

IPv6 MIB Revision Design Team
INTERNET-DRAFT
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Management Information Base
for the Transmission Control Protocol (TCP)
draft-ietf-ipv6-rfc2012-update-03.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) [[RFC793](#)] in an IP version

independent manner.

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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 [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.](#) Revision History

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.

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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

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.

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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.

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.

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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

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

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[3.](#) Overview

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

- 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.

[3.1](#) Relationship to Other MIBs

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

[3.1.1](#) 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 to add specific status and statistic objects for listening endpoints and connections.

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[3.1.2](#) 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.

[3.1.3](#) 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 sysAppLElmtRunIndex 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.

[4.](#) 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,
    InetPortNumber                FROM INET-ADDRESS-MIB;
```

```
tcpMIB MODULE-IDENTITY
```

```
    LAST-UPDATED "200306160000Z"
    ORGANIZATION "IETF IPv6 MIB Revision Team"
    CONTACT-INFO
        "Rajiv Raghunarayan (editor)
```

```
        Cisco Systems Inc.
        170 West Tasman Drive
        San Jose, CA 95134
```

```
        Phone: +1 408 853 9612
```



```
        Email: <raraghun@cisco.com>"
DESCRIPTION
    "The MIB module for managing TCP implementations."
REVISION    "200306160000Z"
DESCRIPTION
    "IP version neutral revision, published as RFC XXXX."
REVISION    "9411010000Z"
DESCRIPTION
    "Initial SMiv2 version, published as RFC 2012."
```

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```
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 [VANJ]
    }
    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, when the timeout algorithm is rsre(3), an object of this type has the semantics of the LBOUND quantity described in [RFC 793](#)."

::= { 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, when the timeout algorithm is rsre(3), an object of this type has the semantics of the UBOUND quantity described in [RFC 793](#)."

::= { 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."

::= { 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."

::= { 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."

::= { 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."

::= { 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."

::= { 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."

::= { tcp 11 }

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."
 ::= { 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)."
```

```
 ::= { tcp 14 }
```



```
tcpOutRsts OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of TCP segments sent containing the RST flag."
 ::= { tcp 15 }
```



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



```
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."
 ::= { 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."
 ::= { 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. Only IPv4, IPv4z, IPv6 and IPv6z address types are expected."

::= { tcpConnectionEntry 1 }

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tcpConnectionLocalAddress OBJECT-TYPE

SYNTAX InetAddress (SIZE(0..36))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The local IP address for this TCP connection."

::= { 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. Only IPv4, IPv4z, IPv6 and IPv6z address types are expected."

::= { tcpConnectionEntry 4 }

tcpConnectionRemAddress OBJECT-TYPE

SYNTAX InetAddress (SIZE(0..36))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The remote IP address for this TCP connection."

::= { tcpConnectionEntry 5 }

tcpConnectionRemPort OBJECT-TYPE

SYNTAX InetPortNumber

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The remote port number for this TCP connection."

::= { tcpConnectionEntry 6 }

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tcpConnectionState OBJECT-TYPE

```
SYNTAX      INTEGER {
                closed(1),
                listen(2), -- do we need this here???
                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 a 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: that 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`. Only IPv4,

IPv4z, IPv6 and IPv6z address types are expected, or unknown (0) if connection initiation to all local IP addresses are accepted. "
 ::= { tcpListenerEntry 1 }

tcpListenerLocalAddress OBJECT-TYPE

SYNTAX InetAddress (SIZE(0..36))

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."

::= { 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 }

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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 }

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```
-- compliance statements
```

```
tcpMIBCompliance2 MODULE-COMPLIANCE
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "The compliance statement for systems which implement TCP."
```

```
    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 }
```

```
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

5. 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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8. 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.
- 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.

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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.

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

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