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**PacketCable™**

## **RST UE Provisioning Specification**

**PKT-SP-RST-UE-PROV-I01-080905**

**ISSUED**

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## Document Status Sheet

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- Work in Progress**    An incomplete document, designed to guide discussion and generate feedback that may include several alternative requirements for consideration.
  
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**Superseded****1 SCOPE****by a later version of this document****1.1 Introduction and Purpose**

The PacketCable architecture provides a generic Provisioning Framework for UEs, but requires PacketCable application efforts, such as Residential SIP Telephony application (RST) to specify application-specific requirements and data models. This document specifies how the PacketCable UE Provisioning Framework can be used to configure and manage the particular kind of the UEs supporting the PacketCable Residential SIP Telephony (RST) application - PacketCable RST UEs. The document also specifies the data model and the requirements for the RST UEs.

Within the context of this document, any reference to PacketCable is assumed to be PacketCable 2.0, unless stated otherwise.

**1.2 Document Overview**

The document is structured as follows:

- Section 2 - References
- Section 3 - Terms and Definitions
- Section 4 - Abbreviations
- Section 5 - Informative section providing a general overview of RST UE Provisioning
- Section 6 - Normative section providing the RST UE Provisioning Requirements
- Annex A - UE-RST Management Requirement
- Annex B - UE-RST-DEV Management Requirements
- Annex C - UE-RST-ATI Management Requirements
- Annex D - CODEC Enumeration
- Annex E - RST UE Management Events

**1.3 Requirements**

Throughout this document, the words that are used to define the significance of particular requirements are capitalized. These words are:

"MUST"	This word means that the item is an absolute requirement of this specification.
"MUST NOT"	This phrase means that the item is an absolute prohibition of this specification.
"SHOULD"	This word means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.

"SHOULD NOT" This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.

"MAY" This word means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

## 2 REFERENCES

### 2.1 Normative References

In order to claim compliance with this specification, it is necessary to conform to the following standards and other works as indicated, in addition to the other requirements of this specification. Notwithstanding, intellectual property rights may be required to use or implement such normative references.

[PKT-UE-PROV]	UE Provisioning Framework Specification, PKT-SP-UE-PROV-I01-080905, Cable Television Laboratories, Inc.
[PKT-UE-DATA]	UE Provisioning Data Model Specification, PKT-SP-UE-DATA-I01-080905, September 3, 2008, Cable Television Laboratories, Inc.
[PKT-RSTF]	PacketCable Residential SIP Telephony Feature Specification, PKT-SP-RSTF-I04-080710, July 10, 2008, Cable Television Laboratories, Inc.
[PKT-RST-EDVA]	PacketCable Residential SIP Telephony E-DVA Specification, PKT-SP-RST-E-DVA-I04-080710, July 10, 2008, Cable Television Laboratories, Inc.
[RFC 2030]	IETF RFC 2030, Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI, October 1996.

### 2.2 Informative References

This specification uses the following informative references.

[PKT-ARCH-TR]	PacketCable Architecture Framework Technical Report, PKT-TR-ARCH-FRM-V05-080425, April 25, 2008, Cable Television Laboratories, Inc.
[PKT-CODEC-MEDIA]	PacketCable Codec-Media Specification, PKT-SP-CODEC-MEDIA-I05-080710, July 10, 2008, Cable Television Laboratories, Inc.
[PKT 24.229]	PacketCable SIP and SDP Stage 3 Specification 3GPP TS 24.229, PKT-SP-24.229-I04-080425, April 25, 2008, Cable Television Laboratories, Inc.
[STD0017]	Management Information Base for Network Management of TCP/IP-based internets: MIB-II, K. McCloghrie, M. Rose, IETF, March, 1991.

### 2.3 Reference Acquisition

- Cable Television Laboratories, Inc., 858 Coal Creek Circle, Louisville, CO 80027; Phone +1-303-661-9100; Fax +1-303-661-9199; <http://www.cablelabs.com>
- Internet Engineering Task Force (IETF) Secretariat, 46000 Center Oak Plaza, Sterling, VA 20166, Phone +1-571-434-3500, Fax +1-571-434-3535, <http://www.ietf.org>

### 3 TERMS AND DEFINITIONS

This specification uses the following terms:

<b>Configuration</b>	Configuration is the process of defining and propagating data to network elements for providing services.
<b>Description Framework</b>	A specification for how to describe the management syntax and semantics for a particular device type.
<b>Dynamic node</b>	A node is dynamic if the DDF property Scope is set to Dynamic, or if the Scope property is unspecified.
<b>IM Public Identifier</b>	IMS SIP User Public Identifier, which is publically available and used for identifying a particular instance of a SIP User in SIP Signaling.
<b>IM Private Identifier</b>	IMS SIP User Private Identifier, which identifies a SIP User within the SIP Core. It's often used to identify a User's subscription within the SIP Core.
<b>Interior node</b>	A node that may have child nodes, but cannot store any value. The Format property of an interior node is <code>node</code> .
<b>Leaf node</b>	A node that can store a value, but cannot have child nodes. The Format property of a leaf node is <code>not node</code> .
<b>Management</b>	Management refers to the protocols, methodologies and interfaces that enable oversight services in a Service Provider Network.
<b>Management client</b>	A software component in a managed device that correctly interprets OMA DM commands, executes appropriate actions in the device and sends back relevant responses to the issuing management server.
<b>Management Information Base</b>	The description of the data items used by the Network Management for management and configuration of the PacketCable compliant E-UE. Such description is done based on the formal meta-language SMI defined by the corresponding IETF standards.
<b>Management Object</b>	A management object is a subtree of the management tree which is intended to be a (possibly singleton) collection of nodes which are related in some way. For example, the <code>./DevInfo</code> nodes form a management object. A simple management object may consist of one single node.
<b>Management Object Identifier</b>	The Type property describing the kind of data stored as the management object's value.
<b>Management server</b>	A network based entity that issues OMA DM commands to devices and correctly interprets responses sent from the devices.
<b>Management tree</b>	The mechanism by which the management client interacts with the device, e.g., by storing and retrieving values from it and by manipulating the properties of it, for example the access control lists.
<b>Node</b>	A node is a single element in a management tree. There can be two kinds of nodes in a management tree: interior nodes and leaf nodes. The Format property of a node provides information about whether a node is a leaf or an interior node.

---

<b>Permanent node</b>	A node is permanent if the DDF property Scope is set to Permanent. If a node is not permanent, it is dynamic. A permanent node can never be deleted.
<b>Private User Identity</b>	A logical identity for purposes of authentication and authorization of a User.
<b>Provisioning</b>	Provisioning refers to the processes involved in the initialization of user attributes and resources to provide services to a User. This involves protocols, methodologies, and interfaces to network elements such as: Order Entry and Workflow Systems that carry out business processes, Operational Support Elements that handle network resources, Application Servers that offer services, and Use Equipment that offer services.
<b>Public User Identity</b>	A logical identity for purposes of communication with a User.
<b>Residential SIP Telephony</b>	The Telephony functionality delivered by means of the SIP signaling and defined by the set of telephony standards.
<b>RST Delivery Agent</b>	Residential SIP Telephony Delivery Agent is the entity that transforms the acoustic signals (e.g., tone, voice) to the corresponding signals of a different physical nature (e.g., WiFi radio signal, telephone analog signal, etc.). It's possible that the same Agent is also providing the transformation in the opposite direction.
<b>Subscriber</b>	An entity (composed of one or more users) that is engaged in a Subscription with a service provider.
<b>Subscription</b>	A contract for service(s) between a user and a service provider.
<b>User (end-user)</b>	A person (physical or logical) who, in the context of this document, uses a defined service or invokes a feature on a UE.

## 4 ABBREVIATIONS AND ACRONYMS

This specification uses the following abbreviations:

<b>ATI</b>	Analog Telephony Interface
<b>CPE</b>	Customer Premises Equipment: the devices which are used to deliver the telephony services to the subscriber (e.g., telephone)
<b>DDF</b>	Device Description Framework
<b>E-DVA</b>	Embedded Digital Voice Adapter
<b>HFC</b>	Hybrid Fiber/Coaxial. An HFC system is a broadband bi-directional shared media transmission system using fiber trunks between the headend and the fiber nodes, and coaxial distribution from the fiber nodes to the customer locations.
<b>IMPI</b>	IM Private Identifier
<b>IMPU</b>	IM Public Identifier
<b>MIB</b>	Management Information Base
<b>MO</b>	Management Object
<b>OMA</b>	Open Mobile Alliance
<b>RDA</b>	RST Delivery Agent
<b>RDI</b>	RST Delivery Interface
<b>RFC</b>	Request for Comments
<b>RST</b>	Residential SIP Telephony
<b>RST UE</b>	RST User Equipment
<b>SNMP</b>	Simple Network Management Protocol
<b>UE</b>	User Equipment

## 5 OVERVIEW

PacketCable 2.0 is a CableLabs specification effort designed to support the convergence of voice, video, data, and mobility technologies. As part of these efforts, PacketCable defines the base architecture and specifies the data elements required to configure and manage UEs, associated users, and applications, using the PacketCable 2.0 UE Provisioning Framework. For more information about PacketCable 2.0, please refer to the PacketCable 2.0 Architecture Framework Technical Report [PKT-ARCH-TR]. For more information on the PacketCable 2.0 UE Provisioning Framework, please refer to [PKT-UE-PROV]. The definitions for various data elements and relationships between the data elements are specified in the UE Provisioning Framework Specification [PKT-UE-DATA].

PacketCable also specifies various applications built upon the PacketCable architecture. One such application is Residential SIP Telephony [PKT-RSTF]. The present document describes the configuration and management requirements applicable to the User Equipment (UE) supporting the RST application. Specifically, this document covers the following areas:

- Provisioning, Configuration, and Management requirements for RST UEs
- The RST UE Data Model and requirements for the data elements comprising the Data Model

### 5.1 Residential SIP Telephony

The PacketCable RST Feature Specification, [PKT-RSTF], documents an implementation of common residential telephony features in a PacketCable network, including, but not limited to: caller ID, call forwarding, hold, transfer, three-way calling, emergency calling, and operator service. For more information, please refer to [PKT-RSTF].

### 5.2 UE Provisioning Framework

The PacketCable UE Provisioning Framework Specification, [PKT-UE-PROV], together with the UE Provisioning Data Models Specification, [PKT-UE-DATA], documents interfaces, protocols, and data models to support the configuration and management of UEs in a PacketCable network. Those documents require PacketCable application specifications, such as RST, to utilize these interfaces and extend the data models as required to support the specified features.

### 5.3 PacketCable RST UE

The PacketCable RST UE is an IP Network entity defined in [PKT-UE-PROV] that supports the PacketCable RST application. RST UEs require the RST-specific data to be configured and also require an additional functionality specified in this document. This specification defines the requirements for the RST UE regardless of the particular physical nature of the entity that implements the RST UE functionality, including but not limited to, a device or a stand-alone software application hosted by a user's PC.

#### 5.3.1 RST UE Conceptual Diagram

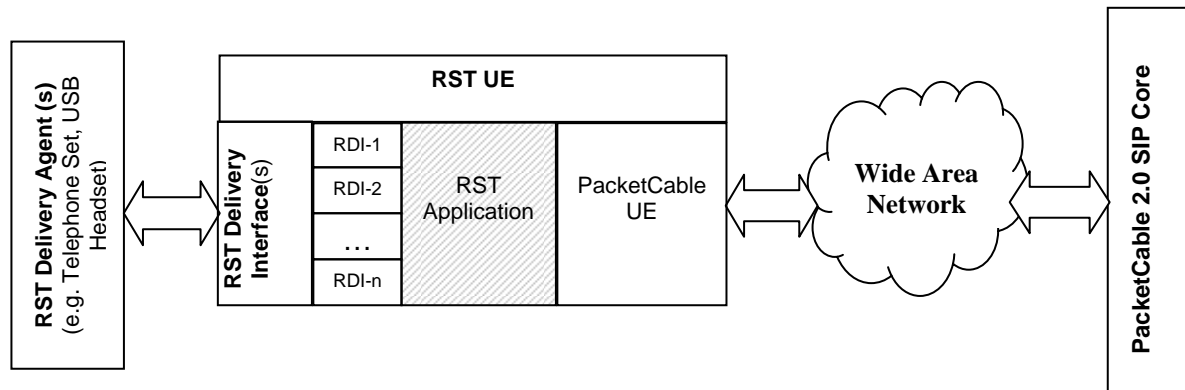
There are three major groups of RST-related requirements that together define an RST UE:

- Requirements related to SIP and Telephony Call Features. This group of requirements is presented in [PKT-RSTF].
- Requirements related to the RST CODECs as defined in [PKT-CODEC-MEDIA].

- Certain core RST requirements defined in [PKT-RST-EDVA], for example: DTMF Signaling, Message Waiting Indicator, Announcements, etc. For more details on this group of the requirements, please refer to Section 5.4.

Particular RST UE types may contain requirements related to telephony hardware (e.g., analog line, analog transmission, local powering, and loss plan), and those related to HFC components. Those types of requirements are defined in [PKT-RST-EDVA].

Figure 1 depicts the conceptual diagram of an RST UE. This specification describes the block with the background pattern on this figure.



**Figure 1 - RST UE Conceptual Block Diagram**

### 5.3.2 RST UE Service Delivery

As depicted by Figure 1, to deliver the RST Services (e.g., voice, tones, fax, etc.) to a subscriber, a particular technical means should be used. Such means can be abstracted as an "RST Delivery Agent" (RDA). RDA is an entity that transforms the acoustic signal received from an end-user (e.g., tone, voice) to the corresponding signal of a different physical nature (e.g., WiFi radio signal, telephone analog signal, etc.) and also has the means to pass the transformed signal on to the RST UE. Usually, an RDA also provides the conversion of the signal in the opposite direction (i.e., from the particular signal originating in the RST UE to the acoustic signal delivered to an end-user). The "RST Delivery Interface" (RDI) represents an abstraction of the connectivity means (usually described by a specific set of standards) to deliver the transformed signal from RDA to the RST UE itself (and, potentially, back) as shown in Figure 1. An RST UE may have multiple RDIs depending on the number and types the RDAs it is capable of supporting.

For each particular instance of the RST UE design and depending on the particular RST UE implementation, RDA and RDI may be implemented differently. Examples of different types of RDA-s and RDI-s are as follows:

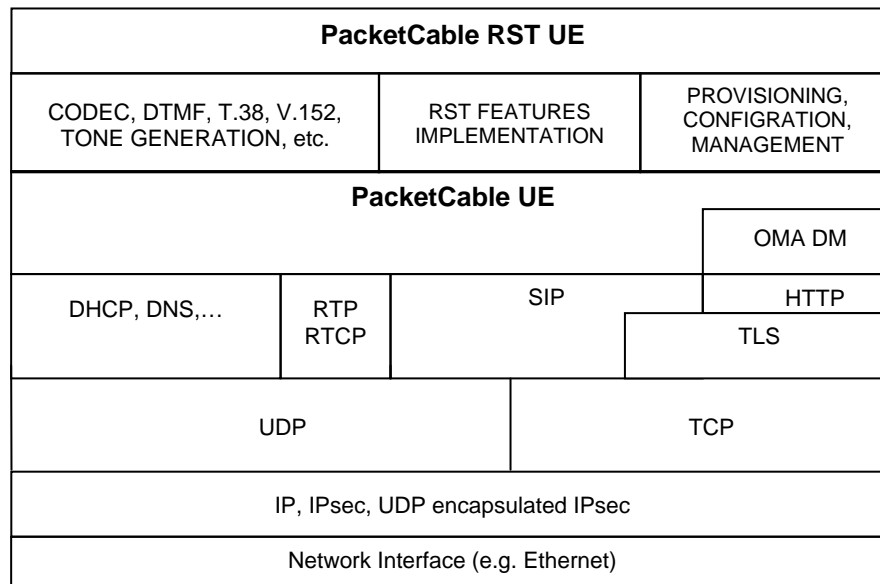
- RDA is a regular analog telephone set, and RDI is an RJ-11 analog interface, which is termed Analog Telephone Interface (ATI) in this specification.
- RDA is a USB headset, and RDI is a USB Port on a PC hosting the RST UE software application.
- RDA is a WiFi phone, and RDI is the WiFi interface of the RST UE, which may be implemented as a standalone device.

- RDA can be a data file carrying the standard voice announcement for an automated voice system implemented as the RST UE software hosted by a PC, with the RDI represented as a programmatic API delivering the voice data to the RST UE software.

PacketCable currently defines the type of the RST UE represented in the first bullet above. Other examples may be introduced in the future.

### 5.3.3 RST UE Protocol Stack

[PKT-UE-PROV] depicts a representative functional diagram of the RST UE Protocol Stack. It shows the protocol layers of the RST UE, which are required for RST functionality implementation. As shown, the RST UE is essentially instantiating a PacketCable UE with the RST related protocol stacks on top of it. While PacketCable UE protocol stack [PKT-UE-PROV] is supporting the general network functionality (network transport for signaling and voice data, for OMA based provisioning, configuration, and management, etc.), the RST UE Protocol stack is implementing the RST specific data manipulation requirements (e.g., CODEC transformation, T.38 implementation, etc.), along with the RST Call Features requirements, and the RST UE management requirements.



*Figure 2 - RST UE Protocol Stack*

## 5.4 RST UE Data Model and the RST Functionality

As mentioned in Section 5.3.1, an RST UE implements the functionality defined in [PKT-RSTF], and a subset of functionality defined in [PKT-RST-EDVA]. This section describes the RST functionality, which is relevant for an RST UE, its Data Model, and Data Elements. The RST UE Data Model and its Data Elements have to reflect the following RST Application functionality:

- Support for all RST Features requirements as defined in [PKT-RSTF].
- Support for the RST UE relevant requirements as defined in [PKT-CODEC-MEDIA].
- Support for DTMF tones generation, telephone-events, signaling, and DTMF Relay as defined in [PKT-RST-EDVA] (section titled "DTMF Signaling").

- Support for Ringing and Cadence requirements as defined in [PKT-RST-EDVA] (section titled "Ringing Delay").
- Support for the Message Waiting Indicator as described in [PKT-RST-EDVA] (section titled "Message Waiting Indicator").
- Support for the Loopback Test Capability as defined in [PKT-RST-EDVA] (section titled "Loopback Test Capability").
- Support for Announcements as defined in [PKT-RST-EDVA] (section titled "Announcements").

## 5.5 Data Model of the RST UE with Analog Telephony Interface

The RST UE, supporting Analog Telephony Interface (ATI), will support the RST functionality as defined for RST UE. In addition, the requirements of the Analog Telephony Interface as defined in [PKT-RST-EDVA] are also applicable (e.g., analog line, analog transmission, local powering, loss plan).

## 6 RST UE PROVISIONING ARCHITECTURE AND REQUIREMENTS

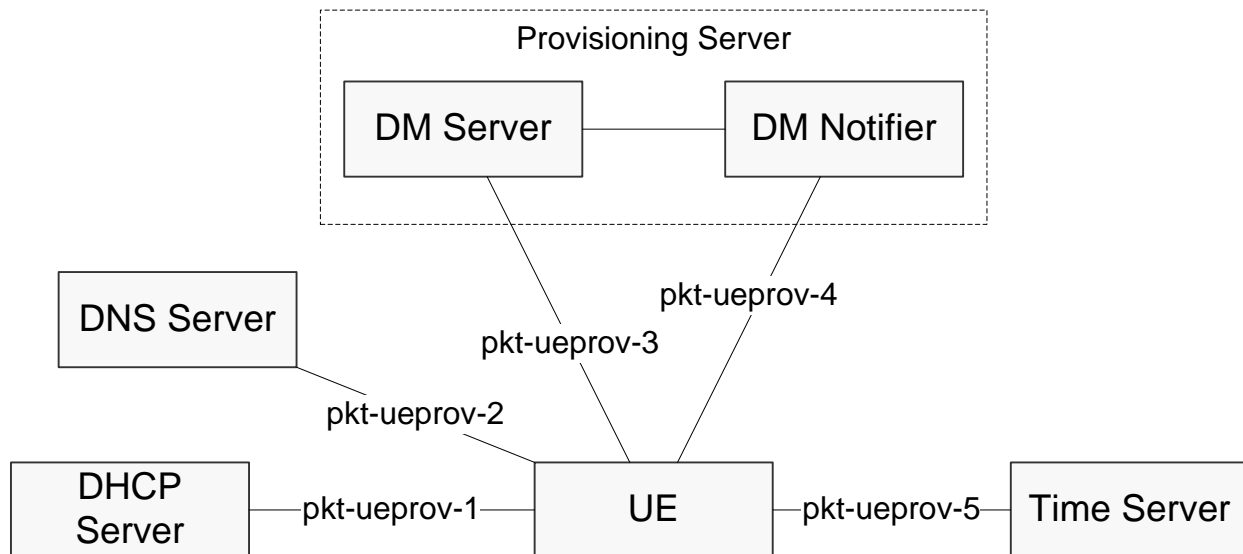
This section presents the normative requirements for RST UE Provisioning, using the PacketCable UE Provisioning Framework. It includes references to the framework and any necessary enhancements to support the RST application. For more information on PacketCable E-UE Provisioning Framework, please refer to [PKT-UE-PROV].

The following sub-sections describe the particular requirements for the RST UE Provisioning along with the requirements to the Provisioning Framework elements pertaining to the RST UE.

### 6.1 RST UE Provisioning Framework

RST UE Provisioning is based on the UE Provisioning specification as specified in the [PKT-UE-PROV] specification. This section describes additional requirements specific for RST UE Provisioning.

Figure 3 represents the network components and interfaces that form the RST UE Provisioning Framework, the basis for RST UE provisioning.



*Figure 3 - RST UE Provisioning Components and Interfaces*

General description of the RST UE Provisioning Components and Interfaces are provided in [PKT-UE-PROV] specification.

### 6.2 RST UE Provisioning Components

This section describes the requirements to the components of the RST UE Provisioning Framework (as depicted in Figure 3).

### 6.2.1 RST UE Component

RST UE is described in Section 5.3 of this document. The RST UE MUST be compliant with the UE requirements documented in the [PKT-UE-PROV] specification, playing the role of the client in the UE Provisioning Framework.

### 6.2.2 Other Network Components

The following network components MUST comply with the requirements specified in [PKT-UE-PROV]:

- DHCP Server
- DNS Server
- Provisioning Server
- Time Server

In addition, the Provisioning Server MUST support the Data Models specified in this document for RST UEs. The Provisioning Server MUST also support any RST UE-specific data elements specified in this document.

Wherever required by the RST Features specified in [PKT-RSTF] (e.g., Customer-Originated Call Trace Feature), the RST UE MUST retrieve time of the day from the Time Server as specified in [RFC 2030].

### 6.2.3 RST UE Bootstrap

In line with [PKT-UE-PROV], the RST UE Bootstrap requirements related to the Bootstrapping mechanism are currently out of the scope of this document. When the requirements for UE Bootstrapping mechanism are defined, the RST UE will need to comply with these and (potentially) additional requirements of the present document. At the same time, the RST UE MUST comply with the requirements related to the Bootstrapping data elements detailed in [PKT-UE-PROV].

### 6.2.4 RST UE Provisioning Flows

The RST UE MUST adhere to all requirements described in [PKT-UE-PROV] for the Provisioning Flows and network protocols used for their implementation. The present document does not enhance the UE requirements related to provisioning flows, configuration, and management, beyond the ones specified in [PKT-UE-PROV].

## 6.3 RST UE Provisioning Data Model

The RST UE MUST comply with the RST UE data model requirements specified in Annex A, Annex B, and Annex C.

The RST UE MUST comply with the requirements defined in [PKT-UE-DATA].

### 6.3.1 Service Delivery Interface Data Model

The RST UE RDI, described in Section 5.3.2, requires the corresponding data model for the RST UE. The RDI Data model includes the data elements described in Table 1. The RST UE MUST implement all data elements defined in Table 1 for each RDI used by the RST UE for the RST service delivery.

**Table 1 - RDI Data Model**

RDI Data Element Name	RDI Data Element Data Type	Read-Write Access	RDI Data Element Description
rdiIndex	Unisgned32	RO	Represents the enumeration value of the RDI corresponding to the particular service delivery path (e.g., RJ-11 line).
rdiIfIndex	Unisgned32	RO	Represents the value of the 'ifIndex' of the 'ifTable' (defined in [STD0017]) corresponding to the particular service delivery path (e.g., value of the ifIndex that corresponds to the particular USB port of the PC through which the USB Headset is connected to a PC). If the particular RDI does not have its ifIndex, then this data element MUST contain a value of '0'.
rdiType	Interface Type Enumeration	RO	Interface Types of RDI should be enumerated based on the PacketCable devices/projects being introduced and developed.
rdiDescription	DisplayString	RO	The textual string that contains information about the interface. The textual string should be defined for the PacketCable devices/projects and should correspond to the 'rdiType' data element.
rdiAdminStatus	'up(1)', 'down(2)', 'testing(3)'	RW	Indicates the desired state of the interface as requested by the Management Operations (for the enumeration types - refer to the description of the 'ifAdminStatus' MIB Object in [STD0017]).
rdiOperStatus	'up(1)', 'down(2)', 'testing(3)', 'unknown(4)', 'dormant(5)', 'notPresent(6)'	RO	Indicates the current operational state of the RDI (for the enumeration types - refer to the description of the 'ifOperStatus' MIB Object in [STD0017]).
rdiActivityStatus	'notActive(1)', 'active(2)'	RO	Indicates the RST Activities potentially going on for the particular RDI:  'notActive(1)': none of the RST activities (services) going on for the RDI. If the value of the 'rdiOperStatus' is not 'up(1)' then 'rdiActivityStatus' must remain in this state.  'active(2)': one or more RST services are active on the RDI. The examples of the RST services are: tones generated by the RDI in response to SIP requests, loopback tests, etc. The particular definition of all RST activities should be specified in the corresponding document for the particular RST UE. 'rdiActivityStatus' can be in this state if and only if the value of the 'rdiOperStatus' is 'up(1)'.

### 6.3.2 Mapping of Users to RDI

As described in Section 5.3, the RST services (e.g., dial tone and voice encoding/decoding, fax detection, etc.) are delivered to the RST UE from the particular RDA via the corresponding RDI. To allow an RST UE to determine the RDIs that are affected when it receives an inbound RST feature request for a specific IMPU, or the IMPU to use when the end-user invokes RST features from a particular RST UE RDI, the Public Identity for each SIP User has to

be mapped to the particular RDI. Such mapping also allows an Operator to enable/disable the delivery of the RST Services for each RDI individually, in addition to (or instead of) the service delivery control, based on the IMPU.

Configuration of the IMPUs on RST UEs is accomplished via the UE-USR MO IMPU object (as described in [PKT-UE-DATA]). If an RST UE is configured with the RST features, additional information is required to specify the association of an IMPU with one or more RDIs. The indicated additional information is provided using specific keyword-value pairs within the UE-USR MO attribute AdditionalInfo of the IMPU object. The RST UE MUST use the following BNF for keyword-value pairs configured within the UE-USR MO attribute AdditionalInfo of the IMPU object to allow the IMPU to RDI mapping:

```

IMPU-mapping = in-keyword-value ";" out-keyword-value |
               out-keyword-value ";" in-keyword-value
in-keyword-value = "RDI#" RDI-list
out-keyword-value = "ORDI#" RDI-list
RDI-list = RDI-Element ["," RDI-List]
RDI-Element = rdiIndex
rdiIndex = 1*DIGIT
-- rdiIndex represents the value of 'rdiIndex' data elements
-- corresponding to the particular RDI as defined in Section 6.3.1.

```

The keyword IRDI (shortened form representing "Inbound RDI-s") indicates that an inbound request for the IMPU (for which the additional information is being provided) is to apply to one or more of the RDI-s listed in the associated value. The keyword ORDI (shortened form representing "Outbound RDI-s") indicates that when any of the RDI-s listed in the value are used to initiate RST features (e.g., dialog-initiating requests) then the applicable IMPU (for which the additional information is being provided) is to be used.

As an example, consider an RST UE associated with two IMPUs sip:user1@example.com and sip:user2@example.com, with the following (partial) configuration:

- Value of the UE-USR MO attribute AdditionalInfo of the IMPU object for sip:user 1@example.com is IRDI#1,2;ORDI#1
- Value of the UE-USR MO attribute AdditionalInfo of the IMPU object for sip:user 2@example.com is IRDI#1;ORDI#2

The RST UE interprets this as follows:

- Any inbound message for the IMPU sip:user1@example.com will apply to RDI-s 1 and 2.
- Any inbound message for the IMPU sip:user2@example.com will apply to RDI 1.
- Any outbound requests from RDI 1 will use the IMPU sip:user1@example.com.
- Any outbound requests from RDI 2 will use the IMPU sip:user2@example.com.

If one or more RDI-s on an RST UE are associated with RST features, the RST UE MUST be configured with one or more IMPUs using the keyword-value pairs as indicated in this section. If an RDI is not associated with any IMPUs, then the RST UE MUST NOT enable RST features for that RDI. If an RDI is associated with one or more IMPUs, then the RST UE MUST support the enabled RST features on that RDI.

If there are multiple outbound IMPUs indicated for an RDI, then the RST UE MUST consider the first occurrence of the UE-USR MO IMPU object as the outbound IMPU and report the additional IMPUs as part of the warnings pertaining to RST UE configuration.

As an example, consider an RST UE associated with two IMPUs, sip:user1@example.com and sip:user2@example.com, with the following (partial) configuration:

- Value of the UE-USR MO attribute AdditionalInfo of the IMPU object for sip:user1@example.com is IRDI#1,2;ORDI#1
- Value of the UE-USR MO attribute AdditionalInfo of the IMPU object for sip:user2@example.com is IRDI#2;ORDI#1

Assuming that sip:user1@example.com has a first occurrence of the UE-USR MO IMPU object, the RSU-UE interprets this as follows:

- Any inbound message for the IMPU sip:user1@example.com will apply to RDI-s 1 and 2.
- Any inbound message for the IMPU sip:user2@example.com will apply to RDI 2.
- Any outbound requests from RDI 1 will use the IMPU sip:user1@example.com.

## 6.4 Provisioning for RST UE with ATI

The RST UE with ATI MUST implement the data model defined in 0.

## 6.5 RST UE Client Configuration Profile

The RST UE MUST support configuration of all data elements during and after provisioning using the configuration mechanism described in [PKT-UE-PROV], and comply with the data model in [PKT-UE-DATA]. In addition the RST UE MUST support the configuration of data elements described in Annex A and Annex B.

To provide support for RST features, RST UE MUST register every active User provided via configuration, if associated with the RST application. Refer to [PKT 24.229] for more information about registration. For more information about User configuration and activation, please refer to [PKT-UE-DATA].

Additionally, for each registered User, the RST UE MUST apply RST application settings provided by means of configuration or default values.

## 6.6 RST UE Client Management Profile

The RST UE MUST support the management of all data elements during and post-provisioning using the management mechanisms described in [PKT-UE-PROV] and compliant with the data model in [PKT-UE-DATA]. Along with that, the RST UE MUST support the configuration of data elements described in the present document.

## 6.7 RST UE Security Profile

The RST UE MUST comply with all security requirements defined in [PKT-UE-PROV].

## 6.8 RST UE Additional Features

### 6.8.1 Capabilities Reporting

An RST UE MUST support capabilities reporting as described in [PKT-UE-PROV]. In addition, the RST UE MUST report the RST related capabilities presented in the Table 2.

**Table 2 - RST UE Capabilities**

<b>Capability Name</b>	<b>Capability Tag</b>
Supported CODECs as defined in [PKT-RST-EDVA]. The CODEC enumeration is defined in Annex D.	5.27
Total Number Of RDI-s	5.28
Number Of RDI-s of ATI type	5.29
Emergency Service Support as defined in [PKT-RSTF].	5.30
Silence Suppression Support as defined in [PKT-RST-EDVA]	5.31
Echo Cancellation Support as defined in [PKT-RST-EDVA]	5.32
T38 Version Support as defined in [PKT-RST-EDVA]	5.33
T38 Error Correction Support as defined in [PKT-RST-EDVA]	5.34
V.152 Support as defined in [PKT-RST-EDVA]	5.35

### 6.8.2 Incremental Provisioning

The RST UE MUST support post-initialization incremental provisioning, such as activation and de-activation of the applications and features using the Management mechanisms defined in [PKT-UE-PROV].

### 6.8.3 Event Reporting

The RST UE MUST support all requirements for the Management Event Reporting defined in the [PKT-UE-PROV]. In addition, there are number of RST UE-specific scenarios requiring the particular event reporting.

#### 6.8.3.1 RDI State Changes Reporting Events

The RST UE MUST report the "RDI Activity Status Change" Event (defined in Annex E) when the value of the "rdiActivityStatus" data element changes its value (per Table 2). The RST UE SHOULD refrain from RST UE Resetting or Initializing operations that may interrupt the service delivery on the RDIs.

## Annex A UE-RST Management Requirements (Normative)

### A.1 UE-RST Object Model Overview

This section defines the management model of the UE RST Features. In particular, this section defines the mapping of Client RST features to User profiles and Network features to provisioned operators in the UE.

Unless specified, the UE MUST NOT persist operator configuration data using the data models herein described. Other documents that reference this object model might change the persistent requirement of the device.

### A.2 UE-RST Object Model Definitions

#### A.2.1 UE-RST Object Model Data Types

This section defines data types used in the UE-RST-ATI object model. Data Types not defined for the UE-RST-ATI object model are defined in [PKT-UE-DATA].

**Table 3 - UE-RST-ATI Data Types**

Attribute Name	Type	Permitted Values
PktrSTTCTONEANNC	hexBinary	
PktrSTTCFeatID	Enum	other(1) digitMap(2) basicCall(3) announcement(4) statusChange(5) noAnsTimeout(6) callerId(7) callerIdDisplay(8) callerIdBlocking(9) callerIdDelivery(10) callForwarding(11) callWaiting(12) callHold(13) callTransfer(14) threeWayCalling(15) doNotDisturb(16) subscrProgPin(17) msgWaitIndicator(18) autoRecall(19) autoCallback(20) busyLineVerify(21) emergencySvc(22) scf(23) acr(24) solicitorBlocking(25) distinctAlerting(26) speedDialing(27) cot(28)

Attribute Name	Type	Permitted Values
PkctEUETCRSTAppFeatIndexType	unsignedInt	0..63
PkctEUETCRSTAUID	AdminString	

- PkctRSTTCTONEANNC

This data type represents an indication of the announcement. If it is an URI, it is represented as a hex string representing the URI.

- PkctRSTTCFeatID

This data type represents an enumeration of RST features.

- PkctEUETCRSTAppFeatIndexType

This data type is used to indicate references to RST Application Features.

- PkctEUETCRSTAUID

This data type is used to indicate Application Unique Identifier (AUID) as defined by PacketCable. AUIDs are used for the dynamic invocation of RSTfeatures.

A.2.2 UE-RST Object Model Class Diagram

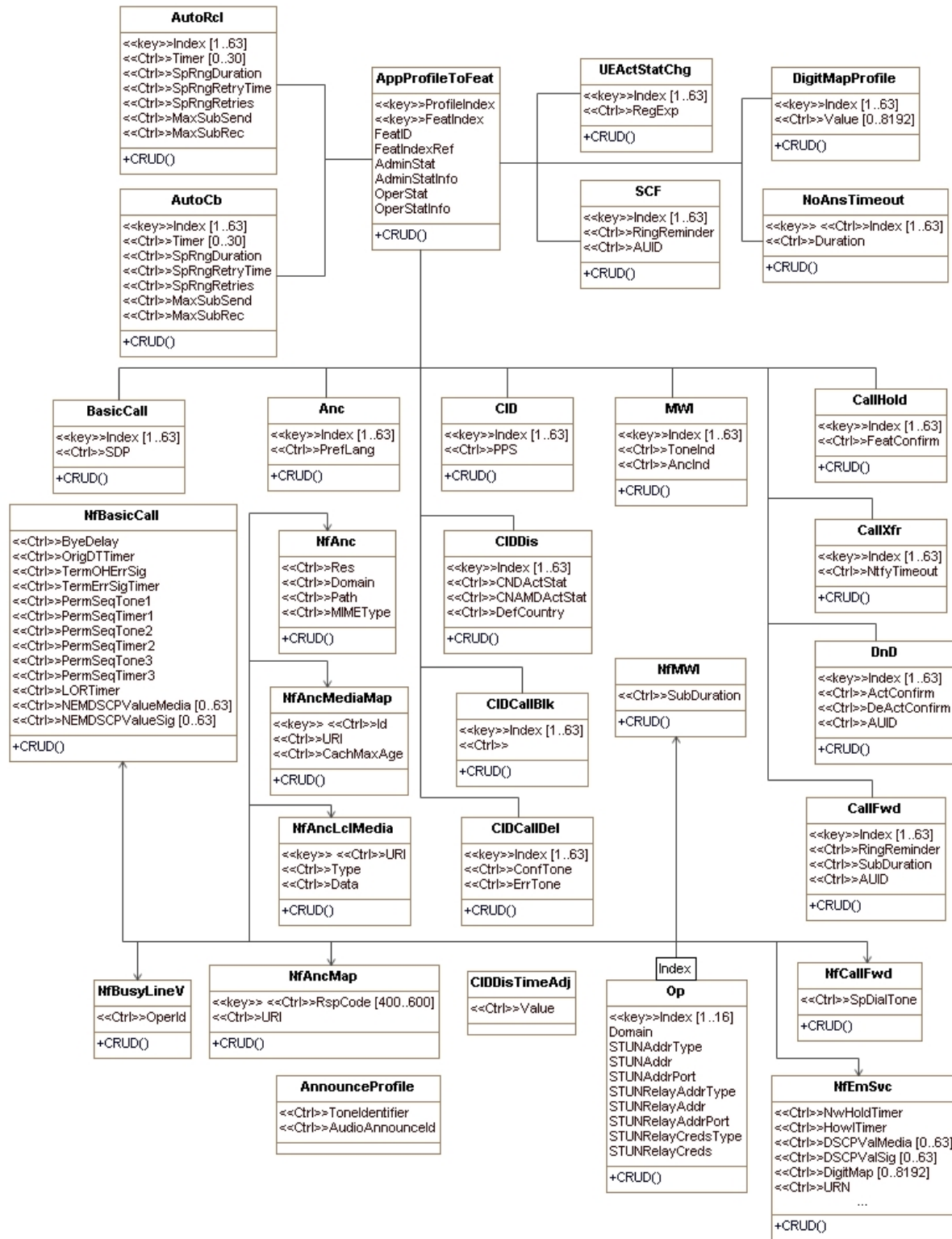


Figure 4 - UE RST Object Model Diagram

### A.2.3 UE-RST Object Model Description

#### A.2.3.1 AppProfileToFeat Object

This object specifies RST profiles that can be associated with Users supporting the RST application.

- Object Operations:

Each instance in this object specifies an RST profile associated with a set of RST features. An instance of this object is not operational until the FeatID and FeatIndexRef are defined. Other attributes takes default values if not initialized at the time of the instance creation. The UE MUST not allow these two attributes to be changed while the instance is operational (AdminStat attribute is 'active').

**Table 4 - AppProfileToFeat Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
ProfileIndex	PktcEUETCUsrAppIndexType	key			
FeatIndex	PktcEUETCRSTAppFeatIndexType	key			
FeatID	PktcRSTTCFeatID	CRUD			
FeatIndexRef	PktcEUETCRSTAppFeatIndexType	CRUD			
AdminStat	PktcEUETCAdminStatus	CRUD			active
AdminStatInfo	PktcEUETCStatusInfo	CRUD			""
OperStat	PktcEUETCOperStatus	R			
OperStatInfo	PktcEUETCStatusInfo	R			""

- ProfileIndex

This key identifies an instance of an RST application profile.

- FeatIndex

This key identifies a specific RST feature instance.

- FeatID

This attribute identifies a specific RST feature.

- FeatIndexRef

This attribute identifies a reference to an RST feature object identified by the attribute FeatID. The value '0' is reserved and is used to either identify a global feature configuration, or when no configuration data is specified for the feature. For example, the value of this attribute is set to '0' for a feature that has no associated additional configuration object(s). Setting the value to '0' in any other cases will result in feature configuration error.

- AdminStat

This attribute contains the administratively desired activation status of the feature within the profile. When set to 'active' the feature is intended to be available to the applications that reference this profile. When set to 'inactive' the feature is not available to the applications that reference this profile.

- AdminStatInfo

This attribute optionally provides more information about the status reported by the attribute AdminStat.

- OperStat

This attribute contains the operational activation status of a feature within a profile. This attribute returns the following values: 'active' When the attribute AdminStat is 'active' and there are no run-time conditions and/or configuration errors that prohibit the feature from being used. 'inactive' When the attribute AdminStat is 'inactive' or, When the attribute AdminStat is 'active' and there are run-time conditions and/or configuration errors that prohibit the feature from being used. 'notPresent' When the application feature is not available or unknown to the UE. 'unknown' Other conditions not covered by the previous values. An example of a run-time condition that can result in a value of 'inactive' is an unsuccessful attempt to bind the resources associated with the feature by an application because the resources are currently bound to another profile. PacketCable applications can specify additional conditions for how an application is considered 'active', 'inactive' or 'notPresent', and corresponding state machine.

- OperStatInfo

This attribute optionally provides more information about the status reported by the attributeOperStat.

### A.2.3.2 *DigitMapProfile Object*

This object provides a Digit Map Profile. A Digit Map Profile may be shared by multiple Users.

- Object Operations:

Each instance in this object provides a digit map profile. There is no restriction on the ability to change values in this row while the row is active. A created row can be set to active only after all corresponding instances of objects in the row have been set to valid values.

**Table 5 - DigitMapProfile Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
Value	hexBinary	CRUD	0..8192		

- Index

This key represents the unique identifier of an instance in this object.

- Value

This attribute specifies the ABNF for the Digit Map.

Reference: PacketCable RST Feature Specification

### A.2.3.3 *BasicCall Object*

This object represents User-based parameters associated with the Basic Call Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Basic Call Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values

**Table 6 - BasicCall Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PkctEUETCRSTAppFeatIndexType	key	1..63		
SDP	AdminString	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- SDP

This attribute specifies the SDP parameters and value.

Reference: PacketCable Residential SIP Telephony Feature Specification

#### **A.2.3.4 NfBasicCall Object**

This object represents Network-based parameters associated with the Basic Call Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a Network Service Provider with a Basic Call Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 7 - NfBasicCall Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
ByeDelay	unsignedInt	CRUD		seconds	
OrigDTTimer	unsignedInt	CRUD		seconds	
TermOHErrSig	PkctRSTTCTONEANNC	CRUD			
TermErrSigTimer	unsignedInt	CRUD			
PermSeqTone1	PkctRSTTCTONEANNC	CRUD			
PermSeqTimer1	unsignedInt	CRUD		seconds	
PermSeqTone2	PkctRSTTCTONEANNC	CRUD			
PermSeqTimer2	unsignedInt	CRUD			
PermSeqTone3	PkctRSTTCTONEANNC	CRUD			
PermSeqTimer3	unsignedInt	CRUD		seconds	
LORTimer	unsignedInt	CRUD		seconds	
NEMDSCPValueMedia	unsignedInt	CRUD	0..63		
NEMDSCPValueSig	unsignedInt	CRUD	0..63		

- ByeDelay

This attribute specifies the Bye Delay in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

- OrigDTTimer

This attribute specifies the Origination Mode Dial Tone Timer in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

- TermOHErrSig

This attribute specifies the Termination Mode Off-Hook error signal.

Reference: PacketCable Residential SIP Telephony Feature Specification

- TermErrSigTimer

This attribute specifies the Termination Mode error signal timer in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

- PermSeqTone1

This attribute specifies the Permanent Sequence tone 1.

Reference: PacketCable Residential SIP Telephony Feature Specification

- PermSeqTimer1

This attribute specifies the Permanent Sequence timer 1 in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

- PermSeqTone2

This attribute specifies the Permanent Sequence tone 2.

Reference: PacketCable Residential SIP Telephony Feature Specification

- PermSeqTimer2

This attribute specifies the Permanent Sequence timer 2 in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

- PermSeqTone3

This attribute specifies the Permanent Sequence tone 3.

Reference: PacketCable Residential SIP Telephony Feature Specification

- PermSeqTimer3

This attribute specifies the Permanent Sequence timer 3 in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

- LORTimer

This attribute specifies the Lockout Reset timer in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

- NEMDSCPValueMedia

This attribute specifies the Non-Emergency DSCP Value for network packets carrying the Media (RTP) information.

Reference: PacketCable Residential SIP Telephony Feature Specification

- NEMDSCPValueSig

This attribute specifies the Non-Emergency DSCP Value for network packets carrying the signaling information.

Reference: PacketCable Residential SIP Telephony Feature Specification

### A.2.3.5 Anc Object

This object represents User-based parameters associated with the Announcement Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with an Announcement Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 8 - Anc Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
PrefLang	AdminString	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- PrefLang

This attribute specifies the preferred language for the UE announcement.

### A.2.3.6 NfAnc Object

This object represents Network-based parameters associated with the Announcement Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a Network Service Provider with an Announcement Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 9 - NfAnc Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Res	AdminString	CRUD			
Domain	AdminString	CRUD			
Path	AdminString	CRUD			
MIMEType	AdminString	CRUD			

- Res

This attribute specifies the Announcement Resource URI for the media server.

- Domain

This attribute specifies the Announcement Domain.

- Path

This attribute specifies the Announcement Path.

- MIMEType

This attribute specifies the Announcement MIME type.

### **A.2.3.7 NfAncMap Object**

This object represents the network-based announcement MAP entries.

- Object Operations:

This object represents the network-based announcement MAP. Each instance in this object represents the Announcement MAP entry URI corresponding to a response code. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 10 - NfAncMap Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
RspCode	unsignedInt	key	400..600		
URI	AdminString	CRUD			

- RspCode

This key specifies the Response code. The following Response codes are valid: 404, 406, 408, 480, 484, 500, 503, 504, 600, 603.

- URI

This attribute specifies the Announcement Map entry. A string identifying the URI for response code.

Reference: PacketCable Residential SIP Telephony Feature Specification

### **A.2.3.8 NfAncMediaMap Object**

This object represents the network-based announcement Media MAP.

- Object Operations:

This object represents the Announcement Media MAP. Each instance in this object represents the Announcement Media MAP entry URI corresponding to an announcement identifier. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 11 - NfAncMediaMap Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Id	AdminString	key			
URI	AdminString	CRUD			

Attribute Name	Type	Access	Type Constraints	Units	Default
CachMaxAge	unsignedInt	CRUD		seconds	

- Id

This key specifies the Announcement Identifier.

- URI

This attribute specifies the Announcement Media Map, which is a string identifying the URI for Announcement Identifier.

Reference: PacketCable Residential SIP Telephony Feature Specification

- CachMaxAge

This attribute specifies the Announcement Media Cache maximum age in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

### A.2.3.9 NfAncLclMedia Object

This object represents the network-based Local Media.

- Object Operations:

Each instance in this object represents the Local Media. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 12 - NfAncLclMedia Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
URI	AdminString	key			
Type	AdminString	CRUD			
Data	AdminString	CRUD			

- URI

This key specifies the Local Media, which is a string identifying the URI for the Local Media.

- Type

This attribute specifies the Media Type entry.

Reference: PacketCable Residential SIP Telephony Feature Specification

- Data

This attribute specifies the Media Data.

Reference: PacketCable Residential SIP Telephony Feature Specification

### A.2.3.10 UEActStatChg Object

This object represents User-based parameters associated with the UE ActStatus Change Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a UE ActStatus Change Feature parameter.

**Table 13 - UEActStatChg Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PkctEUETCRSTAppFeatIndexType	key	1..63		
RegExp	unsignedInt	CRUD		seconds	

- Index

This key represents the unique identifier of an instance in this object.

- RegExp

This attribute specifies the UE ActStatus Registration expiration in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

#### **A.2.3.11 NoAnsTimeout Object**

This object represents User-based parameters associated with the No Answer Timeout Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a No Answer Timeout Feature parameter.

**Table 14 - NoAnsTimeout Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PkctEUETCRSTAppFeatIndexType	key	1..63		
Duration	unsignedInt	CRUD		seconds	

- Index

This key represents the unique identifier of an instance in this object.

- Duration

This attribute specifies the No Answer Timeout Duration in seconds.

Reference: PacketCable Residential SIP Telephony Feature Specification

#### **A.2.3.12 CID Object**

This object represents User-based parameters associated with the Caller ID Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Caller ID Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 15 - CID Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
PPS	Enum	CRUD			

- Index

This key represents the unique identifier of an instance in this object. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

- PPS

This attribute specifies the Permanent Presentation ActStatus.

### **A.2.3.13 CIDDIs Object**

This object represents User-based parameters associated with the Caller ID Display Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Caller ID Display Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 16 - CIDDIs Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
CNDActStat	boolean	CRUD			
CNAMDActStat	boolean	CRUD			
DefCountry	AdminString	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- CNDActStat

This attribute specifies the activation status for Calling Number Display (CND).

- CNAMDActStat

This attribute specifies the activation status for Calling Name Display (CNAMD).

- DefCountry

This attribute specifies default country code.

**A.2.3.14 CIDDIsFeat Object****Table 17 - CIDDIsFeat Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
CIDDIsTimeAdj	int	RU		minutes	

- CIDDIsTimeAdj

This attribute specifies the adjustment from location invariant time to time at current location. The time delta in minutes.

Reference: PacketCable Residential SIP Telephony Feature Specification

**A.2.3.15 CIDCallBlk Object**

This object represents User-based parameters associated with the Call Block Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Call Block Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 18 - CIDCallBlk Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PkctEUETCRSTAppFeatIndexType	key	1..63		

- Index

This key represents the unique identifier of an instance in this object.

**A.2.3.16 CIDCallDel Object**

This object represents User-based parameters associated with the Call Delivery Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Call Delivery Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 19 - CIDCallDel Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PkctEUETCRSTAppFeatIndexType	key	1..63		
ConfTone	PkctRSTTCTONEANNC	CRUD			
ErrTone	PkctRSTTCTONEANNC	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- ConfTone

This attribute specifies the confirmation tone after vertical feature code.

Reference: PacketCable Residential SIP Telephony Feature Specification

- ErrTone

This attribute specifies the error tone after vertical feature code failure.

Reference: PacketCable Residential SIP Telephony Feature Specification

**A.2.3.17 CallFwd Object**

This object represents User-based parameters associated with the Call Forwarding Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Call Forwarding Feature parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 20 - CallFwd Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
RingReminder	Boolean	CRUD			
SubDuration	unsignedInt	CRUD		seconds	
AUID	PktcEUETCRSTAUID	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- RingReminder

This attribute specifies the Call Forward Ring Reminder.

- SubDuration

This attribute specifies the subscription duration in seconds.

- AUID

This attribute defines the Application Unique Identifier (AUID) for this feature.

**A.2.3.18 NfCallFwd Object**

This object represents the network-based Call Forwarding.

- Object Operations:

Each instance in this object represents the Call Forwarding entries. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 21 - NfCallFwd Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
SpDialTone	boolean	CRUD			

- SpDialTone

This attribute specifies the special conditions dial tone when forwarded indicator.

Reference: PacketCable Residential SIP Telephony Feature Specification

#### **A.2.3.19 CallHold Object**

This object represents User-based parameters associated with the Call Hold Feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Call Hold Feature parameter. Each instance in this object has StorageType of volatile. There is no restriction on the ability to change values in this row while the row is active. A created row can be set to active only after all corresponding instances of objects in the row have been set to valid values.

**Table 22 - CallHold Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PkctEUECTCRSTAppFeatIndexType	key	1..63		
FeatConfirm	PkctRSTTCTONEANNC	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- FeatConfirm

This attribute specifies the feature activation/deactivation confirmation indicator.

Reference: PacketCable Residential SIP Telephony Feature Specification

#### **A.2.3.20 CallXfr Object**

This object represents User-based parameters associated with the Call Hold Transfer for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Call Hold Transfer parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 23 - CallXfr Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
NtfyTimeout	unsignedInt	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- NtfyTimeout

This attribute specifies the Notify Timeout in seconds.

#### **A.2.3.21 DnD Object**

This object represents User-based parameters associated with the Do Not Disturb feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with a Do Not Disturb parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 24 - DnD Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
ActConfirm	PktcRSTTCTONEANNC	CRUD			
DeActConfirm	PktcRSTTCTONEANNC	CRUD			
AUID	PktcEUETCRSTAUID	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- ActConfirm

This attribute specifies the Feature Activation Confirmation Indicator.

- DeActConfirm

This attribute specifies the Feature Deactivation Confirmation Indicator.

- AUID

This attribute defines the Application Unique Identifier (AUID) for this feature.

#### **A.2.3.22 NfMWI Object**

This object represents the network-based MWI.

- Object Operations:

Each instance in this object represents the MWI feature entries. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 25 - NfMWI Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
SubDuration	unsignedInt	CRUD			

- SubDuration

This attribute specifies the MWI Subscription duration.

#### **A.2.3.23 MWI Object**

This object represents the user MWI feature.

- Object Operations:

Each instance in this object represents the MWI feature. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 26 - MWI Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
ToneInd	boolean	CRUD			false
AncInd	boolean	CRUD			false

- Index

This key represents the unique identifier of an instance in this object.

- ToneInd

This is the MWI Tone Indicator.

- AncInd

This is the MWI Voice Announcement Indication.

#### **A.2.3.24 AutoRcl Object**

This object represents User-based parameters associated with the Auto Recall feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with an Auto Recall parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 27 - AutoRcl Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
Timer	unsignedInt	CRUD	0..30	minutes	30
SpRngDuration	unsignedInt	CRUD			
SpRngRetryTime	unsignedInt	CRUD		seconds	
SpRngRetries	unsignedInt	CRUD			
MaxSubSend	unsignedInt	CRUD			
MaxSubRec		CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- Timer

This attribute specifies the auto recall timer. This is minutes of feature duration.

- SpRngDuration

This attribute specifies the auto recall special ring duration. This is the number of special ringing ring cycles.

- SpRngRetryTime

This attribute specifies the auto recall special ringing retry wait interval. This is seconds to wait between attempts to alert the user with special ringing.

- SpRngRetries

This attribute specifies the number of auto recall special ringing retries. This is the number of times to retry special ringing before canceling the AR request.

- MaxSubSend

This attribute specifies the maximum number of simultaneous subscriptions the UE should send.

- MaxSubRec

This attribute specifies the maximum number of simultaneous subscriptions the UE should honor.

#### **A.2.3.25 AutoCb Object**

This object represents User-based parameters associated with the Auto Callback feature for the RST Service.

- Object Operations:

Each instance in this object describes an association of a user with an Auto Callback parameter.

**Table 28 - AutoCb Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
Timer	unsignedInt	CRUD	0..30	minutes	30
SpRngDuration	unsignedInt	CRUD			
SpRngRetryTime	unsignedInt	CRUD		seconds	
SpRngRetries	unsignedInt	CRUD			
MaxSubSend	unsignedInt	CRUD			
MaxSubRec	unsignedInt	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- Timer

This attribute specifies the auto callback timer. This is minutes of feature duration.

- SpRngDuration

This attribute specifies the auto callback special ring duration. This is the number of special ringing ring cycles.

- SpRngRetryTime

This attribute specifies the auto callback special ringing retry wait interval. This is seconds to wait between attempts to alert the user with special ringing.

- SpRngRetries

This attribute specifies the number of auto callback special ringing retries. This is the number of times to retry special ringing before canceling the AR request.

- MaxSubSend

This attribute specifies the maximum number of simultaneous subscribers the UE should send.

- MaxSubRec

This attribute specifies the maximum number of simultaneous subscriptions the UE should honor.

#### **A.2.3.26 NfBusyLineV Object**

This object represents the network-based Busy Line Verify Feature.

- Object Operations:

Each instance in this object represents the Busy Line Verify feature. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 29 - NfBusyLineV Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
OperId	AdminString	CRUD			

- OperId

This attribute specifies the Busy Line Verify Operator Id.

Reference: PacketCable Residential SIP Telephony Feature Specification

#### **A.2.3.27 NfEmSvc Object**

This object represents the network-based Emergency Services Feature.

- Object Operations:

Each instance in this object represents the Emergency Services feature. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 30 - NfEmSvc Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
NwHoldTimer	unsignedInt	CRUD		minutes	45
HowlTimer	unsignedInt	CRUD		seconds	3
DSCPValMedia	unsignedInt	CRUD	0..63		
DSCPValSig	unsignedInt	CRUD	0..63		
DigitMap	AdminString	CRUD	0..8192		
URN	Uri	CRUD			
LocationFormat	Enum	CRUD			

- NwHoldTimer

This attribute specifies the Emergency Services network hold timer in minutes.

- HowlTimer

This attribute specifies the Emergency Services howler timer in seconds.

- DSCPValMedia

This attribute specifies the DSCP Value for network packets carrying the Media (RTP) information for Emergency Services.

- DSCPValSig

This attribute specifies the DSCP Value for network packets carrying the Signaling information for Emergency Services.

- DigitMap

This attribute specifies the ABNF for the EM Digit Map.

- URN
- LocationFormat

This attribute describes the type of location format. 'pildf' indicates Presence Information Data Format. 'lo' indicates Location Object

#### A.2.3.28 SCF Object

This object represents User-based parameters associated with the RST SCF Feature.

- Object Operations:

Each instance in this object describes an association of a user with a SCF parameter. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 31 - SCF Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	PktcEUETCRSTAppFeatIndexType	key	1..63		
RingReminder	boolean	CRUD			
AUID	PktcEUETCRSTAUID	CRUD			

- Index

This key represents the unique identifier of an instance in this object.

- RingReminder

This attribute specifies the Call Forward Ring Reminder.

- AUID

This attribute defines the Application Unique Identifier (AUID) for this feature.

#### A.2.3.29 AnnounceProfile Object

- Object Operations:

**Table 32 - AnnounceProfile Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
ToneIdentifier	hexBinary	RU			
AudioAnnounceId	hexBinary	RU			

- ToneIdentifier

This attribute specifies the tone identifier for a UE.

Reference: PacketCable RST UE Specification

- AudioAnnounceId

This attribute specifies the audio announcement identifier for a UE.

Reference: PacketCable RST UE Specification

### A.3 UE-RST OMA Management Objects (MO)

#### A.3.1 UE-RST High Level MO

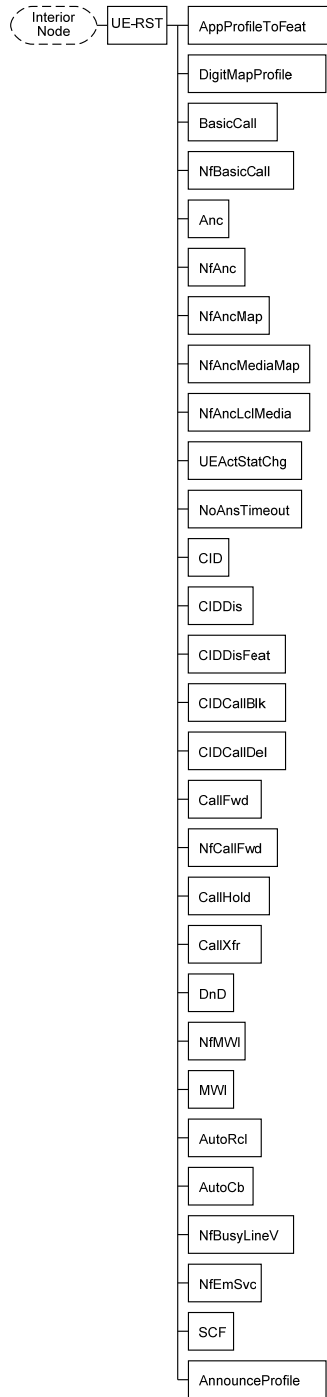


Figure 5 - RST High Level OMA Management Object

## A.3.2 UE-RST Nodes

### A.3.2.1 UE-RST AppProfileToFeat Node MO tree

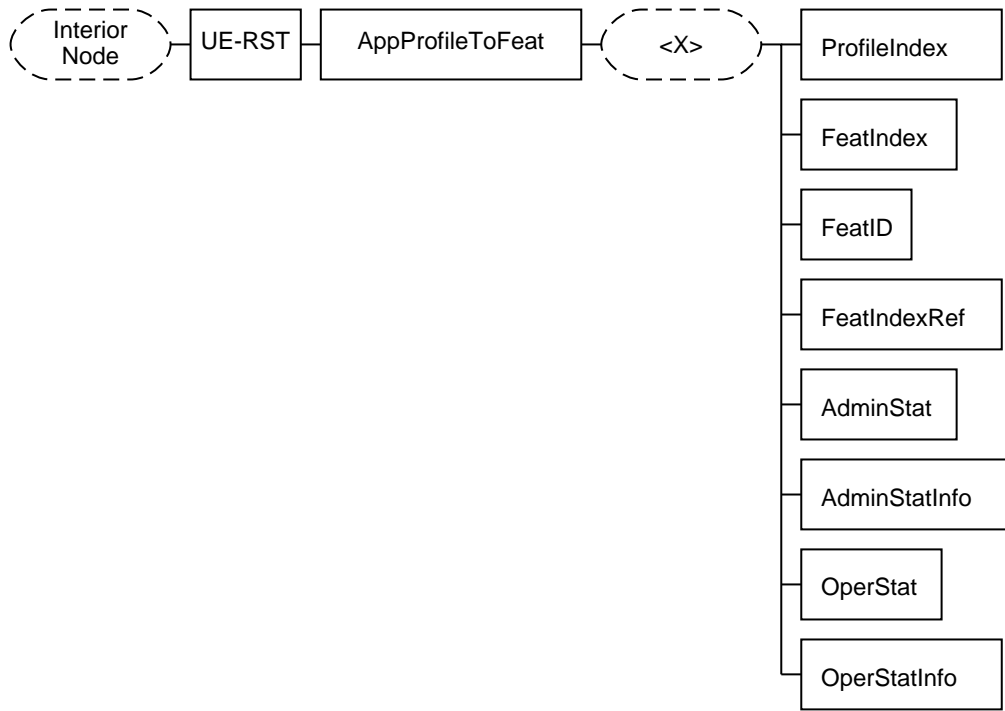
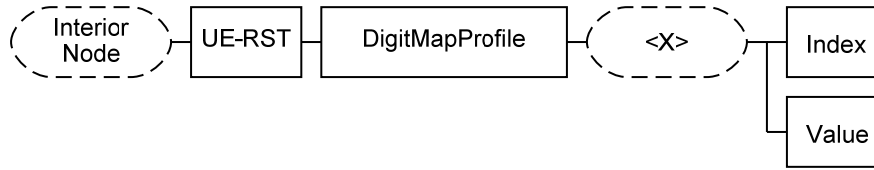


Figure 6 - Node AppProfileToFeat of UE-RST OMA Management Object

#### A.3.2.1.1 UE-RST AppProfileToFeat MO Node Description

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/AppProfileToFeat	current	One	Node	Get
./UE-RST/AppProfileToFeat<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/ProfileIndex/<X>/ProfileIndex	current	OneOrZero	int	Add, Get, Replace
./UE-RST/FeatIndex/<X>/FeatIndex	current	OneOrZero	int	Add, Get, Replace
./UE-RST/FeatID/<X>/FeatID	current	OneOrZero	int	Add, Get, Replace
./UE-RST/FeatIndexRef/<X>/FeatIndexRef	current	OneOrZero	int	Add, Get, Replace
./UE-RST/AdminStat/<X>/AdminStat	current	OneOrZero	int	Add, Get, Replace
./UE-RST/AdminStatInfo/<X>/AdminStatInfo	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/OperStat/<X>/OperStat	current	OneOrZero	int	Get
./UE-RST/OperStatInfo/<X>/OperStatInfo	current	OneOrZero	chr	Get

**A.3.2.2 UE-RST DigitMapProfile Node MO tree**

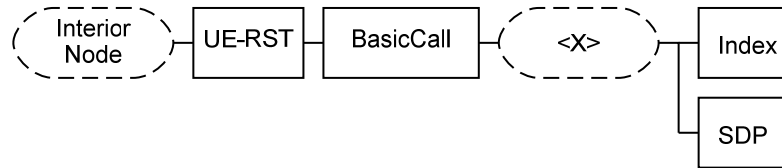


**Figure 7 - Node DigitMapProfile of UE-RST OMA Management Object**

**A.3.2.2.1 UE-RST DigitMapProfile MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/DigitMapProfile	current	One	Node	Get
./UE-RST/DigitMapProfile<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/Value/<X>/Value	current	OneOrZero	bin	Add, Get, Replace

**A.3.2.3 UE-RST BasicCall Node MO tree**



**Figure 8 - Node BasicCall of UE-RST OMA Management Object**

**A.3.2.3.1 UE-RST BasicCall MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/BasicCall	current	One	Node	Get
./UE-RST/BasicCall<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/SDP/<X>/SDP	current	OneOrZero	chr	Add, Get, Replace

### A.3.2.4 UE-RST NfBasicCall Node MO tree

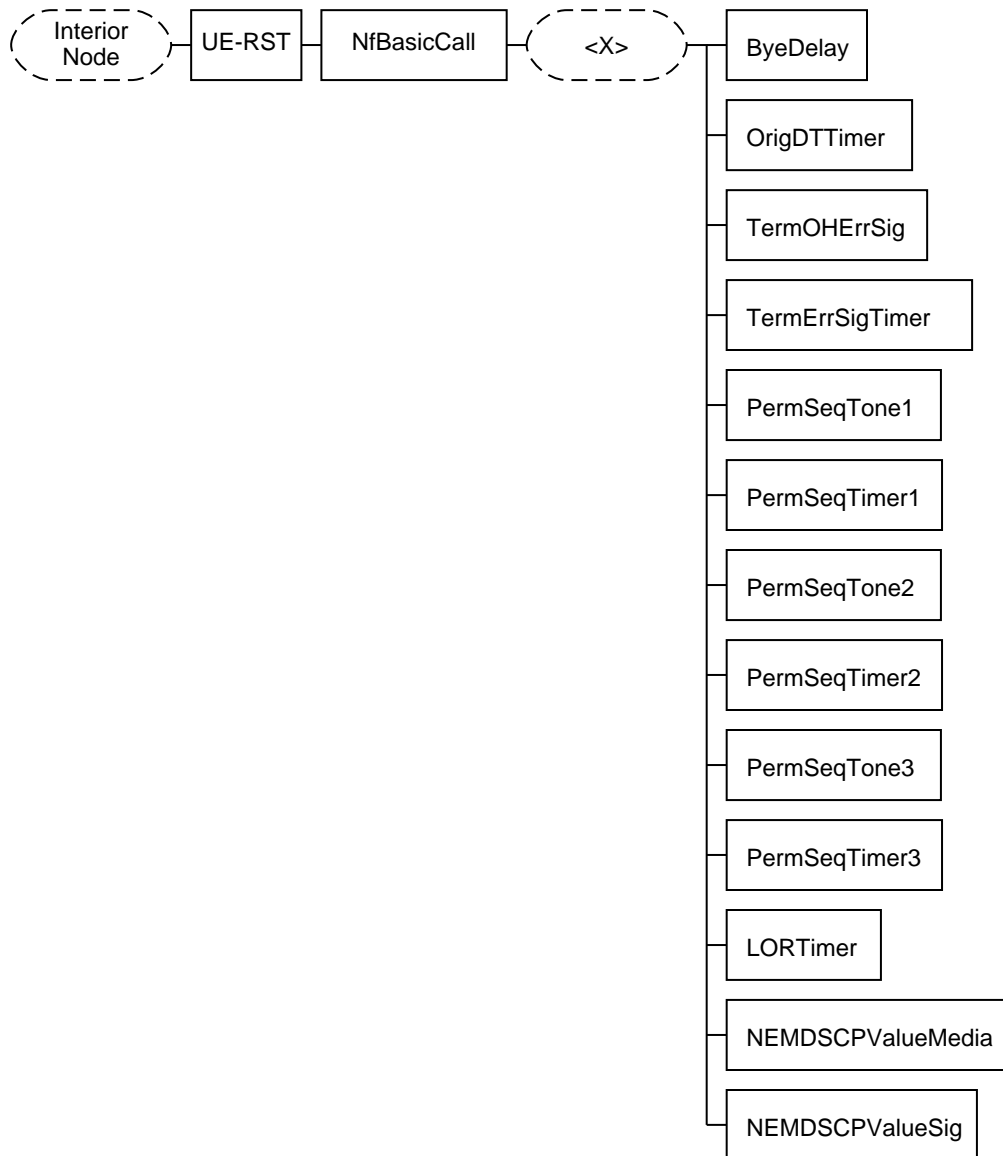


Figure 9 - Node NfBasicCall of UE-RST OMA Management Object

#### A.3.2.4.1 UE-RST NfBasicCall MO Node Description

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfBasicCall	current	One	Node	Get
./UE-RST/NfBasicCall<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/ByeDelay/<X>/ByeDelay	current	OneOrZero	int	Add, Get, Replace
./UE-RST/OrigDTTimer/<X>/OrigDTTimer	current	OneOrZero	int	Add, Get, Replace
./UE-RST/TermOHErrSig/<X>/TermOHErrSig	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/TermErrSigTimer/<X>/TermErrSigTimer	current	OneOrZero	chr	Add, Get, Replace

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/PermSeqTone1/<X>/PermSeqTone1	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/PermSeqTimer1/<X>/PermSeqTimer1	current	OneOrZero	int	Add, Get, Replace
./UE-RST/PermSeqTone2/<X>/PermSeqTone2	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/PermSeqTimer2/<X>/PermSeqTimer2	current	OneOrZero	int	Add, Get, Replace
./UE-RST/PermSeqTone3/<X>/PermSeqTone3	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/PermSeqTimer3/<X>/PermSeqTimer3	current	OneOrZero	int	Add, Get, Replace
./UE-RST/LORTimer/<X>/LORTimer	current	OneOrZero	int	Add, Get, Replace
./UE-RST/NEMDSCPValueMedia/<X>/NEMDSCPValueMedia	current	OneOrZero	int	Add, Get, Replace
./UE-RST/NEMDSCPValueSig/<X>/NEMDSCPValueSig	current	OneOrZero	int	Add, Get, Replace

**A.3.2.5 UE-RST Anc Node MO tree**

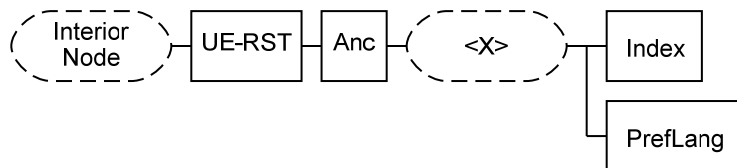


Figure 10 - Node Anc of UE-RST OMA Management Object

**A.3.2.5.1 UE-RST Anc MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/Anc	current	One	Node	Get
./UE-RST/Anc<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/PrefLang/<X>/PrefLang	current	OneOrZero	chr	Add, Get, Replace

**A.3.2.6 UE-RST NfAnc Node MO tree**

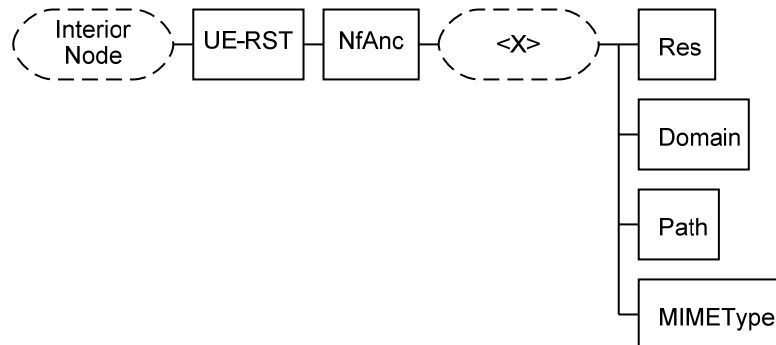
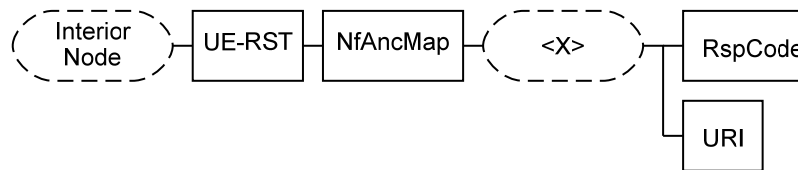


Figure 11 - Node NfAnc of UE-RST OMA Management Object

**A.3.2.6.1 UE-RST NfAnc MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfAnc	current	One	Node	Get
./UE-RST/NfAnc<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Res/<X>/Res	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/Domain/<X>/Domain	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/Path/<X>/Path	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/MIMEType/<X>/MIMEType	current	OneOrZero	chr	Add, Get, Replace

**A.3.2.7 UE-RST NfAncMap Node MO tree**

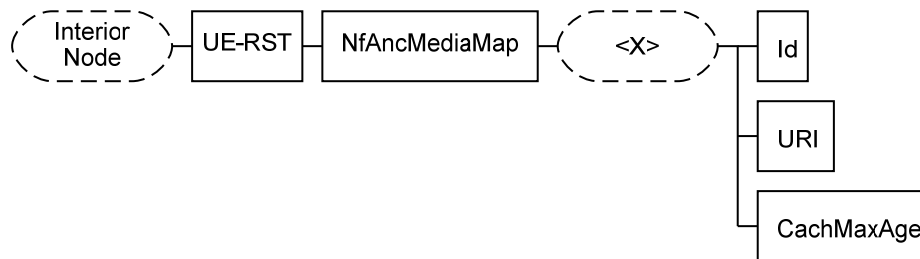


**Figure 12 - Node NfAncMap of UE-RST OMA Management Object**

**A.3.2.7.1 UE-RST NfAncMap MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfAncMap	current	One	Node	Get
./UE-RST/NfAncMap<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/RspCode/<X>/RspCode	current	OneOrZero	int	Add, Get, Replace
./UE-RST/URI/<X>/URI	current	OneOrZero	chr	Add, Get, Replace

**A.3.2.8 UE-RST NfAncMediaMap Node MO tree**



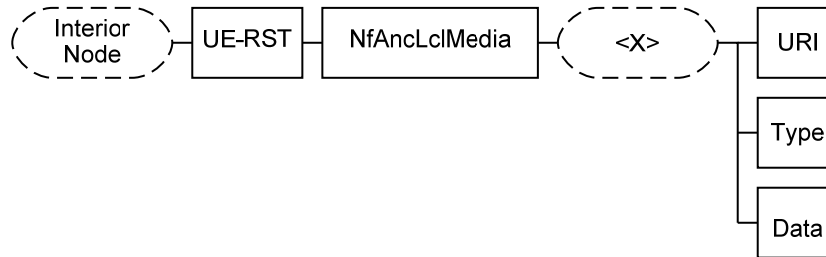
**Figure 13 - Node NfAncMediaMap of UE-RST OMA Management Object**

**A.3.2.8.1 UE-RST NfAncMediaMap MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfAncMediaMap	current	One	Node	Get
./UE-RST/NfAncMediaMap<X>	current	OneOrMore	Node	Add, Get, Replace

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/Id/<X>/Id	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/URI/<X>/URI	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/CachMaxAge/<X>/CachMaxAge	current	OneOrZero	int	Add, Get, Replace

**A.3.2.9 UE-RST NfAncLclMedia Node MO tree**

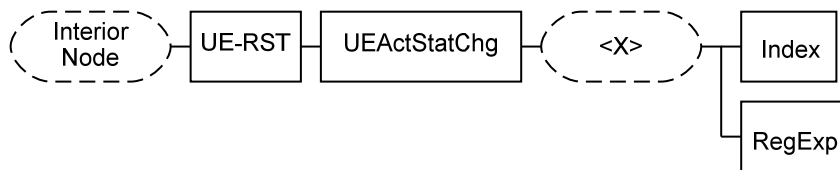


**Figure 14 - Node NfAncLclMedia of UE-RST OMA Management Object**

**A.3.2.9.1 UE-RST NfAncLclMedia MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfAncLclMedia	current	One	Node	Get
./UE-RST/NfAncLclMedia<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/URI/<X>/URI	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/Type/<X>/Type	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/Data/<X>/Data	current	OneOrZero	chr	Add, Get, Replace

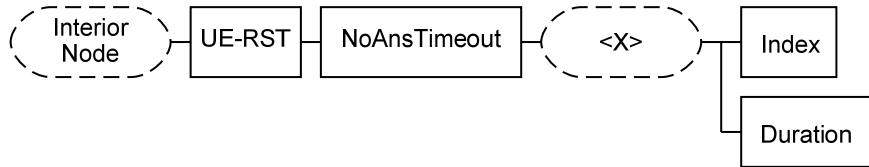
**A.3.2.10 UE-RST UEActStatChg Node MO tree**



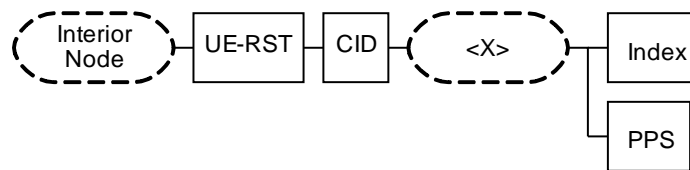
**Figure 15 - Node UEActStatChg of UE-RST OMA Management Object**

**A.3.2.10.1 UE-RST UEActStatChg MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/UEActStatChg	current	One	Node	Get
./UE-RST/UEActStatChg<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/RegExp/<X>/RegExp	current	OneOrZero	int	Add, Get, Replace

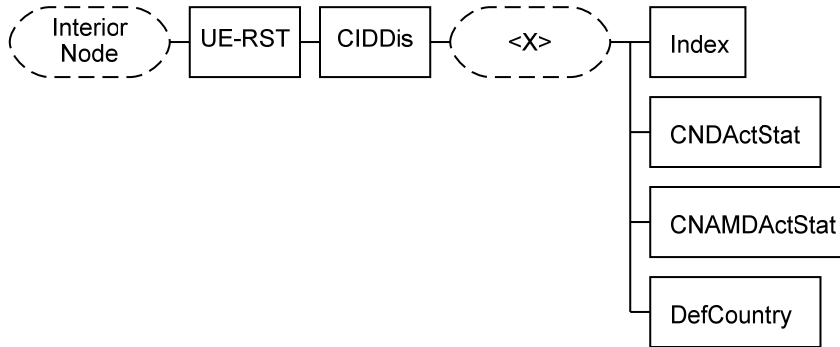
**A.3.2.11 UE-RST NoAnsTimeout Node MO tree****Figure 16 - Node NoAnsTimeout of UE-RST OMA Management Object****A.3.2.11.1 UE-RST NoAnsTimeout MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NoAnsTimeout	current	One	Node	Get
./UE-RST/NoAnsTimeout<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/Duration/<X>/Duration	current	OneOrZero	int	Add, Get, Replace

**A.3.2.12 UE-RST CID Node MO tree****Figure 17 - Node CID of UE-RST OMA Management Object****A.3.2.12.1 UE-RST CID MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/CID	current	One	Node	Get
./UE-RST/CID<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/PPS/<X>/PPS	current	OneOrZero	int	Add, Get, Replace

**A.3.2.13 UE-RST CIDDIs Node MO tree**

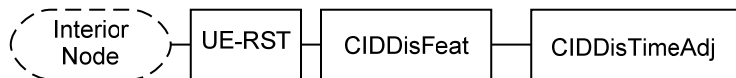


**Figure 18 - Node CIDDIs of UE-RST OMA Management Object**

**A.3.2.13.1 UE-RST CIDDIs MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/CIDDIs	current	One	Node	Get
./UE-RST/CIDDIs<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/CNDAActStat/<X>/CNDAActStat	current	OneOrZero	bool	Add, Get, Replace
./UE-RST/CNAMDAActStat/<X>/CNAMDAActStat	current	OneOrZero	bool	Add, Get, Replace
./UE-RST/DefCountry/<X>/DefCountry	current	OneOrZero	chr	Add, Get, Replace

**A.3.2.14 UE-RST CIDDIsFeat Node MO tree**

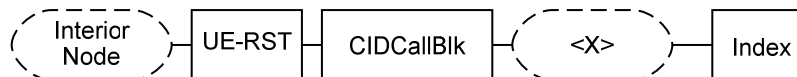


**Figure 19 - Node CIDDIsFeat of UE-RST OMA Management Object**

**A.3.2.14.1 UE-RST CIDDIsFeat MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/CIDDIsFeat	current	One	Node	Get
./UE-RST/CIDDIsTimeAdj/<X>/CIDDIsTimeAdj	current	OneOrZero	int	Get, Replace

**A.3.2.15 UE-RST CIDCallBlk Node MO tree**



**Figure 20 - Node CIDCallBlk of UE-RST OMA Management Object**

A.3.2.15.1 UE-RST CIDCallBlk MO Node Description

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/CIDCallBlk	current	One	Node	Get
./UE-RST/CIDCallBlk<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace

A.3.2.16 UE-RST CIDCallDel Node MO tree

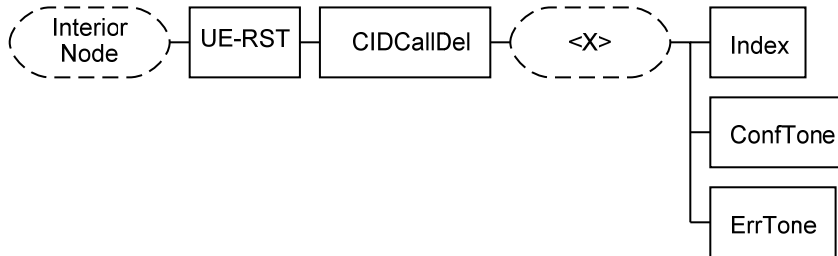


Figure 21 - Node CIDCallDel of UE-RST OMA Management Object

A.3.2.16.1 UE-RST CIDCallDel MO Node Description

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/CIDCallDel	current	One	Node	Get
./UE-RST/CIDCallDel<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/ConfTone/<X>/ConfTone	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/ErrTone/<X>/ErrTone	current	OneOrZero	chr	Add, Get, Replace

A.3.2.17 UE-RST CallFwd Node MO tree

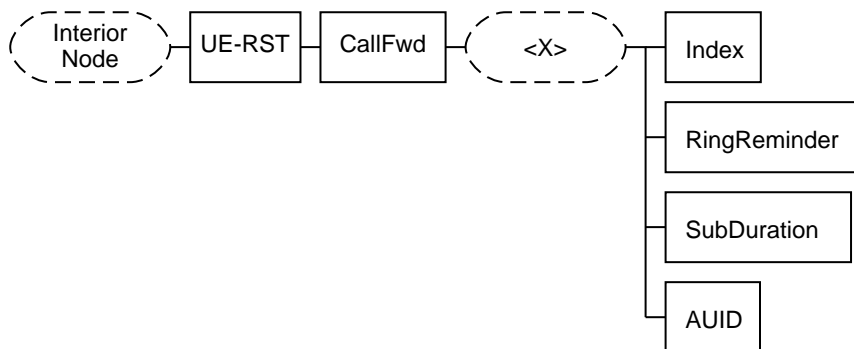
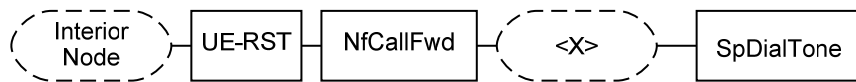


Figure 22 - Node CallFwd of UE-RST OMA Management Object

**A.3.2.17.1 UE-RST CallFwd MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/CallFwd	current	One	Node	Get
./UE-RST/CallFwd<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/RingReminder/<X>/RingReminder	current	OneOrZero	bool	Add, Get, Replace
./UE-RST/SubDuration/<X>/SubDuration	current	OneOrZero	int	Add, Get, Replace
./UE-RST/AUID/<X>/AUID	current	OneOrZero	chr	Add, Get, Replace

**A.3.2.18 UE-RST NfCallFwd Node MO tree**

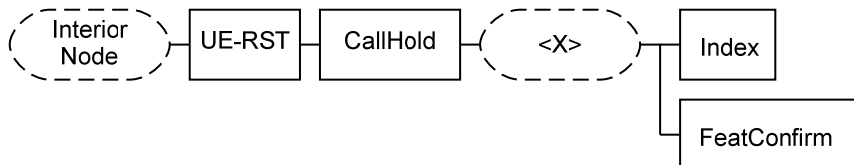


**Figure 23 - Node NfCallFwd of UE-RST OMA Management Object**

**A.3.2.18.1 UE-RST NfCallFwd MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfCallFwd	current	One	Node	Get
./UE-RST/NfCallFwd<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/SpDialTone/<X>/SpDialTone	current	OneOrZero	bool	Add, Get, Replace

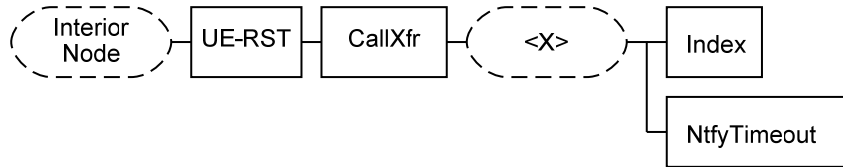
**A.3.2.19 UE-RST CallHold Node MO tree**



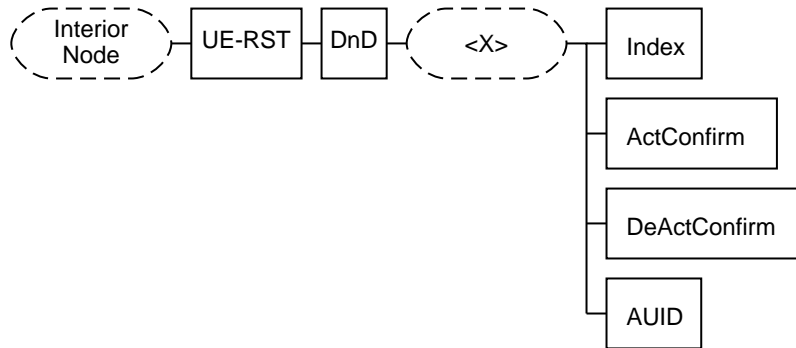
**Figure 24 - Node CallHold of UE-RST OMA Management Object**

**A.3.2.19.1 UE-RST CallHold MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/CallHold	current	One	Node	Get
./UE-RST/CallHold<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/FeatConfirm/<X>/FeatConfirm	current	OneOrZero	chr	Add, Get, Replace

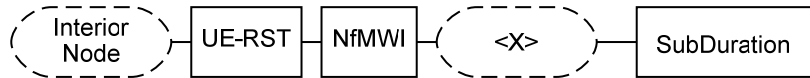
**A.3.2.20 UE-RST CallXfr Node MO tree****Figure 25 - Node CallXfr of UE-RST OMA Management Object****A.3.2.20.1 UE-RST CallXfr MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/CallXfr	current	One	Node	Get
./UE-RST/CallXfr<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/NtfyTimeout/<X>/NtfyTimeout	current	OneOrZero	int	Add, Get, Replace

**A.3.2.21 UE-RST DnD Node MO tree****Figure 26 - Node DnD of UE-RST OMA Management Object****A.3.2.21.1 UE-RST DnD MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/DnD	current	One	Node	Get
./UE-RST/DnD<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/ActConfirm/<X>/ActConfirm	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/DeActConfirm/<X>/DeActConfirm	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/AUID/<X>/AUID	current	OneOrZero	chr	Add, Get, Replace

**A.3.2.22 UE-RST NfMWI Node MO tree**

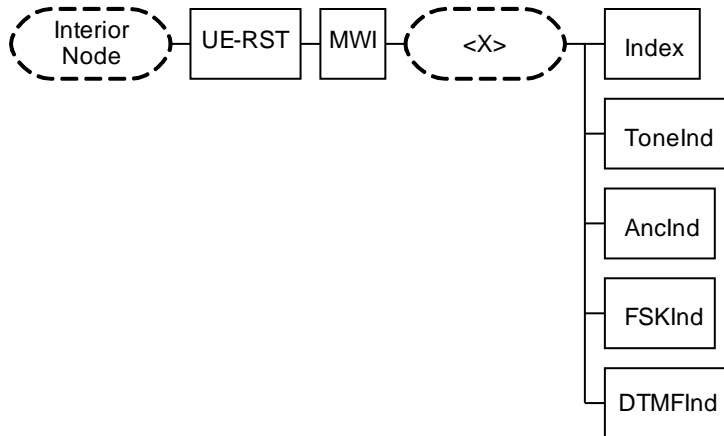


**Figure 27 - Node NfMWI of UE-RST OMA Management Object**

**A.3.2.22.1 UE-RST NfMWI MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfMWI	current	One	Node	Get
./UE-RST/NfMWI<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/SubDuration/<X>/SubDuration	current	OneOrZero	int	Add, Get, Replace

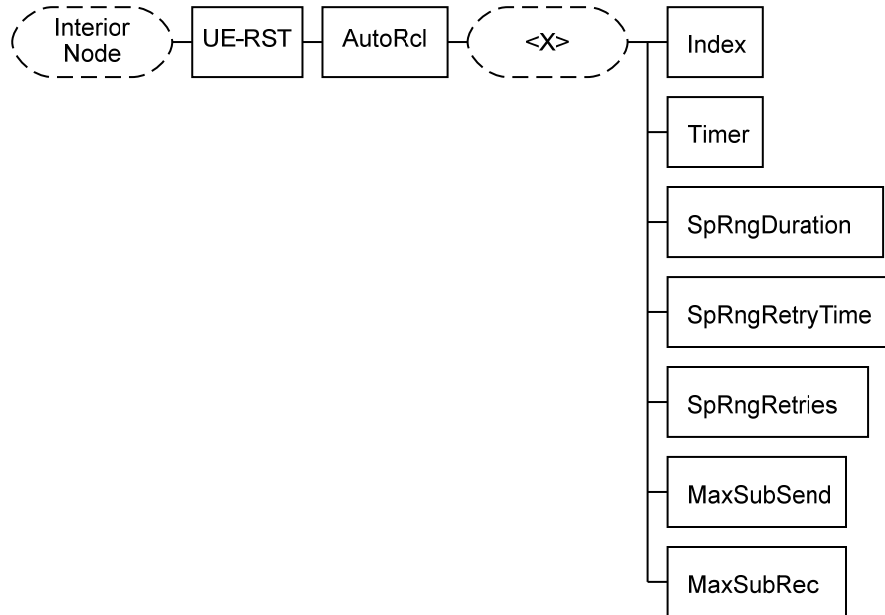
**A.3.2.23 UE-RST MWI Node MO tree**



**Figure 28 - Node MWI of UE-RST OMA Management Object**

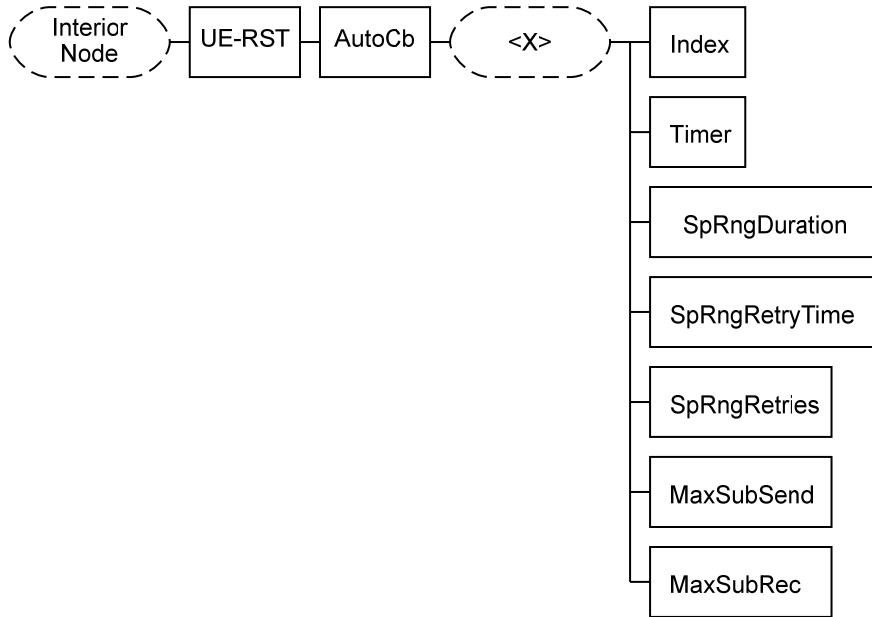
**A.3.2.23.1 UE-RST MWI MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/MWI	current	One	Node	Get
./UE-RST/MWI<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/ToneInd/<X>/ToneInd	current	OneOrZero	bool	Add, Get, Replace
./UE-RST/AncInd/<X>/AncInd	current	OneOrZero	bool	Add, Get, Replace

**A.3.2.24 UE-RST AutoRcl Node MO tree****Figure 29 - Node AutoRcl of UE-RST OMA Management Object****A.3.2.24.1 UE-RST AutoRcl MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/AutoRcl	current	One	Node	Get
./UE-RST/AutoRcl<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/Timer/<X>/Timer	current	OneOrZero	int	Add, Get, Replace
./UE-RST/SpRngDuration/<X>/SpRngDuration	current	OneOrZero	int	Add, Get, Replace
./UE-RST/SpRngRetryTime/<X>/SpRngRetryTime	current	OneOrZero	int	Add, Get, Replace
./UE-RST/SpRngRetries/<X>/SpRngRetries	current	OneOrZero	int	Add, Get, Replace
./UE-RST/MaxSubSend/<X>/MaxSubSend	current	OneOrZero	int	Add, Get, Replace
./UE-RST/MaxSubRec/<X>/MaxSubRec	current	OneOrZero	int	Add, Get, Replace

**A.3.2.25 UE-RST AutoCb Node MO tree**

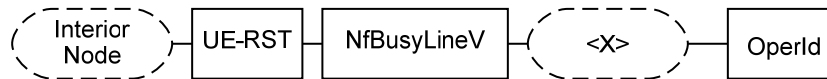


**Figure 30 - Node AutoCb of UE-RST OMA Management Object**

**A.3.2.25.1 UE-RST AutoCb MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/AutoCb	current	One	Node	Get
./UE-RST/AutoCb<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/Timer/<X>/Timer	current	OneOrZero	int	Add, Get, Replace
./UE-RST/SpRngDuration/<X>/SpRngDuration	current	OneOrZero	int	Add, Get, Replace
./UE-RST/SpRngRetryTime/<X>/SpRngRetryTime	current	OneOrZero	int	Add, Get, Replace
./UE-RST/SpRngRetries/<X>/SpRngRetries	current	OneOrZero	int	Add, Get, Replace
./UE-RST/MaxSubSend/<X>/MaxSubSend	current	OneOrZero	int	Add, Get, Replace
./UE-RST/MaxSubRec/<X>/MaxSubRec	current	OneOrZero	int	Add, Get, Replace

**A.3.2.26 UE-RST NfBusyLineV Node MO tree**



**Figure 31 - Node NfBusyLineV of UE-RST OMA Management Object**

## A.3.2.26.1 UE-RST NfBusyLineV MO Node Description

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfBusyLineV	current	One	Node	Get
./UE-RST/NfBusyLineV<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/OperId/<X>/OperId	current	OneOrZero	chr	Add, Get, Replace

## A.3.2.27 UE-RST NfEmSvc Node MO tree

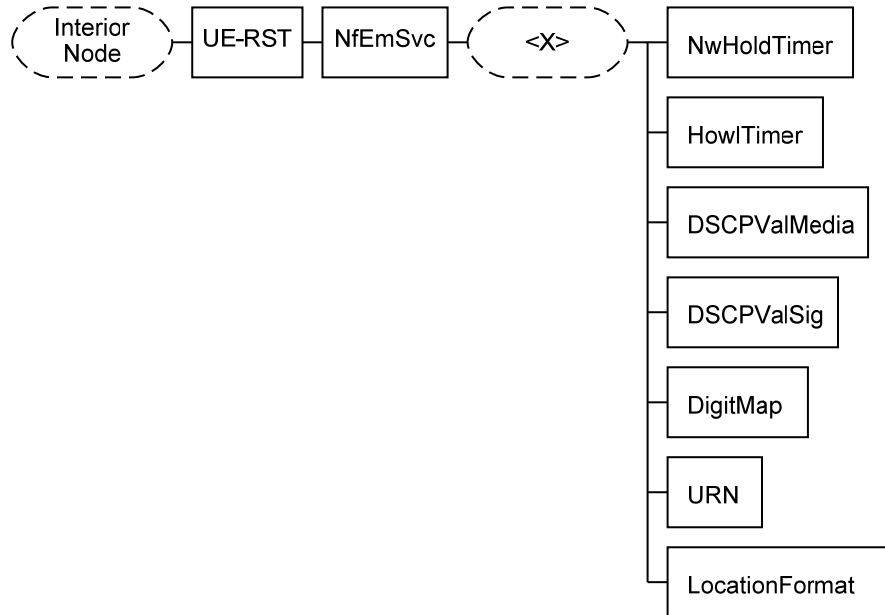
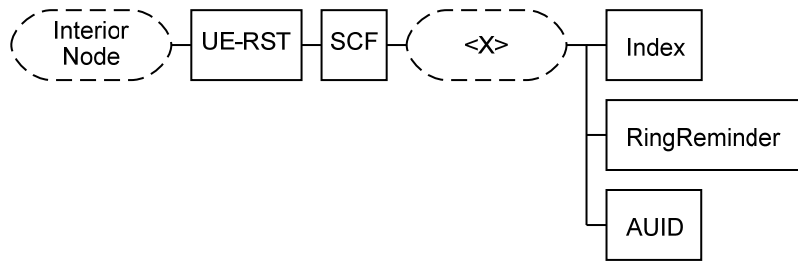


Figure 32 - Node NfEmSvc of UE-RST OMA Management Object

## A.3.2.27.1 UE-RST NfEmSvc MO Node Description

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/NfEmSvc	current	One	Node	Get
./UE-RST/NfEmSvc<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/NwHoldTimer/<X>/NwHoldTimer	current	OneOrZero	int	Add, Get, Replace
./UE-RST/HowlTimer/<X>/HowlTimer	current	OneOrZero	int	Add, Get, Replace
./UE-RST/DSCPValMedia/<X>/DSCPValMedia	current	OneOrZero	int	Add, Get, Replace
./UE-RST/DSCPValSig/<X>/DSCPValSig	current	OneOrZero	int	Add, Get, Replace
./UE-RST/DigitMap/<X>/DigitMap	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/URN/<X>/URN	current	OneOrZero	chr	Add, Get, Replace
./UE-RST/LocationFormat/<X>/LocationFormat	current	OneOrZero	int	Add, Get, Replace

**A.3.2.28 UE-RST SCF Node MO tree**

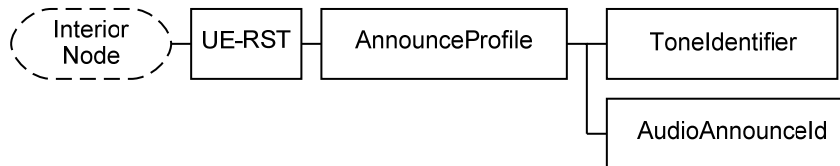


**Figure 33 - Node SCF of UE-RST OMA Management Object**

**A.3.2.28.1 UE-RST SCF MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/SCF	current	One	Node	Get
./UE-RST/SCF<X>	current	OneOrMore	Node	Add, Get, Replace
./UE-RST/Index/<X>/Index	current	OneOrZero	int	Add, Get, Replace
./UE-RST/RingReminder/<X>/RingReminder	current	OneOrZero	int	Add, Get, Replace
./UE-RST/AUID/<X>/AUID	current	OneOrZero	int	Add, Get, Replace

**A.3.2.29 UE-RST AnnounceProfile Node MO tree**



**Figure 34 - Node AnnounceProfile of UE-RST OMA Management Object**

**A.3.2.29.1 UE-RST AnnounceProfile MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST/AnnounceProfile	current	One	Node	Get
./UE-RST/ToneIdentifier/<X>/ToneIdentifier	current	OneOrZero	bin	Get, Replace
./UE-RST/AudioAnnounceId/<X>/AudioAnnounceId	current	OneOrZero	bin	Get, Replace

## A.4 UE-RST OMA Device Description Framework (DDF)

```

<?xml version="1.0"?>
<MgmtTree>
  <VerDTD>1.2</VerDTD>
  <Man>PacketCable - Cable Laboratories Inc.</Man>
  <!--This DDF considers as model the UE MO (as defined in the PacketCable
specifications) followed by a colon character (e.g., UE-RST:) -->
  <Mod>UE-RST:</Mod>
  <Node>
    <NodeName>UE-RST</NodeName>
    <Path>./Pktc2</Path>
    <DFProperties>
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        <Get/>
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      <DefaultValue/>
      <Description>The node that defines the UE-RST MO
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## Annex B UE-RST-DEV Management Requirements (Normative)

### B.1 UE-RST-DEV Object Model Overview

This section defines the management model of RST management features at the UE Device level.

Unless specified, the UE MUST NOT persist operator configuration data using the data models described herein. Other documents that reference this object model might change the persistent requirement of the device.

### B.2 UE-RST-DEV Object Model Definitions

#### B.2.1 UE-RST-DEV Object Model Data Types

There are no UE-RST-DEV object model specific Data Types. General Data Types are defined in [PKT-UE-DATA].

#### B.2.2 UE-RST-DEV Object Model Class Diagram

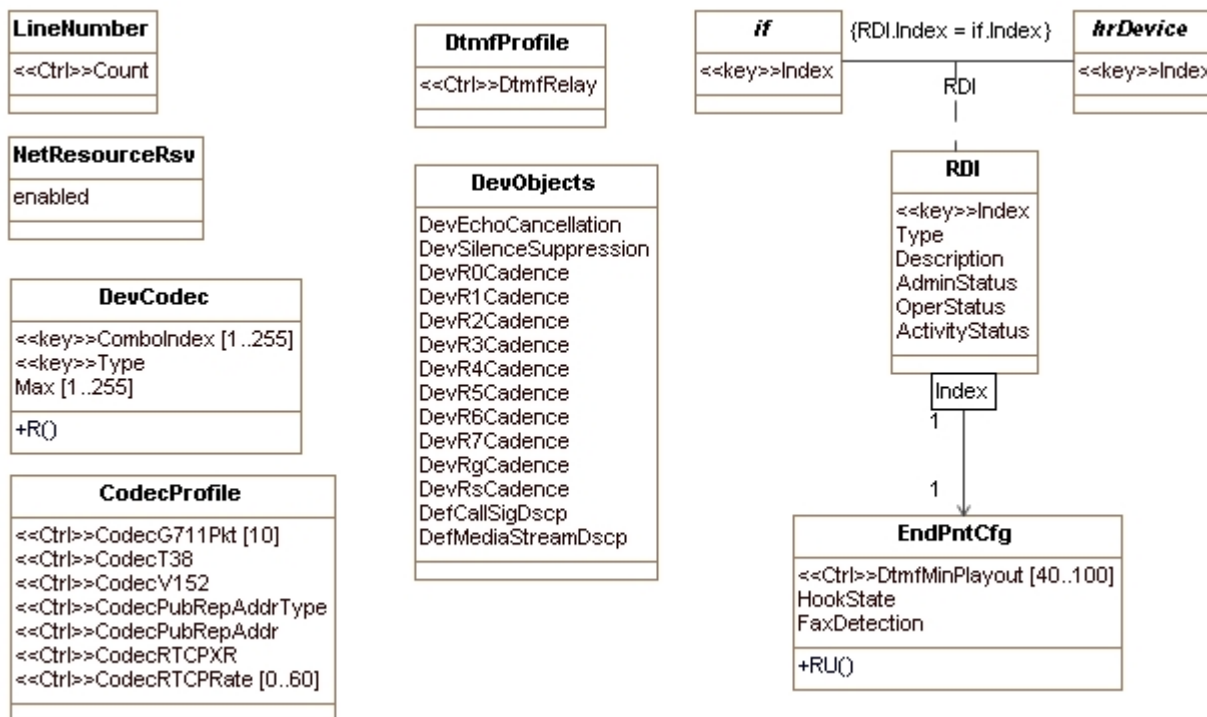


Figure 35 - UE-RST-DEV Object Model Diagram

#### B.2.3 UE-RST-DEV Object Model Description

##### B.2.3.1 DevCodec Object

This object describes the UE-supported codec types. An UE MUST populate this object with all possible combinations of codecs it supports for simultaneous operation. For example, an UE with two endpoints may be designed with a particular Digital Signal Processing (DSP) and memory architecture that allows it to support the

following fixed combinations of codecs for simultaneous operation: Codec Type Maximum Number of Simultaneous Codecs PCMA 3 PCMA 2 PCMU 1 PCMA 1 PCMU 2 PCMU 3 PCMA 1 G729 1 G729 2 PCMU 1 G729 1 Based on this example, the entries in the codec table would be: CodecComboIndex CodecType CodecMax 1 pcma 3 2 pcma 2 2 pcmu 1 3 pcma 1 3 pcmu 2 4 pcmu 3 5 pcma 1 5 g729 1 6 g729 2 7 pcmu 1 7 g729 1 An operator querying this object is able to determine all possible codec combinations the UE is capable of simultaneously supporting. This object MUST NOT include non-voice codecs.

- Object Operations:

Each instance represents the maximum number of active connections with a particular codec the UE is capable of supporting.

**Table 33 - DevCodec Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
ComboIndex	unsignedInt	key	1..255		
Type	PktcCodecType	key			
Max	unsignedInt	R	1..255		

- ComboIndex

This key enumerates a particular codec combination in this object.

- Type

This key represents the codecs supported by the UE.

- Max

This attribute represents the maximum number of simultaneous sessions of a particular codec that the UE can support.

**B.2.3.2 CodecProfile Object**

**Table 34 - CodecProfile Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
CodecG711Pkt	int	RU	10..10	milliseconds	20
CodecT38	boolean	RU			true
CodecV152	boolean	RU			true
CodecPubRepAddrType	InetAddressType	RU			
CodecPubRepAddr	InetAddress	RU			
CodecRTCPXR	boolean	RU			true
CodecRTCPRate	int	RU	0..60	seconds	5

- CodecG711Pkt

This attribute specifies the packetization period of a G.711 payload.

- CodecT38

This attribute specifies whether fax relay is enabled/disabled. A value of 'true' enables fax relay on the UE.

Reference: PacketCable RST UE Specification

- CodecV152

This attribute specifies whether modem relay is enabled/disable. A value of 'true' (ON) enables modem relay on the UE.

Reference: PacketCable RST UE Specification

- CodecPubRepAddrType

This attribute specifies the address type for the attribute CodecPubRepAddr. The valid types are 'ipv4' and 'ipv6'.

Reference: PacketCable RST UE Specification

- CodecPubRepAddr

This attribute specifies the network address that receives the call statistics report from the UE. Publish reports must be sent at the end of each call if enabled.

Reference: PacketCable RST UE Specification

- CodecRTCPXR

This attribute specifies if extended reports for the sake of voice metrics are included within RTCP packets. A value of 'true' enables RTCP extended reports.

Reference: PacketCable RST UE Specification

- CodecRTCPRate

This object specifies the interval at which RTCP packets are sent from the UE. A value of zero for RTCP\_RATE disables RTCP transmission.

### B.2.3.3 DtmfProfile Object

**Table 35 - DtmfProfile Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
DtmfRelay	boolean	RU			true

- DtmfRelay

This attribute represents the DTMF Relay status for the UE. The UE must support the use of DTMF for both dialed digits and for the relay of digits as part of an established session. When dialing the DTMF, signaling is collected at the UE. The digits are gathered according to the digit map and all digits are sent in a single message. If the value of this object is 'true', the UE must offer DTMF relay within SDP upon session origination.

Reference: PacketCable RST UE Specification

### B.2.3.4 DevObjects Object

**Table 36 - DevObjects Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
DevEchoCancellation	boolean	R			

Attribute Name	Type	Access	Type Constraints	Units	Default
DevSilenceSuppression	boolean	R			
DevR0Cadence	PktcRingCadence	RU			
DevR1Cadence	PktcRingCadence	RU			
DevR2Cadence	PktcRingCadence	RU			
DevR3Cadence	PktcRingCadence	RU			
DevR4Cadence	PktcRingCadence	RU			
DevR5Cadence	PktcRingCadence	RU			
DevR6Cadence	PktcRingCadence	RU			
DevR7Cadence	PktcRingCadence	RU			
DevRgCadence	PktcRingCadence	RU			
DevRsCadence	PktcRingCadence	RU			
DefCallSigDscp	Dscp	RU			0
DefMediaStreamDscp	Dscp	RU			0

- DevEchoCancellation

This attribute specifies if the device is capable of echo cancellation. The value 'true' indicates the UE is capable of echo cancellation, and a value of 'false' if not.

- DevSilenceSuppression

This attribute specifies if the device is capable of silence suppression (as a result of Voice Activity Detection). The value 'true' indicates the UE is capable of silence suppression, and a value of 'false' if not.

- DevR0Cadence

This attribute specifies ring cadence 0 (a user-defined field).

- DevR1Cadence

This attribute specifies ring cadence 1 (a user-defined field).

- DevR2Cadence

This attribute specifies ring cadence 2 (a user-defined field).

- DevR3Cadence

This attribute specifies ring cadence 3 (a user-defined field).

- DevR4Cadence

This attribute specifies ring cadence 4 (a user-defined field).

- DevR5Cadence

This attribute specifies ring cadence 5 (a user-defined field).

- DevR6Cadence

This attribute specifies ring cadence 6 (a user-defined field).

- DevR7Cadence

This attribute specifies ring cadence 7 (a user-defined field).

- DevRgCadence

This attribute specifies ring cadence rg (a user-defined field).

- DevRsCadence

This attribute specifies ring cadence rs (a user-defined field). The UE MUST reject any attempt to make this object repeatable.

- DefCallSigDscp

This attribute represents the default value used in the IP header for setting the Differentiated Services Code Point (DSCP) value for call signaling.

- DefMediaStreamDscp

This attribute contains the default value used in the IP header for setting the Differentiated Services Code Point (DSCP) value for media stream packets. The UE MUST NOT update this object with the value supplied by the CMS in the NCS messages (if present). Any currently active connections are not affected by updates to this object. When the value of this object is updated by SNMP, the UE MUST use the new value as a default starting only from new connections.

### **B.2.3.5 LineNumber Object**

**Table 37 - LineNumber Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Count	unsignedInt	R			

- Count

This attribute represents the number of physical, telephony endpoints on a UE.

### **B.2.3.6 EndPntCfg Object**

This object describes configuration data pertaining for each end point (telephony line). The number of entries in this object represents the number of provisioned end points.

- Object Operations:

This object describes the configuration data for the associated line.

**Table 38 - EndPntCfg Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
DtmfMinPlayout	unsignedInt	RU	40..100	milliseconds	0
HookState	Enum	R			
FaxDetection	boolean	RU			false

- DtmfMinPlayout

This attribute defines the minimum playout time for the DTMF digit when IETF RFC 4734 DTMF Relay is used for the egress gateway. If the value set via this attribute is different from that specified in RFC4734 packet, then the UE MUST use the maximum of the two values. The value 0 indicates to use what is specified in RFC 4734. For example, if the RFC 4734 packet specifies 23ms and if this attribute is set to 40ms, then the egress gateway must use a value of 40ms. Similarly, if the RFC 4734 packet specifies 60 ms and if this object is set to 40ms, then the egress gateway must use a value of 60ms.

- HookState

This attribute indicates the state of an endpoint with respect to the hook state and, potentially, to the 'significant activities', which should not be interrupted by the network operations. The UE considers the following activities as significant: - tones generated by the end-point in response to an incoming SIP requests, - loopback tests. The UE sets the value of this object according to the following: - 'onHook': when endpoint is 'on hook' and there are no 'significant activities' going on this endpoint; - 'onHookWithActivity': when endpoint is 'on hook' and there is at least one of the 'significant activities' going on for this endpoint; - 'offHook': when the endpoint is 'off hook'. When this attribute indicates the value of the 'onHookWithActivity' or 'offHook', the Management Station has to refrain from initiation of network operations that may interrupt the significant activities on the endpoints.

- FaxDetection

This attribute is used to configure the distinctive fax calling tone (CNG) detection feature on a UE endpoint with reference to the analog interface. When set to 'true', the UE enables the detection of CNG tones on the specific endpoint. When set to false, the UE disables the detection of CNG tones on the specific endpoint. If a connection already exists on the endpoint when this attribute value is updated, then the setting needs to take effect on the next connection.

### **B.2.3.7 NetResourceRsv Object**

**Table 39 - NetResourceRsv Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
enabled		RU			

- enabled

This attribute represents the UE enforcement of network resource reservation: 'true' indicates resource reservation is required in order for the UE to delivery media to the user, and 'false' indicates that resource reservation is not required.

### B.3 UE-RST-DEV OMA Management Objects (MO)

#### B.3.1 UE-RST-DEV High Level MO

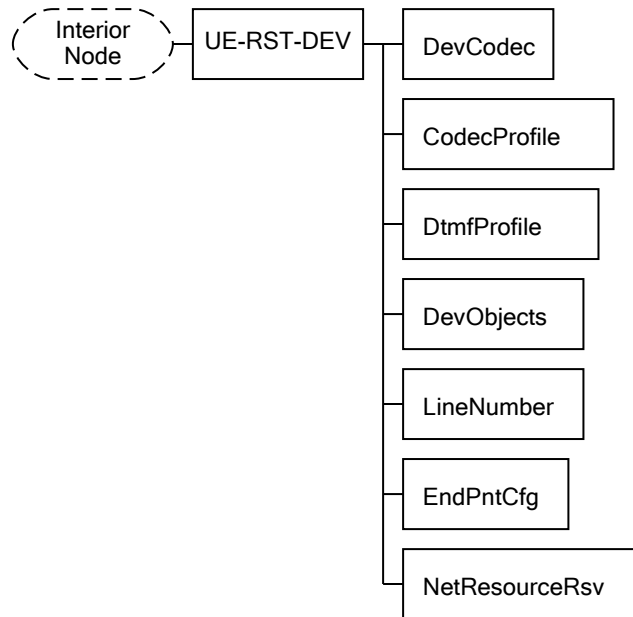


Figure 36 - UE-RST-DEV High Level OMA Management Object

#### B.3.2 UE-RST-DEV Nodes

##### B.3.2.1 UE-RST-DEV DevCodec Node MO tree

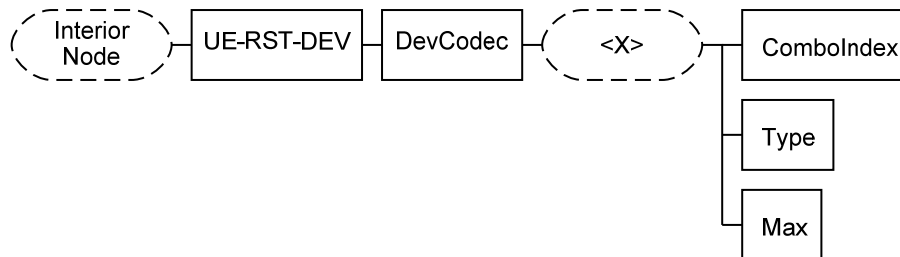
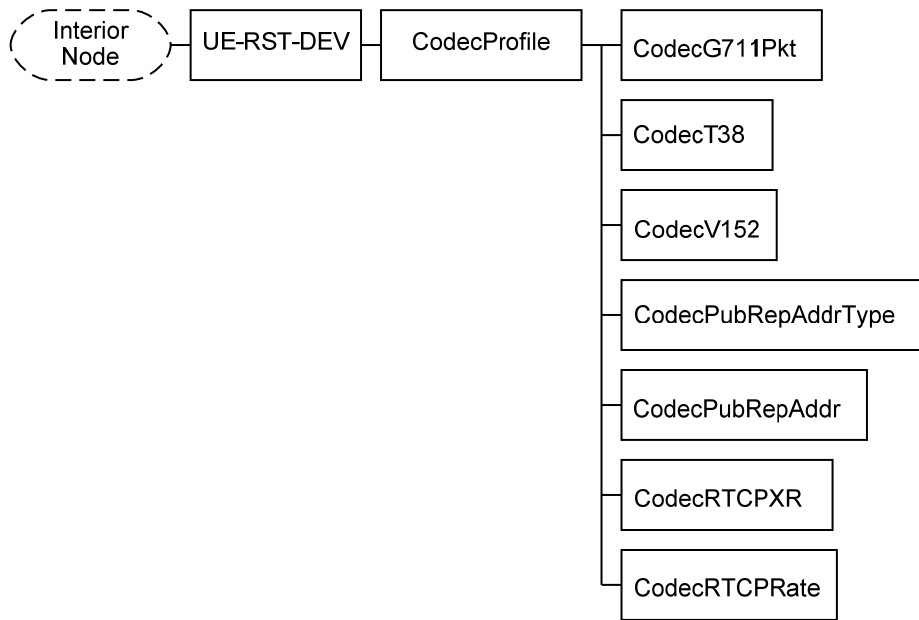


Figure 37 - Node DevCodec of UE-RST-DEV OMA Management Object

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-DEV/DevCodec	current	One	Node	Get
./UE-RST-DEV/DevCodec<X>	current	OneOrMore	Node	Get, Replace
./UE-RST-DEV/ComboIndex/<X>/ComboIndex	current	OneOrZero	int	Get, Replace
./UE-RST-DEV/Type/<X>/Type	current	OneOrZero	int	Get, Replace
./UE-RST-DEV/Max/<X>/Max	current	OneOrZero	int	Get

**B.3.2.2 UE-RST-DEV CodecProfile Node MO tree**



**Figure 38 - Node CodecProfile of UE-RST-DEV OMA Management Object**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-DEV/CodecProfile	current	One	Node	Get
./UE-RST-DEV/CodecG711Pkt/<X>/CodecG711Pkt	current	OneOrZero	int	Get, Replace
./UE-RST-DEV/CodecT38/<X>/CodecT38	current	OneOrZero	bool	Get, Replace
./UE-RST-DEV/CodecV152/<X>/CodecV152	current	OneOrZero	bool	Get, Replace
./UE-RST-DEV/CodecPubRepAddrType/<X>/CodecPubRepAddrType	current	OneOrZero	int	Get, Replace
./UE-RST-DEV/CodecPubRepAddr/<X>/CodecPubRepAddr	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/CodecRTCPXR/<X>/CodecRTCPXR	current	OneOrZero	bool	Get, Replace
./UE-RST-DEV/CodecRTCPRate/<X>/CodecRTCPRate	current	OneOrZero	int	Get, Replace

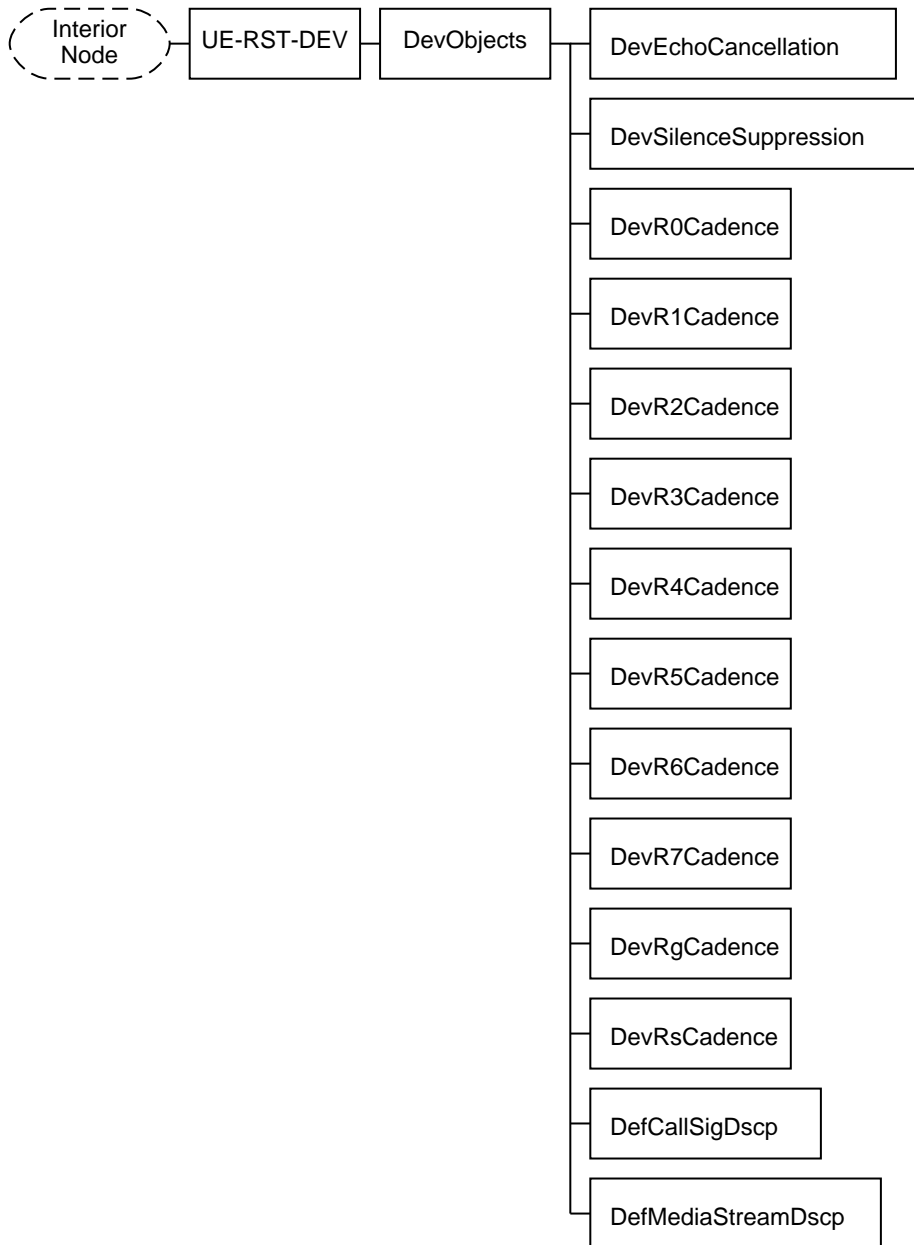
**B.3.2.3 UE-RST-DEV DtmfProfile Node MO tree**



**Figure 39 - Node DtmfProfile of UE-RST-DEV OMA Management Object**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-DEV/DtmfProfile	current	One	Node	Get
./UE-RST-DEV/DtmfRelay/<X>/DtmfRelay	current	OneOrZero	bool	Get, Replace

**B.3.2.4 UE-RST-DEV DevObjects Node MO tree**



**Figure 40 - Node DevObjects of UE-RST-DEV OMA Management Object**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-DEV/DevObjects	current	One	Node	Get
./UE-RST-DEV/DevEchoCancellation/<X>/DevEchoCancellation	current	OneOrZero	bool	Get
./UE-RST-DEV/DevSilenceSuppression/<X>/DevSilenceSuppression	current	OneOrZero	bool	Get
./UE-RST-DEV/DevR0Cadence/<X>/DevR0Cadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevR1Cadence/<X>/DevR1Cadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevR2Cadence/<X>/DevR2Cadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevR3Cadence/<X>/DevR3Cadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevR4Cadence/<X>/DevR4Cadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevR5Cadence/<X>/DevR5Cadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevR6Cadence/<X>/DevR6Cadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevR7Cadence/<X>/DevR7Cadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevRgCadence/<X>/DevRgCadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DevRsCadence/<X>/DevRsCadence	current	OneOrZero	bin	Get, Replace
./UE-RST-DEV/DefCallSigDscp/<X>/DefCallSigDscp	current	OneOrZero		Get, Replace
./UE-RST-DEV/DefMediaStreamDscp/<X>/DefMediaStreamDscp	current	OneOrZero		Get, Replace

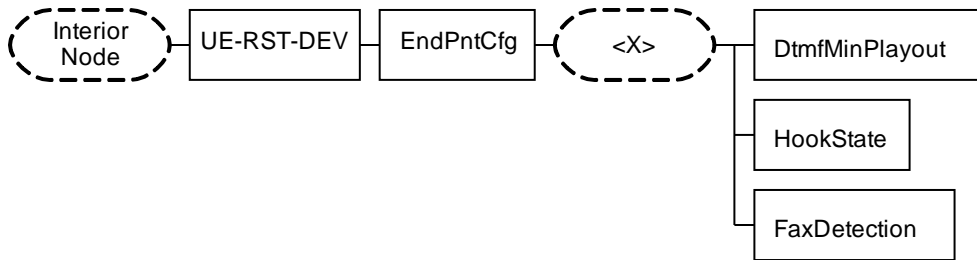
**B.3.2.5 UE-RST-DEV LineNumber Node MO tree**



**Figure 41 - Node LineNumber of UE-RST-DEV OMA Management Object**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-DEV/LineNumber	current	One	Node	Get
./UE-RST-DEV/Count/<X>/Count	current	OneOrZero	int	Get

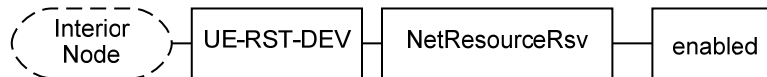
**B.3.2.6 UE-RST-DEV EndPntCfg Node MO tree**



**Figure 42 - Node EndPntCfg of UE-RST-DEV OMA Management Object**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-DEV/EndPntCfg	current	One	Node	Get
./UE-RST-DEV/EndPntCfg<X>	current	OneOrMore	Node	Get, Replace
./UE-RST-DEV/DtmfMinPayout/<X>/DtmfMinPayout	current	OneOrZero	int	Get, Replace
./UE-RST-DEV/HookState/<X>/HookState	current	OneOrZero	int	Get
./UE-RST-DEV/FaxDetection/<X>/FaxDetection	current	OneOrZero	int	Get, Replace

**B.3.2.7 UE-RST-DEV NetResourceRsv Node MO tree**



**Figure 43 - Node NetResourceRsv of UE-RST-DEV OMA Management Object**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-DEV/NetResourceRsv	current	One	Node	Get
./UE-RST-DEV/enabled/<X>/enabled	current	OneOrZero		Get, Replace

**B.4 UE-RST-DEV OMA Device Description Framework (DDF)**

```

<?xml version="1.0"?>
<MgmtTree>
  <VerDTD>1.2</VerDTD>
  <Man>PacketCable - Cable Laboratories Inc.</Man>
  <!--This DDF considers as model the UE MO (as defined in the PacketCable
specifications) followed by a colon character (e.g., UE-RST-DEV:) -->
  <Mod>UE-RST-DEV:</Mod>
  <Node>
    <NodeName>UE-RST-DEV</NodeName>
    <Path>./Pktc2</Path>
    <DFProperties>
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        <Get/>
      </AccessType>
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    </DFProperties>
  </Node>
</MgmtTree>
    
```

```

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UE-RST-DEV MO three</DFTitle>
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## Annex C UE-RST-ATI Management Requirements (Normative)

### C.1 UE-RST-ATI Object Model Overview

This section defines the management model of the UE RST ATI.

Unless specified, the UE MUST NOT persist operator configuration data using the data models described herein. Other documents that reference this object model might change the persistent requirement of the device.

### C.2 UE-RST-ATI Object Model Definitions

#### C.2.1 UE-RST-ATI Object Model Data Types

There are no UE-RST-ATI object model specific Data Types. General Data Types are defined in [PKT-UE-DATA].

#### C.2.2 UE-RST-ATI Object Model Class Diagram

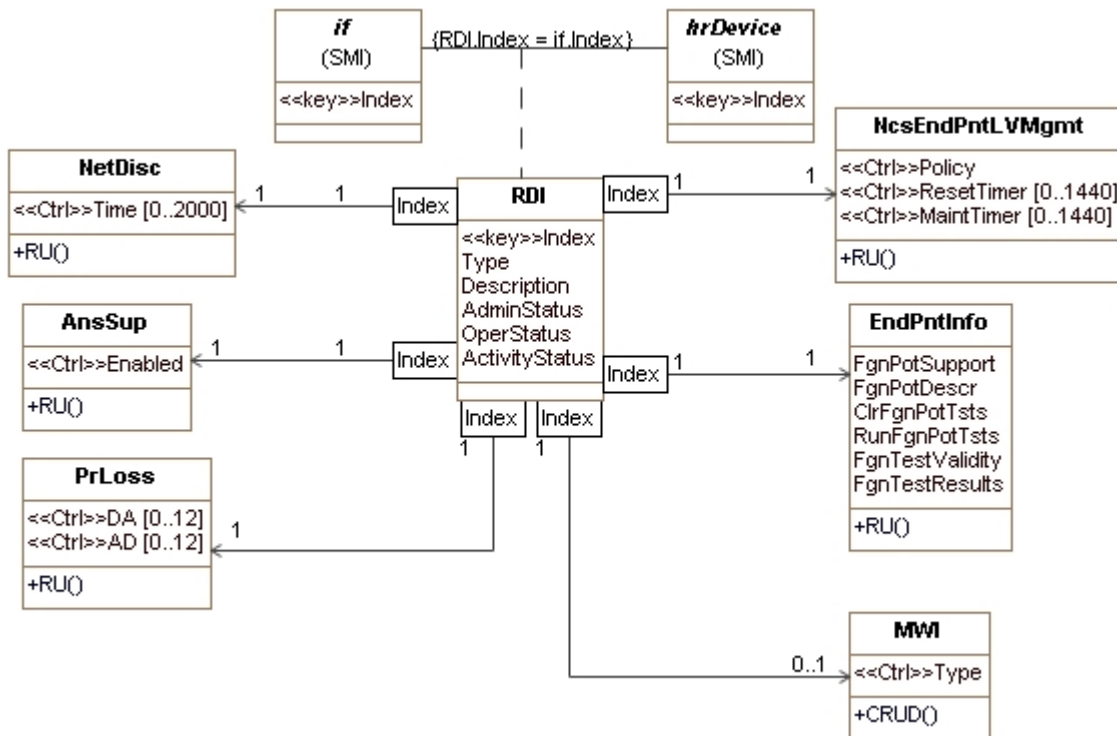


Figure 44- UE-RST-ATI Object Model Diagram

#### C.2.3 UE-RST-ATI Object Model Description

##### C.2.3.1 NetDisc Object

This object represents the Network Disconnect time for each line provided by the UE.

- Object Operations:

Each instance in this object describes the Network Disconnect Time for the associated line.

**Table 40 - NetDisc Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Time	int	RU	0..2000	milliseconds	1000

- Time

This attribute specifies the time in milliseconds that the UE must remove DC bias when a call has been cleared by the network. A value of zero (0) indicates that the UE MUST NOT remove DC bias when a call disconnects.

### C.2.3.2 AnsSup Object

This object represents the Answer Supervision for each line provided by the UE.

- Object Operations:

Each instance in this object describes the Answer Supervision for the associated line.

**Table 41 - AnsSup Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Enabled	boolean	RU			false

- Enabled

This attribute specifies the Answer Supervision state. Answer Supervision (also called battery reversal, reverse DC bias, or Reverse Loop Current Feed) is signaled when the distant end answers a call originated by the CPE.

Typically this signal is used to notify electronic equipment, such as PBXs, which have a local billing system that a call has been answered. When provisioned to do so, the UE may reverse DC bias when a call has been answered. The default value for this object is 'false,' indicating that Answer Supervision is disabled.

Reference: PacketCable RST E-DVA Specification

### C.2.3.3 PrLoss Object

The UE supports two provisioned loss parameters, one for the D/A direction (towards the subscriber) and one for A/D direction (from the subscriber) direction. This data table represents the loss for each line provided by the E-DVA.

- Object Operations:

The UE supports two provisioned loss parameters, one for the D/A direction (towards the subscriber) and one for A/D direction (from the subscriber) direction. This object represents the loss for each line provided by the UE. Each instance in this object describes the loss for the associated line.

**Table 42 - PrLoss Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
DA	int	RU	0..12	dB	6
AD	int	RU	0..12	dB	6

- DA

This attribute specifies the provisioned loss parameter for the D/A direction (towards the subscriber) in dB.

- AD

This attribute specifies the provisioned loss parameter for the A/D direction (from the subscriber) in dB.

### C.2.3.4 EndPntInfo Object

This table includes any additional information associated with PacketCable EndPoints. The number of entries in this table represents the number of available PacketCable EndPoints.

- Object Operations:

An instance of this object exists for each PacketCable UE Endpoint.

**Table 43 - EndPntInfo Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
FgnPotSupport	EnumBits	R			
FgnPotDescr	AdminString	R			
ClrFgnPotTsts	EnumBits	RU			
RunFgnPotTsts	EnumBits	RU			
FgnTestValidity	EnumBits	R			
FgnTestResults	EnumBits	R			

- FgnPotSupport

This attribute indicates the capabilities of the UE to detect various conditions related to the presence of foreign potential on an endpoint. The UE sets a value of '1' for each bit corresponding to a supported functionality and a value of '0' for each bit corresponding to an unsupported functionality.

- FgnPotDescr

This attribute provides information related to the various tests for each detection mechanism supported by the UE. While the actual contents are vendor-specific, the recommended format is: [<Capability>:<Test References>:<Other Info>]... Example: <fgnPotDetection>:<test XYZ, Reference 'Document'>:<NA>; <hazardousFngPotDetection>:<Test ABC, References>:<NA>

- ClrFgnPotTsts

This attribute is used to clear the current test results of supported conditions indicated by the attribute 'FgnPotSupport'. Setting a bit to a value of '1' clears the corresponding results in the attribute 'FgnTestResults' and the validity as indicated by the attribute 'FgnTestValidity'. An attempt to set a bit corresponding to an unsupported condition to a value of '1' is rejected. For all unsupported scenarios, the UE always reports the bit set to zero.

- RunFgnPotTsts

This attribute is used to initiate one or more test cases associated with a supported foreign potential detection. Thus, whenever one or more BITS corresponding to supported foreign scenario potential detection mechanisms are set to a value of '1', the UE enables those tests. Once the tests are executed, the UE does: - set the corresponding bit to a value of '0' - clears to '0' the values of the corresponding bits in the attribute 'clrFngPotsTest' - update the corresponding Bits in the attribute 'FgnTestValidity' and 'FgnTestResults'. An attempt to set a bit corresponding to an unsupported condition to a value of '1' is rejected. Whenever a test is being run on an Endpoint the UE sets the corresponding interface 'OperStatus' attribute to the value 'testing' for the whole duration of the test. When the test is completed, the US sets the RDI OperStatus to the value corresponding to the current state of the line.

**NOTE:** Whenever multiple tests are run, the ordering of the tests or the results is vendor dependent and need not necessarily follow the ordering of BITS in this attribute.

- FgnTestValidity

This attribute is used to indicate the validity of the corresponding test cases that were initiated using the attribute 'RunFgnPotTests' as follows: - return a value of '1' if the tests were run successfully and the results are valid. - Return a value of '0' if a particular test was not initiated, or if the tests cases are in progress, or if the tests could not be run successfully, and hence the results are invalid.

- FgnTestResults

This attribute is used to indicate the results of the corresponding test cases that were initiated using the attribute 'RunFgnPotTests' as follows: - set the corresponding bit to a value of '1' if the tests indicated the presence of a foreign potential as per the associated test case. - set the corresponding bit to a value of '0' if the tests indicated the absence of a foreign potential as per the associated test case, or if the tests cases are in progress.

### C.2.3.5 NcsEndPntLVMgmt Object

This object contains the attributes used for managing loop voltage on a UE.

- Object Operations:

Each instance in this object consists of the loop voltage management policy for the specified end-point. The UE includes instances for the UE itself (represented by a RDI = '1') and instances for each endpoint. Policies associated to RDI = '1' applies to all end points. The UE MUST persist the value of the writable attributes in this object upon all types of device re-initialization.

**Table 44 - NcsEndPntLVMgmt Object**

Attribute Name	Type	Access	Type Constraints	Units	Default
Policy	Enum	RU			voltageBasedOnService
ResetTimer	unsignedInt	RU	0..1440	minutes	5
MaintTimer	unsignedInt	RU	0..1440	minutes	0

- Policy

This attribute allows the operator to choose a suitable policy for Loop Voltage behavior on UEs.

The UE MUST adhere to PacketCable signaling requirements, such as the NCS open loop voltage requirement, irrespective of any chosen policy. For UEs that need to remove loop voltage during the UE initialization phase, in contradiction to a chosen policy, such a loop voltage removal period MUST NOT exceed 1000ms.

This attribute specifies four policies. An informative illustration of the UE behavior with different policies is presented in Appendix A. Provisioned line is a UE Endpoint that has been fully configured.

The possible values for this attribute are:

- 'voltageAtAllTimes'

Indicates Policy 1. The UE MUST maintain the loop idle voltage on all lines, irrespective of the line status.

- 'voltageUnlessIPConnectivityAbsent'

Indicates Policy 2. The UE MUST apply loop idle voltage at all times except when it confirms the absence IP connectivity. Additionally, the following conditions apply:

- During a hard reboot, this policy applies at all lines until the UE is successfully provisioned.

- Once the UE is successfully provisioned, then the policy applies to all provisioned lines
- Upon the onset of a re-initialization due to a soft reset, the UE MUST continue to maintain the existing policy and state on previously provisioned lines, unless overridden by a policy or the provisioning process specifies otherwise.

This policy is similar to Policy 1, except for the ability to recognize events like cable cuts (due to malicious activities, or otherwise).

The following requirements apply to policies 3 and 4.

- Upon the onset of a re-initialization due to a soft reset, the UE MUST continue to maintain the existing policy and state on provisioned lines, unless overridden by a policy or the provisioning process specifies otherwise.
- Once the provisioning process is completed, the UE MUST apply the chosen policy to all the provisioned lines.

- 'voltageBasedOnServiceOrTimers'

Indicates Policy 3. The UE MUST adhere to the requirements that follow at any given point in time:

- When the timer defined by the attribute ResetTimer has a non-zero value, the UE MUST apply loop idle voltage under all circumstances (similar to policy 1).
- When the timer defined by MaintTimer has a non-zero value, the UE MUST maintain a line's loop idle voltage state that was in effect prior to the timer being set to a non-zero value.
- When the timers defined by MaintTimer and ResetTimer have expired (both have a value of zero), then:
  - The UE MUST apply loop voltage if the provisioning process is completed.
  - During IP disconnection, E-UE MUST remove loop idle voltage on all lines
- When both the timers are active (i.e., they both have non-zero values), then the timer MaintTimer takes precedence
- If none of the above cases apply, the UE MUST remove loop idle voltage on all lines.

- 'voltageBasedOnService'

Indicates Policy 4. The following conditions apply at any given point in time:

- The UE MUST apply loop idle voltage to all the provisioned when the device completes provisioning.
- In all other cases, the UE MUST remove loop idle voltage on all lines.

- ResetTimer

This attribute specifies the time duration allowed for a UE to successfully provision and is only applicable when the attribute Policy is set to a value of 'voltageBasedOnServiceOrTimers'.

The value contained by this MIB Object is a countdown timer and the UE MUST start counting down the configured value only upon a UE re-initialization. Once this timer has reached a value of zero, the UE MUST retain the value (of zero) until successfully configured otherwise. The UE MUST use a change in the value of this attribute only on the next UE re-initialization. The UE MUST persist the last configured value (i.e., not the countdown value) upon UE re-initialization.

- MaintTimer

This attribute allows the operator to specify the time that loop voltage condition will be maintained, irrespective of the changes to the UE. It is only applicable when the Policy attribute is set to a value of 'voltageBasedOnServiceOrTimers'.

The value contained in this attribute is a countdown timer, and the UE MUST start counting down the value immediately after a successful configuration to a non-zero value and the attribute Policy value is 'voltageBasedOnServiceOrTimers'. Once this timer has reached a value of zero, the UE MUST retain the value (of zero) until successfully configured otherwise. The UE MUST retain the value of this attribute (i.e., the countdown value) across soft resets. The UE MUST reset the value of this attribute (to its default value) during UE hard re-initialization.

### C.2.3.6 MWI Object

This object represents the visual MWI feature of the ATI.

- Object Operations:

Each instance in this object represents the MWI feature. There is no restriction to change the value of attributes of this object. An instance of this object is not operational until all the corresponding attributes of an instance have been created to valid values.

**Table 45 - MWI Object**

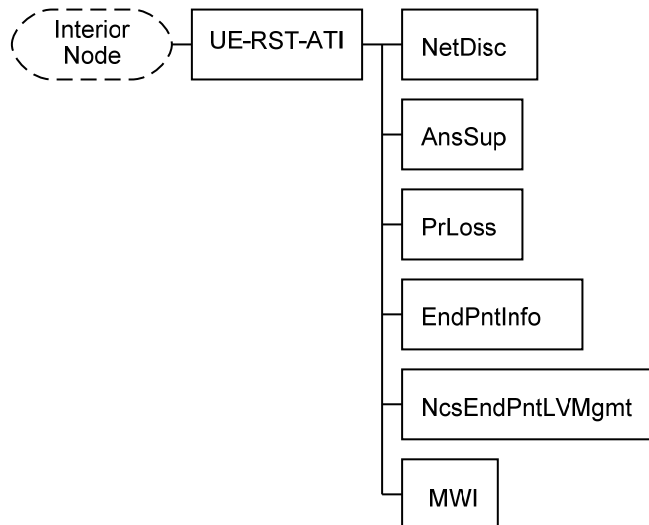
Attribute Name	Type	Access	Type Constraints	Units	Default
Type	boolean	CRUD			false

- Type

This attribute represents the visual MWI method for the ATI. 'fsk' indicates that the type of MWI is FSK signal. 'dtmf' indicates that the type of MWI is the DTMF signal, and 'none' indicates that the MWI is disabled on the particular ATI This is the MWI FSK Indication.

## C.3 UE-RST-ATI OMA Management Objects (MO)

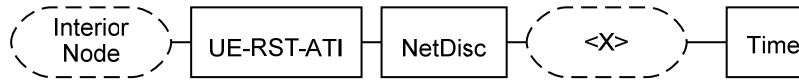
### C.3.1 UE-RST-ATI High Level MO



**Figure 45 - UE-RST-ATI High Level OMA Management Object**

**C.3.2 UE-RST-ATI Nodes**

**C.3.2.1 UE-RST-ATI NetDisc Node MO tree**

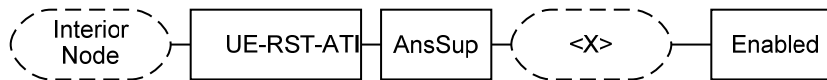


**Figure 46 - Node NetDisc of UE-RST-ATI OMA Management Object**

**C.3.2.2 UE-RST-ATI NetDisc MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-ATI/NetDisc	current	One	Node	Get
./UE-RST-ATI/NetDisc<X>	current	OneOrMore	Node	
./UE-RST-ATI/Time/<X>/Time	current	OneOrZero	int	Get, Replace

**C.3.2.3 UE-RST-ATI AnsSup Node MO tree**

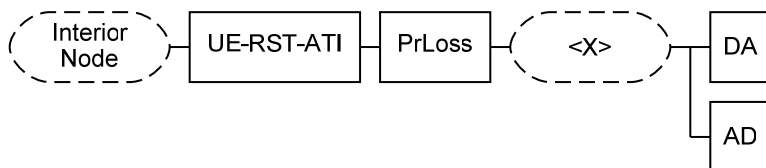


**Figure 47 - Node AnsSup of UE-RST-ATI OMA Management Object**

**C.3.2.4 UE-RST-ATI AnsSup MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-ATI/AnsSup	current	One	Node	Get
./UE-RST-ATI/AnsSup<X>	current	OneOrMore	Node	
./UE-RST-ATI/Enabled/<X>/Enabled	current	OneOrZero	bool	Get, Replace

**C.3.2.5 UE-RST-ATI PrLoss Node MO tree**



**Figure 48 - Node PrLoss of UE-RST-ATI OMA Management Object**

**C.3.2.6 UE-RST-ATI PrLoss MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-ATI/PrLoss	current	One	Node	Get
./UE-RST-ATI/PrLoss<X>	current	OneOrMore	Node	
./UE-RST-ATI/DA/<X>/DA	current	OneOrZero	int	Get, Replace

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-ATI/AD/<X>/AD	current	OneOrZero	int	Get, Replace

### C.3.2.7 UE-RST-ATI EndPntInfo Node MO tree

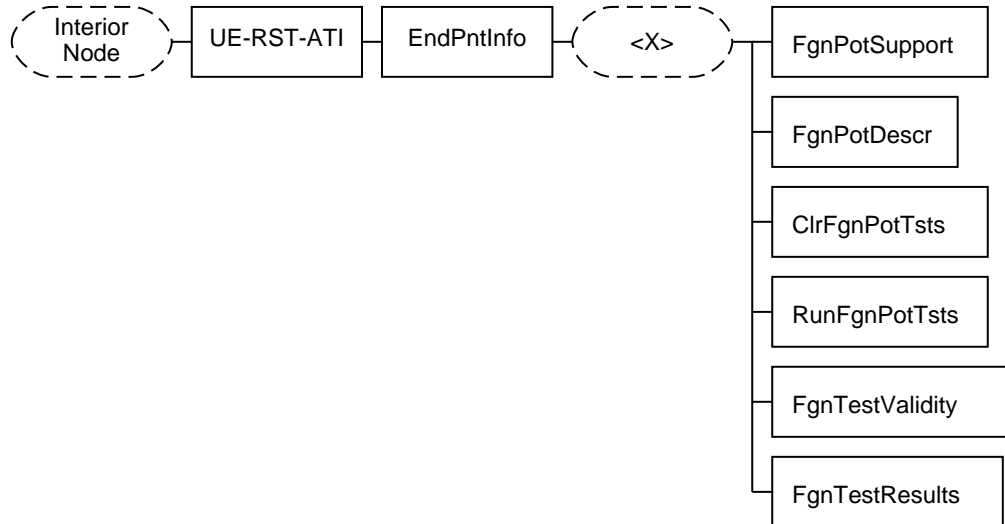
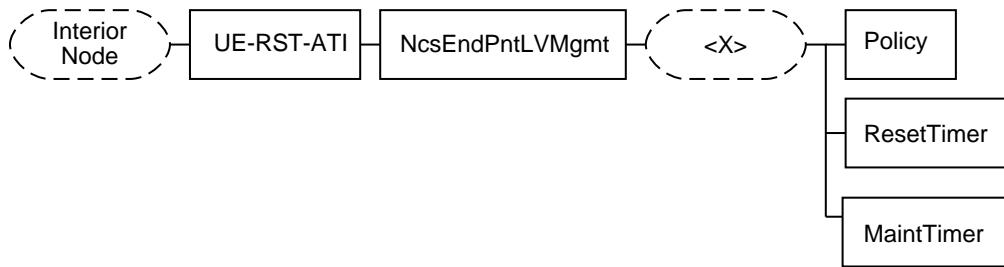


Figure 49 - Node EndPntInfo of UE-RST-ATI OMA Management Object

### C.3.2.8 UE-RST-ATI EndPntInfo MO Node Description

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-ATI/EndPntInfo	current	One	Node	Get
./UE-RST-ATI/EndPntInfo<X>	current	OneOrMore	Node	
./UE-RST-ATI/FgnPotSupport/<X>/FgnPotSupport	current	OneOrZero	bin	Get
./UE-RST-ATI/FgnPotDescr/<X>/FgnPotDescr	current	OneOrZero	chr	Get
./UE-RST-ATI/ClrFgnPotTsts/<X>/ClrFgnPotTsts	current	OneOrZero	bin	Get, Replace
./UE-RST-ATI/RunFgnPotTsts/<X>/RunFgnPotTsts	current	OneOrZero	bin	Get, Replace
./UE-RST-ATI/FgnTestValidity/<X>/FgnTestValidity	current	OneOrZero	bin	Get
./UE-RST-ATI/FgnTestResults/<X>/FgnTestResults	current	OneOrZero	bin	Get

**C.3.2.9 UE-RST-ATI NcsEndPntLVMgmt Node MO tree**

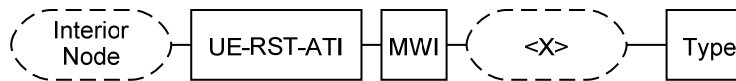


**Figure 50 - Node NcsEndPntLVMgmt of UE-RST-ATI OMA Management Object**

**C.3.2.10 UE-RST-ATI NcsEndPntLVMgmt MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-ATI/NcsEndPntLVMgmt	current	One	Node	Get
./UE-RST-ATI/NcsEndPntLVMgmt<X>	current	OneOrMore	Node	
./UE-RST-ATI/Policy/<X>/Policy	current	OneOrZero	int	Get, Replace
./UE-RST-ATI/ResetTimer/<X>/ResetTimer	current	OneOrZero	int	Get, Replace
./UE-RST-ATI/MaintTimer/<X>/MaintTimer	current	OneOrZero	int	Get, Replace

**C.3.2.11 UE-RST-ATI MWI Node MO tree**



**Figure 51 - Node MWI of UE-RST-ATI OMA Management Object**

**C.3.2.12 UE-RST-ATI MWI MO Node Description**

MO Element	Status	Occurrence	Format	Access Type
./UE-RST-ATI/MWI	current	One	Node	Get
./UE-RST-ATI/MWI<X>	current	OneOrMore	Node	
./UE-RST-ATI/Type/<X>/Type	current	OneOrZero	int	Add, Get, Replace

**C.4 UE-RST-ATI OMA Device Description Framework (DDF)**

```
<?xml version="1.0"?>
<MgmtTree xmlns:uml="http://schema.omg.org/spec/UML/2.0"
xmlns:xmi="http://schema.omg.org/spec/XMI/2.1"
xmlns:CL_Custom="http://www.magicdraw.com/schemas/CL_Custom.xmi">
  <VerDTD>1.2</VerDTD>
  <Man>PacketCable - Cable Laboratories Inc.</Man>
  <!--This DDF considers as model the UE MO (as defined in the PacketCable
specifications) followed by a colon character (e.g., UE-RST-ATI:) -->
  <Mod>UE-RST-ATI:</Mod>
  <Node>
    <NodeName>UE-RST-ATI</NodeName>
    <Path>./Pktc2</Path>
```

```

    <DFProperties>
      <AccessType>
        <Get/>
      </AccessType>
      <DefaultValue/>
      <Description>The node that defines the UE-RST-ATI MO
tree.</Description>
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        <node/>
      </DFFormat>
      <Occurrence>
        <One/>
      </Occurrence>
      <Scope>
        <Permanent/>
      </Scope>
      <DFTitle>The interior node holding all nodes of the PacketCable
UE-RST-ATI MO three</DFTitle>
      <DFType>
        <DDFName>urn:cablelabs:pktc2:oma:dm:ue-rst-ati</DDFName>
      </DFType>
      <CaseSense>
        <CIS/>
      </CaseSense>
    </DFProperties>
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      <NodeName>NetDisc</NodeName>
      <DFProperties>
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        </AccessType>
        <DFFormat>
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        </DFFormat>
        <Occurrence>
          <One/>
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          <DDFName/>
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      </DFProperties>
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          </DFFormat>
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            <OneOrMore/>
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            <DDFName/>
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        </DFProperties>
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  </Node>

```

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        </AccessType>
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```

```

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        </Occurrence>
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```

```

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```

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```

```
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</MgmtTree>
```

## Annex D CODEC Enumeration (Normative)

Table 46 - CODEC Enumeration

CODEC	Literal CODEC Name	CODEC ID
Reserved	Reserved	1
Reserved	Reserved	2
G.729	g729	3
Reserved	Reserved	4
G.729E	g729E	5
G.711 u-law	pcmu	6
G.726-32 (32 kbit/s)	g726at32	7
G.728	g728	8
G.711 a-law	pcma	9
G.726-16 (16 kbit/s)	g726at16	10
G.726-24 (24 kbit/s)	g726at24	11
G.726-40 (40 kbit/s)	g726at40	12
iLBC (IETF internet low bit rate codec)	ilbc	13
BroadVoice™ 16	bv16	14
Telephone event (represents RFC4733 DTMF events)	telephone-event	15
AMR (Adaptive Multirate Compression)	amr	16
SMV - Interleaved/Bundled (Selectable Mode Vocoder)	smvIB	17
SMV - Header-Free (Selectable Mode Vocoder)	smvHF	18
EVRC - Interleaved/Bundled (Enhanced Variable Rate)	evrcIB	19
EVRC - Header-Free (Enhanced Variable Rate)	evrcHF	20
T.38 using RTP	t38Rtp	21

## Annex E RST UE Management Events

Event Name	Default Severity for Event	Default Display String	Packet-Cable EventID	Comments
RST-EV-1	informational	"RDI Activity Status Changed from <value> to <value>"	4000980000	The event is generated each time the "RDI Activity Status" data element changes its value.

## Appendix I      Acknowledgements

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