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Proposed RTP Control Protocol Extended Reports (RTCP XR) VoIP Metrics Management Information Base <u>draft-ietf-avt-rtcp-xr-mib-00.txt</u>

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines objects for managing Real-Time Transport Control Protocol Extended Reports (RTCP XR) VoIP Metrics (<u>RFC3611</u>).

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1. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to <u>section 7 of RFC 3410</u> [<u>RFC 3410</u>].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, <u>RFC 2578 [RFC2578]</u>, STD 58, <u>RFC 2579 [RFC2579]</u> and STD 58, <u>RFC 2580</u>].

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Overview

An "RTP System" may be a host end-system that runs an application program that sends or receives RTP data packets, or it may be an intermediate-system that forwards RTP packets. RTP Control Protocol (RTCP) packets are sent by senders and receivers to convey information about RTP packet transmission and reception [RFC3550]. RTP monitors may collect RTCP information on senders and receivers to and from an RTP host or intermediate-system.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in <u>RFC 2119</u>.

2.1 Components

The RTCP XR MIB is structured around "Session," "Receiver" and "Sender" conceptual abstractions.

2.1.1 An RTP Session is an association of two or more participants communicating with RTP. For each participant, the session is defined by a particular pair of destination transport addresses (one network address plus a port pair for RTP and RTCP). The destination transport addresses may be common for all participants, as in the case of IP multicast, or may be different for each, as in the case of individual unicast addresses plus a common port pair," as defined in section 3 of [RFC3550].

2.1.2 A "Sender" is identified within an RTP session by a 32-bit numeric "Synchronization Source," or "SSRC", value and is "...the source of a stream of RTP packets" as defined in <u>section 3 of</u> [<u>RFC3550</u>]. The sender is also a source of RTCP Sender Report packets as specified in <u>section 6 of [RFC3550]</u>.

2.1.3 A "Receiver" of a "stream of RTP packets" can be a unicast or multicast Receiver as described in 2.1.1, above. An RTP Receiver has an SSRC value that is unique to the session. An RTP Receiver is a source of RTCP Receiver Reports as specified in <u>section 6 of</u> [RFC3550]. Clark

2.2 Applicability of the MIB to RTP System Implementations

The RTCP XR MIB may be used in RTP Host Systems (end systems), see <u>section 3 of [RFC3550]</u> that are supporting Voice over IP (VoIP host systems).

2.2.1 VoIP host Systems are end-systems that may use the RTCP XR MIB to collect RTP Voice over IP session data that the host is sending or receiving; these data may be used by a network manager to detect and diagnose faults that occur over the lifetime of a VoIP session as in a "help-desk" scenario.

2.2.2 Monitors of RTP Voice over IP sessions may be third-party or may be located in the RTP host. Monitors may use the RTCP XR MIB to collect Voice over IP session statistical data; these data may be used by a network manager for planning and other network-management purposes. A Monitor may use the RTCP XR MIB to collect data to permit a network manager to diagnose faults in VoIP sessions.

2.2.3 Many host systems will want to keep track of streams beyond what they are sending and receiving. In a host monitor system, a host agent would use RTP data from the host to maintain data about streams it is sending and receiving, and RTCP data to collect data about other hosts in the session.

2.3 The Structure of the RTCP XR MIB

There is one table in the RTCP XR MIB. The rtpXrVoipTable contains objects that describe completed sessions at the host or monitor.

rtpXrVoipIndex is a global object that permits a network management application to obtain a unique index for conceptual row creation in the rtpSessionTable. In this way the SNMP Set operation MAY be used to configure a monitor.

2.4 Relationship to the RAQMON Architecture

3. Definitions

IMPORTS

Counter32, Counter64, Gauge32, mib-2, Integer32, MODULE-IDENTITY, OBJECT-TYPE, Unsigned32 FROM SNMPv2-SMI OBJECT-GROUP, MODULE-COMPLIANCE FROM SNMPv2-CONF InterfaceIndex FROM IF-MIB ItuPerceivedSeverity FROM ITU-ALARM-TC;

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```
rtcpXrMIB MODULE-IDENTITY
    LAST-UPDATED "200409120000Z"
   ORGANIZATION
        "IETF AVT Working Group"
        DESCRIPTION
        "The managed objects of RTCP XR systems.
         Refer to RFC 3611, Real Time Control Protocol Extended
         Reports (RTCP XR) Section 4.7 VoIP Metrics"
                 "200409120000Z"
   REVISION
   DESCRIPTION "Initial version of this MIB.
                 Published as draft-ietf-avt-rtcpxrmib-00.txt."
::= { mib-2 TBD }
- -
-- OBJECTS
- -
rtcpXrMIBObjects OBJECT IDENTIFIER ::= { rtcpXrMIB 1 }
rtcpXrConformance OBJECT IDENTIFIER ::= { rtcpXrMIB 2 }
rtcpXrEvents
             OBJECT IDENTIFIER ::= { rtcpXrMIB 3 }
-- RTCP Extended Reports - Voice over IP Metrics
- -
-- Description
         This MIB provides basic voice quality monitoring capabilities
- -
         for Voice-over-packet systems. The MIB contains 5 tables of
- -
         information:-
- -
            a table with one entry for each voice terminationPoint
- -
- -
            a table that defines the parameters associated with voice
            coders
- -
           a table of call records with call identifying and quality
- -
           information
- -
            a table of extended call records with additional metrics
- -
            a table of Termination Point groups with one entry per
- -
            logical group
- -
```

rtcpXrVoipTable OBJECT-TYPE SYNTAX SEQUENCE OF rtcpXrVoipEntry ACCESS not-accessible STATUS current DESCRIPTION "Table of information about a receiver or receivers of RTCP XR session data. RTP hosts that receive RTCP XR session packets MUST create an entry in this table for that receiver/sender pair. RTP hosts that send RTCP XR session packets MAY create an entry in this table for each receiver to their stream using RTCP XR feedback from the RTP group. " ::= { rtcpXrMIBObjects 1 }

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rtcpXrVoipEntry OBJECT-TYPE SYNTAX rtcpXrVoipEntry STATUS current DESCRIPTION "An entry in the table of call records. A row in this table is created for each RTP session endpoint participating." INDEX { rtcpXrVoipIndex } ::= { rtcpXrVoipTable 1 }

rtcpXrVoipEntry ::= SEQUENCE { rtcpXrVoipIndex INTEGER, rtcpXrVoipCallIdentifier OCTET STRING, rtcpXrVoipSessionIdentifier OCTET STRING, rtcpXrVoipSourceIPaddress OCTET STRING, rtcpXrVoipSourceIdentifier OCTET STRING, rtcpXrVoipDestinationIPaddress OCTET STRING, rtcpXrVoipDestinationIdentifier OCTET STRING, rtcpXrVoipVocoderType OCTET STRING, rtcpXrVoipFrameSize INTEGER, rtcpXrVoipSmapleRate INTEGER, rtcpXrVoipCallDurationMs INTEGER, rtcpXrVoipNetworkLossRate INTEGER, rtcpXrVoipAverageDiscardRate INTEGER, rtcpXrVoipBurstLossDensity INTEGER, rtcpXrVoipBurstLenMs INTEGER, rtcpXrVoipGapLossDensity INTEGER, rtcpXrVoipGapLenMs INTEGER, rtcpXrVoipAverageOneWayDelay INTEGER, rtcpXrVoipEndSystemDelay INTEGER, rtcpXrVoipNoiseLeveldBm INTEGER, rtcpXrVoipSignalLeveldBm INTEGER, INTEGER, rtcpXrVoipLocalRERLdB rtcpXrVoipConversationalR INTEGER, rtcpXrVoipListeningR INTEGER, rtcpXrVoipListeningMOSLQ INTEGER, rtcpXrVoipConversationalMOSCQ INTEGER, rtcpXrVoipPlcType INTEGER, rtcpXrVoipJitterBufferAdaptationMode INTEGER, rtcpXrVoipJitterBufferAdaptationRate INTEGER, rtcpXrVoipJitterBufferAverageDelay INTEGER, rtcpXrVoipJitterBufferMaximumDelay INTEGER, rtcpXrVoipJitterBufferSize INTEGER

}

rtcpXrVoipIndex OBJECT-TYPE SYNTAX INTEGER (0..65535)

```
STATUS current
DESCRIPTION
    "Index for this call."
::= { rtcpXrVoipEntry 1 }
```

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```
rtcpXrVoipCallIdentifier OBJECT-TYPE
    SYNTAX OCTET STRING
    STATUS optional
    DESCRIPTION
        "Call identifier for this call."
    ::= { rtcpXrVoipEntry 2 }
rtcpXrVoipSessionIdentifier OBJECT-TYPE
    SYNTAX OCTET STRING
    STATUS optional
    DESCRIPTION
        "Unique identifier for this session. Where a billing record
         correlation identifer is not available for a particular call,
         another identifier such as SSRC can be used."
    ::= { rtcpXrVoipEntry 3 }
rtcpXrVoipSourceIPaddress OBJECT-TYPE
    SYNTAX OCTET STRING
    STATUS optional
    DESCRIPTION
        "Source IP address for this session."
    ::= { rtcpXrVoipEntry 4 }
rtcpXrVoipSourceIdentifierType OBJECT-TYPE
    SYNTAX INTEGER { dialedNumber(0),
                     urlId (1)
                                    }
    DESCRIPTION
        "Defines the type of address in parameter
        rtcpXrVoipSourceIdentifier"
    ::= { rtcpXrVoipEntry 5 }
rtcpXrVoipSourceIdentifier OBJECT-TYPE
    SYNTAX OCTET STRING
    STATUS optional
    DESCRIPTION
        "Alternate identifier to the IP address. This can be E.164,
         DN, or URL."
    ::= { rtcpXrVoipEntry 6 }
rtcpXrVoipDestinationIPaddress OBJECT-TYPE
    SYNTAX OCTET STRING
    STATUS current
    DESCRIPTION
        "Source IP address for this session."
    ::= { rtcpXrVoipEntry 7 }
```

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```
rtcpXrVoipDestinationIdentifierType OBJECT-TYPE
    SYNTAX INTEGER { dialedNumber(0),
                     urlId (1)
                                    }
    DESCRIPTION
        "Defines the type of address in parameter
        rtcpXrVoipDestinationIdentifier"
    ::= { rtcpXrVoipEntry 8 }
rtcpXrVoipDestinationIdentifier OBJECT-TYPE
    SYNTAX OCTET STRING
    STATUS current
    DESCRIPTION
        "Alternate identifier to the IP address. This can be E.164,
         DN, or URL."
    ::= { rtcpXrVoipEntry 9 }
rtcpXrVoipVocoderType OBJECT-TYPE
    SYNTAX OCTET STRING
    STATUS current
    DESCRIPTION
        "Vocoder type used on this call."
    ::= { rtcpXrVoipEntry 10 }
rtcpXrVoipFrameSize OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Companion information to vocoder type. This represents the
         size of the frames within the RTP packets at the time the
         information is capture."
    ::= { rtcpXrVoipEntry 11 }
rtcpXrVoipSampleRate OBJECT-TYPE
    SYNTAX OCTET STRING
    STATUS current
    DESCRIPTION
        "Companion information to vocoder type. This represents the
         rate at which the frames where sampled.
    ::= { rtcpXrVoipEntry 12 }
rtcpXrVoipCallDurationMs OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Duration of call in milliseconds."
    ::= { rtcpXrVoipEntry 13 }
```

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```

```
rtcpXrVoipStartTimestamp OBJECT-TYPE
    SYNTAX INTEGER
   ACCESS read-only
   STATUS mandatory
    DESCRIPTION
        "The timestamp captured at the start of the session."
    ::= { rtcpXrVoipEntry 14 }
rtcpXrVoipEndTimestamp OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "The timestamp captured at the end of the session."
    ::= { rtcpXrVoipEntry 15 }
rtcpXrVoipNetworkLossRate OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Average rate of network packet loss (<u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 16 }
rtcpXrVoipAverageDiscardRate OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Average rate of discards due to jitter(<u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 17 }
rtcpXrVoipBurstLossDensity OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Density of loss and discarded packets during burst periods.
         (see <u>RFC3611 Section 4.7</u>)"
    ::= { rtcpXrVoipEntry 18 }
rtcpXrVoipBurstLenMs OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Average length of bursts in milliseconds (RFC3611
        Section 4.7)."
    ::= { rtcpXrVoipEntry 19 }
```

```
rtcpXrVoipGapLossDensity OBJECT-TYPE
SYNTAX INTEGER
STATUS current
DESCRIPTION
    "Density of loss and discarded packets during gap periods
    (see <u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 20 }
```

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```
rtcpXrVoipGapLenMs OBJECT-TYPE
   SYNTAX INTEGER
   STATUS current
    DESCRIPTION
        "Average length of gaps in milliseconds (see <u>RFC3611</u>
        Section 4.7)."
   ::= { rtcpXrVoipEntry 21 }
rtcpXrVoipAverageOneWayDelay OBJECT-TYPE
   SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Average (symmetric) one way RTCP delay on call. A value of
         zero may indicate that this value has not yet been determined.
         (see <u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 22 }
rtcpXrVoipEndSystemDelay OBJECT-TYPE
    SYNTAX INTEGER
   STATUS current
   DESCRIPTION
        "Average end system delay on call. A value of zero may
         indicate that this value has not yet been determined
         (see RFC3611 Section 4.7)."
    ::= { rtcpXrVoipEntry 23 }
rtcpXrVoipNoiseLeveldBm OBJECT-TYPE
   SYNTAX INTEGER
   STATUS current
    DESCRIPTION
        "Measured received silent period noise level in dBm
        (see RFC3611 Section 4.7)."
    ::= { rtcpXrVoipEntry 24 }
rtcpXrVoipSignalLeveldBm OBJECT-TYPE
   SYNTAX INTEGER
   STATUS current
   DESCRIPTION
        "Measured received signal level during talkspurts in dBm
        (see RFC3611 Section 4.7)."
    ::= { rtcpXrVoipEntry 25 }
rtcpXrVoipLocalRERLdB OBJECT-TYPE
```

```
SYNTAX INTEGER
```

STATUS current
DESCRIPTION
 "Residual Echo Return Loss measured at this endpoint
 (see <u>RFC3611 Section 4.7</u>)."
::= { rtcpXrVoipEntry 26 }

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```
rtcpXrVoipConversationalRCQ OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Conversational quality R factor for this call
         (see <u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 27 }
rtcpXrVoipListeningMOSLQ OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Estimated listening quality MOS for this call
        (see <u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 28 }
rtcpXrVoipConversationalMOSCQ OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Estimated conversational quality MOS for this call
         (see <u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 29 }
rtcpXrVoipPlcType OBJECT-TYPE
    SYNTAX INTEGER { disabled(1),
                     enhanced(2),
                     standard(3),
                     unspecified (4)}
    STATUS current
    DESCRIPTION
        "Defines type of packet loss concealment used on this call
         (see RFC3611 Section 4.7)."
    ::= { rtcpXrVoipEntry 30 }
rtcpXrVoipJitterBufferAdaptationMode OBJECT-TYPE
    SYNTAX INTEGER { reserved (1),
                     nonAdaptive (2),
                     adaptive (3),
                     unknown (4) }
    STATUS current
    DESCRIPTION
        "Defines if jitter buffer is in fixed or adaptive mode
         (see RFC3611 Section 4.7)."
    ::= { rtcpXrVoipEntry 31 }
```

```
rtcpXrVoipJitterBufferAdaptationRate OBJECT-TYPE
   SYNTAX INTEGER
   STATUS current
   DESCRIPTION
     "Estimated adaptation rate of jitter buffer
        (see <u>RFC3611 Section 4.7</u>)."
   ::= { rtcpXrVoipEntry 32 }
```

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```
rtcpXrVoipJitterBufferAverageDelay OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Average size of jitter buffer in mS
         (see <u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 33 }
rtcpXrVoipJitterBufferMaximumDelay OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Maximum delay through jitter buffer at current size in mS
         (see <u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 34 }
rtcpXrVoipJitterBufferSize OBJECT-TYPE
    SYNTAX INTEGER
    STATUS current
    DESCRIPTION
        "Absolute maximum size jitter buffer can reach in mS
         (see <u>RFC3611 Section 4.7</u>)."
    ::= { rtcpXrVoipEntry 35 }
-- Notifications
rtcpXrVoipNotifications OBJECT IDENTIFIER ::= { rtcpXrEvents 0 }
-- RTCP XR Threshold Violation Notification
-- RTCP XR issues event notification when two conditions are met:
      1) The notification is enabled for a specified endpoint
- -
      2) The voice quality falls below the specified threshold
- -
- -
```

rtcpXrVoipThresholdViolation TRAP-TYPE ENTERPRISE rtcpXrVoipNotifications VARIABLES { rtcpXrVoipAlertSeverity, rtcpXrVoipAlertType, rtcpXrVoipIndex}
DESCRIPTION
 "Notification that voice quality has changed
 Sent immediately when the condition is detected."
::= 1

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```
- -
-- Definition of Alert Severity: import from Alarm MIB
- -
    rtcpXrVoipAlertSeverity OBJECT-TYPE
        SYNTAX ItuPerceivedSeverity
        STATUS current
        DESCRIPTION
        "The severity of the alert as defined in ITU-T X.733."
        ::= { rtcpXrVoipEntry 36 }
- -
   The definition of the syntax is as follows:
      ItuPerceivedSeverity ::= TEXTUAL-CONVENTION
- -
         STATUS current
         DESCRIPTION
- -
                 "ITU perceived severity values"
- -
         REFERENCE
- -
                "ITU Recommendation M.3100, 'Generic Network
- -
- -
                 Information Model', 1995
                 ITU Recommendation X.733, 'Information Technology
- -
                 - Open Systems Interconnection - System Management:
- -
                 Alarm Reporting Function', 1992"
- -
         SYNTAX INTEGER
- -
- -
                {
                         cleared
                                          (1),
- -
                         indeterminate (2),
                         critical
                                         (3),
                         major
                                         (4),
                         minor
                                          (5),
- -
                         warning
                                          (6)
- -
                }
- -
- -
- -
     In use with these alarms, the cleared value will not be used
- -
     due the size of alarms.
- -
        rtcpXrVoipAlertType OBJECT-TYPE
            SYNTAX OCTET STRING
            ACCESS read-only
            STATUS current
            DESCRIPTION
            "Text description of the type of alert. Where possible,
            this parameter should be populated with the correct
```

rtcpXrVoipEventsEntry" ::= { rtcpXrVoipEntry 37 }

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4. Security Considerations

In most cases, MIBs are not themselves security risks; if SNMP security is operating as intended, the use of a MIB to view information about a system, or to change some parameter at the system, is a tool, not a threat.

None of the read-only objects in this MIB reports a password, though some SDES [RFC3550] items such as the CNAME [RFC3550], the canonical name, may be deemed sensitive depending on the security policies of a particular enterprise. If access to these objects is not limited by an appropriate access control policy, these objects can provide an attacker with information about a system's configuration and the services that that system is providing. Some enterprises view their network and system configurations, as well as information about usage and performance, as corporate assets; such enterprises may wish to restrict SNMP access to most of the objects in the MIB.

Confidentiality of RTP and RTCP data packets is defined in <u>section 9</u> of the RTP specification [<u>RFC3550</u>]. Encryption may be performed on RTP packets, RTCP packets, or both. Encryption of RTCP packets may pose a problem for third-party monitors though "For RTCP, it is allowed to split a compound RTCP packet into two lower-layer packets, one to be encrypted and one to be sent in the clear. For example, SDES information might be encrypted while reception reports were sent in the clear to accommodate third-party monitors [<u>RFC3550</u>]."

SNMPv1 by itself is not a secure environment. Even if the network itself is secure (for example by using IPSec), there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB. It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model <u>RFC 2574</u> [<u>RFC2574</u>] and the View-based Access Control Model <u>RFC 2575</u> [<u>RFC2575</u>] is recommended. It is then a customer/user responsibility to ensure that the SNMP entity giving access to an instance of this MIB, is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

5. Acknowledgements

<u>6</u>. Intellectual Property

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7. Normative References

- [RFC3550] Shulzrinne, H., Casner, S., Frederick, R. and V. Jacobson, "RTP: A Transport Protocol for real-time applications," <u>RFC 3550</u>, July 2003.
- [RFC3611] Friedman, T., Caceres, R., Clark, A., "RTP Control Protocol Reporting Extensions (RTCP XR)," <u>RFC 3611</u>, [October/November] 2003
- [RFC2571] Harrington, D., Presuhn, R. and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2571, December 1999.
- [RFC1155] Rose, M. and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", STD 16, <u>RFC 1155</u>, May 1990.
- [RFC1212] Rose, M. and K. McCloghrie, "Concise MIB Definitions", STD 16, <u>RFC 1212</u>, April 1991.
- [RFC1215] Rose, M., "A Convention for Defining Traps for use with the SNMP", <u>RFC 1215</u>, April 1991.
- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, <u>RFC 2578</u>, December 1999.

- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, <u>RFC 2579</u>, December 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, <u>RFC 2580</u>, December 1999.
- [RFC1157] Case, J., Fedor, M., Schoffstall, M. and J. Davin, "Simple Network Management Protocol", STD 15, <u>RFC 1157</u>, May 1990.

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- [RFC1901] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Introduction to Community-based SNMPv2", <u>RFC 1901</u>, April 1996.
- [RFC1906] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)", <u>RFC 1906</u>, April 1996.
- [RFC2572] Case, J., Harrington D., Presuhn R. and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", <u>RFC 2572</u>, December 1999.
- [RFC2574] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", <u>RFC 2574</u>, December 1999.
- [RFC1905] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", <u>RFC 1905</u>, April 1996.
- [RFC2573] Levi, D., Meyer, P. and B. Stewart, "SNMPv3 Applications", <u>RFC 2573</u>, December 1999.
- [RFC2575] Wijnen, B., Presuhn, R. and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", <u>RFC 2575</u>, December 1999.
- [RFC2570] Case, J., Mundy, R., Partain, D. and B. Stewart, "Introduction to Version 3 of the Internet-standard Network Management Framework", <u>RFC 2570</u>, December 1999.

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