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Cable Gateway Tools Management Information Base for CableHome compliant Residential Gateways

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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 a basic set of managed objects for SNMP-based management of CableHome compliant WAN Gateway Devices and home routers. Specifically, this MIB defines managed objects for both a

connection speed tool and an ICMP "ping" tool between the Gateway and devices on the LAN.

This memo specifies a MIB module in a manner that is compliant to the SNMP SMIV2 [5][6][7]. The set of objects is consistent with the SNMP framework and existing SNMP standards.

Conventions used in this document

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 [RFC-2119](#) [2].

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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](#) [12].

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](#) [7], STD 58, [RFC 2579](#) [8] and STD 58, [RFC 2580](#) [9].

[2. Glossary](#)

The terms in this document are derived either from normal cable system usage, from normal residential gateway operation, or from the documents associated with the CableHome Specifications [21].

[2.1 CableHome Residential Gateway](#)

A CableHome Residential gateway passes data traffic between the cable operator's broadband data network (the Wide Area Network, WAN) and the Local Area Network (LAN) in the cable data service subscriber's residence or business. In addition to passing traffic between the WAN and LAN, the CableHome Residential Gateway provides several services including a DHCP client and a DHCP server ([RFC2131](#)) [22], a TFTP server ([RFC1350](#)) [23], management services as enabled by SNMPv1/v2c/v3 agent compliant with the RFCs listed in [Section 1](#), and security services including stateful packet inspection firewall functionality and software code image verification using techniques.

[2.2 Portal Services](#)

A logical element aggregating the set of CableHome-specified functionality in a CableHome compliant cable gateway device.

[2.3 LAN IP Device](#)

A LAN IP Device is representative of a typical IP device expected to reside on home networks, and is assumed to contain a TCP/IP stack as well as a DHCP client.

[2.4 WAN Management \(WAN-Man\) Address](#)

WAN Management Addresses are intended for network management traffic on the cable network between the network management system and the PS element. Typically, these addresses will reside in private IP address space.

[2.5 WAN Data \(WAN-Data\) Address](#)

WAN Data Addresses are intended for subscriber application traffic on the cable network and beyond, such as traffic between LAN IP Devices and Internet hosts. Typically, these addresses will reside in public IP address space.

2.6 LAN Translated (LAN-Trans) Address

LAN Translated Addresses are intended for subscriber application and management traffic on the home network between LAN IP Devices and the PS element. Typically, these addresses will reside in private IP address space, and can typically be reused across subscribers.

2.7 LAN Passthrough (LAN-Pass) Address

LAN Passthrough Addresses are intended for subscriber application traffic, such as traffic between LAN IP Devices and Internet hosts, on the home network, the cable network, and beyond. Typically, these addresses will reside in public IP address space.

3. Overview

This MIB provides a set of security objects required for the management of CableHome compliant residential gateway devices. The specification is derived from the CableHome 1.0 specification [21].

3.1 Structure of the MIB

This MIB is structured into two groups:

The cabhCtpConnSpeed group contains objects needed to test the connection speed between the Gateway and a LAN device.

The cabhCtpPing Group provides objects allowing the manager to send an ICMP ping from the Gateway to a LAN device.

4. MIB Definitions

```
CABH-IETF-CTP-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY,  
    OBJECT-TYPE,  
    mib-2                FROM SNMPv2-SMI
```

```
    TimeStamp,  
    TruthValue           FROM SNMPv2-TC
```

```
    OBJECT-GROUP,  
    MODULE-COMPLIANCE    FROM SNMPv2-CONF
```

```
    InetAddressType,
```


InetAddress FROM INET-ADDRESS-MIB;

cabhCtpMib MODULE-IDENTITY

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DESCRIPTION

"This MIB module defines the diagnostic controls offered by the CableHome Test Portal (CTP).

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DESCRIPTION

"Initial version, published as RFC xxxx."

-- RFC editor to assign xxxx

::= { mib-2 xx }

-- xx to be assigned by IANA

-- Textual conventions

cabhCtpObjects OBJECT IDENTIFIER ::= { cabhCtpMib 1 }
cabhCtpBase OBJECT IDENTIFIER ::= { cabhCtpObjects 1 }
cabhCtpConnSpeed OBJECT IDENTIFIER ::= { cabhCtpObjects 2 }
cabhCtpPing OBJECT IDENTIFIER ::= { cabhCtpObjects 3 }

--

-- The following group describes the base objects in the CableHome
-- Management Portal.

--


```
cabhCtpSetToFactory      OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS   read-write
    STATUS      current
    DESCRIPTION
        "Setting this object to true(1) causes all the tables in
        the CTP MIB to be cleared, and all CTP MIB objects with
        default values set back to those default values.
        Reading this object always returns false(2)."
```

```
 ::= { cabhCtpBase 1 }
```

```
cabhCtpLastSetToFactory  OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The value of sysUpTime when cabhCtpSetToFactory was
        last set to true. Zero if never reset."
```

```
 ::= { cabhCtpBase 2 }
```

```
--
--   Parameter and results from Connection Speed Command
--
```

```
cabhCtpConnSrcIpType     OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS   read-write
    STATUS      current
    DESCRIPTION
        "The IP Address type used as the source address for the
        Connection Speed Test."
```

```
 DEFVAL { ipv4 }
 ::= { cabhCtpConnSpeed 1 }
```

```
cabhCtpConnSrcIp         OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS   read-write
    STATUS      current
    DESCRIPTION
        "The IP Address used as the source address for the
        Connection Speed Test. The type of this address is
        specified by cabhCtpConnSrcIpType. The default value is
        the value of cabhCdpServerRouter (192.168.0.1)."
```

```
 REFERENCE
        "CableHome Specification Section 6.4.4"
    DEFVAL { 'c0a80001'h }      -- 192.168.0.1
 ::= { cabhCtpConnSpeed 2 }
```

```
cabhCtpConnDestIpType    OBJECT-TYPE
```

SYNTAX

InetAddressType

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MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The IP Address Type for the CTP Connection Speed Tool
 destination address. "
DEFVAL { ipv4 }
::={ cabhCtpConnSpeed 3 }

cabhCtpConnDestIp OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The IP Address used as the destination address for the
 Connection Speed Test. The type of this address is
 specified by cabhCtpConnDestIpType"
::= { cabhCtpConnSpeed 4 }

cabhCtpConnProto OBJECT-TYPE
SYNTAX INTEGER {
 udp(1),
 tcp(2)
}
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The protocol used in the Connection Speed Test.
 TCP testing is optional."
DEFVAL { udp }
::= { cabhCtpConnSpeed 5 }

cabhCtpConnNumPkts OBJECT-TYPE
SYNTAX INTEGER (1..65535)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The number of packets the CTP is to send when triggered
 to execute the Connection Speed Tool."
DEFVAL { 100 }
::= { cabhCtpConnSpeed 6 }

cabhCtpConnPktSize OBJECT-TYPE
SYNTAX INTEGER (64..1518)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The size of the test frames."
REFERENCE
 ""

DEFVAL { 1518 }

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```
::= { cabhCtpConnSpeed 7 }
```

cabhCtpConnTimeOut OBJECT-TYPE

SYNTAX INTEGER (0..600000) -- Max 10 minutes

UNITS "milliseconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The timeout value for the response. A value of zero indicates no time out and can be used for TCP only."

DEFVAL {30000} -- 30 seconds

```
::= { cabhCtpConnSpeed 8 }
```

cabhCtpConnControl OBJECT-TYPE

SYNTAX INTEGER {
 start(1),
 abort(2)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The control for the Connection Speed Tool. Setting this object to start(1) causes the Connection Speed Tool to execute. Setting this object to abort(2) causes the Connection Speed Tool to stop running.

This parameter should only be set via SNMP."

DEFVAL {abort }

```
::={ cabhCtpConnSpeed 9 }
```

cabhCtpConnStatus OBJECT-TYPE

SYNTAX INTEGER {
 notRun(1),
 running(2),
 complete(3),
 aborted(4),
 timedOut(5)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The status of the Connection Speed Tool."

DEFVAL { notRun }

```
::={ cabhCtpConnSpeed 10 }
```

cabhCtpConnPktsSent OBJECT-TYPE

SYNTAX INTEGER (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of packets the CTP sent after it was

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triggered to execute the Connection Speed Tool."
::= { cabhCtpConnSpeed 11 }

cabhCtpConnPktsRecv OBJECT-TYPE
 SYNTAX INTEGER (0..65535)
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of packets the CTP received after it
 executed the Connection Speed Tool."
 ::= { cabhCtpConnSpeed 12 }

cabhCtpConnRTT OBJECT-TYPE
 SYNTAX INTEGER (0..600000)
 UNITS "millisec"
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The resulting round trip time for the set of packets
 sent to and received from the target LAN IP Device."
 ::= { cabhCtpConnSpeed 13 }

cabhCtpConnThroughput OBJECT-TYPE
 SYNTAX INTEGER (0..65535)
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The average round-trip throughput measured in kilobits
 per second."
 ::= { cabhCtpConnSpeed 14 }

--
-- Parameters and Results for Ping Command
--

cabhCtpPingSrcIpType OBJECT-TYPE
 SYNTAX InetAddressType
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION
 "The IP Address Type for CTP Ping Tool source address."
 DEFVAL { ipv4 }
 ::={ cabhCtpPing 1 }

cabhCtpPingSrcIp OBJECT-TYPE
 SYNTAX InetAddress
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"The IP Address used as the source address for the Ping

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Test. The type of this address is specified by cabhCtpPingSrcIpType. The default value is the value of CabhCdpServerRouter (192.168.0.1)."

REFERENCE

"CableHome 1.0 Specification [Section 6.4.4](#)"

DEFVAL { 'c0a80001'h }

::= { cabhCtpPing 2 }

cabhCtpPingDestIpType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The IP Address Type for the CTP Ping Tool destination address."

DEFVAL { ipv4 }

::={ cabhCtpPing 3 }

cabhCtpPingDestIp OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The Destination IP Address used as the destination address for the Ping Test."

::= { cabhCtpPing 4 }

cabhCtpPingNumPkts OBJECT-TYPE

SYNTAX INTEGER (1..4)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The number of packets to send to each host."

DEFVAL {1}

::= { cabhCtpPing 5 }

cabhCtpPingPktSize OBJECT-TYPE

SYNTAX INTEGER (64..1518)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The size of the test frames."

DEFVAL {64}

::= { cabhCtpPing 6 }

cabhCtpPingTimeBetween OBJECT-TYPE

SYNTAX INTEGER (0..600000)

UNITS "milliseconds"

MAX-ACCESS read-write

STATUS current

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DESCRIPTION

"The time between sending one ping and the next."

DEFVAL { 1000 }

::= { cabhCtpPing 7 }

cabhCtpPingTimeOut OBJECT-TYPE

SYNTAX INTEGER (1..600000)

UNITS "milliseconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The time out for ping response (ICMP reply) for a single transmitted ping message (ICMP request)."

DEFVAL { 1000 } -- 1 second

::={ cabhCtpPing 8 }

cabhCtpPingControl OBJECT-TYPE

SYNTAX INTEGER {
start(1),
abort(2)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The control for the Ping Tool. Setting this object to start(1) causes the Ping Tool to execute. Setting this object to abort(2) causes the Ping Tool to stop running. This parameter should only be set via SNMP."

DEFVAL { abort }

::={ cabhCtpPing 9 }

cabhCtpPingStatus OBJECT-TYPE

SYNTAX INTEGER {
notRun(1),
running(2),
complete(3),
aborted(4),
timedOut(5)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The status of the Ping Tool."

DEFVAL { notRun }

::={ cabhCtpPing 10 }

cabhCtpPingNumSent OBJECT-TYPE

SYNTAX INTEGER (0..4)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Pings sent"

::={ cabhCtpPing 11 }

cabhCtpPingNumRecv OBJECT-TYPE

SYNTAX INTEGER (0..255)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of pings received."

::= { cabhCtpPing 12 }

cabhCtpPingAvgRTT OBJECT-TYPE

SYNTAX INTEGER (0..600000)

UNITS "millisec"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The resulting average of round trip times for
acknowledged packets."

::= { cabhCtpPing 13 }

cabhCtpPingMaxRTT OBJECT-TYPE

SYNTAX INTEGER (0..600000)

UNITS "millisec"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The resulting maximum of round trip times for
acknowledged packets."

::= { cabhCtpPing 14 }

cabhCtpPingMinRTT OBJECT-TYPE

SYNTAX INTEGER (0..600000)

UNITS "millisec"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The resulting minimum of round trip times for
acknowledged packets."

::= { cabhCtpPing 15 }

cabhCtpPingNumIcmpError OBJECT-TYPE

SYNTAX INTEGER (0..255)

MAX-ACCESS read-only

STATUS current

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```
DESCRIPTION
    "Number of ICMP errors."
 ::= { cabhCtpPing 16 }

cabhCtpPingIcmpError    OBJECT-TYPE
    SYNTAX      INTEGER (0..255)
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The last ICMP error."
 ::= { cabhCtpPing 17 }

=====

--
-- notification group is for future extension.
--

cabhCtpNotification    OBJECT IDENTIFIER ::= { cabhCtpMib 2 }
cabhCtpNotifications   OBJECT IDENTIFIER ::= { cabhCtpNotification 0 }
cabhCtpConformance     OBJECT IDENTIFIER ::= { cabhCtpMib 3 }
cabhCtpCompliances     OBJECT IDENTIFIER ::= { cabhCtpConformance 1 }
cabhCtpGroups          OBJECT IDENTIFIER ::= { cabhCtpConformance 2 }

--
-- Notification Group
--
--
-- compliance statements

cabhCtpBasicCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for devices that implement
        Portal Service feature."
    MODULE      --cabhCtpMib

-- unconditionally mandatory groups

MANDATORY-GROUPS {
    cabhCtpGroup
}

OBJECT cabhCtpConnSrcIpType
    SYNTAX InetAddressType { ipv4(1) }
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."
```



```
OBJECT cabhCtpConnSrcIp
  SYNTAX InetAddress (SIZE(4))
  DESCRIPTION
    "An implementation is only required to support IPv4
    addresses."
```

```
OBJECT cabhCtpConnDestIpType
  SYNTAX InetAddressType { ipv4(1) }
  DESCRIPTION
    "An implementation is only required to support IPv4
    addresses."
```

```
OBJECT cabhCtpConnDestIp
  SYNTAX InetAddress (SIZE(4))
  DESCRIPTION
    "An implementation is only required to support IPv4
    addresses."
```

```
OBJECT cabhCtpPingSrcIpType
  SYNTAX InetAddressType { ipv4(1) }
  DESCRIPTION
    "An implementation is only required to support IPv4
    addresses."
```

```
OBJECT cabhCtpPingSrcIp
  SYNTAX InetAddress (SIZE(4))
  DESCRIPTION
    "An implementation is only required to support IPv4
    addresses."
```

```
OBJECT cabhCtpPingDestIpType
  SYNTAX InetAddressType { ipv4(1) }
  DESCRIPTION
    "An implementation is only required to support IPv4
    addresses."
```

```
OBJECT cabhCtpPingDestIp
  SYNTAX InetAddress (SIZE(4))
  DESCRIPTION
    "An implementation is only required to support IPv4
    addresses."
```

```
::= { cabhCtpCompliances 3 }
```

```
cabhCtpGroup OBJECT-GROUP
  OBJECTS {

    cabhCtpSetToFactory,
```



```
cabhCtpLastSetToFactory,  
cabhCtpConnSrcIpType,  
cabhCtpConnSrcIp,  
cabhCtpConnDestIpType,  
cabhCtpConnDestIp,  
cabhCtpConnProto,  
cabhCtpConnNumPkts,  
cabhCtpConnPktSize,  
cabhCtpConnTimeOut,  
cabhCtpConnControl,  
cabhCtpConnStatus,  
cabhCtpConnPktsSent,  
cabhCtpConnPktsRecv,  
cabhCtpConnRTT,  
cabhCtpConnThroughput,
```

```
cabhCtpPingSrcIpType,  
cabhCtpPingSrcIp,  
cabhCtpPingDestIpType,  
cabhCtpPingDestIp,  
cabhCtpPingNumPkts,  
cabhCtpPingPktSize,  
cabhCtpPingTimeBetween,  
cabhCtpPingTimeOut,  
cabhCtpPingControl,  
cabhCtpPingStatus,  
cabhCtpPingNumSent,  
cabhCtpPingNumRecv,  
cabhCtpPingAvgRTT,  
cabhCtpPingMinRTT,  
cabhCtpPingMaxRTT,  
cabhCtpPingNumIcmpError,  
cabhCtpPingIcmpError
```

```
}
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "Group of objects for CableHome CTP MIB."
```

```
::= { cabhCtpGroups 1 }
```

```
END
```


5. Acknowledgements

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6. Formal Syntax

The following syntax specification uses the augmented Backus-Naur Form (BNF) as described in [RFC-2234](#) [3].

7. Security Considerations

There are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. 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.

It is thus important to control even GET access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.

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. Normative References

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