

IPv6 MIB Revision Design Team
INTERNET-DRAFT
Expires: August 2004

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Cisco Systems
February 2004

Management Information Base
for the Transmission Control Protocol (TCP)
draft-ietf-ipv6-rfc2012-update-06.txt

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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 describes managed objects used for implementations of the Transmission Control Protocol (TCP) in an IP version independent manner. This memo obsoletes RFCs 2012 and 2452.

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Revision History

[Note to RFC Editor: Please remove prior to publication]

Changes from [draft-ietf-ipv6-rfc2012-update-05.txt](#):

4th February 2004

Added a new type '[rfc2988](#)' to the tcpRtoAlgorithm list.

Modified the description of tcpRtoMin and tcpRtoMax to point to [RFC 2988](#) for more detailed information.

Added [RFC 2988](#) and [RFC 3418](#) to the list of references.

Updated the description of InetAddress objects - added a pointer to the corresponding InetAddressType objects.

Updated tcpMIBCompliance2 to include unknown(0) as a value to be supported for tcpListenerLocalAddressType.

Added an explicit reference to sysUpTime as a discontinuity indicator to the counter objects in the mib.

Also updated the description of InetAddress objects used as index elements to indicate the 128 octet limit.

Removed citations from within the mib.

Changes from [draft-ietf-ipv6-rfc2012-update-04.txt](#):

25th November 2003

As per consensus, removed the SIZE(0..36) restriction from InetAddress objects. This has been stated as a part of the compliance.

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Added an IPR section and a copyright statement to DESCRIPTION clause in MODULE-IDENTITY.

Added an RFC Editor's note to change XXXX to RFC publication number.

Updated contact addresses for Brian Haberman, Shawn Routhier and Dave Thaler.

Shortened the author list on the front page to editor only.

Changes from [draft-ietf-ipv6-rfc2012-update-03.txt](#):

14th September 2003

Some editorial changes - correcting some spellings, and added a statement to indicate the deprecation of [RFC 2012](#) and [RFC 2542](#).

Changes from [draft-ietf-ipv6-rfc2012-update-02.txt](#):

16th June 2003

Added tcpHCInSegs and tcpHCOutSegs back to the mib, in order to have the 64-bit counters along with the 32-bit counters.

Changes from [draft-ietf-ipv6-rfc2012-update-01.txt](#):

23rd February 2003

Changes in this version mainly concentrate on reducing this mib to a bare minimum update of [RFC 2012](#), enough to satisfy the needs of IPv6. The actual modifications are listed below.

Scalars tcpHCInSegs and tcpHCOutSegs dropped.

Objects dropped from the tcpConnectionTable include tcpConnectionInSegs, tcpConnectionOutSegs, tcpConnectionInOctets, tcpConnectionOutOctets, tcpConnectionHCInSegs, tcpConnectionHCOutSegs, tcpConnectionHCInOctets, tcpConnectionHCOutOctets, tcpConnectionAge and tcpConnectionId.

Objects dropped from tcpListenerTable include tcpListenerTimeOuts, tcpListenerEstablished and tcpListenerAge.

Updated compliance statements to reflect the aforementioned changes.

Changes from [draft-ietf-ipv6-rfc2012-update-00.txt](#):

4th November 2002

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Replaced the tcpConnectionStartTime and tcpListenerStartTime objects with tcpConnectionAge and tcpListenerAge respectively.

Added tcpConnectionRemAddressType as an auxiliary object into the tcpConnectionTable.

Added new object, tcpConnectionId, to provide a link into the TCP-ESTATS-MIB.

Included tcpConnectionAge and tcpConnectionProcess into the tcpConnectionGroup.

Included tcpListenerAge and tcpListenerProcess into the tcpListenerGroup.

tcpListenerGroup added to the mandatory list for compliance.

Changes from [draft-ietf-ipngwg-rfc2012-update-01.txt](#):

[27](#) June 2002

Replaced all occurrences of the term packets to segments, to be consistent with the TCP specification.

Added limits to tcpRtoMin, tcpRtoMax and tcpMaxConn.

Added the scalar, tcpListenerTableLastChange.

Updated the description of tcpConnectionLocalAddress - removed reference to 'listen' state.

Updated the description tcpConnection*Octets to explicitly indicate whether the count includes the TCP header octets.

Updated the description of tcpConnectionStartTime and tcpListenerStartTime - added clarifying text.

Renamed tcpConnectionProcessID to tcpConnectionProcess.

Updated the description of tcpListenerTable.

Updated the description of tcpListenerLocalAddressType to include unknown (0) as a valid value.

Updated the description of tcpListenerLocalAddress - the value ''h (zero-length octet-string) represents the case wherein an application is will to accept connections for any IP interface associated with the node.

Removed tcpListenerRemAddressType.

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Removed tcpListenerHCConnectionsTimedOut and tcpListenerHCConnectionsAccepted. Added them to open issues, to be added iff deemed required after discussions.

Renamed tcpListenerConnectionsAccepted to tcpListenerEstablished and tcpListenerConnectionsTimedOut to tcpListenerTimeOuts.

Renamed tcpListenerProcessID to tcpListenerProcess.

Updated compliance statement for the object tcpConnectionState -

support for the value 'deleteTCB (12)' deemed optional.

Added [RFC 2790](#) and [RFC 2287](#) to the References section.

Updated Contact-Info and Editor's address.

Added Authors section.

Changes from [draft-ietf-ipngwg-rfc2012-update-00.txt](#):

[14](#) November 2001

Added HC versions of connection counters.

Added Listener table, with counters for accepted and timed out connection attempts.

Added tcp{Connection,Listener}ProcessID to index into SYSAPPL-MIB or HOST-RESOURCES-MIB.

Removed tcpConnectionRemAddrType, it must be the same as tcpConnectionLocalAddrType.

Changes from [draft-ops-rfc2012-update-00.txt](#)

[12](#) Jul 2001

Turned into IPNG WG document

Added tcpCountersGroup for per-connection counters

Changes from first draft posted to v6mib mailing list:

[23](#) Feb 2001

Made threshold for HC packet counters 1Mpps

Added copyright statements and table of contents

[21](#) Feb 2001 -- Juergen's changes

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Renamed tcpInetConn* to tcpConnection*

Updated Conformance info

Added missing tcpConnectionState and tcpConnState objects to SEQUENCEs

[6](#) Feb 2001

Removed v6-only objects.

Renamed inetTcp* to tcpInet*

Added SIZE restriction to InetAddress index objects. (36 = 32-byte addresses plus 4-byte scope, but it's just a strawman)

Used InetPortNumber TC from updated INET-ADDRESS-MIB

Updated compliance statements.

Added Keith to authors

Added open issues section.

Changes from [RFC 2012](#)

Deprecated tcpConnTable

Added tcpConnectionTable

[1.](#) The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to [section 7 of RFC 3410](#) [[RFC3410](#)].

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, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].

[2.](#) Overview

The current TCP-MIB defined in this memo consists of two tables and a group of scalars:

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- The tcp group of scalars reports parameters and statistics of a TCP protocol engine.
- The tcpConnectionTable provides access to status information for all TCP connections handled by a TCP protocol engine. In addition the table also reports identification of the operating system level processes which handle the TCP connections.
- The tcpListenerTable provides access to information about all TCP listening endpoints known by a TCP protocol engine. And similar to the case of the connection table, the tcpListenerTable also reports the identification of the operating system level processes which handle this listening TCP endpoint.

[2.1](#) Relationship to Other MIBs

This section discusses the relationship of this TCP-MIB module to other MIB modules.

[2.1.1](#) Relationship to [RFC1213](#)-MIB

TCP related MIB objects were originally defined as part of the [RFC1213](#)-MIB defined in [RFC 1213](#) [[RFC1213](#)]. The TCP related objects of the [RFC1213](#)-MIB were later copied into a separate MIB module and published in [RFC 2012](#) [[RFC2012](#)] in SMIV2 format.

The previous versions of the TCP-MIB both defined the tcpConnTable, which has been deprecated for basically two reasons:

- (1) The tcpConnTable only supports IPv4.

The current approach in the IETF is to write IP version neutral MIBs rather than having different definitions for various version of IP. This reduces the amount of overhead when new objects are introduced since there is only one place to add them. Hence, the approach taken in [RFC 2452](#) of having separate tables is not continued.

- (2) The tcpConnTable mixes listening endpoints with connections.

It turns out that connections tend to have a different behaviour and management access pattern compared to listening endpoints. Splitting the original tcpConnTable into two tables thus allows

for the addition of specific status and statistics objects for listening endpoints and connections.

[2.1.2](#) Relationship to IPV6-TCP-MIB

The IPV6-TCP-MIB defined in [RFC 2452](#) has been moved to Historic since the approach of having separate IP version specific tables is not followed anymore. Implementation of [RFC 2452](#) is thus not suggested anymore.

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[2.1.3](#) Relationship to HOST-RESOURCES-MIB and SYSAPPL-MIB

The tcpConnectionTable and the tcpListenerTable report the identification of the operating system level process which handles a connection or a listening endpoint. The value is reported as an Unsigned32 which is expected to be the same as the hrSWRunIndex of the HOST-RESOURCES-MIB [[RFC2790](#)] (if the value is smaller than 2147483647) or the sysAppElmtRunIndex of the SYSAPPL-MIB [[RFC2287](#)]. This allows management applications to identify the TCP connections that belong to an operating system level process which has proven to be valuable in operational environments.

[3.](#) Definitions

TCP-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, Integer32, Unsigned32,
Gauge32, Counter32, Counter64, IpAddress, mib-2
FROM SNMPv2-SMI
MODULE-COMPLIANCE, OBJECT-GROUP FROM SNMPv2-CONF
InetAddress, InetAddressType,
InetAddressType FROM INET-ADDRESS-MIB;

tcpMIB MODULE-IDENTITY

LAST-UPDATED "200402040000Z"

ORGANIZATION

"IETF IPv6 MIB Revision Team

<http://www.ietf.org/html.charters/ipv6-charter.html>"

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Send comments to <ipv6@ietf.org>"
-- RFC Ed: please verify mailing list address at publication
-- and delete this note

DESCRIPTION

"The MIB module for managing TCP implementations.

Copyright (C) The Internet Society (2004). This version
of this MIB module is a part of RFC xxxx; see the RFC
itself for full legal notices."

-- RFC Ed : replace xxxx with actual RFC number & remove note

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REVISION "200402040000Z"

DESCRIPTION

"IP version neutral revision, published as RFC XXXX."

-- RFC Ed : replace xxxx with actual RFC number & remove note

REVISION "9411010000Z"

DESCRIPTION

"Initial SMIV2 version, published as [RFC 2012](#)."

REVISION "9103310000Z"

DESCRIPTION

"The initial revision of this MIB module was part of
MIB-II."

::= { mib-2 49 }

-- the TCP base variables group

tcp OBJECT IDENTIFIER ::= { mib-2 6 }

-- Scalars

tcpRtoAlgorithm OBJECT-TYPE

SYNTAX INTEGER {

other(1), -- none of the following

constant(2), -- a constant rto

rsre(3), -- MIL-STD-1778, [Appendix B](#)

```
        vanj(4),      -- Van Jacobson's algorithm
        rfc2988(5)      -- RFC 2988
    }
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "The algorithm used to determine the timeout value used for
    retransmitting unacknowledged octets."
 ::= { tcp 1 }
```

tcpRtoMin OBJECT-TYPE

```
SYNTAX      Integer32 (0..2147483647)
UNITS       "milliseconds"
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "The minimum value permitted by a TCP implementation for
    the retransmission timeout, measured in milliseconds.
    More refined semantics for objects of this type depend
    upon the algorithm used to determine the retransmission
    timeout; in particular, the IETF standard algorithm
    rfc2988(5) provides a minimum value."
 ::= { tcp 2 }
```

tcpRtoMax OBJECT-TYPE

```
SYNTAX      Integer32 (0..2147483647)
UNITS       "milliseconds"
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "The maximum value permitted by a TCP implementation for
    the retransmission timeout, measured in milliseconds.
    More refined semantics for objects of this type depend
    upon the algorithm used to determine the retransmission
    timeout; in particular, the IETF standard algorithm
    rfc2988(5) provides an upper bound (as part of an
    adaptive backoff algorithm)."
 ::= { tcp 3 }
```

tcpMaxConn OBJECT-TYPE

SYNTAX Integer32 (-1 | 0..2147483647)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The limit on the total number of TCP connections the entity can support. In entities where the maximum number of connections is dynamic, this object should contain the value -1."

::= { tcp 4 }

tcpActiveOpens OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 5 }

tcpPassiveOpens OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 6 }

tcpAttemptFails OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 7 }

tcpEstabResets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 8 }

tcpCurrEstab OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT."

::= { tcp 9 }

tcpInSegs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of segments received, including those received in error. This count includes segments received on currently established connections.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 10 }

tcpOutSegs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 11 }

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tcpRetransSegs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of segments retransmitted - that is, the number of TCP segments transmitted containing one or more previously transmitted octets.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 12 }

tcpInErrs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of segments received in error (e.g., bad TCP checksums).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 14 }

tcpOutRsts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of TCP segments sent containing the RST flag.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 15 }

-- { tcp 16 } was used to represent the ipv6TcpConnTable in [RFC 2452](#),
-- which has since been obsoleted. It MUST not be used.

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tcpHCInSegs OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of segments received, including those received in error. This count includes segments received on currently established connections. This object is the 64-bit equivalent of tcpInSegs.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 17 }

tcpHCOutSegs OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets. This object is the 64-bit equivalent of tcpOutSegs.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by discontinuities the value of sysUpTime."

::= { tcp 18 }

-- The TCP Connection table

tcpConnectionTable OBJECT-TYPE

SYNTAX SEQUENCE OF TcpConnectionEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table containing information about existing TCP connections. Note that unlike earlier TCP MIBs, there is a separate table for connections in the LISTEN state."

::= { tcp 19 }

tcpConnectionEntry OBJECT-TYPE

SYNTAX TcpConnectionEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A conceptual row of the tcpConnectionTable containing information about a particular current TCP connection. Each row of this table is transient, in that it ceases to exist when (or soon after) the connection makes the transition to the CLOSED state."

INDEX { tcpConnectionLocalAddressType,
tcpConnectionLocalAddress,
tcpConnectionLocalPort,
tcpConnectionRemAddressType,
tcpConnectionRemAddress,
tcpConnectionRemPort }

::= { tcpConnectionTable 1 }

TcpConnectionEntry ::= SEQUENCE {

tcpConnectionLocalAddressType InetAddressType,

tcpConnectionLocalAddress InetAddress,

tcpConnectionLocalPort InetPortNumber,

```

        tcpConnectionRemAddressType      InetAddressType,
        tcpConnectionRemAddress          InetAddress,
        tcpConnectionRemPort             InetPortNumber,
        tcpConnectionState                INTEGER,
        tcpConnectionProcess              Unsigned32
    }

```

tcpConnectionLocalAddressType OBJECT-TYPE

```

    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The address type of tcpConnectionLocalAddress."
    ::= { tcpConnectionEntry 1 }

```

tcpConnectionLocalAddress OBJECT-TYPE

```

    SYNTAX      InetAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The local IP address for this TCP connection. The type
        of this address is determined by the value of
        tcpConnectionLocalAddressType."

```

As this object is used in the index for the tcpConnectionTable, implementors of this table should be careful not to create entries that would result in OIDs with more than 128 subidentifiers; else the information cannot be accessed using SNMPv1, SNMPv2c or SNMPv3."

```

    ::= { tcpConnectionEntry 2 }

```

tcpConnectionLocalPort OBJECT-TYPE

```

    SYNTAX      InetPortNumber
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The local port number for this TCP connection."
    ::= { tcpConnectionEntry 3 }

```

tcpConnectionRemAddressType OBJECT-TYPE

```

    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION

```

"The address type of tcpConnectionRemAddress."
 ::= { tcpConnectionEntry 4 }

tcpConnectionRemAddress OBJECT-TYPE

SYNTAX InetAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"The remote IP address for this TCP connection. The type of this address is determined by the value of tcpConnectionRemAddressType.

As this object is used in the index for the tcpConnectionTable, implementors of this table should be careful not to create entries that would result in OIDs with more than 128 subidentifiers; else the information cannot be accessed using SNMPv1, SNMPv2c or SNMPv3."

::= { tcpConnectionEntry 5 }

tcpConnectionRemPort OBJECT-TYPE

SYNTAX InetPortNumber
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"The remote port number for this TCP connection."

::= { tcpConnectionEntry 6 }

tcpConnectionState OBJECT-TYPE

SYNTAX INTEGER {
closed(1),
listen(2),

```

        synSent(3),
        synReceived(4),
        established(5),
        finWait1(6),
        finWait2(7),
        closeWait(8),
        lastAck(9),
        closing(10),
        timeWait(11),
        deleteTCB(12)
    }
MAX-ACCESS read-write
STATUS current
DESCRIPTION
    "The state of this TCP connection.

```

The value listen(2) is included only for parallelism to the old tcpConnTable, and should not be used. A connection in LISTEN state should be present in the tcpListenerTable.

The only value which may be set by a management station is deleteTCB(12). Accordingly, it is appropriate for an agent to return a 'badValue' response if a management station attempts to set this object to any other value.

If a management station sets this object to the value deleteTCB(12), then this has the effect of deleting the TCB (as defined in [RFC 793](#)) of the corresponding connection on the managed node, resulting in immediate termination of the connection.

As an implementation-specific option, a RST segment may be sent from the managed node to the other TCP endpoint (note however that RST segments are not sent reliably)."

```
 ::= { tcpConnectionEntry 7 }
```

tcpConnectionProcess OBJECT-TYPE

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

"The system's process ID for the process associated with this connection, or zero if there is no such process. This value is expected to be the same as HOST-RESOURCES-MIB::hrSWRunIndex or SYSAPPL-MIB::sysAppLElmtRunIndex for some row in the appropriate tables."

```
 ::= { tcpConnectionEntry 8 }
```

-- The TCP Listener table

tcpListenerTable OBJECT-TYPE

SYNTAX SEQUENCE OF TcpListenerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table containing information about TCP listeners. A listening application can be represented in three possible ways:

1. An application that is willing to accept both IPv4 and IPv6 datagrams is represented by tcpListenerLocalAddressType of unknown (0) and tcpListenerLocalAddress of ''h (a zero-length octet-string).
2. An application which is willing to accept only IPv4 or IPv6 datagrams is represented by a tcpListenerLocalAddressType of the appropriate address type and tcpListenerLocalAddress of ''h (a zero-length octet-string).
3. An application which is listening for data destined only to a specific IP address, but from any remote system, is represented by a tcpListenerLocalAddressType of an appropriate address type, with tcpListenerLocalAddress the specific local address.

NOTE: The address type in this table represents the address type used for the communication, irrespective of the higher-layer abstraction. For example, an application using IPv6 'sockets' to communicate via IPv4 between ::ffff:10.0.0.1 and ::ffff:10.0.0.2 would use InetAddressType ipv4(1)."

::= { tcp 20 }

tcpListenerEntry OBJECT-TYPE

SYNTAX TcpListenerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A conceptual row of the tcpListenerTable containing information about a particular TCP listener."

INDEX { tcpListenerLocalAddressType,
tcpListenerLocalAddress,
tcpListenerLocalPort }

```
::= { tcpListenerTable 1 }
```

```
TcpListenerEntry ::= SEQUENCE {  
    tcpListenerLocalAddressType      InetAddressType,  
    tcpListenerLocalAddress          InetAddress,  
    tcpListenerLocalPort             InetPortNumber,  
    tcpListenerProcess                Unsigned32  
}
```

tcpListenerLocalAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The address type of tcpListenerLocalAddress. The value should be unknown (0) if connection initiation to all local IP addresses are accepted."

```
::= { tcpListenerEntry 1 }
```

tcpListenerLocalAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The local IP address for this TCP connection. In the case of a listener which is willing to accept connections for any IP interface associated with the node, a value of ''h (zero-length octet-string) is used. The type of this address is determined by the value of tcpListenerLocalAddressType.

As this object is used in the index for the tcpListenerTable, implementors of this table should be careful not to create entries that would result in OIDs with more than 128 subidentifiers; else the information cannot be accessed using SNMPv1, SNMPv2c or SNMPv3."

```
::= { tcpListenerEntry 2 }
```

tcpListenerLocalPort OBJECT-TYPE

SYNTAX InetPortNumber

```
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "The local port number for this TCP connection."
 ::= { tcpListenerEntry 3 }
```

```
tcpListenerProcess OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
    "The system's process ID for the process associated with
    this listener, or zero if there is no such process. This
    value is expected to be the same as HOST-RESOURCES-MIB::
    hrSWRunIndex or SYSAPPL-MIB::sysAppLElmtRunIndex for some
    row in the appropriate tables."
```

```
 ::= { tcpListenerEntry 4 }
```

```
-- The deprecated TCP Connection table
```

```
tcpConnTable OBJECT-TYPE
```

```
SYNTAX SEQUENCE OF TcpConnEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS deprecated
```

```
DESCRIPTION
```

```
    "A table containing information about existing IPv4-specific
    TCP connections or listeners. This table has been
    deprecated in favor of the version neutral
    tcpConnectionTable."
```

```
 ::= { tcp 13 }
```

```
tcpConnEntry OBJECT-TYPE
```

```
SYNTAX TcpConnEntry
```

```
MAX-ACCESS not-accessible
```

STATUS deprecated

DESCRIPTION

"A conceptual row of the tcpConnTable containing information about a particular current IPv4 TCP connection. Each row of this table is transient, in that it ceases to exist when (or soon after) the connection makes the transition to the CLOSED state."

INDEX { tcpConnLocalAddress,
tcpConnLocalPort,
tcpConnRemAddress,
tcpConnRemPort }

::= { tcpConnTable 1 }

TcpConnEntry ::= SEQUENCE {
tcpConnState INTEGER,
tcpConnLocalAddress IpAddress,
tcpConnLocalPort Integer32,
tcpConnRemAddress IpAddress,
tcpConnRemPort Integer32
}

tcpConnState OBJECT-TYPE

SYNTAX INTEGER {
closed(1),
listen(2),
synSent(3),
synReceived(4),
established(5),
finWait1(6),
finWait2(7),
closeWait(8),
lastAck(9),
closing(10),
timeWait(11),
deleteTCB(12)
}

MAX-ACCESS read-write

STATUS deprecated

DESCRIPTION

"The state of this TCP connection."

The only value which may be set by a management station is deleteTCB(12). Accordingly, it is appropriate for an agent to return a 'badValue' response if a management station attempts to set this object to any other value.

If a management station sets this object to the value deleteTCB(12), then this has the effect of deleting the TCB (as defined in [RFC 793](#)) of the corresponding connection on the managed node, resulting in immediate termination of the connection.

As an implementation-specific option, a RST segment may be sent from the managed node to the other TCP endpoint (note however that RST segments are not sent reliably)."

::= { tcpConnEntry 1 }

tcpConnLocalAddress OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"The local IP address for this TCP connection. In the case of a connection in the listen state which is willing to accept connections for any IP interface associated with the node, the value 0.0.0.0 is used."

::= { tcpConnEntry 2 }

tcpConnLocalPort OBJECT-TYPE

SYNTAX Integer32 (0..65535)

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"The local port number for this TCP connection."

::= { tcpConnEntry 3 }

tcpConnRemAddress OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

```

STATUS      deprecated
DESCRIPTION
    "The remote IP address for this TCP connection."
 ::= { tcpConnEntry 4 }

tcpConnRemPort OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "The remote port number for this TCP connection."
 ::= { tcpConnEntry 5 }

-- conformance information

tcpMIBConformance OBJECT IDENTIFIER ::= { tcpMIB 2 }

tcpMIBCompliances OBJECT IDENTIFIER ::= { tcpMIBConformance 1 }
tcpMIBGroups      OBJECT IDENTIFIER ::= { tcpMIBConformance 2 }

-- compliance statements

tcpMIBCompliance2 MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for systems which implement TCP.

        There are a number of INDEX objects that cannot be
        represented in the form of OBJECT clauses in SMIV2, but
        for which we have the following compliance requirements,
        expressed in OBJECT clause form in this description
        clause:

```

```

-- OBJECT      tcpConnectionLocalAddressType
-- SYNTAX      InetAddressType { ipv4(1), ipv6(2) }

```

```

-- DESCRIPTION
--     This MIB requires support for only global IPv4
--     and IPv6 address types.
--
-- OBJECT      tcpConnectionRemAddressType
-- SYNTAX      InetAddressType { ipv4(1), ipv6(2) }
-- DESCRIPTION
--     This MIB requires support for only global IPv4
--     and IPv6 address types.
--
-- OBJECT      tcpListenerLocalAddressType
-- SYNTAX      InetAddressType { unknown(0), ipv4(1),
--                               ipv6(2) }
-- DESCRIPTION
--     This MIB requires support for only global IPv4
--     and IPv6 address types. The type unknown also
--     needs to be supported to identify a special
--     case in the listener table - a listen using
--     both IPv4 and IPv6 addresses on the device.
--
"
MODULE -- this module
    MANDATORY-GROUPS { tcpBaseGroup, tcpConnectionGroup,
                       tcpListenerGroup }
    GROUP      tcpHCGroup
    DESCRIPTION
        "This group is mandatory for those systems which are capable
        of receiving or transmitting more than 1 million TCP
        segments per second. 1 million segments per second will
        cause a Counter32 to wrap in just over an hour."
    OBJECT      tcpConnectionState
    SYNTAX      INTEGER { closed(1), listen(2), synSent(3),
                        synReceived(4), established(5),
                        finWait1(6), finWait2(7), closeWait(8),
                        lastAck(9), closing(10), timeWait(11) }
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required, nor is support for the value
        deleteTCB (12)."
```

::= { tcpMIBCompliances 2 }

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tcpMIBCompliance MODULE-COMPLIANCE

STATUS deprecated

DESCRIPTION

"The compliance statement for IPv4-only systems which implement TCP. In order to be IP version independent, this compliance statement is deprecated in favor of tcpMIBCompliance2. However, agents are still encouraged to implement these objects in order to interoperate with the deployed base of managers."

MODULE -- this module

MANDATORY-GROUPS { tcpGroup }

OBJECT tcpConnState

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

::= { tcpMIBCompliances 1 }

-- units of conformance

tcpGroup OBJECT-GROUP

OBJECTS { tcpRtoAlgorithm, tcpRtoMin, tcpRtoMax,
tcpMaxConn, tcpActiveOpens,
tcpPassiveOpens, tcpAttemptFails,
tcpEstabResets, tcpCurrEstab, tcpInSegs,
tcpOutSegs, tcpRetransSegs, tcpConnState,
tcpConnLocalAddress, tcpConnLocalPort,
tcpConnRemAddress, tcpConnRemPort,
tcpInErrs, tcpOutRsts }

STATUS deprecated

DESCRIPTION

"The tcp group of objects providing for management of TCP entities."

::= { tcpMIBGroups 1 }

tcpBaseGroup OBJECT-GROUP

OBJECTS { tcpRtoAlgorithm, tcpRtoMin, tcpRtoMax,
tcpMaxConn, tcpActiveOpens,
tcpPassiveOpens, tcpAttemptFails,
tcpEstabResets, tcpCurrEstab, tcpInSegs,
tcpOutSegs, tcpRetransSegs,
tcpInErrs, tcpOutRsts }

STATUS current

DESCRIPTION

"The group of counters common to TCP entities."
 ::= { tcpMIBGroups 2 }

tcpConnectionGroup OBJECT-GROUP

OBJECTS { tcpConnectionState, tcpConnectionProcess }

STATUS current

DESCRIPTION

"The group provides general information about TCP connections."

::= { tcpMIBGroups 3 }

tcpListenerGroup OBJECT-GROUP

OBJECTS { tcpListenerProcess }

STATUS current

DESCRIPTION

"This group has objects providing general information about TCP listeners."

::= { tcpMIBGroups 4 }

tcpHCGroup OBJECT-GROUP

OBJECTS { tcpHCInSegs, tcpHCOutSegs }

STATUS current

DESCRIPTION

"The group of objects providing for counters of high speed TCP implementations."

::= { tcpMIBGroups 5 }

END

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4. Acknowledgements

This document contains a modified subset of [RFC 1213](#) and updates RFC [2012](#) and [RFC 2452](#). Acknowledgements are therefore due to the authors and editors of these documents for their excellent work. Several useful comments regarding usability and design were also received from Kristine Adamson. The authors would like to like all these people for their contribution to this effort.

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7. Security Considerations

There are management objects defined in this MIB that have a MAX-ACCESS clause of read-write. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- o The tcpConnectionState and tcpConnState objects have a MAX-ACCESS clause of read-write, which allows termination of an arbitrary connection. Unauthorized access could cause a denial of service.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

- o The tcpConnectionTable and the tcpConnTable contain objects providing information on the active connections on the device, the status of these connections and the associated processes. This information may be used by an attacker to launch attacks against known/unknown weakness in certain protocols/applications. In addition, access to the connection table could also have privacy implications since it provide detailed information on active connections.

- o The tcpListenerTable and the tcpConnTable contain objects providing information on listeners on an entity. For e.g. the tcpListenerLocalPort and tcpConnLocalPort objects can be used to identify what ports are open on the machine and can thus what attacks are likely to succeed, without the attacker having to run a port scanner.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPSec), even then, 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 module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [\[RFC3410\], section 8](#)), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module 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.

[8](#). Intellectual Property

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This document updates parts of the MIBs from several documents. RFC [2012](#) has been the base document for these updates. [RFC 2452](#) was the first document to define the managed objects for implementations of TCP over IPv6.

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