SatLabs System Recommendations
Part 3 – Management & Control Planes Specifications

Version 2.0

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Document history

Revision	Date	Changes
1.1	03-07-2003	First version
1.2	02-12-2005	Updated version defining the SatLabs Qualification programme baseline
2.0	15-11-2006	Second version, defining Version 1 and Version 2 recommendations.

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1 References

[1] ETSI EN 301 790 v.1.4.1, “Digital Video Broadcasting (DVB); Interaction channel for satellite distribution systems” (2005-09)

[2] IETF STD62 - RFC 3416, Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP), December 2002

[3] IETF STD58 – RFC 2579, Textual Conventions for SMIv2, April 1999

[4] IETF STD62 – RFC 3418, Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)

[5] ETSI TR 101 790 v1.3.1, “Digital Video Broadcasting (DVB); Interaction channel for Satellite Distribution Systems; Guidelines for the use of EN 301 790” (2006-09)

[6] ETSI EN 300 468 v1.7.1, "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems" (2006-05)

[7] IETF STD33 – RFC 1350, The TFTP Protocol (Revision 2), July 1992

[8] IETF STD9 – RFC 959, File Transfer Protocol, October 1985

[9] IETF RFC 2131, Dynamic Host Configuration Protocol, March 1997

[10] IETF STD033 - RFC 1350, Trivial File Transfer Protocol (revision 2), July 1992

[11] IETF RFC 2348, TFTP Blocksize Option, May 1998

[12] IETF RFC 2349, TFTP Timeout Interval and Transfer Size Options, May 1998

[13] IETF RFC 2347, TFTP option format

[14] ETSI TS 102 006, Specification for system SW update in DVB systems

[15] IETF BCP0023 – RFC 2365, Administratively Scoped IP Multicast, July 1998

[16] IETF STD0017 - RFC1213, Management Information Base for Network Management of TCP/IP-based internets: MIB-II, March 1991

[17] IETF RFC 2863, The Interfaces Group MIB, June 2000

[18] IETF RFC 2669, DOCSIS Cable Device MIB Cable Device Management Information Base for DOCSIS compliant Cable Modems and Cable Modem Termination Systems, August 1999

[19] IETF RFC2670, Radio Frequency (RF) Interface Management Information Base for MCNS/DOCSIS compliant RF interfaces, August 1999

[20] http://www.iana.org/assignments/ianaiftype-mib

[21] IETF STD 0013 - RFC1034, Domain names – concepts and facilities, November 1987

[22] IETF STD 0013 - RFC1035, Domain names - implementation and specification, November 1987

[23] ETSI EN 300 468 v1.7.1, “Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB Systems” (2005-12)

[24] ETSI EN 302 307 v1.1.2, "Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications" (2006-06)

2 Acronyms

ATM	Asynchronous Transfer Mode
AVBDC	Absolute VBDC
BER	Bit Error Rate
BSM	Broadband Satellite Multimedia – Ad Hoc working group in ETSI under the SES technical body
BTP	Burst Time Plan
CoS	Class of Service
CRA	Continuous Rate Assignment
CSC	Common Signaling Channel
CW	Continuous Wave
DHCP	Dynamic Host Control Protocol
DL	DownLink
DSCP	DiffServ Code Point
DVB	Digital Video Broadcast
ETSI	European Telecommunications Standards Institute
FCAPS	Fault, Configuration, Accounting, Performance, Security
FEC	Forward Error Correction
FL	Forward Link
FTP	File Transfer Protocol
HM&C	Harmonized Management & Control
ICMP	Internet Control Message Protocol
ID	Identifier
IDU	InDoor Unit
IGMP	Internet Group Management Protocol
IP	Internet Protocol
LAN	Local Area Network
MAC	Medium Access Control
MIB	Management Information Base
MF-TDMA	Multi-Frequency TDMA
MMT	Multicast Mapping Table
MODCOD	Modulation/Coding
MPE	Multi-Protocol Encapsulation

MPEG	Motion Picture Expert Group
MSDP	Multicast Software Distribution Protocol
MTU	Maximum Transfer Unit
NCC	Network Control Center
NIT	Network Information Table
NMEA	National Marine Electronics Association
OAM	Operation, Administration and Maintenance
OBR	Out of Band Request
ODU	OutDoor Unit
OID	Object Identifier
PHB	Per Hop Behavior
PID	Packet IDentifier
PMT	Program Map Table
QoS	Quality of Service
RBDC	Rate Based Dynamic Capacity
RC	Request Class
RCS	Return Channel - Satellite
RCST	Return Channel Satellite Terminal
RL	Return Link
SES	Satellite Earth Stations, ETSI technical body
SLA	Service Level Agreement
SMI	Structure of Management Information
SNMP	Simple Network Management Protocol
SNR	Signal to Noise Ratio
SSPA	Solid State Power Amplifier
SW	Software
SWU	Software Upgrade
TBTP	Terminal Burst Time Plan
TDMA	Time Division Multiple Access
TFTP	Trivial File Transfer Protocol
TID	Transfer IDentifier
TIM	Terminal Information Message
TIM-U	TIM Unicast
TS	Transport Stream
UDP	User Datagram Protocol

UL	UpLink
VBDC	Volume Based Dynamic Capacity
VCI	Virtual Channel Identifier
VLAN	Virtual LAN
VPI	Virtual Path Identifier
XML	Extensible Mark-up Language

3 Introduction

This document forms the Part 3 of the SatLabs System Recommendations. It defines Management and Control (M&C) architecture and specifications for DVB-RCS systems [1].

Defining such a reference M&C will allow interoperability between the various RCST manufacturers.

The objectives of these M&C specifications are:

1. Extend interoperability of RCSTs from different vendors.
2. The solution should be based on known and established standards wherever possible.
3. The solution should strive to light agent implementation, to ensure fast and widespread adoption.
4. Focus on the air-interface.
5. No change to the current standard.
6. Enable a controlled way of introducing a new M&C compatible RCST into the network so that the RCST is allowed into the network when its antenna is sufficiently aligned, the Software/Firmware has a sufficiently recent revision and it is sufficiently configured.
7. Enable M&C compatible network support installation, commissioning, management and control of a RCST
8. The solution should focus on the short-term.

4 FCAPS

The RCST lifecycle poses different Management needs for different phases. This can be divided as per the FCAPS model:

1. FCAPS-Fault
2. FCAPS-Configuration
3. FCAPS-Accounting
4. FCAPS-Performance
5. FCAPS-Security

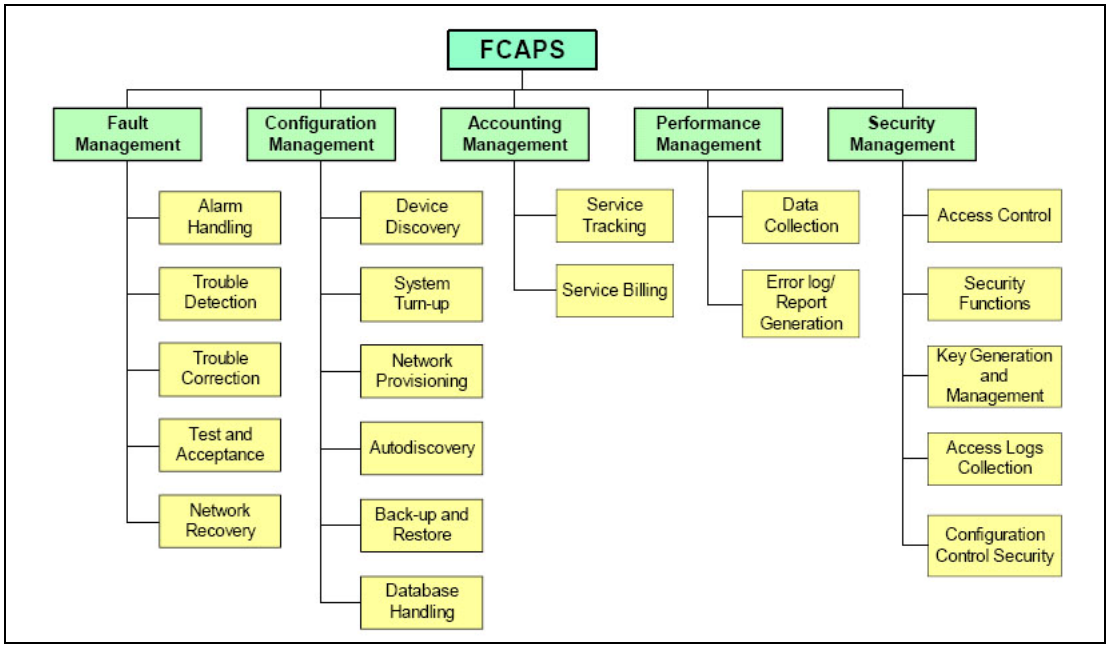


Figure 4-1 - FCAPS

5 Basic Capabilities

This section lists the protocols that must be supported by RCSTs or that can be supported as an option.

5.1 SNMP

The protocol support requirements are as follows:

1. All RCSTs will support SNMP/UDP/IP in their Satellite and Ethernet interfaces. The RCST will be an SNMP agent/client.
2. The RCSTs will support SNMPv2c ([1] and [3]).

The supported MIBs are the following:

1. Standard MIB to mandate and elements (e.g. MIB 2, RMON)

Only the interface (if) and system (sys) subgroups of MIB 2 [4] are mandatory for the Satellite and Ethernet Interfaces.

The other subgroups might be implemented (vendor specific).

2. A common MIB necessary for interoperability is specified.

The common MIB does not mandate the implementation of the MIB specified in the DVB-RCS guidelines [5]. This Common MIB is defined in Appendix G – MIB.

5.2 File Transfer

All RCSTs will have TFTP client [6] capabilities for their satellite interface.

FTP OPTION: a RCST can also implement FTP client [8].

TFTP and/or FTP are used for Configuration file download (see 7.2).

All RCST also support MSDP for Software upgrade (see 12 – Appendix B – SWU)

5.3 ICMP

All RCSTs will answer through the satellite return link to ping messages that are sent to their management IP address via satellite forward link.

5.4 DNS

DNS OPTION: a RCST can implement a DNS client (see [21] and [22]).

If DNS is supported, hostname can replace IP addresses in some configuration parameters (see 17.2.3.2). Such DNS is only used for RCST management operation (e.g. to resolve TFTP or FTP host names). The DNS server is located in the NCC.

6 FCAPS – Fault

6.1 Alarm Handling and Trouble Detection

1. **Definition:** The RCST enables the NCC to detect troubles and handle the alarms. RCST alarms should be sent to an internal RCST log.
2. **Applicable:** Yes
3. **Function Specification:** The RCST allows the collection of information by the NCC. This allows the NCC to understand what might be the cause for trouble and try to solve the problem.
4. **Protocol Spec:** SNMP GET
5. **Basic functions:** n/a
6. **Basic parameters:**
   6.1. *rcstStatus* Group MIB (see section 17.2.3.3)
   6.2. From MIB-II, use the error counters from the interface (if) group (see section 17.2.4.3.2)

6.2 Trouble Correction

1. **Definition:** The RCST enables the NCC to correct troubles.
2. **Applicable:** Yes
3. **Function Specification:** The RCST allows the correction of RCST behavior from NCC.
4. **Protocol Spec:** SNMP SET, TIM (TIM can be used for transmission disable as specified in [1]).
5. **Basic functions:**
   5.1. Reboot.
   5.2. Transmission disable: done through TIM, see [1], or as an option, through SNMP (see 17.2.3.4)
   5.3. User transmission disable: used to disable user traffic (only RCST management traffic can be transmitted)
6. **Basic parameters:**
   6.1. *RebootCommand* (see section 17.2.3.4)
   6.2. *RcstTxDisable* (Optional: see section 17.2.3.4)
   6.3. *UserTrafficDisable* (see section 17.2.3.4)

6.3 Test and Acceptance

1. **Definition:** The RCST enables the NCC to test its functionality and perform acceptance measurements.
2. **Applicable:** Yes
3. **Function Specification:** The RCST allows the NCC to get measurements of information that is needed for acceptance tests and initiate tests (such as CW).
4. **Protocol Spec:** SNMP GET and SET, TIM

5. Basic functions:

5.1. SNR measurements

5.2. Forward link BER measurements.

5.3. CW On/Off

5.4. Tx Disable, Tx Enable, Wake-Up and Log-on and off at the MAC Layer as mandated by [1].

6. Basic parameters:

6.1 *rcstActionsRebootCommand* (see section 17.2.3.4)
Forces the RCST to reboot:
(1) - idle
(2) - normal reboot (from current software load)
(3) - reboot from alternate load (swap to alternate load before reboot)

6.2 rcstConfigFwdLinkStatusBER (see section 17.2.3.2.3)

Provides the RCST BER on the Forward Link.

6.3 rcstConfigFwdLinkStatusSNR (see section 17.2.3.2.3)

Provides the RCST SNR on the Forward Link.

6.4 *rcstActionsCWEnable* (see section 17.2.3.4)

Forces the RCST to start CW transmission.

6.5 *rcstActionsRcstLogonCommand* (see section 17.2.3.4)

Optional: Initiates a RCST logon.

6.6 *rcstActionsRcstLogoffCommand* (see section 17.2.3.4)

Optional: Initiates a RCST logoff (see 13 - Appendix C – Graceful Logoff Process from NCC).

7 FCAPS – Configuration

7.1 System Turn-up and Service Provisioning

1. **Definition:** The RCST enables the NCC to validate its configuration and allow it to go on-line.
2. **Applicable:** Yes
3. **Function Specification:** The RCST allows the NCC to check its Software image and trigger a Software download if needed.
4. **Protocol Spec:** SNMP GET and SET
5. **Basic functions:**

When the RCST boot, it will first verify that its SW image is adequate and only then will the RCST go online (see 12 – Software upgrade).

The transition between SW download and going online is vendor specific (some vendors might choose to go through re-boot to achieve this).

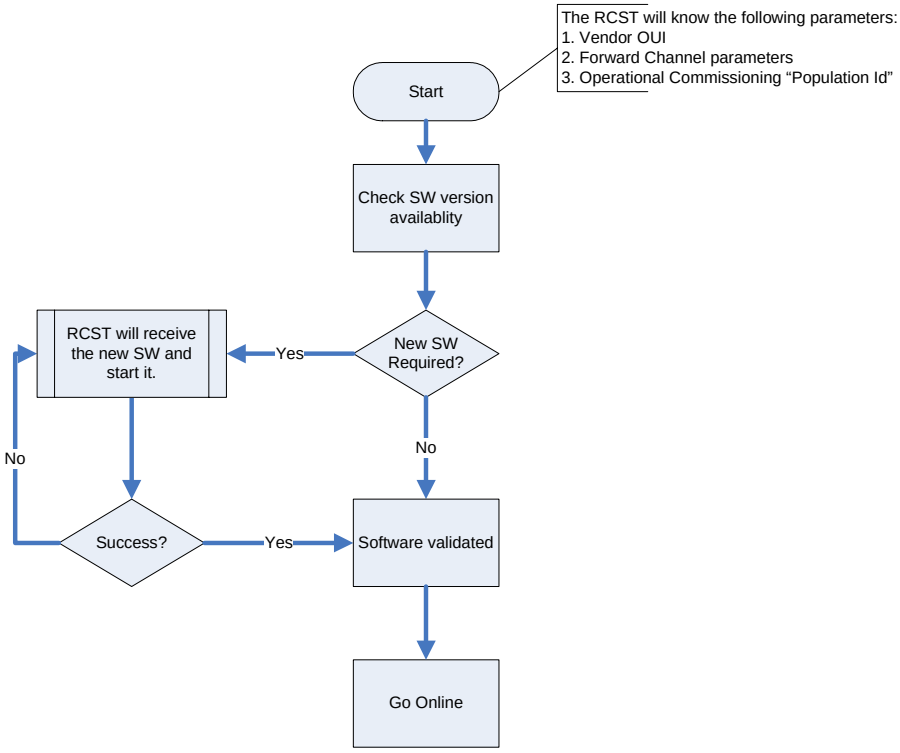


Figure 7-1 – System turn-up

6. **Basic parameters:**

   6.1 *CurrentSoftwareVersion* (see 17.2.3.3)

   Is the current software version running on the RCST. It is also provided through the CSC burst (see [1]).

6.2 *AlternateSoftwareVersion* (see 17.2.3.3)

Is the alternate software version downloaded on the RCST.

6.3 *DownloadStatus* (see 17.2.3.3)

Tells whether the download of the SW was a success or not.

6.4 *rcstActionsRebootCommand* (see section 17.2.3.4)
forces the RCST to reboot:

(1) - idle
(2) - normal reboot (from current software load)
(3) - reboot from alternate load (swap to alternate load before reboot)

Note: as the software version field of the CSC burst is only 8-bit long, it does not represent the exact software version. The value assigned in the CSC for a given software load should be vendor specific. Vendors will need to publish a mapping table that relates the value reported in the CSC burst to the actual software version. The NCC should use the MAC address (in the CSC) to discriminate between vendors that may report the same value in the CSC burst.

7.2 Installation and commissioning

1. **Definition**: Installation and commissioning of the RCST
2. **Applicable**: Yes
3. **Function Specification**: The RCST allows the NCC to detect it is in Installation mode, drive the RCST antenna alignment. Mandatory commissioning parameters are configured. As an option (INSTALL_LOG option), the NCC can retrieve an installation log file from the RCST.
4. **Protocol Spec**: SNMP GET and SET (and DHCP as an option)
5. **Basic functions**:

In order for the RCST to start working at the MAC level, the installer can use the LAN interface to configure some initial parameters (forward link frequency etc.) through SNMP. Supported parameters through this interface are listed in 16 - Appendix F – Mandatory commissioning and installation parameters supported via LAN interface.
Section 14describes the mandatory commissioning parameters.
Section 15 describes the mandatory installation parameters.

DHCP OPTION: Dynamic Configuration of RCST management Address. The RCST will have a DHCP client [9] that will enable it to automatically acquire its management IP address from the NCC (Assuming the NCC act as a DHCP server). If the NLID/TIM-U option is supported by the RCST, the RCST management IP address can be configured this way.

The solution should minimize Return-Channel satellite traffic before Antenna alignment is achieved since until this phase is over, the risk for the RCST to interfere with other networks is high.

The RCST will have a “Population Id” parameter that could take different (it could be the same) values depending on the RCST operating mode: Installation and Operational. The "Population Id” will have a default value (Installation Population ID) that all RCSTs from all vendors will have when they leave the factory. This value will be "0". Nevertheless, the RCST shall give the Installer the option to change this value if needed. The value for the Operational mode (Operational Population ID) replacing the Installation Population ID will be given to the RCST as described in the following procedure.

1. When in Installation Mode, the RCST will:
    a. Use "Installation Population Id" as the RCST "Population Id" and Network ID
    b. Set the “RCST mode" field in the "RCST capability" structure to "Installation Mode" (see CSC burst description in [1] – section 6.2.3).

    Every RCST MUST allow the installer to set the above parameters.
2. The RCST will perform MAC logon to this channel.
3. The Hub will detect the fact that the RCST is in "Installation Mode" and will not assign the RCST any SYNC slots. The RCST will not fail due to that and will continue work (without any transmissions) but the TIM has to be received.
4. The NCC will instruct the RCST to enter CW mode and will send it relevant parameters for the alignment process every time interval.
    a. These parameters are SNMP objects
    b. This SNMP message will be sent to the terminal via SNMP/UDP/IP.
    c. The parameters are described in 14 - Appendix D – Mandatory Commissioning Parameters.
5. The RCST will use this information to assist in the antenna alignment process.
6. The RCST will transmit CW
7. The RCST will wait in this condition until the NCC informs it of the process result (Antenna Alignment State is SET to Success or Fail) or "CW Max Duration" period is over.
8. Once alignment is achieved, the RCST should:
    a. Set the “RCST mode" field in the "RCST capability" structure of the CSC burst (see [1]) to "Operational Mode".
    b. Load its "Operational Population Id" to the "Population Id".
    c. Start the Operational state machine.

When INSTALL_LOG option is supported, an installation log file can be created on the installer’s computer and downloaded to the RCST. This log file can then be retrieved from the RCST by the NCC or by the installer via the LAN.

6. **Basic parameters:**

See 14 - Appendix D – Mandatory Commissioning Parameters,

15 - Appendix E - Mandatory Installation Parameters,

And 16 - Appendix F – Mandatory commissioning and installation parameters supported via LAN interface.

6.1 *RcstMode* (see 17.2.3.3)

Tells whether the RCST is in installation or operational mode. The same object also allows, through SET, to switch a RCST back into installation mode.

6.2 *rcstActionsCWEnable* (see section 17.2.3.4)

Forces the RCST to start CW transmission.

6.3 *rcstConfigNetworkInstallLogFileDownloadUrl* (see section 17.2.3.2.1)

Full path of the installation log file to download.

6.4 *rcstConfigNetworkInstallLogFileUploadUrl* (see section 17.2.3.2.1)

Full path of the installation log file.

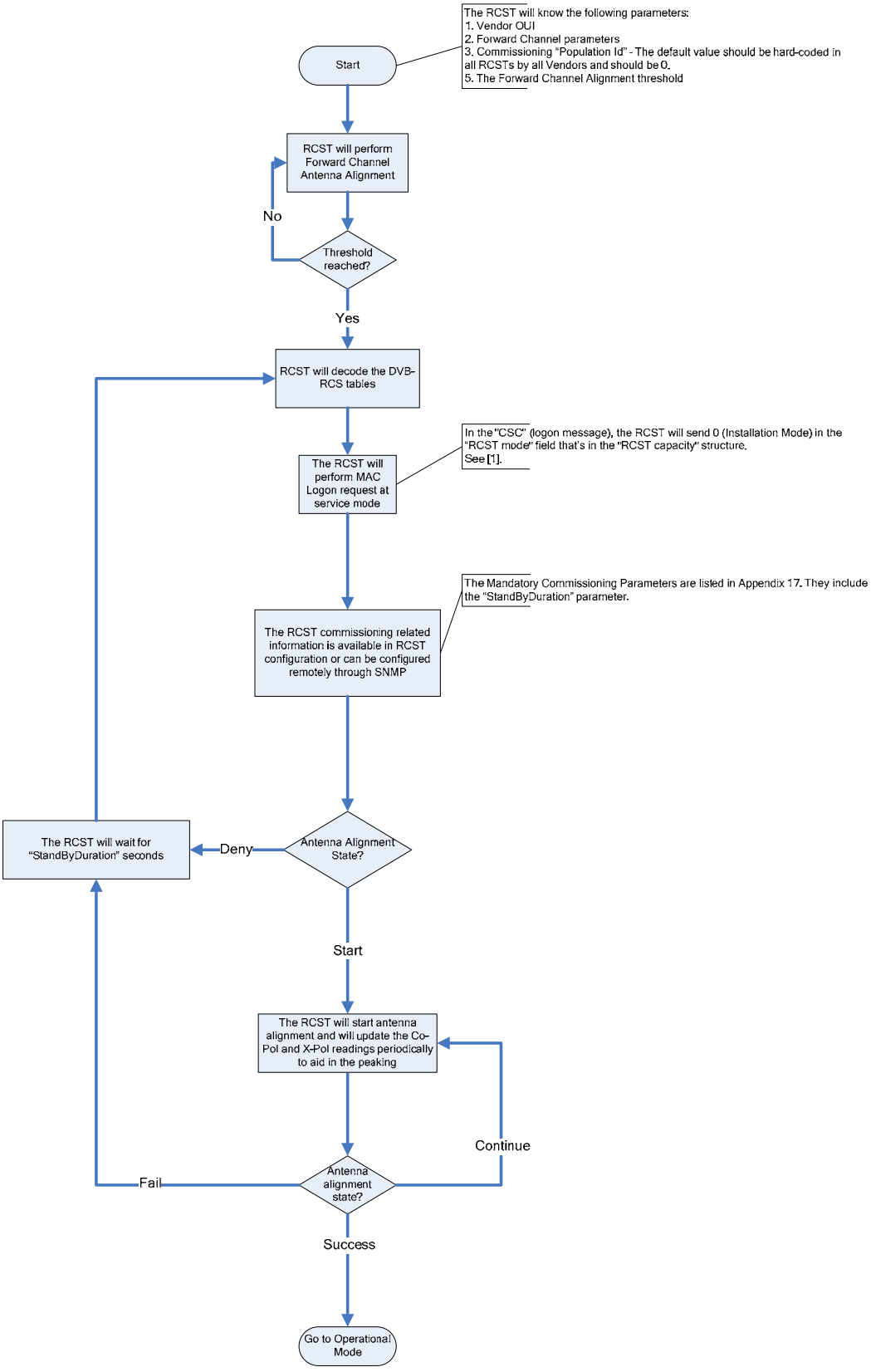


Figure 7-2 – RCST commissioning

7.3 Configuration delivery (Service provisioning)

1. **Definition**: RCST configuration
2. **Applicable**: Yes
3. **Function Specification**: The RCST allows the NCC to download a configuration file.
4. **Protocol Spec**: SNMP SET, TFTP (option FTP), TIM-unicast
5. **Basic functions**:

The need for configuration arises at two cases:

1. Installation time
2. Configuration Updates

The solution should allow the RCST to download the configuration file only when it is needed (configuration was changed).

TIM-unicast can be used to transfer the Return Interaction Path (RIP) descriptor [1]. RIP conveys the supported mapping of Request Classes (RC) to VPI/VCI (or PID pool). Please refer to Part 2: QoS Specifications for the definition of PID pool. The Channel_ID field is used to indicate the RC associated with the VPI/VCI (or PID pool).

RCST SHALL support RIP descriptor [1]. The RIP parameters can be delivered via the configuration file as well.

TFTP (or FTP as an option) can be used to transfer the configuration file from the NCC (server) to the RCST (client).
The version of the configuration file is a Display String. The file version shall be contained in the file and its calculation is vendor specific.
The configuration file download will proceed as follows:

1. Configuration will start after the installation parameters were entered and after the RCST has performed MAC level logon.
2. The NCC will send SNMP SET *ConfigFileDownloadUrl* (which includes the TFTP or FTP server IP address)
3. The NCC will send SNMP SET *DownloadFileCommand* for configuration file
4. The RCST will use TFTP or FTP and the above information to download the configuration file. Once downloaded, the RCST validates the configuration file and checks the file version. Upon a successful validation and check, *PendingConfigFileVersion* is updated with the version of the file that was just downloaded.
5. The NCC will send SNMP SET *ActivateConfigFileCommand* at the desired time of activation (immediately following the *DownloadFileCommand* or at a later time). In some RCST implementation, it may be required

for the RCST to reboot in order to take into account the new configuration file (vendor specific). Once the configuration file is activated, the *CurrentConfigFileVersion* is updated with the file version.

Full configuration of common elements defined by HM&C has to be supported (not delta configuration with changes detection).

If a local change occurs at the RCST, it is superseded by the Configuration File received from NCC.

A configuration file is always sent in full for the common parameters.

No security requirement is associated to configuration file download.

6. Basic parameters:

Section 11 describes the mandatory parameters in the Configuration file.

The RC to Channel_ID mapping can be configured through RIP, the Configuration file or SNMP (Write option for parameters defined in 17.2.3.2.4). The latest received by an RCST always takes precedence and overwrites the configuration.

6.1 *rcstStatusCurrentConfigFileVersion* (see section 17.2.3.3)

Version of the activated configuration file. Version is vendor specific.

6.2 rcstStatusPendingConfigFileVersion (see section 17.2.3.3)

Version of the last downloaded configuration file. Version is vendor specific.

6.3 rcstConfigNetworkConfigFileDownloadUrl (see section 17.2.3.2.1)

Full path name for the configuration file download.

6.4 rcstActionsDownloadFileCommand (see section 17.2.3.4)

This variable shall initiate a RCST configuration file download process

(1) idle

(2) download RCST configuration file from TFTP/FTP server

6.5 rcstActionsActivateConfigFileCommand (see section 17.2.3.4)

Triggers the RCST to use the configuration file and update its parameters accordingly. Some RCST implementation may require a reboot for the parameters to take effect (vendor specific).

(1) Idle

(2) activate

Note: at each reboot, the RCST update its parameters with the current configuration. After a new configuration file is downloaded, the RCST can update its parameters after receiving the *ActivateConfigFileCommand* or at the next reboot, whichever comes first.

Configuration File format:

The syntax will be XML with the following requirements:

1. The file will be opened by any standard XML viewer/parser
2. Every parameter in the file will have a SNMP OID and this will be the unique identifier for the parameter
3. The minimal set of attributes are
   a. SNMP OID (it is important since it allows to make unique identification of objects in particular wrt private ones)
   b. Value
4. The following can be added/changed without any need for change in the minimal XML parser
   a. Additional information for a parameter; the additional information will be captured, but will not be processed. The parser will not crash
   b. Additional parameters; for additional parameters with unknown tags, the parser will capture the info and it will not be processed. The parser will not crash.
   c. Structured or flat XML

<**Element**>

```
<Parameter ID="1.3.6.1.4.1.7352.3.5.3.5.1.1.0">
        <Value>1</Value>
</Parameter>
<Parameter ID="1.3.6.1.4.1.7352.3.5.3.1.1.2.12">
        <Value>0</Value>
</Parameter>
```

</Element>

The first is a scalar parameter and the second is a table instance parameter.

7.4 Software update

1. **Definition**: RCST software update
2. **Applicable**: Yes
3. **Function Specification**: The RCST allows the NCC to download software images and command RCST re-boot.
4. **Protocol Spec**: SNMP SET, MSDP (defined in section 12. Appendix B – SWU)
5. **Basic functions**:
   1. The Software Update (SWU) service will run over the forward link as a multicast IP service.
   2. SWU will support multiple SW and control streams

3. SWU will allow the RCST to detect a change in its streamed SW version and to download this version.
4. Reboot command

The procedure makes use of SNMP and requires implementation of the RCST MIB. An RCST image will be distributed to the RCST in one binary file by the NCC. The RCST does not have to maintain one binary file for the image, but does have to provide the SW version upon request by the NCC. The SW version is a string and its structure is RCST vendor specific.

The RCST is required to maintain two images of the software. The images are referred to as the current and alternate images. The current image is the image the RCST is running. The alternate image is the other image and is not running. Therefore the RCST MIB includes two parameters for the associated SW versions (see 17.2.3.3):

- *CurrentSoftwareVersion*
- *AlternateSoftwareVersion*

The RCST software download process shall only update the alternate image.
The software image is received using MSDP as described in section 12. Appendix B – SWU.

It should be noted that the RCST will “take” the new software image if the following conditions are met:

- matches the identifier of the manufacturer (*manufID* parameter for MSDP in 12.7)
- the software version of the downloaded software is different from both the current and alternate software version in the RCST

A new image has to pass the download validation stage. The download validation is done after the file transfer of the new image. The way this validation is performed is vendor specific. It can fail for instance if the checksum is wrong or if the version is too old and cannot be supported by the RCST. Potential step back to a previous version by the RCST is also vendor specific. The software download status is declared a ‘success’ if this validation phase is successful.

After the successful download validation, the RCST may auto-switch to the alternate image (the new one), depending on vendor specific configuration. Such auto-switch will trigger a RCST log-off then log-on.
If no vendor specific configuration allows auto-switch, it will be necessary for the IDU to reboot for the new image to take effect. After the auto-switch or the reboot, the RCST is running the latest software as the current image, and its alternate image is the previous version of software.

In the case the validation had failed, the RCST will re-start receiving the software download stream.
The RCST software download also provides the mechanism to revert to the previous version of software.
This would involve the use of the *RebootCommand* from alternate load (see 17.2.3.4).

6. Basic parameters:

6.1 *rcstStatusDownloadStatus* (see section 17.2.3.3)

Provides some information about the result of the software download process. The following values shall be supported:

(1) success

(2) failure

6.2 rcstStatusCurrentSoftwareVersion (see section 17.2.3.3)

Current software version of the Software Download image.

6.3 rcstStatusAlternateSoftwareVersion (see section 17.2.3.3)

Alternate software version of the Software Download image.

7.5 Device Discovery

Device discovery is not applicable in the short term.

The method in which the NCC will detect the fact that an RCST is available in the management plane is NCC related and not RCST and in any case should be handled in the long-term solution.

The NCC has various ways of achieving this, among which: using periodic pings, using SNMP GET, NCC MAC logon detection capabilities.

7.6 Upload Configuration File

1. **Definition**: Configuration file upload from the RCST to the NCC
2. **Applicable**: Yes
3. **Function Specification**: The RCST allows the NCC to command configuration file upload
4. **Protocol Spec**: SNMP SET, TFTP (option FTP)
5. **Basic functions**:

The RCST will support the upload of its configuration to the NCC in the form of a configuration file.

1. The NCC will send SNMP SET *ConfigFileUploadUrl*
2. The NCC will send SNMP SET *UploadFileCommand* for configuration file
3. The terminal starts the configuration file upload immediately with TFTP (or FTP as an option).

The uploaded configuration file has to reflect the current RCST configuration. This means that any parameter change (through SNMP for instance) has to be reflected in the uploaded file.

The RCST has to update the version parameter in the configuration file if there has been a change in the RCST configuration since the previous version. The format of this version parameter is vendor specific.

6. Basic parameters:

6.1 rcstConfigNetworkConfigFileUploadUrl (see section 17.2.3.2.1)

Full path name for the configuration file upload.

6.2 rcstActionsUploadFileCommand (see section 17.2.3.4)

This variable shall initiate a RCST upload process

(1) idle

(2) upload RCST configuration file to TFTP/FTP server

(3) upload RCST event/alarm log file to TFTP/FTP server

8 FCAPS – Accounting

8.1 Service tracking

N/A

8.2 Service Billing

N/A

9 FCAPS – Performance

9.1 Data Collection

1. **Definition:** Collect data from RCST interfaces
2. **Applicable:** Yes
3. **Function Specification:** The RCST allows the NCC to collect data regarding the traffic on each RCST interface
4. **Protocol Spec:** SNMP GET
5. **Basic functions:**

Objects from the interface (if) and ifMIBObjects subgroups of mib-2 (32-bit format) shall be used (see sections 17.2.4.3.2 and 17.2.4.3.3):

- *ifInOctects*
- *ifOutOctects*
- *ifInUcastPkts*
- *ifOutUcastPkts*
- *ifInErrors*
- *ifOutErrors*
- *ifInDiscards*
- *ifOutDiscards*
- *ifInMulticastPkts*
- *ifOutMulticastPkts*
- *ifInBroadcastPkts*
- *ifOutBroadcastPkts*

9.2 Error/Log report generation

1. **Definition:** Generate error/log report
2. **Applicable:** Yes
3. **Function Specification:** The RCST allows the NCC to trigger the upload of a log file and view the error counters from mib-2.
4. **Protocol Spec:** SNMP GET and SET, TFTP (option FTP)
5. **Basic functions:**

Error counters from the objects in the interface subgroup (if) of mib-2, as defined in section 9.1, shall be used.

SNMP SET is used to set some parameters to get an error log from the terminal to a TFTP Server.

- The NCC will send SNMP SET *LogFileUploadUrl*
- The NCC will send SNMP SET *UploadFileCommand* for log file
- The terminal starts the Log file upload immediately with TFTP (or FTP as an option).

6. Basic parameters:

6.1 *rcstStatusLogUpdated* (see section 17.2.3.3)

Indicates the existence of an updated log file.

6.2 *rcstConfigNetworkLogFileUploadUrl* (see section 17.2.3.2)

Full path of the event log file

6.3 *rcstActionsUploadFileCommand* (see section 17.2.3.4)

This variable shall initiate a RCST upload process:

(1) idle

(2) upload RCST configuration file to TFTP/FTP server

(3) upload RCST event/alarm log file to TFTP/FTP server

9.3 Trending

N/A

10 FCAPS – Security

10.1 RCST access control

1. **Definition:** Access control at the RCST
2. **Applicable:** Yes
3. **Function Specification:** The RCST allows the NCC to trigger a MAC level logoff.
4. **Protocol Spec:** SNMP SET
5. **Basic functions:**

MAC level log-off

Only MAC level (as already defined by the DVB-RCS standard) is mandatory for access control.

The NCC can use SNMP to activate MAC level logoff, as an option.

Section 13 shows this process.

6. Basic parameters:

rcstActionsLogoffCommand (see section 17.2.3.4)

Initiates a RCST logoff.

10.2 Collect RCST access information

N/A

11 Appendix A – Unified set of configuration parameters

List of configuration parameters that each vendor configuration file MUST have:

1. Configuration file identifier (string type)
2. Ethernet IP address (parameter *LANIpAddress* in section 17.2.3.2.1)
3. Ethernet IP subnet mask (parameter *LANIpMask* in section 17.2.3.2.1)
4. SNMP write community string (char string)
5. SNMP read community string (char string)
6. SLA/QoS parameters (see section 17.2.3.2.4)
7. Operational Population ID (parameter *StartConfigPopId* in section 17.2.3.2.3)

The support of all these parameters through SNMP GET is also mandatory except for the SNMP community strings.

12 Appendix B – SWU

12.1 Introduction

The present chapter defines a solution allowing interoperability for *system software update* services and receivers. It is denoted MSDP (Multicast Software Download Protocol). It has been selected to minimize interdependencies between the parties involved. In particular:

- It defines how to locate the stream containing the *system software update service* in a network.
- It defines the signaling information used to locate the *system software update service* in a transport stream (via the PMT or MMT and the information part of the service).
- It defines the transmission of the actual *system software update service* as a standardized IP multicast.
- The protocol is based on OUIs (Organization Unique Identifier) for identifying manufacturer.
- It defines components that can be used to enhance the system software update functionality in an upward compatible way. This provides a standard mechanism for carrying additional information, e.g. update scheduling information, extensive selection and targeting information, action notification, filtering descriptors.

This solution offers all the required functionality as compared with [14], but eliminates the need for costly servers and complex software implementations in the RCST which are associated with the previously proposed techniques. The present solution is standards-based.

12.2 Scope

DVB-RCS terminal software is complex. In order to guarantee the functionality of a terminal as well as increasing its functionality once deployed in the field a software update service is required. The present chapter specifies a mechanism for signaling a software update service and the means to carry the data for such a software update service.

The mechanism takes advantage of the IP capabilities present in a DVB-RCS terminal to keep the lower layer implementation simple and unchanged from the current version of the DVB-RCS specification [1]. It also takes advantage of the multicast capabilities of DVB-S and DVB-S2.

The present chapter does not define the mandatory character of this protocol in a specific context. For example, it does not specify the triggers for software updates or the distribution schedule. Furthermore, it does not preclude the use of proprietary mechanisms for doing a software update. This allows a network to support horizontal market model DVB-RCS terminals. Equally it allows terminals requiring a software update service to be deployed in a network independent way.

12.3 Overview of the Basic Protocol

Any file transfer begins with a request to write a file (WRQ message) or an information (INFO message) telling where the file is located. The connection is automatically opened and the file is sent in fixed length blocks of typically 512 bytes. Each data packet contains one block of data (DATA message). A data packet of less than 512 bytes indicates termination of a transfer.

Most errors cause termination of the connection. Errors are caused by three types of events: not being able to satisfy the request (e.g. access violation), receiving a packet which cannot be explained by a delay or duplication in the network (e.g., an incorrectly formed packet), and losing access to a necessary resource (e.g., memory resources exhausted or access denied during a transfer).

MSDP recognizes only one error condition that does not cause termination, the source port of a received packet being incorrect.

This protocol is very restrictive, in order to simplify implementation. For example, the fixed length blocks makes allocation straightforward.

12.4 Relation to other Protocols

The basis for MSDP is TFTP elements as specified in [10] modified to apply for one way file transfer associated with multicast. TFTP options as specified by [11], [12] and [13] are also used. In addition, application specific options are defined. The TFTP elements are amended with an optional information carousel that supports scaling and increased speed of commissioning.

The MSDP is implemented on top of the Datagram protocol (UDP). Since Datagram is implemented on the Internet protocol, packets will have an Internet header, a Datagram header, and a MSDP header. Additionally, the packets will have an MPE or GSE header for transfer via DVB-S or S2. The MPE/GSE is assumed to apply a multicast MAC address that conforms to RFC1112 i.e. as for an Ethernet multicast MAC address. This is the only dependency on MPE/GSE. This aspect is readily transferable to other encapsulation methods, should they be adopted in future — assuming that they provide multicast functionality. In the following, we refer to MPE as required without repeating this comment.

As shown in Figure 12-1, the order of the contents of a packet will be MPE/GSE header, Internet header, Datagram header, MSDP header and the remainder of the MSDP packet. (This may or may not be data depending on the type of packet as specified in the MSDP header.) MSDP does not specify any of the values in the Internet header. On the other hand, the source and destination port fields of the Datagram header (its format is given in the appendix) are used by MSDP and the length field reflects the size of the MSDP packet. The Transfer IDentifiers (TID's) used by MSDP are

passed to the Datagram layer to be used as ports; therefore they must be between 0 and 65,535. The initialization of TID's is discussed in the section on initial connection protocol.

The MSDP header consists of a 2 byte opcode field which indicates the packet's type (e.g., DATA, etc.) These opcodes and the formats of the various types of packets are discussed further in the section on MSDP packets.

Figure 12-1 - Order of Headers

12.5 Basic MSDP Packet Formats

MSDP supports three types of packets, all of which have been mentioned above:

opcode	operation
2	Write request (WRQ)
3	Data (DATA)
255	Information (INFO)

The MSDP header of a packet contains the opcode associated with that packet.

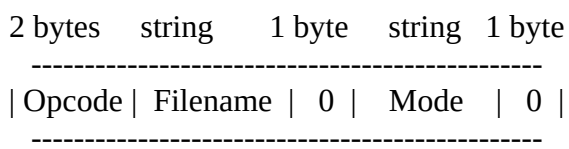


Figure 12-2 - WRQ packet

WRQ packets (opcode 2) have the format shown in Figure 12-2. The file name is a sequence of bytes in netascii terminated by a zero byte. The mode field contains the string "octet" (or any combination of upper and lower case, such as "OCTET", “Octet", etc.) in netascii. Octet mode is used to transfer a file that is in the 8-bit format of the indicated target type.

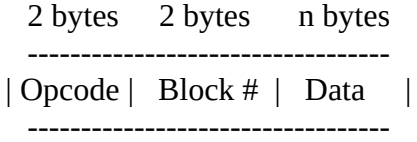


Figure 12-3 - DATA packet

Data is actually transferred in DATA packets depicted in Figure 12-3. DATA packets (opcode = 3) have a block number and data field. The block numbers on data packets begin with one and increase by one for each new block of data. This

restriction allows the program to use a single number to discriminate between new packets and duplicates. The data field is from zero to N bytes long. If it is exactly N bytes long, the block is not the last block of data. If it is from zero to (N-1) bytes long, it signals the end of the transfer. If the file ends with a final data segment of N bytes the transfer will be terminated by a block with a zero length data field. The default value of N is 512. Another block size can be indicated by the parameter ”blksize”.

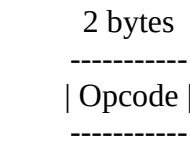


Figure 12-4 - INFO packet

Control information may be transferred regularly in INFO packets depicted in Figure 5-3. INFO packets (opcode = 255) are typically carrying additional parameters. INFO packets may occur anywhere in the stream.

12.6 Parameter transfer

The parameter transfer mechanism specified in this document allows file transfer parameters to be conveyed prior to the transfer using a mechanism that is consistent with MSDP's Request Packet format.

MSDP parameters are appended to the Write Request and Information packets.

Parameters are appended to an MSDP Write Request packet as follows:

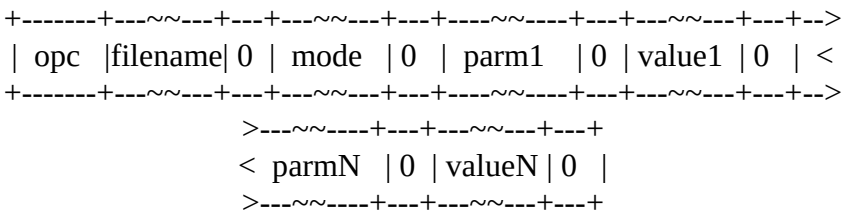


Figure 12-5 – MSDP parameters in WRQ packet

opc

The opcode field contains a 2, for Write Requests, as defined in [10].

filename

The name of the file to be read or written, as defined in [10]. This is a NULL-terminated field.

mode

The mode of the file transfer: "netascii", "octet", or "mail", as defined in [10]. This is a NULL-terminated field.

parm1

The name of the first parameter in case-insensitive ASCII (e.g. blksize). This is a NULL-terminated field.

value1

The value associated with the first parameter, in case-insensitive ASCII. This is a NULL-terminated field.

parmN, valueN

The final parameter/value pair. Each NULL-terminated field is specified in case-insensitive ASCII.

INFO messages have exactly the same layout as WRQ ones. The only difference is their opcode (255 instead of 2) and the fact that they are repeated at a higher rate than the WRQ. The WRQ are sent only once per loop of the data carousel, on the same redirected IP address and UDP port as the data, just before the file is sent. INFO messages may be sent at a higher rate and are sent on the default multicast group and port. The maximum length of INFO messages or write requests is 512 bytes.

The parameter names and values are all NULL-terminated, in keeping with the original request format. If multiple options are to be negotiated, they are appended to each other. The order in which parameters are specified is not significant. The maximum size of a request packet is 512 octets.

12.7 Parameters

Table 12-1 – MSDP parameters

Parameter	*Required functionality (O/M)*	*Presence of the parameter in message (O/M)*	Occurrence	Function	Value
blksize	***M***	***O***	WRQ, INFO	Set the DATA block size to another value than the default of 512 byte	Decimal number of bytes
Tsize	***M***	***M***	WRQ, INFO	Indicate the total transfer size	Decimal number of bytes
manufID	***M***	***M***	WRQ, INFO	Indicate OUI.	24 bit OUI as decimal value
Vendor specific parameters	***O***	***O***	WRQ, INFO	Maximum 10 vendor specific parameters. Server is supposed to support that many parameters. RCST implementation shall not consider the server is able to handle more.	Manufacturer specific
ver	***M***	***O***	WRQ, INFO	Current SW version in the SW distribution carousel, respective to the manufID and vendor specific parameters	Manufacturer specific
minver	***O***	***O***	WRQ, INFO	Indicates the minimum SW version required for log-on, with respect to manufID and vendor specific parameters	Manufacturer specific
method	***O***	***O***	WRQ, INFO	Indicates if the SW update method is different from the default ”immediate”. It can also be ”pending”, i.e. awaiting the next RCST restart.	”immediate” ”pending”
timeout	***O***	***O***	WRQ, INFO	Indicates the timeout when waiting for the next DATA packet, default value is TBC sec.	Decimal seconds
mgroup	***O***	***O***	INFO	Set a custom multicast group address respective to the manufID and vendor specific parameters	Dot separated decimal
port	***O***	***O***	INFO	Set a custom UDP port respective to the manufID and vendor specific parameters	Decimal
PID	***O***	***O***	INFO	Provide PID used for specific download	Decimal number of bytes

An M indicates parameters and functionality that must be supported. An O indicates parameters and functionality that may or should be supported. It some cases the lack of support of the latter type of functionality must be compensated through the capability of manual configuration at the RCST to allow the RCST to be entered into a system that utilizes all capabilities of the MSDP.

If a parameter occurs in an INFO message and the occurrence column states “WRQ, INFO” it should also occurs in the WRQ message.

The MSDP transmitter has to provide the mandatory parameters and may supply the other parameters as required for functionality and consistency.

12.8 Initial Connection Protocol

A transfer may be established by sending an INFO message on the default multicast group and UDP port. In this case the terminal will redirect to a new IP address and port and it will start reading the file on this multicast address and UDP port. A write request should be sent on the redirected IP address and UDP port to signal the beginning of the file. The terminal implementation may either wait for this write request and obtain the data blocks of the file in order (starting from block number 1) or it may just pick in anywhere in the data carousel (not waiting for the write requests) and it may download the file until all block numbers of that file have been received. There should be only one file per redirected IP address and port. In case we introduce new software for a certain terminal we first have to start the data carousel for this software and after that we can start sending the INFO messages. When we redraw old software we first have to stop sending the INFO messages and after that we stop the data carousel.

A transfer may also be established by sending WRQ messages on the default multicast group and port, that the RCST keeps listening even after redirection. In this case the terminal will use the default multicast IP address and UDP port for obtaining the data stream.

If an INFO messages does not contain any redirection a write request is to be expected on the default multicast group and UDP port.

The default multicast group and UDP port is 239.192.0.1 and 49152 unless specified otherwise in the RCST configuration.

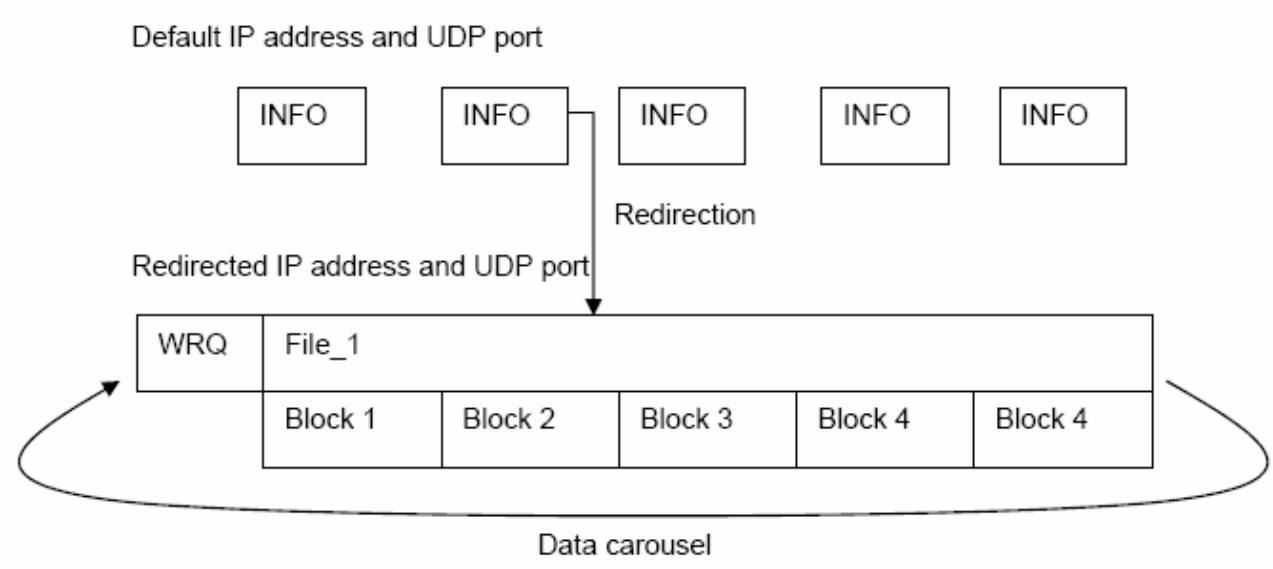


Figure 12-6 – MSDP redirection and carousel

12.9 Service location

Once the IP/DVB service is identified, the RCST will parse the PMT where it may get the PID value carrying the Multicast PID Mapping Table (MMT). From the MMT the RCST will know on which PID(s) it will get its multicast IP traffic.

Before initial logon the service has to be located in a PID that is identified by the PMT to carry MPE or by the MMT as applicable for the specific network. After initial logon and later logons, the service can be located in a PID as defined either by PMT, FIP or MMT as applicable for the specific network. In this functionality the SW distribution function is not differing from other IP multicast.

12.10 Signal sequence and Timing

The RCST has to be capable of receiving DATA packets at a pace of up to 50 kbps. This allows the RCST time to access the data storage. An RCST may have capability to support even higher rates. This is subject to manufacturer specification.

If the RCST has not received the next data packet within a given timeout it shall terminate the file reception and it shall retune to the default multicast group and UDP port.

In case the RCST implementation waits for the write request before storing any data packets, the RCST shall retune to the default multicast group and UDP port if such a request could not be received within 30 minutes.

An RCST that is not engaged in receiving DATA packets shall be capable of decoding INFO packets and write requests (WRQ) on its default multicast group and UDP port.

12.11 Flow diagram

The following procedure occurs after every log-on of the RCST.

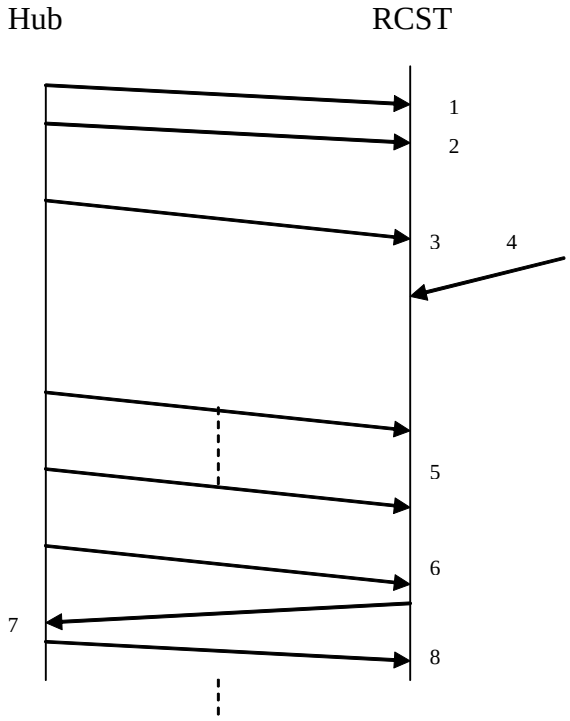


Figure 12-7 – MSDP flow diagram

1. An RCST in initialization mode tunes in to the FL and finds the PID for MMT in the PMT (or uses the PID assigned for IP if MMT is not referenced).
2. It finds the mapping of multicast addresses to PIDs in the MMT (if MMT is provided)
3. It opens up for reception on the configured multicast address and port (normally the default values) and decodes the stream. The stream may include manufacturer specific receiver redirection to another multicast address and port. It may also include additional vendor specific information.
4. The operator may directly set the multicast address and port to be used as entry point (can compensate for lack of redirection information)
5. The RCST opens up PID, Multicast address and port where it expects to find SW update, and receives a file.

As SW update download is completed, the RCST replaces the alternate SW load with the new downloaded SW and updates the *AlternateSoftwareVersion* MIB parameter (see 17.2.3.3) accordingly.

6. In parallel the RCST will acquire the TBTP
7. The RCST can send logon request in CSC slot
8. The hub will respond with TIM-U

Vendor specific configuration can prevent the RCST to log-on until a given SW version has been downloaded. SW version can indeed be checked in the RCST capability field of the CSC burst (see[1]). Otherwise the RCST log-on will proceed in parallel with the SW download.

As an RCST continuously listens to the Forward Link Signaling, the SW download can be triggered at any time when multicast address and port are found.

12.12 Instant for SW download

PMT will indicate either:

- a PID to generally be used for reception of IP (including multicast)
- a PID to use for reception of the MMT (as recommended by SatLabs)

MMT will indicate mapping from supported multicast groups to PID. This mapping is used to identify the PID to be used for a specific multicast group.

12.13 PID differentiation

The SWU information channel can run alone on the default address (locally scoped, all systems) or can be multiplexed with a SW stream/carousel. SW streams can be separated on different multicast addresses that map to different PIDs through MMT.

12.14 Definition of multicast IP address

The SW information channel should be located on the default multicast address. Vendor specific redirection information should be located in this channel. Alternatively the target multicast address and port can be configured manually at the RCST.

The default multicast address should be under control by the network operator and should not be used for user traffic. It is within the local network control block address range. Note that if IGMP (Internet Group Management Protocol) is in use on the FL general IGMP queries can also occur addressed to this address. These will not interfere with MSDP that uses UDP.

The hub should block user traffic on the multicast addresses assigned to SW update to avoid any possibility of conflict. It is e.g. possible to select custom SWU multicast addresses from the Organization Local Scope multicast addresses. Another possibility is to use non-conflicting addresses from the Local Network Control Block, but note that packets with these addresses will not be forwarded by IP routers.

From [15]:

239.192.0.0/14 is defined to be the IPv4 Organization Local Scope, and is the space from which an organization should allocate sub- ranges when defining scopes for private use.

12.15 Transfer error handling

The RCST should filter duplicate packets and should also detect missing packets through the consecutive block numbering. The SW acceptance process of the RCST should include vendor specific consistency control of the received data.

12.16 Vendor specific methods

Additional vendor specific parameters should be included as required. The protocol is designed to be flexible (building on the TFTP).

The RCST should discard any unknown parameters.

12.17 Location of assigned PID

The RCST will detect the PID on which it will listen for the SWU information stream in the following manner:

Before logon:

- either directly on a PID identified by the PMT if the MMT is not defined
- or through MMT lookup

After logon

- either through MMT lookup if the MMT is defined, or
- through the PMT, alternatively also
- through the Forward Interaction Path descriptor (see [1]) received as logon response

13 Appendix C – Graceful Logoff Process from NCC

Figure 13-1 illustrates the graceful logoff process from NCC (which is optional).

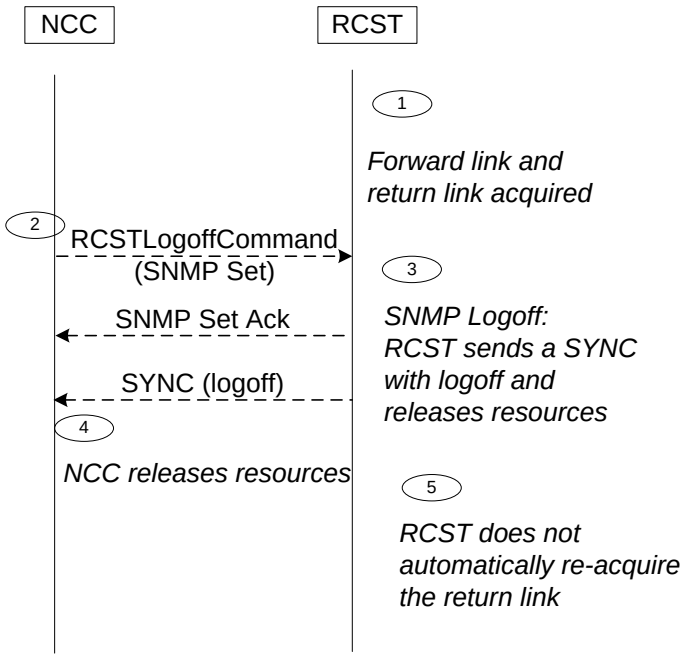


Figure 13-1 - Graceful Logoff Process from NCC

The graceful logoff process from NCC is described as follows:

1. The RCST has acquired the forward and return links.
2. An operator requests an RCST to logoff from the NCC. The NCC sends the SNMP Set – Logoff command (see *RcstLogoffCommand* parameter in 17.2.3.4) to the RCST.
3. The RCST receives the SNMP Set – Logoff command. The RCST replies with an SNMP Ack to the NCC. The RCST sends the SYNC with the logoff message. After, the RCST stops to transmit the SYNC burst. The RCST releases resources.
4. The Hub receives the SYNC with the logoff message. The Hub can release RL QoS resources.
5. The NCC keeps the management IP address association with the terminal for the next logon.
6. The RCST does not automatically re-acquire the return link unless there is traffic coming in. The RCST does not release the forward link

14 Appendix D – Mandatory Commissioning Parameters

The Commissioning Parameters that MUST be supported by all RCSTs are the following:

- MIB parameters defined in section 17.2.3.1.
    a. Antenna Alignment State (1 Byte) (Start, Deny, Continue, Stop, Success, Fail)
    b. CW Frequency [Hz] (8 Bytes)
    c. CW Max Duration [sec] (2 Bytes)
    d. Co-pol reading [0.1dB] (2 Bytes)
    e. X-pol reading (2 Bytes)
    f. Co-pol target (2 Bytes)
    g. X-pol target (2 Bytes)
    h. Time to wait in stand-by mode (2 Bytes)
    i. Target Es/N0 (2 bytes)
    j. Operational Population Id (2 Bytes)
    k. CWEnable (enabled or disabled)
    l. Default Contention Control descriptor parameters (section 17.2.3.2.2)

The above mandatory MIB parameters SHALL be accessible through SNMP GET/SET, at least when RCST user traffic is disabled (see object *userTrafficDisable* in 17.2.3.4).

15 Appendix E - Mandatory Installation Parameters

The Installation Parameters that MUST be supported by all RCSTs are the following:

- MIB parameters:
    a. Forward Channel standard (see section 17.2.3.2.3)
    b. Forward Channel Frequency and Polarization (see section 17.2.3.2.3)
    c. Forward Channel symbol rate (see section 17.2.3.2.3)
    d. Forward Channel modulation and inner FEC (see section 17.2.3.2.3)
    e. Forward Channel roll-off for DVB-S2 (see section 17.2.3.2.3)
    f. Installation population ID (see section 17.2.3.2.3)
    g. RCST Management IP address (see section 17.2.3.2.1)
    h. RCST Location (minimum latitude, longitude and altitude) (see section 17.2.3.1)
    i. Network ID (see section 17.2.3.2.3)
    j. Default values for capacity parameters per RC (see section 17.2.3.2.4)

The support of the previous parameters is mandatory in the RCST MIB. They SHALL be accessible through SNMP GET/SET, at least when RCST user traffic is disabled (see object *userTrafficDisable* in 17.2.3.4).

- SNMP write community string
- SNMP read community string

These previous parameters can be configured through CLI, HTTP or through configuration file download.

16 Appendix F – Mandatory commissioning and installation parameters supported via LAN interface

The mandatory parameters that MUST be accessible through the LAN interface are:

[rcstSystem]MIBVersion

[rcstSystem]Location

If SNMPALL option is supported, [rcstSystem]OduAntennaGain

If SNMPALL option is supported, [rcstSystem]OduSspa

[rcstSystem]OduTxType

[rcstSystem]OduRxType

If SNMPALL option is supported, [rcstSystem]OduRxBand

If SNMPALL option is supported, [rcstSystem]OduRxLO

If SNMPALL option is supported, [rcstSystem]OduTxLO

[rcstSystem]CWFrequency

If SNMPALL option is supported, [rcstSystem]CWPower

[rcstConfigNetwork]LANIpAddress

[rcstConfigNetwork]LANIpMask

[rcstConfigNetwork]OAMIpAddress

[rcstConfigNetwork]OAMIpNetworkMask

[rcstConfigNetwork]OamIpAddrAssign

If SNMPALL option is supported, [rcstConfigNetwork]AirInterfaceDefaultGateway

[rcstConfigNetwork]ConfigFileDownloadUrl

[rcstConfigNetwork]ConfigFileUploadUrl

If INSTALL_LOG option is supported, [rcstConfigNetwork]InstallLogFileDownloadUrl

If INSTALL_LOG option is supported, [rcstConfigNetwork]InstallLogFileUploadUrl

[rcstConfigNetwork]LogFileUploadUrl

[rcstConfigRtnLink]DefIfLevel

[rcstConfigFwdLinkStartConfig]PopID

[rcstConfigFwdLinkStartConfig]Standard

[rcstConfigFwdLinkStartConfig]Freq

[rcstConfigFwdLinkStartConfig]Polar

[rcstConfigFwdLinkStartConfig]Fec

[rcstConfigFwdLinkStartConfig]SymbRate

[rcstConfigFwdLinkStartConfig]Rolloff

[rcstConfigFwdLinkStartConfig]Modulation

[rcstConfigFwdLinkStatus]CNR

If FWDLINKSTATUS option is supported, [rcstConfigFwdLinkStatus]BER

[rcstConfigFwdLinkStatus]NetID

[rcstConfigQoS] Default values for capacity parameters per RC

[rcstStatus]RcstMode

If FWDLINKSTATUS option is supported, [rcstStatus]FwdLinkStatus

If SNMPALL option is supported, [rcstStatus]RtnLinkStatus

[rcstActions]RebootCommand

If SNMPALL option is supported, [rcstActions]RcstTxDisable

[rcstActions]CWEnable

If SNMPALL option is supported, [rcstActions]OduTxReferenceEnable

If SNMPALL option is supported, [rcstActions]OduTxDCEnable

If SNMPALL option is supported, [rcstActions]OduRxDCEnable

[rcstActions]DownloadFileCommand

[rcstActions]UploadFileCommand

[rcstActions]ActivateConfigFileCommand

If SNMPALL option is supported, [rcstActions]RcstLogonCommand

If SNMPALL option is supported, [rcstActions]RcstLogoffCommand

Note that MIB parameters that are optional in the MIB are also optional through LAN access. But if an optional parameter is supported in the MIB and if it is in the above list, its access through the LAN interface has to be supported.

17 Appendix G – MIB

17.1 Structure for DVB-RCS MIB

The DVB-RCS interface MIB is located under the iso.org.dod.internet.mgnt.mib-2 branch. Three sub-groups, system, interfaces and ifMIB, will be used to identify the DVB-RCS interface objects. New ifType labels will be defined for DVB-RCS interface. The DVB-RCS transmission MIB will be located under the iso.org.dod.internet.mgnt.mib-2.transmission. The first ifType for DVB-RCS will be used to identify the DVB-RCS MIB under the transmission tree (referred to as y in Figure 17-1). The sysObjectID from the system group of the mib-2 is used to provide an OID pointer to the vendor-specific dvb-rcs MIB.

The following MIB sets are required in the DVB-RCS:

1. A DVB-RCS interface MIB definition which requires only the system (RFC 1213 [16]) and the interfaces (RFC 2863 [16]) sub-groups. DVB-RCS specific elements are situated in them mib-2 transmission branch.
2. A DVB-RCS vendor-specific MIB (vendor-specific RFC)

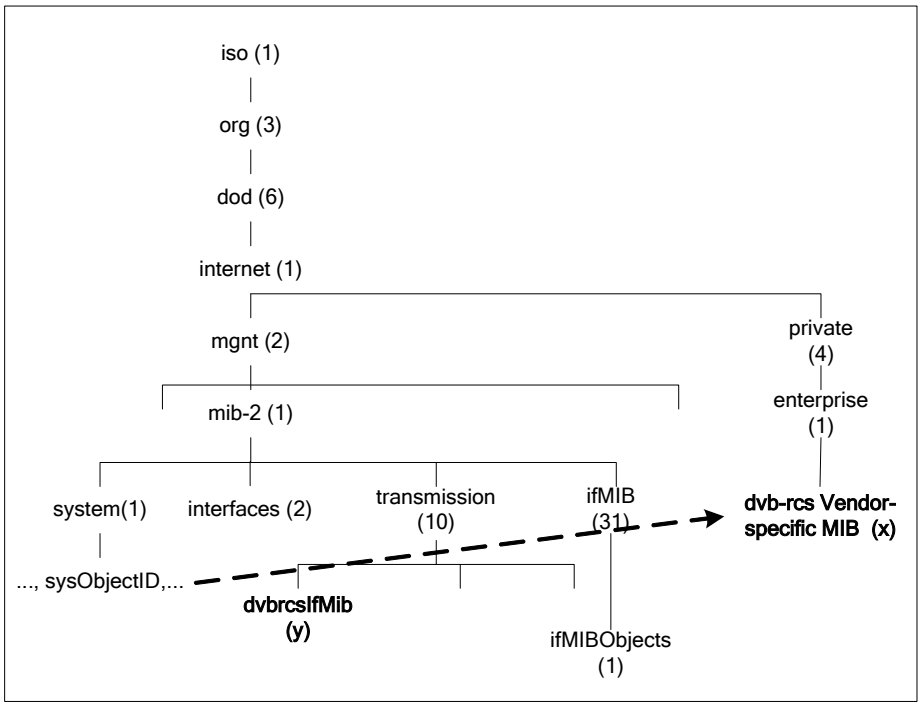


Figure 17-1 - DVB-RCS MIB Tree

17.1.1 DVB-RCS interface MIB Definition

The DVB-RCS interface MIB is described in this section. IANA [20] will reserve five *ifType* labels for DVB-RCS. These values are important as they are the standardized way of identifying the interface type. Interface type is not identified by

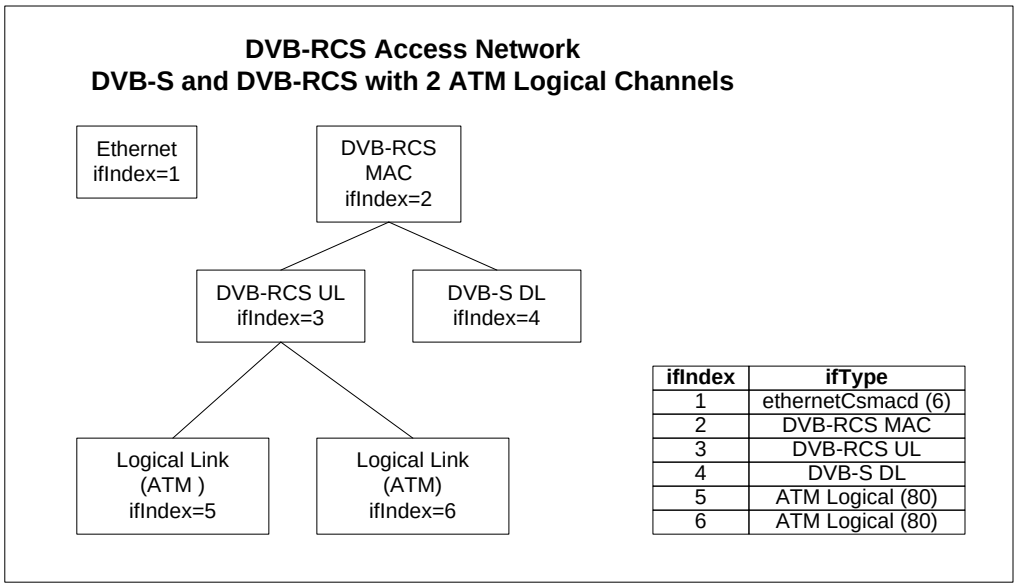
a convention related to the index values – the index value has local significance. The media specific MIB for DVB-RCS should specify the use of the parameters of [16] for these interface types. Each DVB-RCS terminal will thus have at least the three interfaces: dvbRcsMacLayer, dvbRcsUpLink, and one of dvbRcsDvbsDownlink and dvbRcsDvbs2Downlink. The additional Ethernet interface is used on the LAN side of the RCST.

Table 17-1 – ifType labels

New ifType Labels	Name	Description
dvbRcsMacLayer	DVB-RCS MAC Layer	DVB-RCS MAC Layer represents the air interface of a Return Channel Satellite Terminal (RCST), as defined in the DVB-RCS Standard. This interface supports star and mesh networks.
dvbRcsUpLink	DVB-RCS Up Link (UL)	DVB-RCS Up Link (UL) is the transmitted side of the DVB-RCS MAC layer for a terminal in a star network or transparent mesh network.
dvbRcsDownLink	DVB-RCS Down Link (DL)	DVB-RCS Down Link (DL) is the received part of the DVB-RCS MAC layer for a terminal in a transparent mesh network.
dvbRcsDvbsDownLink	DVB-RCS DVB-S Down Link (DL)	DVB-RCS DVB-S Down Link (DL) is the received part of the DVB-S for a terminal in a star network or transparent mesh network.
dvbRcsDvbs2DownLink	DVB-RCS DVB-S2 Down Link (DL)	DVB-RCS DVB-S2 Down Link (DL) is the received part of the DVB-S2 for a terminal in a star network or transparent mesh network.

Eventually, IANA will assign *ifType* numbers and the DVB-RCS IF MIB RFC will be published. Two scenarios, the Access network and the transparent mesh over multiple beams are presented with the structure of different interfaces.

This list of ifType labels provides full flexibility to define a DVB-RCS network. Two examples are given to illustrate only some possibilities. Figure 17-2 illustrates a DVB-RCS Access network with DVB-S and DVB-RCS. In this network, ATM encapsulation is used in the DVB-RCS uplink. DVB-S2 can be used instead of DVB-S in the down link. MPEG can be used as well instead of ATM logical link. The ifType for ATM is 80 and the ifType for MPEG is 214.



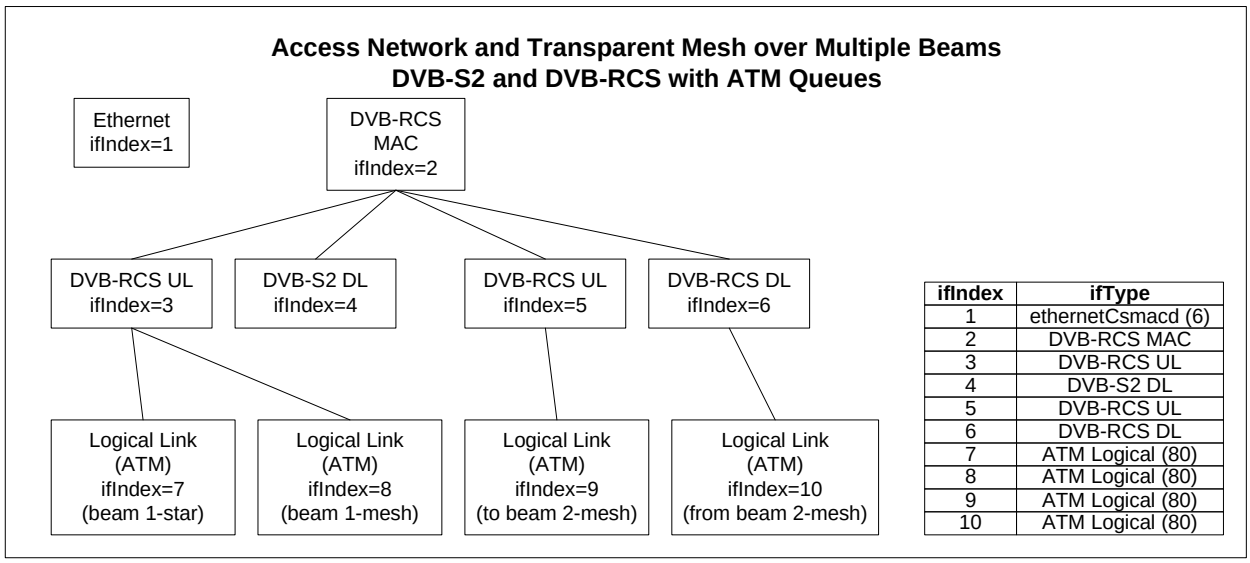
ifIndex	ifType
1	ethernetCsmacd (6)
2	DVB-RCS MAC
3	DVB-RCS UL
4	DVB-S DL
5	ATM Logical (80)
6	ATM Logical (80)

Figure 17-2 - DVB-RCS Access Network

The ifStackTable implementation for this example is:

ifStackHigherLayer	ifStackLowerLayer
0	1
0	2
1	0
2	3
2	4
3	5
3	6
4	0
5	0
6	0

The Figure 17-3 illustrates a DVB-RCS Access network and transparent mesh over multiple beams with DVB-S2 and DVB-RCS. In this network, ATM encapsulation is used in the DVB-RCS uplink.



ifIndex	ifType
1	ethernetCsmacd (6)
2	DVB-RCS MAC
3	DVB-RCS UL
4	DVB-S2 DL
5	DVB-RCS UL
6	DVB-RCS DL
7	ATM Logical (80)
8	ATM Logical (80)
9	ATM Logical (80)
10	ATM Logical (80)

Figure 17-3 - DVB-RCS Access Network and Transparent Mesh with ATM in the Return Link

The ifStackTable implementation for this example is:

ifStackHigherLayer	ifStackLowerLayer
0	1
0	2
1	0
2	3
2	4
2	5
2	6
3	7
3	8
4	0
5	9
6	10
7	0
8	0
9	0
10	0

Per DVB-RCS interface, only some counters from the interfaces group of MIB-II will be supported. The Table 17-2 presents the (M)andatory and (O)ptional counters per DVB-RCS interface. The counters for DVB-RCS MAC, DVB-RCS uplink and DVB-S (or DVB-S2 or DVB-RCS) down link interfaces are required. The counters for other sub-interfaces (ATM and MPEG) are optional.

Table 17-2 - MIB-II Counters for DVB-RCS Interfaces

OID	Name	DVB-RCS MAC	DVB-RCS UL	DVBS DL or DVBS2 DL or DVB-RCS DL	ATM Logical Link (UL)	MPEG Logical Link (UL)	ATM Logical Link (DL)
	Interfaces MIB						
2	ifTable						
2.1	ifEntry						
2.1.1	ifIndex	M	M	M	O	O	O
2.1.2	ifDescr	M	M	M	O	O	O
2.1.3	ifType	M	M	M	O (80)	O (214)	O (80)
2.1.4	ifMtu	M (1500)	M (1500)	M (1500)	O (53)	O (188)	O (53)
2.1.5	ifSpeed		M	M			
2.1.6	ifPhysAddress	M (MAC @)			O (ATM VCC)	O (PID)	O (ATM VCC)
2.1.7	ifAdminStatus	M	M	M	O	O	O
2.1.8	ifOperStatus	M	M	M	O	O	O
2.1.9	ifLastChange	M	M	M	O	O	O
2.1.10	ifInOctets	M		M			O
2.1.11	ifInUcastPkts	M		M			O
2.1.13	ifInDiscards	M		M			O
2.1.14	ifInErrors	M		M			O
2.1.15	ifInUnknownProtos	M		M			O

OID	Name	DVB-RCS MAC	DVB-RCS UL	DVBS DL or DVBS2 DL or DVB-RCS DL	ATM Logical Link (UL)	MPEG Logical Link (UL)	ATM Logical Link (DL)
2.1.16	ifOutOctets	M	M		O	O	
2.1.17	ifOutUcastPkts	M	M		O	O	
2.1.19	ifOutDiscards	M	M		O	O	
2.1.20	ifOutErrors	M	M		O	O	
	ifMIBObjects MIB						
1	ifXTable						
1.1	ifXEntry						
1.1.1	ifName	M	M	M	O	O	O
1.1.2	ifInMulticastPkts	M		M			O
1.1.3	ifInBroadcastPkts	M		M			O
1.1.4	ifOutMulticastPkts	M	M		O	O	
1.1.5	ifOutBroadcastPkts	M	M		O	O	

17.1.2 DVB-RCS Transmission MIB Definition

The DVB-RCS transmission MIB will be included into the mib-2 tree. The mib-2 tree starts with 1.3.6.1.2.1.10, which corresponds to iso / org / dod / internet / mgnt / mib-2 / transmission.

The DVB-RCS transmission specification covers the following object groups:

- Objects for terminal installation
- Objects for QoS
- Objects for network configuration
- Objects for return link configuration
- Objects for terminal status
- Objects to command the terminal (reboot, logoff, logon, download file, upload file)
- Object pointing to an optional proprietary device MIB

17.2 Subset of DVB-RCS MIB – SATLABS

17.2.1 Access Rights

The MAX-ACCESS clause defines whether it makes "protocol sense" to read, write and/or create an instance of the object, or to include its value in a notification. This is the maximal level of access for the object. (This maximal level of access is independent of any administrative authorization policy.) These values are ordered, from least to greatest: "not-accessible", "accessible-for-notify", "read-only", "read-write", "read-create". If any columnar object in a conceptual row has "read-create" as its maximal level of access, then no other columnar object of the same conceptual row may have a maximal access of "read write". (Note that "read-create" is a superset of "read-write".) The write and read access rights of any SNMP object are defined/identified according to the different users/entities. In the RCST MIB definition within the present document, the following notations are used in the scope of the access rights:

- 'W' stands for 'Write' access
- 'R' stands for 'Read' access
- 'N' stands for 'Not-Accessible' access

The access rights to a particular SNMP object are defined cross-checking both the maximum level of access of that SNMP object and the access rights granted to the entity according to its community name.

Table 17-3 describes the relationship between SNMPv2 MIB MAX-ACCESS Value and Protocol Access Mode.

Table 17-3 - relationship between SNMPv2 MIB MAX-ACCESS Value and Protocol Access Mode

SNMPv2 Protocol Operation		
MAX-ACCESS **Value**	READ-ONLY	READ-WRITE
read-only	Available for get and trap operations	
read-write	for get and trap operations	Available for get, set, and trap operations
read-create	Available for get and trap operations	Available for get, set, create, and trap operations
accessible-for-notify	Available for trap operations	
not-accessible	Unavailable	

The table shall be understood as follows. Defining an SNMP object, one has to give it a maximum access. This access is described by the different rows of the table. But every object belongs to the different views defined for each community. Moreover, its access rights are defined in relation with this community. This can be read in the columns of table 1. The intersection of each row and each column defines a kind of 'availability' of the SNMP object as far as the SNMP actions (get, set, trap, etc) are concerned. Hence, when the view access rights of an SNMP object in a particular view are defined as 'Read-Only' while its maximum access rights are 'Read-Write', this means that the object is somehow available to GET and TRAP operations. Indeed, this object is at most readable and, hence, no SET action can be done.

17.2.2 SNMP Objects Syntax

Each SNMP object is of a specific type. There exist numerous types and those are defined in different RFCs. The following comments emanate from those RFCs. The Integer32 type represents integer-valued information between -2^{31} and $2^{31}-1$ inclusive (-2 147 483 648 to 2147483647 decimal). This type is indistinguishable from the INTEGER type. Both the INTEGER and Integer32 types may be sub-typed to be more constrained than the Integer32 type. The INTEGER type (but not the Integer32 type) may also be used to represent integer-valued information as named-number enumerations. In this case, only those named-numbers so enumerated may be present as a value. Note that although it is recommended that enumerated values start at 1 and be numbered contiguously, any valid value for Integer32 is allowed for an enumerated value and, further, enumerated values need not be contiguously assigned. Note that the 'RowStatus' type is a textual convention defined in [3] and shall be implemented as such. This syntax is mainly used to declare dynamic tables. The TimeTicks type represents a non-negative integer which represents the time, modulo 2^{32} (4 294 967 296 decimal), in hundredths of a second between two epochs. When objects are defined which use this ASN.1 type, the description of the object identifies both of the reference epochs. The TimeStamp textual convention is defined in [3] and is based on the TimeTicks type. With a TimeStamp, the first reference epoch is defined as the time when sysUpTime (MIB-II system SNMP object) was zero, and the second reference epoch is defined as the current value of sysUpTime.

17.2.3 DVB-RCS Transmission MIB

The DVB-RCS transmission MIB shall be included into the mib-2 tree. The mib-2 tree starts with 1.3.6.1.2.1.10, which corresponds to iso / org / dod / internet / mgnt / mib-2 / transmission.

The different sub-groups of the DVB-RCS Transmission MIB are illustrated in Figure 17-4.

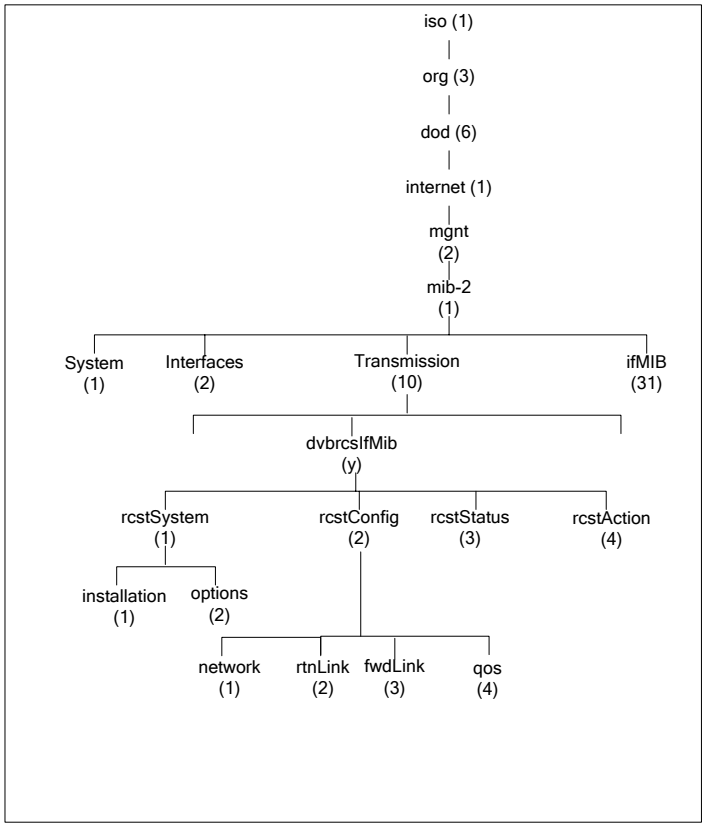


Figure 17-4 - DVB-RCS MIB Structure

17.2.3.1 rcstSystem group (1)

Basically, the SNMP variables of this group shall gather some basic information that would allow anyone to trace the history - the life - of the RCST as well as to get a complete description of its constitution on the component point of view. Lots of parameter will be defined at installation. Hence, a subgroup has been allocated to those.

This group contains all the information related to the RCST installation and the technical staffs that performed this installation. These parameters are believed to stay unchanged once it has been defined during installation. Modification of hardware equipment, maintenance operations and geographical re-location may require an update of those SNMP objects. They are defined in Table 17-4. Note that *rcstSystem.Location* object gives the location of the ODU antenna, which is needed for network operation, while the *system.sysLocation* (MIB-II SNMP OID) provides the location of the IDU unit, which can not be used for the same purpose.

17.2.3.1.1 installation subgroup (1)

This subgroup contains all the information related to the RCST installation and commissioning. Many parameters are believed to stay unchanged once it has been defined during installation. Modification of hardware equipment, maintenance operations and geographical re-location may require an update of those SNMP objects. They are defined in Table 17-4. Note that *rcstSysInstallLocation* object gives the location of the ODU antenna, which is needed for network operation, while the *system.sysLocation* (MIB-II SNMP OID) provides the location of the IDU unit, which can not be used for the same purpose.

Table 17-4 - *dvbrcsIfMib.rcstSystem.installation* sub-group definition

OID	Name RcstSystemInstallation…	Syntax	Access	Description	Satlabs Applicability	Section
1	...MIBVersion	DisplayString Size(0..255)	R	This object is the MIB version. The first version is 1.0	M	7.2
2	...Location	DisplayString Size(0..255)	R W	Physical location of the **ODU antenna** expressed as Longitude, Latitude and Altitude. The format used shall be NMEA 0183, as shown below: Latitude: llll.ll,a (a=N or S) Longitude: yyy.yy,b (b=E or W) Altitude: xxxx.x (in meters) Examples: 4916.46,N Latitude 49 deg. 16.45 min. North 12311.12,W Longitude 123 deg. 11.12 min. West 545.4,M Altitude, Metres, above mean sea level This location and the satellite position are used to calculate the RCST-satellite path delay. Note: The system.sysLocation object of MIB-II provides physical location of the **IDU unit**.	M	7.2

OID	Name RcstSystemInstallation…	Syntax	Access	Description	Satlabs Applicability	Section
3	...OduAntennaSize	DisplayString Size(0..255)	R W	This object gives the diameter of the antenna. This value shall be given in centimeter. Defined at Installation. The object can be used in conjunction with environmental requirements.	O (SNMPALL option)	7.2
4	…OduAntennaGain	Integer32	R W	This field describes the antenna peak gain of the ODU and shall be defined by the installer. The gain shall be given in tenth of dBi for more flexibility, i.e. 46.5 dBi will be represented by 465. Defined at installation.	O (SNMPALL option)	
5	...OduSspa	Integer32	R W	This field describes the SSPA installed in the ODU and shall be defined by the installer. The power shall be given in tenth of Watt for more flexibility, i.e. 0,5 W will be represented by 5, 1 W by 10 and 2 W by 20. Defined at installation.	O (SNMPALL option)	7.2
6	…OduTxType	DisplayString Size(0..255)	R W	Describes the type of transmitter installed in the ODU.	M	
7	…OduRxType	DisplayString Size(0..255)	R W	Describes the type of LNB installed in the ODU, with information such as vendor type, ouput type (single, twin, quad,…), etc..	M	
8	…OduRxBand	Integer	R W	Describes whether High Band or Low Band is selected in the LNB. Specifying High Band results in activation of a 18-26 kHz tone with 0.4-0.8 Vpp in the Rx IFL cable: (0) – High Band (1) – Low Band	O (SNMPALL option)	

OID	Name RcstSystemInstallation…	Syntax	Access	Description	Satlabs Applicability	Section
9	…OduRxLO	Integer32	RW	Frequency of LNB Local Oscillator (in 100 Hz)	O (SNMPALL option)	
10	…OduTxLO	Integer32	RW	Frequency of BUC Local Oscillator (in 100 Hz)	O (SNMPALL option)	
11	…AntennaAlignmentState	Integer	R W	Indicates the state: (1)-Start; (2)-Deny; (3)-Continue; (4)-Stop; (5)-Success; (6)-Fail	M	7.2
12	…CWFrequency	Integer32	R W	Frequency at which the carrier is put up (in 100 Hz). Minimum required precision is 1 kHz.	M	7.2
13	…CWMaxDuration	Integer32	R W	Time after which the carrier must be put down (in seconds)	M	7.2
14	…CWPower	Integer32	R W	Specified in tenth of dBm This parameter allows for fine (manual) tuning of the power setup. Minimum required precision is 1 dBm. It must be configurable while CW signal is on. Once the power has been properly adjusted, the power setup is stored in rcstConfigRtnLinkDefIfLevel.	O (SNMPALL option)	
15	…Co-PolReading	Integer32	R W	Co-Pol measured value (in 0.1 dB)	M	7.2

OID	Name RcstSystemInstallation…	Syntax	Access	Description	Satlabs Applicability	Section
16	…X-PolReading	Integer32	R W	Cross-Pol measured value (in 0.1 dB)	M	7.2
17	…Co-PolTarget	Integer32	R W	Co-Pol target (in 0.1 dB)	M	7.2
18	…X-PolTarget	Integer32	R W	Cross-Pol target (in 0.1 dB)	M	7.2
19	…StandByDuration	Integer32	R W	Time to wait in stand-by mode (in s)	M	7.2
20	...TargetEsNO	Integer32	R W	This value describes the wanted Es/N0 value that enables operation of the return link with the required error performance. The values shall be given in tenth of dB and the initial value shall be equal to 7 dB. The range shall be from 0 dBm to 31.5 dBm with a precision of 0,1 dB.	M	7.2

17.2.3.1.2 options subgroup (2)

This sub-group lists the SatLabs options supported by the RCST.

Table 17-5 - *dvbrcsIfMib.rcstSystem.options* sub-group definition

OID	Name RcstSystemOptions…	Syntax	Access	Description	Satlabs Applicability	Section
1	…MpegTrf	Integer	R	Indicates whether the MPEG_TRF SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1

OID	Name RcstSystemOptions…	Syntax	Access	Description	Satlabs Applicability	Section
2	…CoarseSync	Integer	R	Indicates whether the COARSE_SYNC SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
3	…WideHopp	Integer	R	Indicates whether the WIDE_HOPP SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
4	…FastHopp	Integer	R	Indicates whether the FAST_HOPP SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
5	…DynamicMfTdma	Integer	R	Indicates whether the Dynamic_MF_TDMA SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
6	…RouteId	Integer	R	Indicates whether the ROUTE_ID SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1

OID	Name RcstSystemOptions…	Syntax	Access	Description	Satlabs Applicability	Section
7	…ContentionSync	Integer	R	Indicates whether the CONTENTION_SYNC SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
8	…QpskLow	Integer	R	Indicates whether the QPSKLOW SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
9	…16Apsk	Integer	R	Indicates whether the 16APSK SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
10	…32Apsk	Integer	R	Indicates whether the 32APSK SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
11	…NormalFec	Integer	R	Indicates whether the NORMALFEC SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1

OID	Name RcstSystemOptions…	Syntax	Access	Description	Satlabs Applicability	Section
12	…MultiTs	Integer	R	Indicates whether the MULTITS SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
13	…GsTs	Integer	R	Indicates whether the GSTS SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
14	…EnhQos	Integer	R	Indicates whether the ENHQOS SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
15	…Pep	Integer	R	Indicates whether the PEP SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
16	…Http	Integer	R	Indicates whether the HTTP SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1

OID	Name RcstSystemOptions…	Syntax	Access	Description	Satlabs Applicability	Section
17	…Ftp	Integer	R	Indicates whether the FTP SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
18	…Dhcp	Integer	R	Indicates whether the DHCP SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
19	…Dns	Integer	R	Indicates whether the DNS SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
20	…AvbdcRep	Integer	R	Indicates whether the AVBDC_REP SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
21	…ChIdStrict	Integer	R	Indicates whether the CHID_STRICT SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1

OID	Name RcstSystemOptions…	Syntax	Access	Description	Satlabs Applicability	Section
22	…rcstPara	Integer	R	Indicates whether the RCST_PARA SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
23	…Nlid	Integer	R	Indicates whether the NLID SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
24	…SnmpAll	Integer	R	Indicates whether the SNMPALL SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
25	…InstallLog	Integer	R	Indicates whether the INSTALL_LOG SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1
26	…FwdLinkStatus	Integer	R	Indicates whether the FWDLINKSTATUS SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1

OID	Name RcstSystemOptions…	Syntax	Access	Description	Satlabs Applicability	Section
27	…EnhClassifier	Integer	R	Indicates whether the ENHCLASSIFIER SatLabs option is supported by the RCST: Not supported (0) Supported (1)	M	See SSR – part 1

17.2.3.2 rcstConfig group (2)

This group shall be considered as gathering any data that is useful to get access, maintain and enter a session. Hence, things like synchronization, access management, interface parameters, network settings, user information and the likes are part of this group. Some aspects have been grouped under a common title, *airIf*, in the *lines* group in order to create an interface-dependent subgroup.

17.2.3.2.1 network subgroup (1)

This subgroup shall contain all the SNMP objects related to network parameters. The different SNMP objects are defined in Table 17-6.

In this subgroup, two objects have been defined in order to differentiate between control and user traffic and associate them with a physical interface. Both *rcstConfigNetworkLANIpAddress* (Traffic) and *rcstConfigNetworkOamIpAddress* (OAM) provide the value of the IP address of, respectively, the user traffic and the control flow.

Table 17-6 - *rcstConfig.network* subgroup definition

OID	Name RcstConfigNetwork…	Syntax	Access	Description	Satlabs Applicability	Section
1	...OamIpAddr	IpAddress	R W	OAM IP Address of the RCST. This object used with both *ip* and *interfaces* MIB-II subgroups determines uniquely the interface through which OAM traffic is passing through. Note that the OAM IP address may be statically or dynamically assigned. It is system dependent whether the OAM IP address and the Traffic IP address are the same address.	M	7.3
2	...OamIpNetworkMask	IpAddress	R W	Network Mask for the OAM IP Address.	M	7.3

OID	Name RcstConfigNetwork…	Syntax	Access	Description	Satlabs Applicability	Section
3	...OamIpAddrAssign	INTEGER	R	Identifies whether the OAM IP address is statically ('static' - 1) or dynamically ('dynamic' - 2) assigned.	O (SNMPALL option)	7.3
4	…LANIpAddress	IpAddress	R R W	IP address of the LAN interface	M (read) SNMPALL (write)	7.3
5	…LANIpMask	IpAddress	M: R O: W	Mask for the LAN interface	M SNMPALL (write)	7.3
6	…AirInterfaceDefaultGatewa y	IpAddress	R W	Default Gateway for the air interface	O (SNMPALL option)	7.3
7	…DNSServerIpAddress	IpAddress	R W	IP address of the DNS server in the NCC.	O (DNS option)	5.4
8	…NCCMgtIpAddress	IpAddress	R W	IP address of the management server in the NCC.	O (SNMPALL option)	
9	…ConfigFileDownloadUrl	DisplayString Size(0..255)	R W	Full path name for the configuration file download It includes the protocol type (tftp or ftp) and the associated server IP address or hostname. Hostname can only be used if DNS is supported by the RCST.	M	7.3

OID	Name RcstConfigNetwork…	Syntax	Access	Description	Satlabs Applicability	Section
10	…InstallLogFileDownloadUrl	DisplayString Size(0..255)	R W	Full path of the installation log file to download. It includes the protocol type (tftp or ftp) and the associated server IP address or hostname. Hostname can only be used if DNS is supported by the RCST. The installation log file can be created on the installer's computer and downloaded to the RCST.	O (INSTALL_LOG option)	7.2
11	…ConfigFileUploadUrl	DisplayString Size(0..255)	R W	Full path name for the configuration file upload. It includes the protocol type (tftp or ftp) and the associated server IP address or hostname. Hostname can only be used if DNS is supported by the RCST.	M	7.6
12	…LogFileUploadUrl	DisplayString Size(0..255)	R W	Full path of the event log file. It includes the protocol type (tftp or ftp) and the associated server IP address or hostname. Hostname can only be used if DNS is supported by the RCST.	M	9.2

OID	Name RcstConfigNetwork…	Syntax	Access	Description	Satlabs Applicability	Section
13	…InstallLogFileUploadUrl	DisplayString Size(0..255)	R W	Full path of the installation log file. It includes the protocol type (tftp or ftp) and the associated server IP address or hostname. Hostname can only be used if DNS is supported by the RCST. The installation log file can be retrieved from the RCST by the NCC or by the installer via the LAN.	O (INSTALL_LOG option)	7.2

17.2.3.2.2 rtnLink subgroup (2)

This subgroup contains parameters that enable the NCC to have access to data about the return path.

Up to now, the RCST is only able to deal with one return link at a time. Hence, there was no need to define a table to collect the different SNMP objects, as it will be done for the forward.

Table 17-7 - *rcstConfig.rtnLink* subgroup definition

OID	Name rcstConfigRtnLink…	Syntax	Access	Description	Satlabs Applicability	Section
1	...MaxEirp	Integer32	R W	Maximum allowed EIRP in tenth of dBm on the return link.	O (SNMPALL option)	7.2
2	...DefIfLevel	Integer32	R W	Default transmitted IF power level, specified in tenth of dBm, out of the IDU for sending a CSC burst at RCST reboot or power on. Applies to all signals transmitted by RCST (CW and traffic) immediately	M	7.2

17.2.3.2.3 fwdLink subgroup (3)

This subgroup contains parameters that enable the NCC to have access to data about the forward path.

The information of the FwdLinkStartConfig table are used for the first time the RCST tries to acquire the FL. All these objects values are aligned with the Satellite Delivery System Descriptor in the NIT table [23].

The objects in the FwdLinkStatus table are aligned with the satellite forward path descriptor form the RMT [1] and with the Physical Layer (PL) Header [24], which specified the MODCOD (modulation and FEC rate) and the Type (frame length short of long and the presence/absence of pilots). The Transmission Mode support table (TST) is optional for DVB-S2 support, thus can not be used to update the FwdLinkStatus and the TST does not represent the MODCOD in real-time.

Figure 17-5 illustrates different relations between the FwdLink group with the NIT, RMT, PL Frame, TST and the DVB-RCS interfaces.

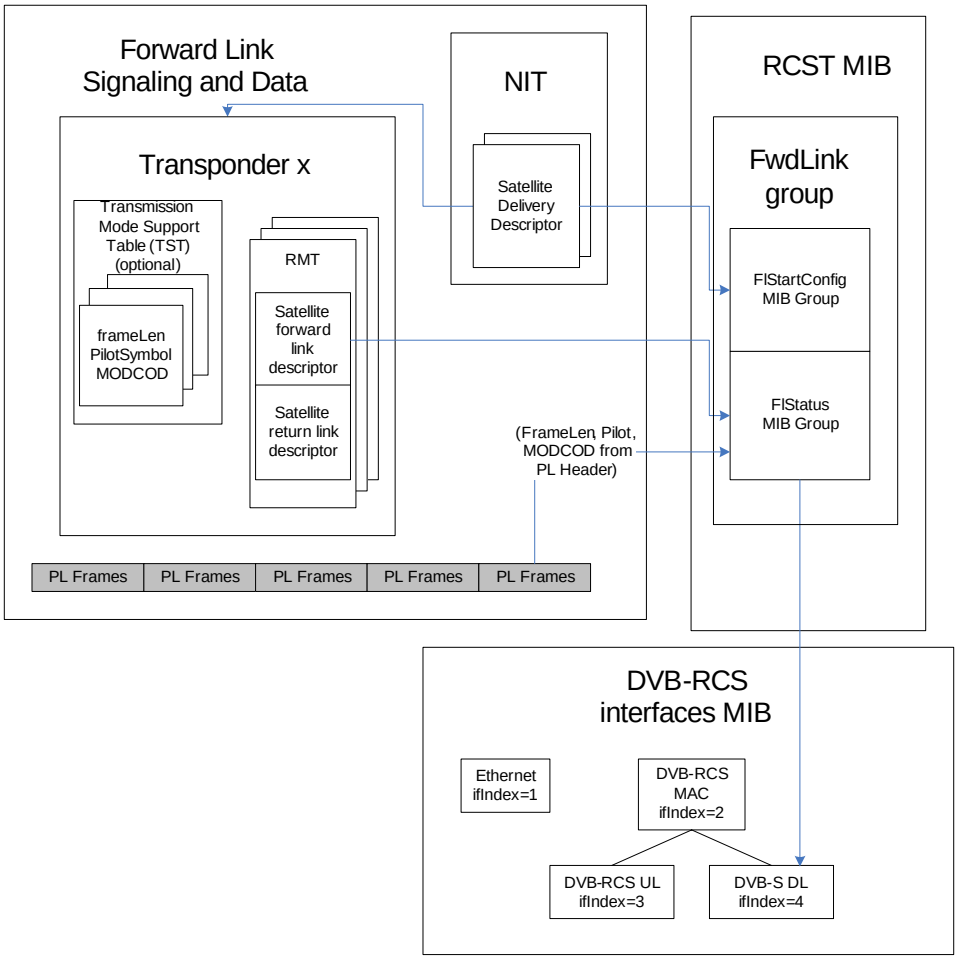


Figure 17-5 – FwdLink group

StartConfig subgroup (1)

Table 17-8 - *rcstConfig.fwdLink.startConfig* subgroup definition

OID	Name **rcstConfigFwdLinkStartConfig…**	Syntax	Access	Description	Satlabs **Applicability**	Section
1	…Table	Sequence of Entry	N	Lists Forward Links attachment points (e.g. different for installation and operation). The table describes the forward link parameters used for the start-up stream with the NCC.	M	
1.1	…Entry	Sequence	N	An entry in the FL StartConfig table.	M	
1.1.1	…Index	Index	R	Index of the FL StartConfig table. For short term, the number of entries is one. An RCST SHALL have at least one entry.	M	
1.1.1.1	... PopId	Integer32	R	Population identifier associated with the start-up forward link: “-1”: any (auto) “0”-“n”: specific StartPopId	M	7.2
1.1.1.2	...Freq	Integer32	R	Frequency of the start transponder carrying a Network Information Table to which any RCST shall trigger to acquire forward link. Its value shall be given in multiple of 100 kHz.	M	7.2

OID	Name rcstConfigFwdLinkStartConfig…	Syntax	Access	Description	Satlabs Applicability	Section
1.1.1.3	..Polar	Integer32	R	2-bit field giving the polarization of the start transponder carrying an Network Information Table to which any RCST shall trigger to acquire forward link: “00”: linear and horizontal “01”: linear and vertical “10”: circular left “11”: circular right	M	7.2
1.1.1.4	...Standard	Integer32	R	Specifies the transmission standard applied on the start transponder. The start transponder carries a Network Information Table that the RCST uses for acquiring the forward link signaling. Supported values are: “-1”: any (auto) “0”: DVB-S “1”: DVB-S2 “4”-“n”: reserved	M	7.2

OID	Name rcstConfigFwdLinkStartConfig…	Syntax	Access	Description	Satlabs Applicability	Section
1.1.1.5	…Modulation	Integer32	R	Specifies the modulation used on the start transponder carrying a NIT to which any RCST shall trigger to acquire forward link. "0": any (auto) "1": QPSK "2": 8PSK Other values shall be as specified in the NIT.	M	7.2
1.1.1.6	…Rolloff	Integer32	R	Specifies the roll-off applied on the start transponder. The start transponder carries a Network Information Table that the RCST uses for acquiring the forward link signaling. This object is only relevant when the transmission standard is 'DVB-S2'. Supported values are: "0": any (auto) "1": 0.35 "2": 0.25 "3": 0.20 "4"-"n": reserved	M	7.2

OID	Name rcstConfigFwdLinkStartConfig…	Syntax	Access	Description	Satlabs Applicability	Section
1.1.1.7	...SymbRate	Integer32	R	Specifies the symbol rate on the start transponder carrying a Network Information Table to which any RCST shall trigger to acquire forward link. Its value shall be given in multiple of 100 symbol/s.	M	7.2
1.1.1.8	...InnerFec	Integer32	R	Specifies the inner Forward Error Correction used on the start transponder carrying a NIT to which any RCST shall trigger to acquire forward link. "0": any (auto) "1": 1/2 "2": 2/3 "3": ¾ “4”: 5/6 "5": 7/8 “6”: 8/9 "7": 3/5 “8”: 4/5 “9”: 9/10 “10”-“14”: reserved "15": No inner code	M	7.2

OID	Name rcstConfigFwdLinkStartConfig…	Syntax	Access	Description	Satlabs Applicability	Section
1.1.1.9	…RowStatus	Integer	R W	Standard SNMP row status: (1) active (2) notInService (3) notReady (4) createAndGo (5) createAndWait (6) Destroy	M	7.2

Status subgroup (2)

Table 17-9 - *rcstConfig.fwdLink.status* subgroup definition

OID	Name rcstConfigFwdLinkStatus…	Syntax	Access	Description	Satlabs applicability	Section
1	…Table	Sequence of Entry	N	This table describes the current status of FL interfaces.	M	
1.1	…Entry	Sequence	N	An entry in the FL Status table. Each entry is associated with a physical interface. A RCST SHALL support at least one entry.	M	
1.1.1	…Index	Index	R	Index of the FL Status table.	M	
1.1.1.1	…IfIndex	Integer32	R	Cross reference to the interface table	M	17.2.4.3.2
1.1.1.2	...NetId	Integer32	R	Interactive network identifier of the forward link (from RMT)	M	7.2

OID	Name rcstConfigFwdLinkStatus…	Syntax	Access	Description	Satlabs applicability	Section
1.1.1.3	…TransmissionStandard	Integer32	R W	Specifies the transmission standard applied on the forward link. Supported values are (from RMT): “0”: DVB-S “1”: DVB-S2 using CCM “2”: DVB-S2 using ACM “3”: reserved	O (FWDLINKSTATUS option)	7.2
1.1.1.4	…Frequency	Integer32	R W	Frequency of the forward link (from RMT). Its value shall be given in multiple of 100 kHz.	O (FWDLINKSTATUS option)	7.2
1.1.1.6	…Polar	Integer32	R W	2-bit field giving the polarization of the forward link (from RMT): “00”: linear and horizontal “01”: linear and vertical “10”: circular left “11”: circular right	O (FWDLINKSTATUS option)	7.2

OID	Name rcstConfigFwdLinkStatus…	Syntax	Access	Description	Satlabs applicability	Section
1.1.1.7	...FecInner	Integer32	R W	Specifies the inner Forward Error Correction of the forward link (from RMT). "0": 1/2 "1": 2/3 "2": 3/4 “3”: 5/6 "4": 7/8 “5-14”: reserved "15": No inner code This object is not used for DVB-S2.	O (FWDLINKSTATUS option)	7.2
1.1.1.8	... SymbolRate	Integer32	R W	Specifies the symbol rate of the forward link (from RMT). Its value shall be given in multiple of 100 symbol/s.	O (FWDLINKSTATUS option)	7.2

OID	Name rcstConfigFwdLinkStatus…	Syntax	Access	Description	Satlabs applicability	Section
1.1.1.9	…Rolloff	Integer32	R W	Specifies the roll-off applied on the forward link (from RMT). This object is only relevant when the transmission standard is 'DVB-S2'. Supported values are: "0": undefined "1": 0.20 "2": 0.25 "3": 0.35 "4"-"15": reserved	O (FWDLINKSTATUS option)	7.2

OID	Name rcstConfigFwdLinkStatus…	Syntax	Access	Description	Satlabs applicability	Section
1.1.1.10	…Modulation	Integer32	R W	Indicates the modulation on the forward link. “0”: undefined “1”: QPSK (DVB-S) “2”: 8PSK “3”: reserved For DVB-S2 with CCM, the MODCOD is fixed. The MODCOD value is obtained from the PL Header of the PL frame every time the RCST acquires the FL. The MODCOD corresponds to the values as defined in the DVB-S2 standard: “1”: QPSK 1/4 “2”: QPSK 1/3 “3”: QPSK 2/5 etc. For DVB-S2 with ACM, the RCST updates the modulation object from the PL Header every 10 sec.	O (FWDLINKSTATUS option)	7.2

OID	Name rcstConfigFwdLinkStatus…	Syntax	Access	Description	Satlabs applicability	Section
1.1.1.11	…FECFrame	Integer32	R	Indicates the frame size of the forward link (from PL header of DVB-S2). This object is only relevant when the transmission standard is 'DVB-S2'. Supported values are: "0": Normal frame "1": Short frame For DVB-S2 with CCM, the frame length is fixed. It is updated from the PL Header every time the RCST acquire the FL. For DVB-S2 with ACM, the RCST updates the frame length object from the PL Header every 10 sec.	O (FWDLINKSTATUS option)	

OID	Name rcstConfigFwdLinkStatus…	Syntax	Access	Description	Satlabs applicability	Section
1.1.1.12	…Pilot	Integer32	R	Indicates if pilot mode is used on the forward link (from PL header of DVB-S2). This object is only relevant when the transmission standard is 'DVB-S2'. Supported values are: "0": Not used "1": In use For DVB-S2 with CCM, the pilot is fixed. It is updated from the PL Header every time the RCST acquire the FL. For DVB-S2 with ACM, the RCST updates the pilot object from the PL Header every 10 sec.	O (FWDLINKSTATUS option)	
1.1.1.13	.. BER	Integer32	R	Provides the RCST BER on the Forward Link in $\log_{10}$ units.	O (FWDLINKSTATUS option)	7.2
1.1.1.14	.. CNR	Integer32	R	Provides the RCST CNR on the Forward Link in 0.1 dB units.	M	7.2

OID	Name **rcstConfigFwdLinkStatus…**	Syntax	Access	Description	Satlabs **applicability**	Section
1.1.1.15	…RowStatus	Integer	R W	Standard SNMP row status: (1) active (2) notInService (3) notReady (4) createAndGo (5) createAndWait *(6)* Destroy	M	7.2

17.2.3.2.4 qos subgroup (4)

This subgroup contains objects to configure the QoS of the RCST by the NCC.

The PktClass table defines the packet classification for IP layer 3 classifications. Some objects part of the IP layer 3 packet classification and layer 2 Ethernet classifications (e.g. MAC address and VLAN id) are not required for short term QoS support. Each PktClass entry is mapped to a PhbEntry in the PhbMapping table.

The PhbMapping table makes the relation between a packet classification entry, a PHB identifier and a Request class entry.

The RequestClass table defines all the layer 2 DVB-RCS QoS parameters.

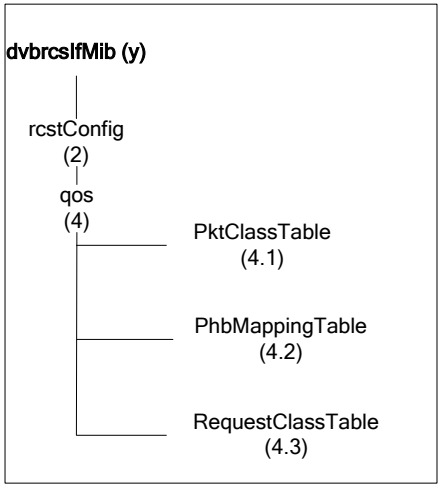


Figure 17-6 - qos Structure

Table 17-10 - *rcstConfig.qos* subgroup

OID	Name qos…	Syntax	Access	Description	Satlabs Applicability	Section
1	…PktClassTable	Sequence of PktClassEntry	N	This table describes the packet classification used in the DVB-RCS terminal. The number of entries is specified by PktClassIndex.	M	See SSR – Part 2
1.1	…PktClassEntry	Sequence	N	An entry in the packet classification table.	M	See SSR – Part 2
1.1.1	…PktClassIndex	Index	R	Index of the packet classification table.	M	See SSR – Part 2
1.1.2	…PktClassDscpLow	Integer	R R W	This object specifies the low value of a range of DSCP values to which a packet is compared.	M (read) ENHCLASSIFIER (write)	See SSR – Part 2
1.1.3	…PktClassDscpHigh	Integer	R R W	This object specifies the high value of a range of DSCP values to which a packet is compared.	M (read) ENHCLASSIFIER (write)	See SSR – Part 2
1.1.4	…PktClassDscpMarkValue	Integer	R R W	This object is the DSCP value used to mark the packet, -1 indicates no DSCP marking, possible DSCP marks values are (0..63)	M (read) ENHCLASSIFIER (write)	See SSR – Part 2
1.1.5	...PktClassIPProtocol	Integer	R W	This object specifies the IP protocol to which a packet is compared.	O (ENHCLASSIFIER option)	See SSR – Part 2
1.1.6	…PktClassIPSrcAddr	IPAddress	R W	This object specifies the IP source address to which a packet is compared.	O (ENHCLASSIFIER option)	See SSR – Part 2
1.1.7	…PktClassIPSrcAddrMask	IPAddress	R W	This object specifies which bits of the IP source address will be matched.	O (ENHCLASSIFIER option)	See SSR – Part 2

OID	Name qos…	Syntax	Access	Description	Satlabs Applicability	Section
1.1.8	…PktClassIPDstAddr	IPAddress	R W	This object specifies the IP destination address to which a packet is compared.	O (ENHCLASSIFIER option)	See SSR – Part 2
1.1.9	…PktClassIPDstAddrMask	IPAddress	R W	This object specifies which bits of the IP destination address will be matched.	O (ENHCLASSIFIER option)	See SSR – Part 2
1.1.10	…PktClassSrcPortLow	Integer	R W	This object specifies the low range of the source port to which a packet is compared.	O (ENHCLASSIFIER option)	See SSR – Part 2
1.1.11	…PktClassSrcPortHigh	Integer	R W	This object specifies the high range of the source port to which a packet is compared.	O (ENHCLASSIFIER option)	See SSR – Part 2
1.1.12	…PktClassDstPortLow	Integer	R W	This object specifies the low range of the destination port to which a packet is compared.	O (ENHCLASSIFIER option)	See SSR – Part 2
1.1.13	…PktClassDstPortHigh	Integer	R W	This object specifies the high range of the destination port to which a packet is compared.	O (ENHCLASSIFIER option)	See SSR – Part 2
1.1.14	…PktClassDstMacAddr	MacAddress	R W	This object specifies the destination MAC address to which a packet is compared.	Not tested	See SSR – Part 2
1.1.15	…PktClassDstMacMask	MacAddress	R W	This object specifies the mask of the destination MAC address to which a packet is compared.	Not tested	See SSR – Part 2
1.1.16	…PktClassSrcMacAddr	MacAddress	R W	This object specifies the source MAC address to which a packet is compared.	Not tested	See SSR – Part 2
1.1.17	…PktClassVlanId	Integer	R W	This object specifies the VLAN id to which a packet is compared.	Not tested	See SSR – Part 2

OID	Name qos…	Syntax	Access	Description	Satlabs Applicability	Section
1.1.18	…PktClassVlanCoS	Integer (0..7)	R W	This object specifies the VLAN Class of Service (CoS) to which a packet is compared.	Not tested	See SSR – Part 2
1.1.19	…PktClassPhbAssociation	Integer	R W	Associate the filter entry to a specific PHB (refer to PhbIndex).	M	See SSR – Part 2
1.1.20	…PktClassRowStatus	Integer	R W	Standard SNMP row status (1) active (2) notInService (3) notReady (4) createAndGo (5) createAndWait (6) Destroy	M	See SSR – Part 2
2	…PhbMappingTable	Sequence of PhbEntry	N	This table is a list of PHB MIB entries. This class describes the PHB mapping with the Request Class. The number of entries is specified by PhbIndex.	M	See SSR – Part 2
2.1	…PhbEntry	Sequence	N	An entry in the PHB mapping table.	M	See SSR – Part 2
2.1.1	…PhbIndex	Index	R	Index of the PHB mapping table. A maximum of 64 entries can be created.	M	See SSR – Part 2
2.1.2	…PhbIdentifier	Integer (0..63)	R R W	Identification of the PHB (0..63).	M (read) SNMPALL (write)	See SSR – Part 2
2.1.3	…PhbName	DisplayString Size(0..255)	R R W	Name of the PHB	M (read) SNMPALL (write)	See SSR – Part 2

OID	Name qos…	Syntax	Access	Description	Satlabs Applicability	Section
2.1.4	…PhbRequestClassAssociation	Integer (0..15)	R R W	This object is an association with this PHB and a Request class entry in the Request class table. (refer to a Request Class index)	M (read) SNMPALL (write)	See SSR – Part 2
2.1.5	…PhbMappingRowStatus	Integer	R R W	Standard SNMP row status (1) active (2) notInService (3) notReady (4) createAndGo (5) createAndWait (6) Destroy	M (read) SNMPALL (write)	See SSR – Part 2
3	…RequestClassTable	Sequence of RequestClassEntry	N	This table is a list of Request class entries. This class describes the layer 2 QoS objects. The number of entries is specified by RequestClassIndex.	M	See SSR – Part 2
3.1	…RequestClassEntry	Sequence	N	An entry in the Request class table.	M	See SSR – Part 2
3.1.1	…RequestClassIndex	Index	R	Index of the Request Class table. A maximum of 16 entries can be created.	M	See SSR – Part 2
3.1.2	…RequestClassName	DisplayString Size(0..255)	R R W	Name of the Request class.	M (read) SNMPALL (write)	See SSR – Part 2
3.1.3	…RequestClassChanId	Integer	R R W	Channel id of the Request class.	M (read) SNMPALL (write)	See SSR – Part 2

OID	Name qos…	Syntax	Access	Description	Satlabs Applicability	Section
3.1.4	…RequestClassVccVpi	Integer	R R W	Defines VPI used for the Request class (ATM profile).	M (read) SNMPALL (write)	See SSR – Part 2
3.1.5	…RequestClassVccVci	Integer	R R W	Defines VCI used for the Request class (ATM profile).	M (read) SNMPALL (write)	See SSR – Part 2
3.1.6	…RequestClassPidTable	Sequence of RequestClassPidEntry	N	This table is a list of PIDs per Request class. The number of entries is specified by RequestClassPidIndex.	O (MPEG option)	See SSR – Part 2
3.1.6.1	…RequestClassPidEntry	Sequence	N	An entry in the Request class PID table.	O (MPEG option)	See SSR – Part 2
3.1.6.1.1	…RequestClassPidIndex	Index	R	Index of the Request class PID table. Only one PID entry is required for short term QoS support	O (MPEG option)	See SSR – Part 2
3.1.6.1.2	…RequestClassPidValue	Integer	R W	Define the PID used for the Request Class. One PID per RC will be used for the short term QoS support.	O (MPEG option)	See SSR – Part 2
3.1.7	…RequestClassCra	Integer	R R W	Define CRA level for the Request class in bit per second (b/s).	M (read) SNMPALL (write)	See SSR – Part 2
3.1.8	…RequestClassRbdcMax	Integer	R R W	Max RBDC that can be requested for the Request class, in number of 2 Kb/s	M (read) SNMPALL (write)	See SSR – Part 2
3.1.9	…RequestClassRbdcTimeout	Integer	R R W	Persistence of the RBDC request, expressed in superframes	M (read) SNMPALL (write)	See SSR – Part 2
3.1.10	…RequestClassVbdcMax	Integer	R R W	Max VBDC that can be requested for the Request class, in payload unit (one ATM cell or one MPEG packet) per superframe	M (read) SNMPALL (write)	See SSR – Part 2

OID	Name qos…	Syntax	Access	Description	Satlabs Applicability	Section
3.1.11	…RequestClassVbdcTimeout	Integer	R R W	Time after which the RCST considers that the pending requests are lost. The RCST may issue new request for that traffic. VBDC Timeout is expressed in superframes.	M (read) SNMPALL (write)	See SSR – Part 2
3.1.12	…RequestClassVbdcMaxBackLog	Integer	R R W	VBDC back Log per Request class. (expressed in bytes)	M (read) SNMPALL (write)	See SSR – Part 2
3.1.13	…RequestClassAvbdcRepTime	Integer	R W	Optional parameter. AVBDC requests can be sent periodically, according to the value of that parameter. AVBDCRepTime is expressed in superframes.	O (AVBDC_REP option)	See SSR – Part 2
3.1.14	…RequestClassRowStatus	Integer	R R W	Standard SNMP row status (1) active (2) notInService (3) notReady (4) createAndGo (5) createAndWait (6) Destroy	M (read) SNMPALL (write)	See SSR – Part 2
4	…GlobalRbdcMax	Integer	R W	The global RBDC max is for information only and it is optional. (expressed in number of 2 kb/s)	O (RCST_PARA option)	See SSR – Part 2
5	…GlobalVbdcMax	Integer	R W	The global VBDC max is for information only and it is optional. (expressed in payload units/superframe)	O (RCST_PARA option)	See SSR – Part 2

OID	Name qos…	Syntax	Access	Description	Satlabs Applicability	Section
6	…GlobalVbdcMaxBackLog	Integer	R W	The global VBDC back log is used only if the VBDC back log is not configured in the Request class. (expressed in bytes)	O (RCST_PARA option)	See SSR – Part 2
7	…GlobalAvbdcRepTime	Integer	R W	The global AVBDC rep time is optional. (expressed in superframes)	O (RCST_PARA option)	See SSR – Part 2
8	…*ChannelIdStrictDispatching*	Integer Default = 0	R W	Indicates whether the RCST will strictly follow RC association when signaled through Channel_ID in the TBTP: No strict association (0) Strict association (1)	O (CHID_STRICT option)	See SSR – Part 2

17.2.3.3 rcstStatus group (3)

This clause shall describe the fault state, software versions and configuration file versions.

Table 17-11 - *dvbrcsIfMib.rcstStatus* group definition

OID	Name **rcstStatus…**	Syntax	Access	Description	Satlabs **Applicability**	Section
1	…RcstMode	INTEGER Default = 0	R W	Allows to identify in which mode the RCST is and to return it to the installation mode when needed. Values for the RCST mode are: Installation (0) Operational (1)	M	
2	...FaultStatus	INTEGER Default = 0	R	Provide the fault status of the terminal. The fault status management is vendor specific. Values for the Fault Status are: no fault (0) fault (1)	M	6.1
3	…FwdLinkStatus	INTEGER Default = 0	R	Provides the status of the RCST Forward Link. Values for the Forward Link Status are: Not acquired (0) Acquired (1)	O (FWDLINKSTATUS option)	

OID	Name rcstStatus…	Syntax	Access	Description	Satlabs Applicability	Section
4	…RtnLinkStatus	INTEGER Default = 0	R	Provides the status of the RCST Return Link. Values for the Return Link Status are: Logged-off (0) Logged-on (1)	O (SNMPALL option)	
5	…LogUpdated	INTEGER Default = 0	R	Indicates the existence of an updated log file: No update (0) Log file updated (1) The RCST should remove the Log file updated indication as the log file is fetched by the NCC.	M	9.2
6	...DownloadStatus	INTEGER	R	Provide some information about the result of the software download process. The following values shall be supported: success (1) failure (2)	M	7.4
7	...CurrentSoftwareVersion	DisplayString Size(0..255)	R	Current software version of the Software Download material.	M	7.4
8	... AlternateSoftwareVersion	DisplayString Size(0..255)	R	Alternate software version of the Software Download material.	M	7.4
9	…CurrentConfigFileVersion	DisplayString Size(0..255)	R	Version of the activated configuration file. Version is vendor specific	M	7.3

OID	Name rcstStatus…	Syntax	Access	Description	Satlabs Applicability	Section
10	…PendingConfigFileVersion	DisplayString Size(0..255)	R	Version of the last downloaded configuration file. Version is vendor specific	M	7.3

17.2.3.4 rcstActions group (4)

This MIB group contains objects a network manager can use to invoke actions and tests supported by the RCST agent and to retrieve the action/test results.

Table 17-12 - *dvbrcsIfMib.rcstActions* subgroup

OID	Name rcstActions…	Syntax	Access	Description	Satlabs Applicability	Section
1	...RebootCommand	INTEGER Default = 1	R W	This variable shall force the RCST to reboot (1)- idle (2)- normal reboot (from current software load) (3)- reboot from alternate load (swap to alternate load before reboot)	M	6.2
2	…RcstTxDisable	INTEGER Default = 1	R W	This variable shall force the RCST to stop transmission (transmit disabled as defined in [1]): (1)- idle (2)- initiate Tx Disabled	O (SNMPALL option)	
3	…UserTrafficDisable	INTEGER Default = 1	R W	This variable shall disable user traffic (only RCST management traffic can be transmitted) (1)- idle (2)- disable user traffic	M	
4	…CWEnable	INTEGER Default = 1	R W	This variable shall force the RCST to start transmission of CW : (1)- off (2)- on	M	7.2

OID	Name rcstActions…	Syntax	Access	Description	Satlabs Applicability	Section
5	…OduTxReferenceEnable	INTEGER Default = 2	R W	Enables activation and deactivation of 10 MHz reference clock in the Tx IFL cable: (1) off (2) on	O (SNMPALL option)	
6	…OduTxDCEnable	INTEGER Default = 2	R W	Enables activation and deactivation of DC in the Tx IFL cable: (1) off (2) on	O (SNMPALL option)	
7	…OduRxDCEnable	INTEGER Default = 2	R W	Enables activation and deactivation of DC in the Rx IFL cable: (1) off (2) on	O (SNMPALL option)	
8	...DownloadFileCommand	INTEGER Default = 1	R W	This variable shall initiate a RCST configuration file download process (1) idle (2) download RCST configuration file from TFTP/FTP server (3) Download RCST installation log file from TFTP/FTP server (INSTALL_LOG OPTION)	M	6.2, 7.3

OID	Name rcstActions…	Syntax	Access	Description	Satlabs Applicability	Section
9	...UploadFileCommand	INTEGER Default = 1	R W	This variable shall initiate a RCST upload process (1) idle (2) upload RCST configuration file to TFTP/FTP server (3) upload RCST event/alarm log file to TFTP/FTP server (4) upload RCST installation log file to TFTP/FTP server (INSTALL_LOG OPTION)	M	7.6
10	…ActivateConfigFileCommand	INTEGER Default = 1	R W	Triggers the RCST to use the configuration file and update its parameters accordingly. Some RCST implementation may require a reboot for the parameters to take effect (vendor specific). (1) Idle (2) activate	M	7.3
11	...RcstLogonCommand	INTEGER Default = 1	R W	This variable shall initiate a RCST logon (1) idle (2) initiate RCST logon	O (SNMPALL option)	6.2
12	...RcstLogoffCommand	INTEGER Default = 1	R W	This variable shall initiate a RCST logoff (1) idle (2) initiate RCST logoff	O (SNMPALL option)	6.2

17.2.4 MIB-II

17.2.4.1 Supported MIB-II Groups

The following MIB-II Groups are applicable to the management of the RCST and shall be supported by the RCST. The supported Objects are specified in the following clauses:

system Group

interfaces Group

17.2.4.2 Objects Not Supported

The MIB-I and MIB-II specifications dictate that for an implementation to claim support for a group, it must support all of the objects in a group. It is certainly permissible for an agent to support only some of the objects in a group, but in that case the vendor cannot claim that the group is supported.

The correct way to handle this situation is for the agent to return the error code *noSuchName* and for the vendor to admit that this particular group is not supported.

17.2.4.3 MIB-II Groups Specifications

Objects of the following MIB-II groups shall be supported as specified.

ID and *Name* identify objects contained in the definition tables. The *ID* specifies the object location in the MIB hierarchy under the group branch; e.g. object *sysContact* in group system has ID 4, and this corresponds to the last digit in the OID string 1.3.6.1.2.1.1.4 specifying the object location.

Individual objects can be accessed in one of the following ways, as defined in the tables' Access column: Read Only (R); Read-Write (RW); Write Only (W); or Not Accessible (N). Write-access in this context is understood to mean from an SNMP Manager or Agent.

17.2.4.3.1 system Group (1)

The system group is under the iso.org.dod.internet.mgnt.mib-2 branch. Some objects of the MIB-II system group shall be supported by the RCST. These objects contain basic system information and are described in Table 17-13.

Table 17-13 - MIB-II *system* Group Objects

OID	Name	Syntax	Access	Description	Satlabs Applicability
1	sysDescr	DisplayString Size(0..255)	R	A text description, which should include some very generic information about the device: type of system (RCST), manufacturer, and date. Replaces rcstSystemInstaller parameters	M
2	sysObjectID	Object Identifier	R	An authoritative identifier assigned to this product by its vendor.	M
3	sysUpTime	TimeTicks	R	The time (in 1/100 th of a second) since the network management portion of the system was last re-initialized.	M
4	sysContact	DisplayString Size(0..255)	R W	A person responsible for the node, along with information such as phone number. Defined at installation. In the scope of the RCS system, this object shall provide all necessary information about the local RCST administrator – Super User.	M
5	sysName	DisplayString Size(0..255)	R W	An administratively assigned name (usually the TCP/IP domain name). Defined at installation.	M

OID	Name	Syntax	Access	Description	Satlabs Applicability
6	sysLocation	DisplayString Size(0..255)	R W	The physical location of the IDU, including street address and GPS co-ordinates expressed as Longitude, Latitude and Altitude. The format used shall be NMEA 0183, as shown below: Latitude: llll.ll,a (a=N or S) Longitude: yyy.yy,b (b=E or W) Altitude: xxxx.x (in meters) Examples: 4916.46,N Latitude 49 deg. 16.45 min. North 12311.12,W Longitude 123 deg. 11.12 min. West 545.4,M Altitude, Metres, above mean sea level Note: The rcstSysInstallLocation object of the RCST MIB provides physical location of the ODU antenna and is used for synchronization purpose.	M

17.2.4.3.2 interfaces Group (2)

The interface group is under the iso.org.dod.internet.mgnt.mib-2 branch. Almost all objects in the MIB-II interfaces group RFC 2863 shall be supported by the RCST. These objects contain configuration, status and performance data for interfaces and are described in Table 17-14.

The interface types supported are ethernetCsmacd, dvbRcsMacLayer, dvbRcsUpLink, and one of dvbRcsDvbsDownlink and dvbRcsDvbs2Downlink.

Table 17-14 - MIB-II *interfaces* Group Objects

OID	Name	Syntax	Access	Description	Satlabs Applicability	Section
1	ifNumber	Integer	R	Total number of network interfaces in the system..	M	9.1
2	ifTable	Sequence of ifEntry	N	List of interface entries. The number of entries is specified by ifNumber.	M	9.1
2.1	ifEntry	Sequence	N	An interface entry containing objects at the sub-network layer and below for a particular interface.	M	9.1
2.1.1	ifIndex	Integer	R	A unique value for each interface.	M	9.1
2.1.2	ifDescr	DisplayString Size(0..255)	R	A unique description for each interface.	M Description is vendor specific	9.1

OID	Name	Syntax	Access	Description	Satlabs Applicability	Section
2.1.3	ifType	IANAifType	R	The type of DVB-RCS interface: dvbRcsMacLayer, dvbRcsUpLink, dvbRcsDownLink, dvbRcsDvbsDownLink, dvbRcsDvbs2DownLink and ethernetCsmacd (6). Optionally the ATM (80) and MPEG (214) interface can be supported as well.	M	9.1
2.1.4	ifMtu	Integer	R	The size (in octets) of the largest protocol data unit that can be sent or received on the interface. For Ethernet, dvbRcsMacLayer, dvbRcsUpLink, dvbRcsDownLink, dvbRcsDvbsDownLink and dvbRcsDvbs2DownLink, the MTU is 1500.	M	6.1

OID	Name	Syntax	Access	Description	Satlabs Applicability	Section
2.1.5	ifSpeed	Gauge	R	For the dvbRcsDvbsDownLink and dvbRcsDvbs2DownLink interfaces, the Speed value is the raw bandwidth in bits/s of this interface. This is the symbol rate multiplied with the number of bits per symbol for the highest modulation profile supported by the terminal. For the dvbRcsUpLink interface, the speed value is the raw bandwidth in bits/s of this interface, regarding the highest modulation profile that is defined for the MF-TDMA super-frame structure and supported by the device. This is the symbol rate multiplied with the number of bits per symbol. For the dvbRcsDownLink interface, the speed value is the raw bandwidth in bits/s of this interface.	M	6.1
2.1.6	ifPhysAddress	PhysAddress	R	This physical address can be the same value for all DVB-RCS interfaces, as well for the Ethernet interface.	M	6.1
2.1.7	ifAdminStatus	Integer	R W	The state of the interface. Supported values are: Up (1); Down (2); Testing (3)	M	6.1

OID	Name	Syntax	Access	Description	Satlabs Applicability	Section
2.1.8	ifOperStatus	Integer:	R	The current operational state of the interface. Supported values are: Up (1); Down (2); Testing (3); Unknown (4); Dormant (5); notPresent (6); lowerlayerDown (7);	M	6.1
2.1.9	ifLastChange	TimeTicks	R	The value of sysUpTime, in 1/100th of seconds, when the interface entered its current operational state. If the operational state of the interface has not changed since power up, the value is 0.	M	6.1
2.1.10	ifInOctets	Counter	R	The total number of octets received on the interface, including framing octets.	M	9.1
2.1.11	ifInUcastPkts	Counter	R	The number of subnetwork unicast packets delivered to a higher layer protocol.	M	9.1
2.1.13	ifInDiscards	Counter	R	The number of inbound packets discarded although no errors were found. This is due to a lack of buffer memory.	M	6.1

OID	Name	Syntax	Access	Description	Satlabs Applicability	Section
2.1.14	ifInErrors	Counter	R	The number of inbound packets discarded because they contain errors.	M	6.1
2.1.15	ifUnknownProtos	Counter	R	The number of inbound packets discarded because of an unknown or unsupported protocol.	M	6.1
2.1.16	ifOutOctets	Counter	R	The total number of octets transmitted out of the interface including framing octets.	M	9.1
2.1.17	ifOutUcastPkts	Counter	R	The total number of unicast packet whose transmission to a single address was requested.	M	9.1
2.1.19	ifOutDiscards	Counter	R	The number of outbound packets that were free of errors but discarded. (i.e. packets that were filtered out, e.g. to free up memory).	M	6.1
2.1.20	ifOutErrors	Counter	R	The number of outbound packets discarded because of errors.	M	6.1

17.2.4.3.3 ifMIBObjects Group (31.1)

The ifMIBObjects group is under the iso.org.dod.internet.mgnt.mib-2.ifMIB branch. Some objects from the ifMIBObjects group RFC 2863 [17] shall be supported by the RCST. These objects contain the if stack table and the performance counters for multicast and broadcast.

Table 17-15 - MIB-II *ifMIB.ifMIBObjects* Group Objects

OID	Name	Syntax	Access	Description	Satlabs Applicability	Section
1	ifXTable	Sequence of ifXEntry	N	List of ifMIB entries. The number of entries is specified by ifXNumber.	M	9.1
1.1	ifXEntry	Sequence	N	An interface entry containing objects at the sub-network layer and below for a particular interface.	M	6.1
1.1.1	ifName	DisplayString Size(0..255)	R	A unique name for each interface.	M Name is vendor specific	6.1
1.1.2	ifInMulticastPkts	Counter32	R	The total number of multicast Pkts received on the interface.	M	6.1
1.1.3	ifInBroadcastPkts	Counter32	R	The total number of broadcast Pkts received on the interface.	M	6.1
1.1.4	ifOutMulticastPkts	Counter32	R	The total number of multicast Pkts received on the interface.	M	6.1
1.1.5	ifOutBroadcastPkts	Counter32	R	The total number of multicast Pkts received on the interface.	M	6.1

OID	Name	Syntax	Access	Description	Satlabs Applicability	Section
2	ifStackTable	Sequence of ifStackEntry	N	This table contains information on the relationships between the multiple sub-layers of network interfaces.	M	
2.1	ifStackEntry	Sequence	N	Information on a particular relationship between two sub-layers, specifying that one sub-layer runs on 'top' of the other sub-layer.	M	
2.1.1	ifStackHigherLayer	Interface index	N	The value of ifIndex corresponding to the higher sub-layer of the relationship. (value can be 0 if there is no higher sub-layer)	M	
2.1.2	ifStackLowerLayer	Interface index	N	The value of ifIndex corresponding to the lower sub-layer of the relationship. (value can be 0 if there is no lower sub-layer)	M	
2.1.3	ifStackStatus	Row Status	R	The status of the relationship between two sub-layers. (Values are active, notInService or destroy)	M	
6	ifStacklastChange	Time Ticks	R	The value of sysUpTime at the time of the last change of the interface stack. (contains 0 if there is no changes since the last re-initialization of the local network management subsystem)	M	

17.2.5 SNMP Response Code

The SNMP Response-PDU error status codes shall be issued in compliance with [1].