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**RE: Proposal for XSD Subclassing**

Dear Mr. Toche,

In the context of subclassing, XSD subclassing is currently not supported by current 3GPP and 3GPP2 XSD Specifications. 3GPP2 TSG-S WG5 hereby proposes within the Annex provided below an approach for adoption by 3GPP SA5. This XSD subclassing approach is complemented by supported requirements for subclassing, and a sample proof of concept. If this subclassing approach is acceptable to 3GPP SA5, 3GPP2 TSG-S WG5 recommends adoption within R6.

3GPP2 TSG-S suggests further deliberations and resolution on this topic via conference calls. As an initial conference call April-18, 2006, 10:00AM-12:00PM EDT (02:00PM-04:00PM UTC/GMT) is being proposed.

3GPP2 TSG-S would appreciate consideration of these aspects of concern and welcome further discussions. If you have additional questions, please contact: Randy Scheer ([rjscheer@lucent.com](mailto:rjscheer@lucent.com)).

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Regards,

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## Annex – XSD Subclassing Approach & Proof of Concept

### **Introduction**

This contribution provides two components. First, it shows that providing “subclassing” in XSD documents in a reasonable fashion is possible. Second, it provides an initial set of requirements of what we want our XSD documents to be.

There are many ways to provide subclassing in XSD documents. This document shows one way, but may not be the way that 3GPP SA5 or 3GPP2 TSG-S WG5 needs. It is first important that we have common agreement on the XSD requirements before we define an XML configuration file format solution.

### **XSD Requirements**

In Bulk CM XSD files, the term “subclassing” is deemed the ability to:

1. Define new objects based on the definitions of existing objects, either within 3GPP SA5 XSD files or in vendor specified XSD files, without editing 3GPP SA5 or 3GPP2 TSG-S WG5 XSD documents.
2. When subclassing, the object’s attributes and containment (i.e., what objects can be contained by this object) are maintained without re-copying each attribute and each containment.
3. Subclassing allows the new object to define new unique attributes and new unique containment (i.e., what objects can be contained by this object).
4. 3GPP SA5 may specify objects that cannot be subclassed.

In addition, the following XSD rules need to apply:

1. 3GPP SA5 XSD compliancy requires the XSD files to be used without any alteration.
2. Each object may contain zero or more attributes. Attributes may be of simple or complex types.
3. The potential highest contained objects need to be specified. These may be subclassed objects.
4. The containment relationships (both high and low) need to be specified.
5. The type of each attribute must be explicitly specified for interoperability purposes.
6. The vsDataContainer requires the specification of vendor specific types.
7. Each attribute definition for a particular object instance may only appear once in the XML configuration files.

### **Sample 3GPP XSD Files Allowing Subclassing**

In this proof of concept, the latest R6 XSD file definitions were used. The same basic methodology was used as in 3GPP SA5 Bulk CM files, while supporting the new subclassing concept. As a result, the XML configuration files are only slightly changed.

In addition, all attributes were specifically supplied attribute types instead of leaving them unspecified.

One of the downsides of this method is that a particular subclassed object may specify only a single containment relationship to the object it is contained under. [This is true only if a single object is subclassed. If multiple objects are subclassed, then multiple containment can be defined, like what is defined for ManagedElement. Thus, a single XSD may define multiple containment relationships.]

Another downside is the attributes must be supplied in the XML Configuration Files in the order listed in the XSD files. The contained objects may be in any order.

## configData.xsd

This XSD file was slightly changed to allow the subclassing of the head objects, SubNetwork, ManagedElement and MEContext.

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
3GPP TS 32.615 Bulk CM IRP
Configuration data file base XML schema
configData.xsd
-->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:xn="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"
xmlns:cn="http://www.3gpp.org/ftp/specs/archive/32_series/32.635#coreNrm"
xmlns:un="http://www.3gpp.org/ftp/specs/archive/32_series/32.645#utranNrm"
xmlns:gn="http://www.3gpp.org/ftp/specs/archive/32_series/32.655#geranNrm"
xmlns:stn="http://www.3gpp.org/ftp/specs/archive/32_series/32.745#stnNrm"
xmlns:in="http://www.3gpp.org/ftp/specs/archive/32_series/32.695#inventoryNrm"
xmlns:tn="http://www.3gpp.org/ftp/specs/archive/32_series/32.715#transportNrm"
xmlns:ns1="http://www.3gpp.org/ftp/specs/archive/32_series/32.615#configData"
targetNamespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.615#configData" elementFormDefault="qualified">
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.635#coreNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.645#utranNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.655#geranNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.745#stnNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.695#inventoryNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.715#transportNrm"/>
  <!-- Configuration data file root XML element -->
  <element name="bulkCmConfigDataFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
          <complexType>
            <attribute name="fileFormatVersion" type="string" use="required"/>
            <attribute name="senderName" type="string" use="optional"/>
            <attribute name="vendorName" type="string" use="optional"/>
          </complexType>
        </element>
        <element name="configData" maxOccurs="unbounded">
          <complexType>
            <choice>
              <element ref="xn:SubNetwork"/>
              <element ref="xn:MeContext"/>
              <element ref="xn:ManagedElement"/>
              <element ref="xn:SubNetworkSubclassedNrmClass"/>
              <element ref="xn:MeContextSubclassedNrmClass"/>
              <element ref="xn:ManagedElementSubclassedNrmClass"/>
            </choice>
            <attribute name="dnPrefix" type="string" use="optional"/>
          </complexType>
        </element>
      </sequence>
    </complexType>
  </element>
</schema>
```

```

        </complexType>
      </element>
      <element name="fileFooter">
        <complexType>
          <attribute name="dateTime" type="dateTime" use="required"/>
        </complexType>
      </element>
    </sequence>
  </complexType>
</element>
</schema>

```

## genericNrm.xsd

The genericNrm.xsd XSD document shows the general methodology used to provide subclassing. An attribute group and a containment group is created for every class. If this class is subclassing another class, it can incorporate the attribute group and containment group of the other class, and then add its own attributes (if any) and containment (if any). This can be used for both abstract classes and classes that can be instantiated.

In addition, optional containment elements are created for each class so objects created in other XSD documents or vendor specific objects may be contained from any object.

```

<?xml version="1.0" encoding="UTF-8"?>
<!--
3GPP TS 32.625 Generic Network Resources IRP
Bulk CM Configuration data file NRM-specific XML schema
genericNrm.xsd
-->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:xn="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"
targetNamespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <simpleType name="modifierType">
    <restriction base="string">
      <enumeration value="create"/>
      <enumeration value="delete"/>
      <enumeration value="update"/>
    </restriction>
  </simpleType>
  <complexType name="StringSet">
    <sequence minOccurs="0" maxOccurs="unbounded">
      <element name="Item" type="string"/>
    </sequence>
  </complexType>
  <simpleType name="dn">
    <restriction base="string">
      <maxLength value="400"/>
    </restriction>
  </simpleType>
  <complexType name="dnList">
    <sequence minOccurs="0" maxOccurs="unbounded">
      <element name="dn" type="xn:dn"/>
    </sequence>
  </complexType>
  <simpleType name="LinkTypeType">
    <list>
      <simpleType>
        <restriction base="string">
          <enumeration value="Signalling"/>

```

```

        <enumeration value="Bearer"/>
        <enumeration value="OAM_AND_P"/>
        <enumeration value="Other"/>
    </restriction>
</simpleType>
</list>
</simpleType>
<complexType name="NrmClass">
    <attribute name="modifier" type="xn:modifierType" use="optional"/>
    <attribute name="id" type="string" use="required"/>
</complexType>
<group name="ManagedFunctionAttributes">
    <sequence>
        <element name="userLabel" type="string" minOccurs="0" maxOccurs="1"/>
    </sequence>
</group>
<group name="ManagedFunctionContainment">
    <choice>
        <element ref="xn:VsDataContainer"/>
    </choice>
</group>
<group name="LinkAttributes">
    <sequence>
        <element name="userLabel" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="aEnd" type="xn:dn" minOccurs="0" maxOccurs="1"/>
        <element name="zEnd" type="xn:dn" minOccurs="0" maxOccurs="1"/>
        <element name="linkType" type="xn:LinkTypeType" minOccurs="0" maxOccurs="1"/>
        <element name="protocolName" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="protocolVersion" type="string" minOccurs="0" maxOccurs="1"/>
    </sequence>
</group>
<group name="LinkContainment">
    <choice>
        <element ref="xn:VsDataContainer"/>
    </choice>
</group>
<group name="SubNetworkAttributes">
    <sequence>
        <element name="userLabel" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="userDefinedNetworkType" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="setOfMcc" type="xn:StringSet" minOccurs="0" maxOccurs="1"/>
    </sequence>
</group>
<group name="SubNetworkContainment">
    <choice>
        <element ref="xn:SubNetwork"/>
        <element ref="xn:ManagedElement"/>
        <element ref="xn:MeContext"/>
        <element ref="xn:IRPAgent"/>
        <element ref="xn:SubNetworkOptionallyContainedNrmClass"/>
        <element ref="xn:LinkSubclassedNrmClass"/>
        <element ref="xn:VsDataContainer"/>
    </choice>
</group>
<element name="SubNetwork">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
                <sequence>
                    <group ref="xn:SubNetworkAttributes"/>
                    <group ref="xn:SubNetworkContainment" minOccurs="0" maxOccurs="unbounded"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>

```

```

        </extension>
    </complexContent>
</complexType>
</element>
<group name="ManagedElementAttributes">
    <sequence>
        <element name="managedElementType" type="xn:StringSet" minOccurs="0" maxOccurs="1"/>
        <element name="userLabel" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="vendorName" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="userDefinedState" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="locationName" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="swVersion" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="managedBy" type="xn:dnList" minOccurs="0" maxOccurs="1"/>
    </sequence>
</group>
<group name="ManagedElementContainment">
    <choice>
        <element ref="xn:IRPAgent"/>
        <element ref="xn:ManagedElementOptionallyContainedNrmClass"/>
        <element ref="xn:VsDataContainer"/>
    </choice>
</group>
<element name="ManagedElement">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
                <sequence>
                    <group ref="xn:ManagedElementAttributes"/>
                    <group ref="xn:ManagedElementContainment" minOccurs="0" maxOccurs="unbounded"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<group name="MeContextContainment">
    <choice>
        <element ref="xn:ManagedElement"/>
        <element ref="xn:MeContextOptionallyContainedNrmClass"/>
    </choice>
</group>
<element name="MeContext">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
                <sequence>
                    <group ref="xn:MeContextContainment" minOccurs="0" maxOccurs="unbounded"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<group name="ManagementNodeAttributes">
    <sequence>
        <element name="userLabel" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="vendorName" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="userDefinedState" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="locationName" type="string" minOccurs="0" maxOccurs="1"/>
        <element name="managedElements" type="xn:dnList" minOccurs="0" maxOccurs="1"/>
        <element name="swVersion" type="string" minOccurs="0" maxOccurs="1"/>
    </sequence>
</group>
<group name="ManagementNodeContainment">

```

```

    <choice>
      <element ref="xn:IRPAgent"/>
      <element ref="xn:VsDataContainer"/>
      <element ref="xn:ManagementNodeOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="ManagementNode" substitutionGroup="xn:SubNetworkOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="xn:ManagementNodeAttributes"/>
            <group ref="xn:ManagementNodeContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <group name="IRPAgentAttributes">
    <sequence>
      <element name="systemDN" type="string" minOccurs="0" maxOccurs="1"/>
    </sequence>
  </group>
  <group name="IRPAgentContainment">
    <choice>
      <element ref="xn:IRPAgentOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="IRPAgent">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="xn:IRPAgentAttributes"/>
            <group ref="xn:IRPAgentContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <group name="VsDataContainerAttributes">
    <sequence>
      <element name="vsDataType" type="string" minOccurs="0" maxOccurs="1"/>
      <element name="vsDataFormatVersion" type="string" minOccurs="0" maxOccurs="1"/>
      <element ref="xn:vsData" minOccurs="0" maxOccurs="1"/>
    </sequence>
  </group>
  <group name="VsDataContainerContainment">
    <choice>
      <element ref="xn:VsDataContainer"/>
      <element ref="xn:VsDataContainerOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="VsDataContainer">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="xn:VsDataContainerAttributes"/>
            <group ref="xn:VsDataContainerContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>

```

```

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

```

```

<complexType name="vsData"/>
<element name="vsData" type="xn:vsData"/>
<element name="SubNetworkOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="ManagedElementOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="MeContextOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="ManagementNodeOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="IRPAgentOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="VsDataContainerOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="SubNetworkSubclassedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="MeContextSubclassedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="ManagedElementSubclassedNrmClass" type="xn:NrmClass" abstract="true"/>
<element name="LinkSubclassedNrmClass" type="xn:NrmClass" abstract="true"/>
</schema>

```

### coreNrm.xsd

This NRM was chosen to show the containment concepts at a larger degree. Notice that userLabel and VsDataContainer no longer appear in this file. They are automatically brought in. The other NRM XSD documents could be similarly updated.

```

<?xml version="1.0" encoding="UTF-8"?>
<!--
3GPP TS 32.635 Core Network Resources IRP
Bulk CM Configuration data file NRM-specific XML schema
coreNrm.xsd
-->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:xn="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"
xmlns:cn="http://www.3gpp.org/ftp/specs/archive/32_series/32.635#coreNrm"
targetNamespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.635#coreNrm"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"/>
  <complexType name="LongSet">
    <sequence minOccurs="0" maxOccurs="unbounded">
      <element name="Item" type="long"/>
    </sequence>
  </complexType>
  <!-- Core Network Resources IRP NRM class associated XML elements -->
  <group name="MscServerFunctionAttributes">
    <sequence>
      <group ref="xn:ManagedFunctionAttributes"/>
      <element name="mccList" type="cn:LongSet" minOccurs="0" maxOccurs="1"/>
      <element name="mncList" type="cn:LongSet" minOccurs="0" maxOccurs="1"/>
      <element name="lacList" type="cn:LongSet" minOccurs="0" maxOccurs="1"/>
      <element name="sacList" type="cn:LongSet" minOccurs="0" maxOccurs="1"/>
      <element name="gcaList" type="cn:LongSet" minOccurs="0" maxOccurs="1"/>
      <element name="mscId" type="long" minOccurs="0" maxOccurs="1"/>
      <element name="mscServerFunctionGsmCell" type="xn:dnList" minOccurs="0" maxOccurs="1"/>
      <element name="mscServerFunctionExternalGsmCell" type="xn:dnList" minOccurs="0" maxOccurs="1"/>
      <element name="mscServerFunctionCsMgwFunction" type="xn:dnList" minOccurs="0" maxOccurs="1"/>
    </sequence>
  </group>
  <group name="MscServerFunctionContainment">
    <choice>
      <group ref="xn:ManagedFunctionContainment"/>
      <element ref="cn:MscServerFunctionOptionallyContainedNrmClass"/>
    </choice>
  </group>

```

```

</choice>
</group>
<element name="MscServerFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:MscServerFunctionAttributes"/>
          <group ref="cn:MscServerFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="MscServerFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="HlrFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="HlrFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:HlrFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="HlrFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:HlrFunctionAttributes"/>
          <group ref="cn:HlrFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="HlrFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="VlrFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="VlrFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:VlrFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="VlrFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:VlrFunctionAttributes"/>
          <group ref="cn:VlrFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

```

```

<element name="VlrFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="AucFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="AucFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:AucFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="AucFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:AucFunctionAttributes"/>
          <group ref="cn:AucFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="AucFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="EirFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="EirFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:EirFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="EirFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:EirFunctionAttributes"/>
          <group ref="cn:EirFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="EirFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="SmsIwmscFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="SmsIwmscFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:SmsIwmscFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="SmsIwmscFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>

```

```

    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:SmsIwmscFunctionAttributes"/>
          <group ref="cn:SmsIwmscFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="SmsIwmscFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="SmsGmscFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="SmsGmscFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
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        <sequence>
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  </complexType>
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</group>

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<group name="IucsLinkContainment">
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  </choice>
</group>
<element name="IucsLink" substitutionGroup="cn:MscServerFunctionOptionallyContainedNrmClass">
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</group>

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</choice>
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    </complexType>
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  </sequence>
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  </sequence>
</group>
<group name="MnpSrfFunctionContainment">
  <choice>
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  </choice>
</group>
<element name="MnpSrfFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
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</group>
<group name="NpdbFunctionContainment">
    <choice>
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    </choice>
</group>
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    </sequence>
</group>
<group name="SgwFunctionContainment">
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        <element ref="cn:SgwFunctionOptionallyContainedNrmClass"/>
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<group name="SsfFunctionContainment">
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  </choice>
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  </sequence>
</group>
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  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
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  </choice>
</group>
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          <group ref="cn:BsFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
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  <sequence>
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    <element name="csMgwFunctionIucsLink" type="xn:dnList" minOccurs="0" maxOccurs="1"/>
    <element name="csMgwFunctionALink" type="xn:dnList" minOccurs="0" maxOccurs="1"/>
  </sequence>
</group>
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  <choice>
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  </choice>
</group>
<element name="CsMgwFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
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      <extension base="xn:NrmClass">

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          <group ref="cn:CsmgwFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
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  </sequence>
</group>
<group name="ScscfFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
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  </choice>
</group>
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  </complexType>
</element>
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</group>
<group name="PscfFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
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  </choice>
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  </complexType>
</element>
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  <sequence>
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  </sequence>
</group>

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<group name="IcscfFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:IcscfFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="IcscfFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:IcscfFunctionAttributes"/>
          <group ref="cn:IcscfFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="IcscfFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="SifFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="SifFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:SifFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="SifFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:SifFunctionAttributes"/>
          <group ref="cn:SifFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="SifFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="BgcfFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="BgcfFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:BgcfFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="BgcfFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:BgcfFunctionAttributes"/>
          <group ref="cn:BgcfFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

```

```

        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="BgcFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
  <group name="MrfcFunctionAttributes">
    <sequence>
      <group ref="xn:ManagedFunctionAttributes"/>
    </sequence>
  </group>
  <group name="MrfcFunctionContainment">
    <choice>
      <group ref="xn:ManagedFunctionContainment"/>
      <element ref="cn:MrfcFunctionOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="MrfcFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="cn:MrfcFunctionAttributes"/>
            <group ref="cn:MrfcFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="MrfpFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
  <group name="MrfpFunctionAttributes">
    <sequence>
      <group ref="xn:ManagedFunctionAttributes"/>
    </sequence>
  </group>
  <group name="MrfpFunctionContainment">
    <choice>
      <group ref="xn:ManagedFunctionContainment"/>
      <element ref="cn:MrfpFunctionOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="MrfpFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="cn:MrfpFunctionAttributes"/>
            <group ref="cn:MrfpFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="MrfpFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
  <group name="AsFunctionAttributes">
    <sequence>
      <group ref="xn:ManagedFunctionAttributes"/>
    </sequence>
  </group>
  <group name="AsFunctionContainment">
    <choice>
      <group ref="xn:ManagedFunctionContainment"/>
      <element ref="cn:AsFunctionOptionallyContainedNrmClass"/>
    </choice>
  </group>

```

```

</choice>
</group>
<element name="AsFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:AsFunctionAttributes"/>
          <group ref="cn:AsFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="AsFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="MgcfFunctionAttributes">
  <sequence>
    <group ref="xn:ManagedFunctionAttributes"/>
  </sequence>
</group>
<group name="MgcfFunctionContainment">
  <choice>
    <group ref="xn:ManagedFunctionContainment"/>
    <element ref="cn:MgcfFunctionOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="MgcfFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:MgcfFunctionAttributes"/>
          <group ref="cn:MgcfFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="MgcfFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_As_AucAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_As_AucContainment">
  <choice>
    <group ref="xn:LinkContainment"/>
    <element ref="cn:Link_As_AucOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="Link_As_Auc" substitutionGroup="xn:LinkSubclassedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:Link_As_AucAttributes"/>
          <group ref="cn:Link_As_AucContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

```

```

<element name="Link_As_AucOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_As_HlrAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_As_HlrContainment">
  <choice>
    <group ref="xn:LinkContainment"/>
    <element ref="cn:Link_As_HlrOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="Link_As_Hlr" substitutionGroup="xn:LinkSubclassedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:Link_As_HlrAttributes"/>
          <group ref="cn:Link_As_HlrContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="Link_As_HlrOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_As_ScscfAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_As_ScscfContainment">
  <choice>
    <group ref="xn:LinkContainment"/>
    <element ref="cn:Link_As_ScscfOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="Link_As_Scscf" substitutionGroup="xn:LinkSubclassedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:Link_As_ScscfAttributes"/>
          <group ref="cn:Link_As_ScscfContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="Link_As_ScscfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_As_SlfAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_As_SlfContainment">
  <choice>
    <group ref="xn:LinkContainment"/>
    <element ref="cn:Link_As_SlfOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="Link_As_Slf" substitutionGroup="xn:LinkSubclassedNrmClass">
  <complexType>

```

```

    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:Link_As_SlfAttributes"/>
          <group ref="cn:Link_As_SlfContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="Link_As_SlfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_Bgcf_BgcfAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_Bgcf_BgcfContainment">
  <choice>
    <group ref="xn:LinkContainment"/>
    <element ref="cn:Link_Bgcf_BgcfOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="Link_Bgcf_Bgcf" substitutionGroup="xn:LinkSubclassedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:Link_Bgcf_BgcfAttributes"/>
          <group ref="cn:Link_Bgcf_BgcfContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="Link_Bgcf_BgcfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_Bgcf_ImsMgwAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_Bgcf_ImsMgwContainment">
  <choice>
    <group ref="xn:LinkContainment"/>
    <element ref="cn:Link_Bgcf_ImsMgwOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="Link_Bgcf_ImsMgw" substitutionGroup="xn:LinkSubclassedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:Link_Bgcf_ImsMgwAttributes"/>
          <group ref="cn:Link_Bgcf_ImsMgwContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="Link_Bgcf_ImsMgwOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_Bgcf_ScscfAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>

```

```

    </sequence>
  </group>
  <group name="Link_Bgcf_ScscfContainment">
    <choice>
      <group ref="xn:LinkContainment"/>
      <element ref="cn:Link_Bgcf_ScscfOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="Link_Bgcf_Scscf" substitutionGroup="xn:LinkSubclassedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="cn:Link_Bgcf_ScscfAttributes"/>
            <group ref="cn:Link_Bgcf_ScscfContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="Link_Bgcf_ScscfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
  <group name="Link_Hlr_ScscfAttributes">
    <sequence>
      <group ref="xn:LinkAttributes"/>
    </sequence>
  </group>
  <group name="Link_Hlr_ScscfContainment">
    <choice>
      <group ref="xn:LinkContainment"/>
      <element ref="cn:Link_Hlr_ScscfOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="Link_Hlr_Scscf" substitutionGroup="xn:LinkSubclassedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="cn:Link_Hlr_ScscfAttributes"/>
            <group ref="cn:Link_Hlr_ScscfContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="Link_Hlr_ScscfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
  <group name="Link_Icscf_SlfAttributes">
    <sequence>
      <group ref="xn:LinkAttributes"/>
    </sequence>
  </group>
  <group name="Link_Icscf_SlfContainment">
    <choice>
      <group ref="xn:LinkContainment"/>
      <element ref="cn:Link_Icscf_SlfOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="Link_Icscf_Slf" substitutionGroup="xn:LinkSubclassedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="cn:Link_Icscf_SlfAttributes"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>

```

```

        <group ref="cn:Link_Icscf_SlfContainment" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
</element>
<element name="Link_Icscf_SlfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_ImsMgw_MgcfAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_ImsMgw_MgcfContainment">
  <choice>
    <group ref="xn:LinkContainment"/>
    <element ref="cn:Link_ImsMgw_MgcfOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="Link_ImsMgw_Mgcf" substitutionGroup="xn:LinkSubclassedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:Link_ImsMgw_MgcfAttributes"/>
          <group ref="cn:Link_ImsMgw_MgcfContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="Link_ImsMgw_MgcfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_ImsMgw_ScscfAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_ImsMgw_ScscfContainment">
  <choice>
    <group ref="xn:LinkContainment"/>
    <element ref="cn:Link_ImsMgw_ScscfOptionallyContainedNrmClass"/>
  </choice>
</group>
<element name="Link_ImsMgw_Scscf" substitutionGroup="xn:LinkSubclassedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <group ref="cn:Link_ImsMgw_ScscfAttributes"/>
          <group ref="cn:Link_ImsMgw_ScscfContainment" minOccurs="0" maxOccurs="unbounded"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
<element name="Link_ImsMgw_ScscfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_Mrfc_MrfpAttributes">
  <sequence>
    <group ref="xn:LinkAttributes"/>
  </sequence>
</group>
<group name="Link_Mrfc_MrfpContainment">
  <choice>

```

```

        <group ref="xn:LinkContainment"/>
        <element ref="cn:Link_Mrfc_MrfpOptionallyContainedNrmClass"/>
    </choice>
</group>
<element name="Link_Mrfc_Mrfp" substitutionGroup="xn:LinkSubclassedNrmClass">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
                <sequence>
                    <group ref="cn:Link_Mrfc_MrfpAttributes"/>
                    <group ref="cn:Link_Mrfc_MrfpContainment" minOccurs="0" maxOccurs="unbounded"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="Link_Mrfc_MrfpOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_Mrfc_ScscfAttributes">
    <sequence>
        <group ref="xn:LinkAttributes"/>
    </sequence>
</group>
<group name="Link_Mrfc_ScscfContainment">
    <choice>
        <group ref="xn:LinkContainment"/>
        <element ref="cn:Link_Mrfc_ScscfOptionallyContainedNrmClass"/>
    </choice>
</group>
<element name="Link_Mrfc_Scscf" substitutionGroup="xn:LinkSubclassedNrmClass">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
                <sequence>
                    <group ref="cn:Link_Mrfc_ScscfAttributes"/>
                    <group ref="cn:Link_Mrfc_ScscfContainment" minOccurs="0" maxOccurs="unbounded"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="Link_Mrfc_ScscfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
<group name="Link_Scscf_ScscfAttributes">
    <sequence>
        <group ref="xn:LinkAttributes"/>
    </sequence>
</group>
<group name="Link_Scscf_ScscfContainment">
    <choice>
        <group ref="xn:LinkContainment"/>
        <element ref="cn:Link_Scscf_ScscfOptionallyContainedNrmClass"/>
    </choice>
</group>
<element name="Link_Scscf_Scscf" substitutionGroup="xn:LinkSubclassedNrmClass">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
                <sequence>
                    <group ref="cn:Link_Scscf_ScscfAttributes"/>
                    <group ref="cn:Link_Scscf_ScscfContainment" minOccurs="0" maxOccurs="unbounded"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>

```

```

    </complexType>
  </element>
  <element name="Link_Scscf_ScscfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
  <group name="Link_Scscf_SlfAttributes">
    <sequence>
      <group ref="xn:LinkAttributes"/>
    </sequence>
  </group>
  <group name="Link_Scscf_SlfContainment">
    <choice>
      <group ref="xn:LinkContainment"/>
      <element ref="cn:Link_Scscf_SlfOptionallyContainedNrmClass"/>
    </choice>
  </group>
  <element name="Link_Scscf_Slf" substitutionGroup="xn:LinkSubclassedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="cn:Link_Scscf_SlfAttributes"/>
            <group ref="cn:Link_Scscf_SlfContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="Link_Scscf_SlfOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
</schema>

```

## Sample XML Configuration File

```

<?xml version="1.0" encoding="UTF-8"?>
<SubNetwork xmlns="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"
xmlns:cn="http://www.3gpp.org/ftp/specs/archive/32_series/32.635#coreNrm"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
id="String" modifier="create">
  <userLabel>String</userLabel>
  <userDefinedNetworkType>string</userDefinedNetworkType>
  <setOfMcc>
    <Item>String</Item>
    <Item>String</Item>
  </setOfMcc>
  <SubNetwork id="String" modifier="create">
    <userLabel>String</userLabel>
    <userDefinedNetworkType>string</userDefinedNetworkType>
    <setOfMcc>
      <Item>String</Item>
      <Item>String</Item>
    </setOfMcc>
    <ManagedElement id="String">
      <managedElementType>
        <Item>MSC</Item>
      </managedElementType>
      <locationName>String</locationName>
      <swVersion>String</swVersion>
      <managedBy>
        <dn>DN</dn>
        <dn>DN</dn>
      </managedBy>
      <cn:AsFunction id="8">
        <userLabel>String</userLabel>

```

```

    <VsDataContainer id="8">
      <VsDataContainer id="9">
        <vsDataType>String</vsDataType>
        <vsDataFormatVersion>String</vsDataFormatVersion>
      </VsDataContainer>
    </VsDataContainer>
  </cn:AsFunction>
  <cn:CsMgwFunction id="8">
    <userLabel>String</userLabel>
    <cn:csMgwFunctionIucsLink>
      <dn>DN</dn>
    </cn:csMgwFunctionIucsLink>
    <cn:csMgwFunctionALink>
      <dn>DN</dn>
    </cn:csMgwFunctionALink>
  </cn:CsMgwFunction>
  <cn:SgsnFunction id="8">
    <userLabel>String</userLabel>
    <cn:sgsnId>5</cn:sgsnId>
    <cn:sgsnFunctionExternalGsmCell>
      <dn>DN</dn>
    </cn:sgsnFunctionExternalGsmCell>
    <cn:GbLink id="8">
      <userLabel>String</userLabel>
      <cn:connectedBss>DN</cn:connectedBss>
    </cn:GbLink>
    <cn:IupsLink id="8">
      <userLabel>String</userLabel>
      <cn:connectedBss>DN</cn:connectedBss>
    </cn:IupsLink>
  </cn:SgsnFunction>
  <IRPAgent id="7"/>
  <IRPAgent id="8"/>
  <VsDataContainer id="8">
    <vsDataFormatVersion>String</vsDataFormatVersion>
    <vsData/>
    <VsDataContainer id="8"/>
  </VsDataContainer>
</ManagedElement>
<ManagementNode id="89"/>
<cn:Link_As_Auc id="8">
  <userLabel>String</userLabel>
  <aEnd>DN</aEnd>
  <zEnd>DN</zEnd>
  <linkType>Other Bearer</linkType>
  <protocolName>String</protocolName>
  <protocolVersion>String</protocolVersion>
</cn:Link_As_Auc>
</SubNetwork>
<SubNetwork id="String" modifier="create">
  <userLabel>String</userLabel>
  <userDefinedNetworkType>string</userDefinedNetworkType>
  <setOfMcc>
    <Item>String</Item>
  </setOfMcc>
</SubNetwork>
<SubNetwork id="String" modifier="create">
  <userLabel>String</userLabel>
  <userDefinedNetworkType>string</userDefinedNetworkType>
  <setOfMcc>
    <Item>String</Item>
  </setOfMcc>
</SubNetwork>

```

```
</SubNetwork>
</SubNetwork>
```

## Vendor Supplied Managed Object Subclassing Example

### Basic XSD Development

The XSD definitions for each non-abstract Managed Object Class is composed of the following four subsections:

1. Attribute Group – This is composed of the Attribute Group of the inherited class (if not Top) followed by each new attribute (if any) for this class. Notice that the type for each attribute is specified. Note that an Attribute Group definition is also needed for each abstract class.
2. Containment Group – This is composed of the Attribute Group of the inherited class (if not Top) followed by each new containment (if any) for this class. Each class defines its own unique OptionallyContainedNrmClass containment to allow vendor-specific objects to be contained underneath any object. Note that a Containment Group definition is also needed for each abstract class (normally without the OptionallyContainedNrmClass containment, which would define a vendor-specified class that can be contained underneath any subclass of the abstract class).
3. Class Definition – This defines the containment relationship for this object (if any) and uses the Attribute Group and Containment Group. There are special containment relationships for base object subclasses.
4. Contained Class Definition – This defines the OptionallyContainedNrmClass containment.

### vendor.xsd

In this example, the MscServerFunction object is subclassed and named newMscServerFunction. Two new attributes are added: Administrative State and Operational State.

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
Sample vendor inclusion of Administrative State and Operational State in subclass of MscServerFunction
-->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:xn="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"
xmlns:cn="http://www.3gpp.org/ftp/specs/archive/32_series/32.635#coreNrm"
xmlns:sm="http://www.3gpp.org/ftp/specs/archive/32_series/32.675#stateManagementIRP"
xmlns:vn=" vendor.xsd"
targetNamespace=" vendor.xsd"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.675#stateManagementIRP"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.635#coreNrm"/>
  <group name="newMscServerFunctionAttributes">
    <sequence>
      <group ref="cn:MscServerFunctionAttributes"/>
      <element name="administrativeState" type="sm:administrativeStateType" minOccurs="0" maxOccurs="1"/>
      <element name="operationalState" type="sm:operationalStateType" minOccurs="0" maxOccurs="1"/>
    </sequence>
  </group>
  <group name="newMscServerFunctionContainment">
    <choice>
      <group ref="cn:MscServerFunctionContainment"/>
      <element ref="vn:newMscServerFunctionOptionallyContainedNrmClass"/>
    </choice>
  </group>
</schema>
```

```

    </choice>
  </group>
  <element name="newMscServerFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <group ref="vn:newMscServerFunctionAttributes"/>
            <group ref="vn:newMscServerFunctionContainment" minOccurs="0" maxOccurs="unbounded"/>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="newMscServerFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
</schema>

```

## Sample XML Configuration File

Notice that the object has all of the capabilities of MscServerFunction (and ManagedFunction) without redefining the attributes and containment.

```

<?xml version="1.0" encoding="UTF-8"?>
<xn:ManagedElement xmlns="vendor.xsd"
xmlns:xn="http://www.3gpp.org/ftp/specs/archive/32_series/32.625#genericNrm"
xmlns:cn="http://www.3gpp.org/ftp/specs/archive/32_series/32.635#coreNrm"
xmlns:sm="http://www.3gpp.org/ftp/specs/archive/32_series/32.675#stateManagementIRP"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
id="String" modifier="create">
  <xn:managedElementType>
    <xn:Item>newMscServer</xn:Item>
  </xn:managedElementType>
  <xn:userLabel>String</xn:userLabel>
  <xn:vendorName>String</xn:vendorName>
  <xn:userDefinedState>String</xn:userDefinedState>
  <xn:locationName>String</xn:locationName>
  <xn:swVersion>String</xn:swVersion>
  <xn:managedBy>
    <xn:dn>DN</xn:dn>
  </xn:managedBy>
  <xn:IRPAgent id="String" modifier="create">
    <xn:systemDN>DN</xn:systemDN>
  </xn:IRPAgent>
  <newMscServerFunction id="String" modifier="create">
    <xn:userLabel>String</xn:userLabel>
    <cn:mccList>
      <cn:Item>100</cn:Item>
      <cn:Item>101</cn:Item>
    </cn:mccList>
    <cn:mncList>
      <cn:Item>102</cn:Item>
    </cn:mncList>
    <cn:lacList>
      <cn:Item>103</cn:Item>
    </cn:lacList>
    <cn:sacList>
      <cn:Item>104</cn:Item>
    </cn:sacList>
    <cn:gcaList>
      <cn:Item>105</cn:Item>
    </cn:gcaList>
  </newMscServerFunction>

```

```

</cn:gcaList>
<cn:mscId>106</cn:mscId>
<cn:mscServerFunctionGsmCell>
  <xn:dn>DN</xn:dn>
</cn:mscServerFunctionGsmCell>
<cn:mscServerFunctionExternalGsmCell>
  <xn:dn>DN</xn:dn>
</cn:mscServerFunctionExternalGsmCell>
<cn:mscServerFunctionCsMgwFunction>
  <xn:dn>DN</xn:dn>
</cn:mscServerFunctionCsMgwFunction>
<administrativeState>unlocked</administrativeState>
<operationalState>enabled</operationalState>
<cn:ALink id="String" modifier="create">
  <xn:userLabel>String</xn:userLabel>
  <cn:connectedBss>DN</cn:connectedBss>
  <xn:VsDataContainer id="String" modifier="create"/>
</cn:ALink>
<cn:IucsLink id="String" modifier="create">
  <xn:userLabel>String</xn:userLabel>
  <cn:connectedRnc>DN</cn:connectedRnc>
  <cn:connectedBss>DN</cn:connectedBss>
  <xn:VsDataContainer id="String" modifier="create"/>
</cn:IucsLink>
<xn:VsDataContainer id="String" modifier="create"/>
</newMscServerFunction>
</xn:ManagedElement>

```