EBU Tech 3323



# General conditions for the control of transmitter-related devices and systems using an SNMP interface

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# Contents

1.	Introduction			
2.	Protocols and Definitions			
	2.1	Physical properties / cabling	5	
	2.2	Network protocol	5	
	2.3	Transport protocol	5	
	2.4	Requirements on the SNMP agent	6	
3	Configuration Options			
	3.1	Configuration of the network connection	6	
	3.2	IP configurations	6	
	3.3	Configuration of the SNMP agent	7	
	3.4	Retrofitting	7	
4.	Operating Performance of the Agent		7	
5.	Local	Mode	8	
Ann	iex 1:	List of relevant RFCs	9	
Annex 2:		Command list 1	1	
Annex 3:		IRT-TC-MIB (including source text)1	3	
Annex 4:		Description of the MIB	5	

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#### General conditions for the control of transmitter-related devices and systems using an SNMP interface

EBU Committee	First Issued	Revised	Re-issued
NMC	2008		

Keywords: Transmitter Control, Simple Network Management Protocol, SNMP

#### 1. Introduction

This document recommends a set of elements needed to control transmitter-related devices using an SNMP structure.

The EBU N/CNCS group has been working to define the command and control elements both with a view of standardising them amongst European broadcasters and to aim for a recommendation at IEC level.

The content is based on the work done by the IRT (Institut für Rundfunktechnik) in collaboration with the transmitter management industry.

An equivalent recommendation also exists as German technical recommendation TR5/1.0 part 3 (<u>http://www.irt.de/richtlinien</u>).

This document should be interpreted in conjunction with the IRT-TC-MIB (Transmitter Control-Management Information [data] Base), the source text of which is available at the following address:- <u>http://www.ebu.ch/CMSimages/en/tec\_doc\_t3323-MIB\_tcm6-58179.zip</u>

# 2. Protocols and Definitions

#### 2.1 Physical properties / cabling

- In accordance with ISO / IEC 11801 and/or EN 50173 (Class D/Cat.5).
- Copper optionally fibre optical.
  - Network connection via RJ45 plug connector (min. Cat.5).
  - Optional: LC/SC/ST plug connector (FO multimode).
- The internal cabling must satisfy relevant EMC requirements.
- Maintained power is highly recommended for the SNMP/Network interface,

#### 2.2 Network protocol

Internet Protocol (IP)

#### 2.3 Transport protocol

UDP (optional: TCP in addition).

#### 2.4 Requirements on the SNMP agent

- 1) SNMPv1 and SNMPv2c must be fully implemented. Only currently valid RFCs are accepted. A list of the currently relevant RFCs is contained in Annex 1.
- 2) The current version of the Transmitter Control MIB must be implemented. (Source: http://www.irt.de/richtlinien).
- 3) The SNMP parameters (e.g. community strings, TRAP destinations, IP ports) must not be capable of being modified remotely via non-proprietary protocols and applications. Access must be password protected.
- 4) It must be possible to define at least two concurrent community strings with identical access rights.
- 5) SNMPv2c offers the option of using INFORMs instead of TRAPs. The agent must be able to generate and process INFORMs.
- 6) It must be possible to define at least two concurrent TRAPs/INFORMs destinations, each with their own community string.
- 7) The OIDs (Object Identifiers) in the branches 'TRAP-Enable' and 'TRAP-Priority' are set to the value "1" in the systems' as-delivered condition.
- 8) On enabling a TRAP, the TRAP of the monitored OID shall be sent immediately as confirmation.
- 9) Time stamps in TRAPS must be synchronisable with a reference time (e.g. NTP).
- 10) Every modified configuration must be saved in a non-volatile memory no later than two minutes after the last modification.
- 11) The contents of the OID "mibRelease" in the CommonVarbinds-MIB correspond to the field "LAST-UPDATED" from the Module-Identity-Construct of the respective MIB implemented in the transmitter.

# **3** Configuration Options

#### 3.1 Configuration of the network connection

- 12) Duplex procedures can be permanently set to auto / half / full-duplex
- 13) Data rate can be permanently set to auto, 10 Mbit/s, 100 Mbit/s, etc.

#### 3.2 IP configurations

- 14) It must be possible to configure the IP address, sub-network mask and gateway without restriction.
- 15) Name resolution / DNS must be freely configurable.
- 16) As an option, additional DHCP support for IP address, sub-network mask, gateway, NTP server and DNS service must be available.
- 17) As an option, it must be possible to configure (at least) a second IP address including the routing table (network / host routing). Services must be freely assignable to the IP addresses.

18) The IP address and/or the name of the NTP server, as well as the synchronisation interval, must be configurable.

## 3.3 Configuration of the SNMP agent

- 19) There shall be separate community strings for read and write to the TC-MIB. As specified in *requirement 5*, there shall be at least two strings for each direction. These strings shall all be separately configurable.
- 20) It must be possible to select IP ports separately for TRAPs and requests.
- 21) For each inform sink, it must be possible to set the timeout, the number of repeats and the number of unacknowledged informs (1 ... min. 255).
- 22) It must be possible to set the total of all the non-transmitted TRAPs / informs (min. 255). If the set value is exceeded, the oldest entries are discarded (FIFO).

## 3.4 Retrofitting

It must be possible to convert/upgrade to a newer version of the MIB. This upgrade should be compatible with existing elements of older control applications.

The commercial conditions by which manufacturers supply these updates should be subject to separate arrangements.

# 4. Operating Performance of the Agent

- 23) The agent must be capable of giving an SNMP-RESPONSE to an SNMP-GET with multiple variables; i.e. it must be able to answer an SNMP-GET with multiple OIDs in one SNMP packet.
- 24) In polling mode, the values of the OIDs must reflect the real state of the queried hardware within 5 seconds of a state transition and also be signalled by TRAP within 5 seconds of a state transition, provided that the TRAP is enabled.
- 25) The "Request ID" used during the query by the manager is to be used again in the response (SNMP response).
- 26) The response times for GETs and SETs are to be met in accordance with close 25.
- 27) The agent must work in a stable manner. The stable state of the agent software is characterised by the following points:
  - The devices to be controlled can be operated at all times.
  - The agent always supplies a RESPONSE to all valid REQUESTs.
  - Neither the agent nor the connected device executes a restart during operation without this being requested.
  - The agent's parameter settings are retained during operation and only change because of control actions.
- 28) All the counters shall be zeroed when warm or cold starting the agent. The current state of the device (contained in the saved TRAP mask) is to be transferred after booting up by means of TRAP/notification.
- 29) If system components cannot be accessed internally or the agent is not capable of providing information via these components, the integer value of 0 (undefined) must be

returned in response to a Get, GetNext and GetBulk request for the OID of these system components. At the same time, the error status shall be set to NoError.

If the system is not capable of implementing a received SET request, the command must be correctly acknowledged, although it must not be saved. SNMP set requests are generally acknowledged (if no SNMP error occurs) with NoError and the correct Varbinds-OID (e.g. Local Mode). Trap, notification and SNMP get requests provide information relating to the successful execution of the command.

- 30) If an OID is obsolete, this is to be skipped during a walk<sup>1</sup>. In the case of a REQUEST, the SNMP error 'NOSUCHNAME' is to be used as a response, i.e. the agent behaves as though the OID does not exist.
- 31) To detect lost TRAPs, a global TRAP counter ("eventCounter") is implemented in the CommonVarbinds-MIB. Prior to sending a TRAP/notification, the OID even-Counter value is to be incremented by 1. The current value can be queried using the OID eventCounter.
- 32) The TRAP priority, which is sent with a TRAP, must correspond to the defined priority of the respective event. It carries the OID of the event priority.

## 5. Local Mode

- 33) If a system is operating in "Local Mode", a command (SET) given by SNMP must be correctly acknowledged, although it must not be executed or saved.
- 34) It must be possible to select message suppression in local mode. When message suppression is activated, all the TRAPs with the exception of the 'local mode' TRAP are suppressed. Apart from the OID "local mode", all the other OIDs are to be set to "0" (undefined). Following a changeover from local to remote mode, the current state of all OIDs is to be transferred by TRAP in accordance with the TRAP mask valid at that particular point in time.
- 35) This only applies to the system or subsystem being set to Local mode.

<sup>&</sup>lt;sup>1</sup> "Walk" is an SNMP term meaning to read all the values from an SNMP agent.

# Annex 1: List of relevant RFCs

#### Excerpt from http://rfc.net/rfc-index.html

- 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks. D. Harrington, R. Presuhn, B. Wijnen. December 2002. (Format: TXT=140096 bytes). (Obsoletes RFC2571) (Also STD0062) (Status: STANDARD)
- Message Processing and Dispatching for the Simple Network Management Protocol (SNMP).
  J. Case, D. Harrington, R. Presuhn, B. Wijnen. December 2002. (Format: TXT=95710 bytes). (Obsoletes RFC2572) (Also STD0062) (Status: STANDARD)
- 3413 Simple Network Management Protocol (SNMP) Applications.
  D. Levi, P. Meyer, B. Stewart. December 2002. (Format: TXT=153719 bytes). (Obsoletes RFC2573) (Also STD0062) (Status: STANDARD)
- 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3).
  U. Blumenthal, B. Wijnen. December 2002. (Format: TXT=193558 bytes). (Obsoletes RFC2574) (Also STD0062) (Status: STANDARD)
- 3415 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP).
  B. Wijnen, R. Presuhn, K. McCloghrie. December 2002. (Format: TXT=82046 bytes). (Obsoletes RFC2575) (Also STD0062) (Status: STANDARD)
- 3416 Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP).
  R. Presuhn, Ed.. December 2002. (Format: TXT=70043 bytes). (Obsoletes RFC1905) (Also STD0062) (Status: STANDARD)
- Transport Mappings for the Simple Network Management Protocol (SNMP).
  R. Presuhn, Ed.. December 2002. (Format: TXT=38650 bytes) (Obsoletes RFC1906) (Also STD0062) (Status: STANDARD)
- Management Information Base (MIB) for the Simple Network Management Protocol (SNMP).
  R. Presuhn, Ed. December 2002. (Format: TXT=49096 bytes). (Obsoletes RFC1907) (Also STD0062) (Status: STANDARD)
- 3512 Configuring Networks and Devices with Simple Network Management Protocol (SNMP).
  M. MacFaden, D. Partain, J. Saperia, W. Tackabury. April 2003. (Format: TXT=196529 bytes) (Status: INFORMATIONAL)

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# Annex 2: Command list

For DVB-T, DAB and FM transmitter types, it is subdivided into:

- Single transmitter
- Dual transmitter
- Active reserve
- Passive reserve
- n+1 reserve
- Gap filler (t.b.d.)

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# Annex 3: IRT-TC-MIB (including source text)

The source text is available for download at the following address:-

http://www.ebu.ch/CMSimages/en/tec\_doc\_t3323-MIB\_tcm6-58179.zip

The structure is as follows:

TG 5\_1.0 Part 3.3 IRT-TC-MIB (2006.09.21)\

IRT-COMMONVARBINDS-MIB.smidb IRT-COMMONVARBINDS-MIB.txt IRT-TRANSMITTER-SMI-MIB.smidb IRT-TRANSMITTER-SMI-MIB.txt

#### [DAB]

IRT-DAB-ACTIVERESERVE-MIB.smidb IRT-DAB-ACTIVERESERVE-MIB.txt IRT-DAB-DUALDRIVE-MIB.smidb IRT-DAB-DUALDRIVE-MIB.txt IRT-DAB-NPLUS1-MIB.smidb IRT-DAB-NPLUS1-MIB.txt IRT-DAB-PASSIVERESERVE-MIB.smidb IRT-DAB-PASSIVERESERVE-MIB.txt IRT-DAB-SINGLETRANSMITTER-MIB.smidb IRT-DAB-SINGLETRANSMITTER-MIB.txt

[DVB]

IRT-DVBT-ACTIVERESERVE-MIB.smidb IRT-DVBT-ACTIVERESERVE-MIB.txt IRT-DVBT-DUALDRIVE-MIB.smidb IRT-DVBT-DUALDRIVE-MIB.txt IRT-DVBT-NPLUS1-MIB.smidb IRT-DVBT-NPLUS1-MIB.txt IRT-DVBT-PASSIVERESERVE-MIB.smidb IRT-DVBT-PASSIVERESERVE-MIB.txt IRT-DVBT-SINGLETRANSMITTER-MIB.smidb IRT-DVBT-SINGLETRANSMITTER-MIB.txt

#### [FM]

IRT-FM-ACTIVERESERVE-MIB.smidb IRT-FM-ACTIVERESERVE-MIB.txt IRT-FM-DUALDRIVE-MIB.smidb IRT-FM-DUALDRIVE-MIB.txt IRT-FM-NPLUS1-MIB.smidb IRT-FM-NPLUS1-MIB.txt IRT-FM-PASSIVERESERVE-MIB.smidb IRT-FM-PASSIVERESERVE-MIB.txt IRT-FM-SINGLETRANSMITTER-MIB.smidb IRT-FM-SINGLETRANSMITTER-MIB.txt

# Annex 4: Description of the MIB

The description of the IRT-TC-MIB is only available in English and is stored in the document "TG 5/1.0 Part 3.4 Description of The IRT-TC-MIB".

The TC-MIB (Transmitter Control-Management Information Base) is a set of commands and messages that can be used to control DVB-T, DAB and FM transmitters. These commands and messages are additional to the private MIBs of Manufacturers and will be separately standardised by IEC.

The TC-MIB supports the following TC-MIB standards:

- RFC-1213 (MIBII)
- RFC 2579 (Textual Conventions for SMIv2)

Table of Contents

Chapter 1

- Introduction
- About the MIB
- About the Guide
- Technology

#### Chapter 2

- MIB Structure
- TRANSMITTER-SMI-MIB
- COMMONVARBNIS-MIB