
-->

<schema
  targetNamespace="NNRncHandOver.1.1.xsd"
  xmlns="XMLSchema"
  xmlns:xn="genericNrm.xsd"
>

  <!-- RncHandOver version 1.1 company NN vendor-specific data -->

  <element name="vsDataRHO" substitutionGroup="xn:vsData">
    <complexType>
      <extension base="xn:vsData">
        <sequence>
          <all>
            <element name="abcMin" minOccurs="0"/>
            <element name="abcMax" minOccurs="0"/>
          </all>
        </sequence>
      </extension>
    </complexType>
  </element>

</schema>
```

Annex D (normative): Session log file XML schema

The following XML schema `bulkCmSessionLogFile.xsd` is the schema for session log XML files:

```
<!--
  3GPP TS 32.615 Bulk CM IRP
  Session log file XML schema
  bulkCmSessionLogFile.xsd
-->

<schema
  targetNamespace="bulkCmSessionLogFile.xsd"
  xmlns="XMLSchema"
>

  <!-- Session log file root XML element -->

  <element name="bulkCmSessionLogFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
          <complexType>
            <attribute name="fileFormatVersion" type="string"/>
            <attribute name="senderName" type="string" use="optional"/>
            <attribute name="vendorName" type="string" use="optional"/>
          </complexType>
        </element>
        <element name="activity" maxOccurs="unbounded">
          <complexType>
            <sequence>
              <element name="log" maxOccurs="unbounded">
                <complexType>
                  <restriction base="string"/>
                  <attribute name="time" type="time"/>
                  <attribute name="type">
                    <simpleType>
                      <restriction base="string">
                        <enumeration value="informative"/>
                        <enumeration value="error"/>
                      </restriction>
                    </simpleType>
                  </attribute>
                  <attribute name="dn" type="string" use="optional"/>
                  <attribute name="modifier" use="optional">
                    <simpleType>
                      <restriction base="string">
                        <enumeration value="create"/>
                        <enumeration value="delete"/>
                        <enumeration value="update"/>
                      </restriction>
                    </simpleType>
                  </attribute>
                </complexType>
              </element>
            </sequence>
            <attribute name="dateTime" type="dateTime"/>
            <attribute name="type">
              <simpleType>
                <restriction base="string">
```

```
                  <enumeration value="upload"/>
                  <enumeration value="download"/>
                  <enumeration value="activate"/>
                  <enumeration value="fallback"/>
                </restriction>
              </simpleType>
            </attribute>
          </complexType>
        </element>
        <element name="fileFooter">
          <complexType>
            <attribute name="dateTime" type="dateTime"/>
          </complexType>
        </element>
      </sequence>
    </complexType>
  </element>

</schema>
```

Annex E (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0
Dec 2001	S_14	SP-010645	001	--	Addition of MCC and MNC attributes to GSM cell related MOCs in Bulk CM XML file format	4.0.0	4.1.0

History

Document history		
V4.0.0	June 2001	Publication
V4.1.0	December 2001	Publication