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Control and Provisioning of Wireless Access Points (CAPWAP) Protocol Base MIB

Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols. In particular, it describes the managed objects for modeling the Control And Provisioning of Wireless Access Points (CAPWAP) Protocol. This MIB module is presented as a basis for future work on the SNMP management of the CAPWAP protocol.

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1. Introduction

The CAPWAP Protocol [RFC5415] defines a standard, interoperable protocol, which enables an Access Controller (AC) to manage a collection of Wireless Termination Points (WTPs).

This document defines a MIB module that can be used to manage the CAPWAP implementations. This MIB module covers both configuration and WTP status-monitoring aspects of CAPWAP, and provides a way to reuse MIB modules for any wireless technology. It presented as a basis for future work on a SNMP management of the CAPWAP protocol.

2. 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].

3. Terminology

This document uses terminology from the CAPWAP Protocol specification [RFC5415] and the Architecture Taxonomy for CAPWAP [RFC4118].

Access Controller (AC): The network entity that provides WTP access to the network infrastructure in the data plane, control plane, management plane, or a combination therein.

Wireless Termination Point (WTP): The physical or network entity that contains an radio frequency (RF) antenna and wireless physical layer (PHY) to transmit and receive station traffic for wireless access networks.

Control And Provisioning of Wireless Access Points (CAPWAP): It is a generic protocol defining AC and WTP control and data plane communication via a CAPWAP protocol transport mechanism. CAPWAP control messages, and optionally CAPWAP data messages, are secured using Datagram Transport Layer Security (DTLS) [RFC4347].

CAPWAP Control Channel: A bi-directional flow defined by the AC IP Address, WTP IP Address, AC control port, WTP control port, and the transport-layer protocol (UDP or UDP-Lite) over which CAPWAP control packets are sent and received.

CAPWAP Data Channel: A bi-directional flow defined by the AC IP Address, WTP IP Address, AC data port, WTP data port, and the transport-layer protocol (UDP or UDP-Lite) over which CAPWAP data packets are sent and received.

Station (STA): A device that contains an interface to a wireless medium (WM).

Split and Local MAC: The CAPWAP protocol supports two modes of operation: Split and Local MAC (medium access control). In Split MAC mode, all Layer 2 wireless data and management frames are encapsulated via the CAPWAP protocol and exchanged between the AC and the WTPs. The Local MAC mode allows the data frames to be either locally bridged or tunneled as 802.3 frames.

Wireless Binding: The CAPWAP protocol is independent of a specific WTP radio technology, as well its associated wireless link-layer protocol. Elements of the CAPWAP protocol are designed to accommodate the specific needs of each wireless technology in a standard way. Implementation of the CAPWAP protocol for a particular wireless technology **MUST** define a binding protocol for it, e.g., the binding for IEEE 802.11, provided in [RFC5416].

Autonomous Wireless Local Area Network (WLAN) Architecture: It is the traditional autonomous WLAN architecture, in which each WTP is a single physical device that implements all the wireless services.

Centralized WLAN Architecture: It is an emerging hierarchical architecture utilizing one or more centralized controllers for managing a large number of WTP devices. It can be said that the full wireless functions are implemented across multiple physical network devices, namely, the WTPs and ACs.

4. Conventions

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 [RFC2119].

5. Overview

5.1. Requirements and Constraints

The CAPWAP Protocol MIB module (CAPWAP-BASE-MIB) is designed to:

- Support centralized management and monitoring of WTPs from the AC in combination with the CAPWAP protocol;
- Allow operators to make configurations for WTPs before and after they connect to the AC;
- Support querying of CAPWAP protocol parameters;
- Support displaying of WTPs' current states and configurations;
- Provide basic property information about the AC, WTPs, radios, and stations, and their relationships;
- Provide counters for events on WTPs and radios such as reboot and hardware failure;
- Provide various notifications such as channel up and join failure.

5.2. Wireless Binding MIB Modules

Other Standards Development Organizations (SDOs), such as IEEE, have already defined MIB modules for a specific wireless technology, e.g., IEEE 802.11 MIB module [IEEE.802-11.2007]. Such MIB modules are called wireless binding MIB modules.

5.3. Design Objectives

This document introduces a mechanism to avoid redefining MIB objects in the existing MIB modules for a specific wireless technology, in other words, a mechanism to reuse wireless binding MIB modules defined by other SDOs.

In summary, the CAPWAP-BASE-MIB module has the following design objectives:

- To implement an architecture that uses SNMP for the management and control of wireless networks, and answering the operator's requirements for centralized management, whatever the wireless devices are configured and deployed (centralized, autonomous, or some mix);
- To be consistent with the CAPWAP protocol;

- To be independent of any wireless technologies and be able to reuse wireless binding MIB modules defined by other SDOs;
- To enable interoperability between vendors;
- To meet the management requirements for the centralized WLAN architecture.

5.4. Design Idea

The basic design idea of the CAPWAP-BASE-MIB module is:

- The SNMP agent **MUST** be run on the AC devices and is not **REQUIRED** on the WTP devices. It follows the same model as the CAPWAP protocol: Centralized Control.
- It is designed to accommodate the specific needs of each wireless technology in a standard way. It is independent of any wireless technologies.
- The ifIndex [RFC2863] is used as a common index for corresponding interfaces in the CAPWAP-BASE-MIB and the MIB modules of specific wireless technologies.
- The operator could manage and control the centralized WLAN architectures using multiple MIB modules defined by multiple SDOs, while keeping them loosely coupled.

5.5. Mechanism of Reusing Wireless Binding MIB Modules

For any wireless technology, the configuration and management of radios are very important. As usual, wireless binding MIB modules support radio management on their own. For example, the MIB tables such as the dot110perationTable [IEEE.802-11.2007] are able to support WTP radio configuration. These tables use the ifIndex as the index, and work well under autonomous WLAN architecture.

To reuse such wireless binding MIB modules is very important to centralized WLAN architectures. According to [RFC5415], a specific PHY radio could be identified by the combination of the identifiers of the WTP and radio (WTP ID + Radio ID), so the key point is to make use of the ifIndex idea and find a way to maintain the mappings between 'WTP ID + radio ID' and the ifIndex. As a generic mechanism, an ifIndex can identify an interface in an abstract way, and it does NOT care for the interface's PHY location (either on the WTP or AC). The AC can have WTP Virtual Radio Interfaces to logically represent PHY radios on the WTP. From the operator's perspective, it appears that PHY radios are located on the AC, and the PHY location of the

WTP (radio) is hidden. The operator can operate radios through MIB tables with the ifIndex of a WTP Virtual Radio Interface. As a type of abstract interface, the WTP Virtual Radio Interface could be used by any wireless technology such as IEEE 802.11 and 802.16. The capwapBaseWirelessBindingTable in the CAPWAP-BASE-MIB module is used to store the mappings between the 'WTP ID + Radio ID' and the ifIndex.

5.6. CAPWAP Protocol Wireless Binding MIB Module

According to the CAPWAP Protocol specification [RFC5415], when defining a binding for wireless technologies, the authors **MUST** include any necessary definitions for technology-specific messages and all technology-specific message elements for those messages. A CAPWAP binding protocol is required for a specific wireless binding technology, e.g., the protocol of [RFC5416] for IEEE 802.11 binding.

Sometimes, not all the technology-specific message elements in a CAPWAP binding protocol have MIB objects defined by other SDOs. For example, the protocol of [RFC5416] defines WLAN management. The WLAN refers to a logical component instantiated on a WTP device. A single physical WTP **MAY** operate a number of WLANs. Also, Local or Split MAC modes could be specified for a WLAN. The MAC mode for a WLAN is not in the scope of IEEE 802.11 [IEEE.802-11.2007]. In such cases, in addition to the existing wireless binding MIB modules defined by other SDOs, a CAPWAP protocol wireless binding MIB module is required to be defined for a wireless binding, e.g, the CAPWAP Protocol Binding MIB for IEEE 802.11 [RFC5834].

5.7. WTP Profile

In a centralized WLAN architecture, a WTP profile is used to make configurations such as a static IP address for a WTP before and after it connects to the AC. It **MUST** contain the Base MAC address [RFC5415] of the WTP because the CAPWAP message received from the WTP contains the Base MAC address and the AC uses this Base MAC address to find the corresponding WTP profile.

Section 4.6.40 of [RFC5415] omits indicating that the WTP's Base MAC address **MUST** be included in the WTP Board Data message element. This is a known errata item [Err1832] and should be fixed in any future revision of RFC 5415.

Another important function of WTP profile is to trigger the creation of WTP Virtual Radio Interfaces on the AC. To implement this function, a WTP profile **MUST** include the WTP's model number [RFC5415], which reflects the number of PHY radios on the WTP. In this way, the creation of a WTP profile triggers the AC to

automatically create the same number of WTP Virtual Radio Interfaces corresponding to the WTP's PHY radios without manual intervention. With the ifIndexes of WTP Virtual Radio Interfaces, the operator could configure and manage the WTP's PHY radios through the wireless binding MIB modules.

6. Structure of the MIB Module

The MIB objects are derived from the CAPWAP protocol document [RFC5415].

1) capwapBaseAcNameListTable

The AC name list table is used to configure the AC name list.

2) capwapBaseMacAclTable

The ACL table is used to configure stations' Access Control Lists (ACLs).

3) capwapBaseWtpProfileTable

The WTP profile table is used to configure WTP profiles for WTPs to be managed before they connect to the AC. An operator could change a WTP's current configuration by changing the values of parameters in the corresponding WTP profile, then the WTP could get the new configuration through the CAPWAP control channel.

4) capwapBaseWtpStateTable

The state table of WTPs is used to indicate the AC's CAPWAP FSM state for each WTP, and helps the operator to query a WTP's current configuration.

5) capwapBaseWtpTable

The WTP table is used to display properties of the WTPs in running state.

6) capwapBaseWirelessBindingTable

The wireless binding table is used to display the mappings between WTP Virtual Radio Interfaces and PHY radios, and the wireless binding type for each PHY radio.

7) capwapBaseStationTable

The station table is used for providing stations' basic property information.

8) capwapBaseWtpEventsStatsTable

The WTP events statistic table is used for collecting WTP reboot count, link failure count, hardware failure count and so on.

9) capwapBaseRadioEventsStatsTable

The radio events statistic table is used for collecting radio reset count, channel change count, hardware failure count, and so on.

7. Relationship to Other MIB Modules

7.1. Relationship to SNMPv2-MIB Module

The CAPWAP-BASE-MIB module does not duplicate the objects of the 'system' group in the SNMPv2-MIB [RFC3418] that is defined as being mandatory for all systems, and the objects apply to the entity as a whole. The 'system' group provides identification of the management entity and certain other system-wide data.

7.2. Relationship to IF-MIB Module

The Interfaces Group [RFC2863] defines generic managed objects for managing interfaces. This memo contains the media-specific extensions to the Interfaces Group for managing WTP PHY radios that are modeled as interfaces.

The IF-MIB module is required to be supported on the AC. Each PHY radio on the WTP corresponds to a WTP Virtual Radio Interface on the AC. The WTP Virtual Radio Interface provides a way to configure the radio's parameters and query radio's traffic statistics, and reuse wireless binding modules defined by other SD0s. The interface MUST be modeled as an ifEntry, and ifEntry objects such as ifIndex, ifDescr, ifName, and ifAlias are to be used as per [RFC2863].

Also, as an ifIndex [RFC2863] is used as a common index for corresponding interfaces in the CAPWAP-BASE-MIB and specific wireless technologies MIB modules, the AC MUST have a mechanism that preserves the values of the ifIndexes in the ifTable at AC reboot.

7.3. Relationship to ENTITY-MIB Module

The ENTITY-MIB module [RFC4133] meets the need for a standardized way of representing a single agent that supports multiple instances of one MIB. It could express a certain relationship between multiple entities and provide entity properties for each entity.

In a centralized WLAN architecture, the SNMP agent runs on the AC and is not required on the WTP. With the ENTITY-MIB module on the AC, it could keep entity information such as firmware revision and software revision of the AC and WTPs. From the ENTITY-MIB module's perspective, the overall physical entity (AC) is a 'compound' of multiple physical entities (that is, the WTPs connected to AC), and all entities are each identified by a physical index. The capwapBaseWtpTable of the CAPWAP-BASE-MIB module uses the capwapBaseWtpPhyIndex object to store the mappings of WTP object between CAPWAP-BASE-MIB and ENTITY-MIB modules.

By querying both the CAPWAP-BASE-MIB and ENTITY-MIB modules, operators could query the status and properties of the AC and WTPs. For example, they could get a WTP's current status through the CAPWAP-BASE-MIB module, and a WTP's software revision information through the ENTITY-MIB module. The CAPWAP-BASE-MIB module does not duplicate those objects defined in the ENTITY-MIB module.

7.4. Relationship to Wireless Binding MIB Modules

The wireless binding MIB module of a wireless technology (such as [IEEE.802-11.2007]) is required to be supported on the AC. The CAPWAP-BASE-MIB module is able to support any wireless binding. Through the ifIndexes of WTP Virtual Radio Interfaces, it provides a consistent and abstract way of reusing MIB objects in the wireless binding MIB modules. The CAPWAP-BASE-MIB module does not duplicate those objects defined in the wireless binding MIB modules.

7.5. MIB Modules Required for IMPORTS

The following MIB module IMPORTS objects from SYSAPPL-MIB [RFC2287], SNMPv2-SMI [RFC2578], SNMPv2-TC [RFC2579], SNMPv2-CONF [RFC2580], IF-MIB [RFC2863], SNMP-FRAMEWORK-MIB [RFC3411], INET-ADDRESS-MIB [RFC4001], and ENTITY-MIB [RFC4133].

8. Example of CAPWAP-BASE-MIB Module Usage

Below, the IEEE 802.11 binding is used as an example of how the MIB modules operate.

- 1) Create a WTP profile.

Suppose the WTP's Base MAC address is '00:01:01:01:01:00'. Create the WTP profile as follows:

In capwapBaseWtpProfileTable

```
{
  capwapBaseWtpProfileId                = 1,
  capwapBaseWtpProfileName              = 'WTP Profile 123456',
  capwapBaseWtpProfileWtpMacAddress     = '00:01:01:01:01:00',
  capwapBaseWtpProfileWtpModelNumber    = 'WTP123',
  capwapBaseWtpProfileWtpName           = 'WTP 123456',
  capwapBaseWtpProfileWtpLocation       = 'office',
  capwapBaseWtpProfileWtpStaticIpEnable = true(1),
  capwapBaseWtpProfileWtpStaticIpType   = ipv4(1),
  capwapBaseWtpProfileWtpStaticIpAddress = '192.0.2.10',
  capwapBaseWtpProfileWtpNetmask        = '255.255.255.0',
  capwapBaseWtpProfileWtpGateway        = '192.0.2.1',
  capwapBaseWtpProfileWtpFallbackEnable = true(1),
  capwapBaseWtpProfileWtpEchoInterval   = 30,
  capwapBaseWtpProfileWtpIdleTimeout    = 300,
  capwapBaseWtpProfileWtpMaxDiscoveryInterval = 20,
  capwapBaseWtpProfileWtpReportInterval = 120,
  capwapBaseWtpProfileWtpStatisticsTimer = 120,
  capwapBaseWtpProfileWtpEcnSupport     = limited(0)
}
```

Suppose the WTP with model number 'WTP123' has one PHY radio, which is identified by ID 1. The creation of this WTP profile triggers the AC to automatically create a WTP Virtual Radio Interface and add a new row object to the capwapBaseWirelessBindingTable without manual intervention. Suppose the ifIndex of the WTP Virtual Radio Interface is 10. The following information is stored in the capwapBaseWirelessBindingTable.

In capwapBaseWirelessBindingTable

```
{
  capwapBaseWtpProfileId                = 1,
  capwapBaseWirelessBindingRadioId       = 1,
  capwapBaseWirelessBindingVirtualRadioIfIndex = 10,
  capwapBaseWirelessBindingType          = dot11(2)
}
```

The WTP Virtual Radio Interfaces on the AC correspond to the PHY radios on the WTP. The WTP Virtual Radio Interface is modeled by ifTable [RFC2863].

```

In ifTable
{
    ifIndex          = 10,
    ifDescr          = 'WTP Virtual Radio Interface',
    ifType           = 254,
    ifMtu            = 0,
    ifSpeed          = 0,
    ifPhysAddress     = '00:00:00:00:00:00',
    ifAdminStatus     = true(1),
    ifOperStatus     = false(0),
    ifLastChange     = 0,
    ifInOctets       = 0,
    ifInUcastPkts    = 0,
    ifInDiscards     = 0,
    ifInErrors       = 0,
    ifInUnknownProtos = 0,
    ifOutOctets      = 0,
    ifOutUcastPkts   = 0,
    ifOutDiscards    = 0,
    ifOutErrors      = 0
}

```

2) Query the ifIndexes of WTP Virtual Radio Interfaces.

Before configuring PHY radios, the operator needs to get the ifIndexes of WTP Virtual Radio Interfaces corresponding to the PHY radios.

As capwapBaseWirelessBindingTable already stores the mappings between PHY radios (Radio IDs) and the ifIndexes of WTP Virtual Radio Interfaces, the operator can get the ifIndex information by querying this table. Such a query operation SHOULD run from radio ID 1 to radio ID 31 according to [RFC5415]), and stop when an invalid ifIndex value (0) is returned.

This example uses capwapBaseWtpProfileId = 1 and capwapBaseWirelessBindingRadioId = 1 as inputs to query the capwapBaseWirelessBindingTable, and gets capwapBaseWirelessBindingVirtualRadioIfIndex = 10. Then it uses capwapBaseWtpProfileId = 1 and capwapBaseWirelessBindingRadioId = 2, and gets an invalid ifIndex value (0), so the query operation ends. This method gets not only the ifIndexes of WTP Virtual Radio Interfaces, but also the numbers of PHY radios. Besides checking whether the ifIndex value is valid, the operator SHOULD check whether the capwapBaseWirelessBindingType is the desired binding type.

3) Configure specific wireless binding parameters for a WTP Virtual Radio Interface.

This configuration is made on the AC through a specific wireless binding MIB module such as the IEEE 802.11 MIB module.

The following shows an example of configuring parameters for a WTP Virtual Radio Interface with ifIndex 10 through the IEEE 802.11 dot11operationTable [IEEE.802-11.2007].

In dot11operationTable

```
{
  ifIndex                = 10,
  dot11MACAddress        = '00:00:00:00:00:00',
  dot11RTSThreshold      = 2347,
  dot11ShortRetryLimit   = 7,
  dot11LongRetryLimit    = 4,
  dot11FragmentationThreshold = 256,
  dot11MaxTransmitMSDULifetime = 512,
  dot11MaxReceiveLifetime = 512,
  dot11ManufacturerID    = 'capwap',
  dot11ProductID         = 'capwap',
  dot11CAPLimit          = 2,
  dot11HCCWmin           = 0,
  dot11HCCWmax           = 0,
  dot11HCCAIFSN          = 1,
  dot11ADDBAResponseTimeout = 1,
  dot11ADDTSResponseTimeout = 1,
  dot11ChannelUtilizationBeaconInterval = 50,
  dot11ScheduleTimeout    = 10,
  dot11DLSResponseTimeout = 10,
  dot11QAPMissingAckRetryLimit = 1,
  dot11EDCAveragingPeriod = 5
}
```

4) Get the current configuration status report from the WTP to the AC.

According to [RFC5415], before a WTP that has joined the AC gets configuration from the AC, it needs to report its current configuration status by sending a configuration status request message to the AC, which uses the message to update MIB objects on the AC. For example, for IEEE 802.11 binding, the AC updates data in the ifTable [RFC2863] and IEEE 802.11 MIB module, and so on, according to the message. For ifIndex 10, its ifOperStatus in ifTable is updated according to the current radio operational status in the CAPWAP message.

5) Query WTP and radio statistical data.

After WTPs start to run, the operator could query WTP and radio statistical data through CAPWAP-BASE-MIB and the specific binding MIB module on the AC. For example, through dot11CountersTable in the IEEE 802.11 MIB module, the operator could query the counter data of a radio using the ifIndex of the corresponding WTP Virtual Radio Interface. With the capwapBaseWtpTable table in the CAPWAP-BASE-MIB module, the operator could query the properties of running WTPs.

6) Run MIB operations through a CAPWAP protocol wireless binding MIB module.

For example, for the CAPWAP IEEE 802.11 binding protocol [RFC5416], some MIB operations such as MAC mode configuration for a WLAN depend on the CAPWAP Protocol Binding MIB for IEEE 802.11 [RFC5834]. For more information, refer to [RFC5834].

7) Query other properties of a WTP.

The Operator could query MIB objects in the ENTITY-MIB [RFC4133] module by using the capwapBaseWtpPhyIndex in the capwapBaseWtpTable of CAPWAP-BASE-MIB module. The properties of a WTP such as software version, hardware version are available in the ENTITY-MIB module.

9. Definitions

CAPWAP-BASE-MIB DEFINITIONS ::= BEGIN

IMPORTS

PhysAddress, TEXTUAL-CONVENTION, TruthValue,
DateAndTime, RowStatus
 FROM SNMPv2-TC
LongUtf8String
 FROM SYSAPPL-MIB
InterfaceIndex, ifGeneralInformationGroup
 FROM IF-MIB
PhysicalIndex
 FROM ENTITY-MIB
SnmpAdminString
 FROM SNMP-FRAMEWORK-MIB
NOTIFICATION-GROUP, OBJECT-GROUP, MODULE-COMPLIANCE
 FROM SNMPv2-CONF
MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, mib-2,
Integer32, Unsigned32, Counter32, Gauge32, TimeTicks

FROM SNMPv2-SMI
InetAddressType, InetAddress
FROM INET-ADDRESS-MIB;

capwapBaseMIB MODULE-IDENTITY

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DESCRIPTION

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This version of this MIB module is part of RFC 5833; see the RFC itself for full legal notices.

This MIB module contains managed object definitions for the CAPWAP Protocol."

REVISION "201004300000Z"

DESCRIPTION

"Initial version published as RFC 5833"

::= { mib-2 196 }

-- Textual Conventions

CapwapBaseWtpProfileIdTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"Represents the unique identifier of a WTP profile."

SYNTAX Unsigned32 (0..4096)

CapwapBaseWtpIdTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "1x:"

STATUS current

DESCRIPTION

"Represents the unique identifier of a WTP instance.

As usual, the Base MAC address of the WTP is used."

SYNTAX OCTET STRING (SIZE(6|8))

CapwapBaseStationIdTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "1x:"

STATUS current

DESCRIPTION

"Represents the unique identifier of a station instance.

As usual, the MAC address of the station is used."

SYNTAX OCTET STRING (SIZE(6|8))

CapwapBaseRadioIdTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"Represents the unique identifier of a radio on a WTP."

SYNTAX Unsigned32 (1..31)

CapwapBaseTunnelModeTC ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Represents the tunneling modes of operation that are supported by a WTP.

The WTP MAY support more than one option, represented by the bit field below:

localBridging(0) - Local bridging mode

dot3Tunnel(1) - 802.3 frame tunnel mode

nativeTunnel(2) - Native frame tunnel mode"

REFERENCE

"Section 4.6.43 of CAPWAP Protocol Specification, RFC 5415."

SYNTAX BITS {
localBridging(0),
dot3Tunnel(1),
nativeTunnel(2)
}

CapwapBaseMacTypeTC ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Represents the MAC mode of operation supported by a WTP.

The following enumerated values are supported:

localMAC(0) - Local-MAC mode

splitMAC(1) - Split-MAC mode

both(2) - Both Local-MAC and Split-MAC

Note that the CAPWAP field [RFC5415] modeled by this object takes zero as starting value; this MIB object follows that rule."

REFERENCE

"Section 4.6.44 of CAPWAP Protocol Specification, RFC 5415."

SYNTAX INTEGER {
localMAC(0),
splitMAC(1),
both(2)
}

CapwapBaseChannelTypeTC ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Represents the channel type for CAPWAP protocol.

The following enumerated values are supported:

data(1) - Data channel

control(2) - Control channel"

SYNTAX INTEGER {
data(1),
control(2)
}

CapwapBaseAuthenMethodTC ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Represents the authentication credential type for a WTP.

The following enumerated values are supported:

other(1) - Other method, for example, vendor specific

clear(2) - Clear text and no authentication

x509(3) - X.509 certificate authentication

psk(4) - Pre-Shared secret authentication

As a mandatory requirement, CAPWAP control channel authentication SHOULD use DTLS, either by certificate or

PSK. For data channel authentication, DTLS is optional."

SYNTAX INTEGER {
 other(1),
 clear(2),
 x509(3),
 psk(4)
}

-- Top-level components of this MIB module

-- Notifications

capwapBaseNotifications OBJECT IDENTIFIER

::= { capwapBaseMIB 0 }

-- Tables, Scalars

capwapBaseObjects OBJECT IDENTIFIER

::= { capwapBaseMIB 1 }

-- Conformance

capwapBaseConformance OBJECT IDENTIFIER

::= { capwapBaseMIB 2 }

-- AC Objects Group

capwapBaseAc OBJECT IDENTIFIER

::= { capwapBaseObjects 1 }

capwapBaseWtpSessions OBJECT-TYPE

SYNTAX Gauge32 (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the total number of WTPs that are connecting to the AC."

REFERENCE

"Section 4.6.1 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseAc 1 }

capwapBaseWtpSessionsLimit OBJECT-TYPE
SYNTAX Unsigned32 (0..65535)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "Represents the maximum number of WTP sessions configured on the AC.
 The value of the object is persistent at restart/reboot."
REFERENCE
 "Section 4.6.1 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseAc 2 }

capwapBaseStationSessions OBJECT-TYPE
SYNTAX Gauge32 (0..65535)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "Represents the total number of stations that are accessing the wireless service provided by the AC."
REFERENCE
 "Section 4.6.1 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseAc 3 }

capwapBaseStationSessionsLimit OBJECT-TYPE
SYNTAX Unsigned32 (0..65535)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "Represents the maximum number of station sessions configured on the AC.
 The value of the object is persistent at restart/reboot."
REFERENCE
 "Section 4.6.1 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseAc 4 }

capwapBaseDataChannelDTLSPolicyOptions OBJECT-TYPE
SYNTAX BITS {
 other(0),
 clear(1),
 dtls(2)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The AC communicates its policy on the use of DTLS for the CAPWAP data channel.
 The AC MAY support more than one option, represented by the bit field below:

other(0) - Other method, for example, vendor specific
 clear(1) - Clear text
 dtls(2) - DTLS"

REFERENCE

"Section 4.6.1 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseAc 5 }

capwapBaseControlChannelAuthenOptions OBJECT-TYPE

SYNTAX BITS {
 x509(0),
 psk(1)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the authentication credential type supported by the AC for CAPWAP control channel.

The AC MAY support more than one option, represented by the bit field below:

x509(0) - X.509 certificate based
 psk(1) - Pre-Shared secret"

REFERENCE

"Section 4.6.1 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseAc 6 }

-- capwapBaseAcNameListTable table

capwapBaseAcNameListTable OBJECT-TYPE

SYNTAX SEQUENCE OF CapwapBaseAcNameListEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of objects that configure the AC name list.
 Values of all read-create objects in this table are persistent at restart/reboot."

REFERENCE

"Section 4.6.5 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseAc 9 }

capwapBaseAcNameListEntry OBJECT-TYPE

SYNTAX CapwapBaseAcNameListEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A set of objects that configures the AC name list."

INDEX { capwapBaseAcNameListId }

::= { capwapBaseAcNameListTable 1 }

```
CapwapBaseAcNameListEntry ::= SEQUENCE {
    capwapBaseAcNameListId      Unsigned32,
    capwapBaseAcNameListName    LongUtf8String,
    capwapBaseAcNameListPriority Unsigned32,
    capwapBaseAcNameListRowStatus RowStatus
}

capwapBaseAcNameListId OBJECT-TYPE
    SYNTAX      Unsigned32 (1..255)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Represents the unique identifier of an AC Name list."
    ::= { capwapBaseAcNameListEntry 1 }

capwapBaseAcNameListName OBJECT-TYPE
    SYNTAX      LongUtf8String (SIZE(1..512))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "Represents the name of an AC, and it is expected to be
         an UTF-8 encoded string."
    REFERENCE
        "Section 4.6.5 of CAPWAP Protocol Specification, RFC 5415."
    ::= { capwapBaseAcNameListEntry 2 }

capwapBaseAcNameListPriority OBJECT-TYPE
    SYNTAX      Unsigned32 (1..255)
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "Represents the priority order of the preferred AC.
         For instance, the value of one (1) is used to set the primary
         AC, the value of two (2) is used to set the secondary AC, etc."
    REFERENCE
        "Section 4.6.5 of CAPWAP Protocol Specification, RFC 5415."
    ::= { capwapBaseAcNameListEntry 3 }

capwapBaseAcNameListRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is used to create, modify, and/or delete a row
         in this table.
         The value of capwapBaseAcNameListName and
         capwapBaseAcNameListPriority can be changed when this
         object is in state 'active' or in 'notInService'."
```

The capwapBaseAcNameListRowStatus may be changed to 'active' if all the managed objects in the conceptual row with MAX-ACCESS read-create have been assigned valid values."

::= { capwapBaseAcNameListEntry 4 }

-- End of capwapBaseAcNameListTable table

-- capwapBaseMacAcLTable table

capwapBaseMacAcLTable OBJECT-TYPE

SYNTAX SEQUENCE OF CapwapBaseMacAcLEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of objects that configure station Access Control Lists (ACLs).

The WTP will not provide service to the MAC addresses configured in this table.

Values of all read-create objects in this table are persistent at AC restart/reboot."

REFERENCE

"Section 4.6.7 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseAc 10 }

capwapBaseMacAcLEntry OBJECT-TYPE

SYNTAX CapwapBaseMacAcLEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A set of objects that configures station Access Control Lists (ACLs)."

INDEX { capwapBaseMacAcLId }

::= { capwapBaseMacAcLTable 1 }

```
CapwapBaseMacAcLEntry ::= SEQUENCE {
    capwapBaseMacAcLId          Unsigned32,
    capwapBaseMacAcLStationId   CapwapBaseStationIdTC,
    capwapBaseMacAcLRowStatus   RowStatus
}
```

capwapBaseMacAcLId OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Represents the unique identifier of an ACL."

::= { capwapBaseMacAcLEntry 1 }

capwapBaseMacAclStationId OBJECT-TYPE**SYNTAX** CapwapBaseStationIdTC**MAX-ACCESS** read-create**STATUS** current**DESCRIPTION**

"Represents the MAC address of a station to which WTPs will no longer provides service."

REFERENCE

"Section 4.6.7 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseMacAclEntry 2 }

capwapBaseMacAclRowStatus OBJECT-TYPE**SYNTAX** RowStatus**MAX-ACCESS** read-create**STATUS** current**DESCRIPTION**

"This object is used to create, modify, and/or delete a row in this table.

The value of capwapBaseMacAclStationId can be changed when this object is in state 'active' or in 'notInService'.

The capwapBaseMacAclRowStatus may be changed to 'active' if all the managed objects in the conceptual row with MAX-ACCESS read-create have been assigned valid values."

::= { capwapBaseMacAclEntry 3 }

-- End of capwapBaseMacAclTable table

-- End of AC Objects Group

-- WTP Objects Group

capwapBaseWtps OBJECT IDENTIFIER

::= { capwapBaseObjects 2 }

-- capwapBaseWtpProfileTable Table

capwapBaseWtpProfileTable OBJECT-TYPE**SYNTAX** SEQUENCE OF CapwapBaseWtpProfileEntry**MAX-ACCESS** not-accessible**STATUS** current**DESCRIPTION**

"A table of objects that configure WTP profiles for WTPs to be managed before they connect to the AC.

An operator could change a WTP's configuration by changing the values of parameters in the corresponding WTP profile, then the WTP could get the new configuration through the CAPWAP control channel.

Values of all read-create objects in this table are persistent at restart/reboot."

::= { capwapBaseWtps 1 }

capwapBaseWtpProfileEntry OBJECT-TYPE
SYNTAX CapwapBaseWtpProfileEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"A set of objects that configures and displays a WTP profile."

INDEX { capwapBaseWtpProfileId }

::= { capwapBaseWtpProfileTable 1 }

CapwapBaseWtpProfileEntry ::= SEQUENCE {	
capwapBaseWtpProfileId	CapwapBaseWtpProfileIdTC,
capwapBaseWtpProfileName	SnmpAdminString,
capwapBaseWtpProfileWtpMacAddress	CapwapBaseWtpIdTC,
capwapBaseWtpProfileWtpModelNumber	SnmpAdminString,
capwapBaseWtpProfileWtpName	LongUtf8String,
capwapBaseWtpProfileWtpLocation	LongUtf8String,
capwapBaseWtpProfileWtpStaticIpEnable	TruthValue,
capwapBaseWtpProfileWtpStaticIpType	InetAddressType,
capwapBaseWtpProfileWtpStaticIpAddress	InetAddress,
capwapBaseWtpProfileWtpNetmask	InetAddress,
capwapBaseWtpProfileWtpGateway	InetAddress,
capwapBaseWtpProfileWtpFallbackEnable	INTEGER,
capwapBaseWtpProfileWtpEchoInterval	Unsigned32,
capwapBaseWtpProfileWtpIdleTimeout	Unsigned32,
capwapBaseWtpProfileWtpMaxDiscoveryInterval	Unsigned32,
capwapBaseWtpProfileWtpReportInterval	Unsigned32,
capwapBaseWtpProfileWtpStatisticsTimer	Unsigned32,
capwapBaseWtpProfileWtpEcnSupport	INTEGER,
capwapBaseWtpProfileRowStatus	RowStatus
}	

capwapBaseWtpProfileId OBJECT-TYPE
SYNTAX CapwapBaseWtpProfileIdTC
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Represents the unique identifier of a WTP profile."
::= { capwapBaseWtpProfileEntry 1 }

capwapBaseWtpProfileName OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"Represents the name of a WTP profile."
 ::= { capwapBaseWtpProfileEntry 2 }

capwapBaseWtpProfileWtpMacAddress OBJECT-TYPE

SYNTAX CapwapBaseWtpIdTC

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the Base MAC address of a WTP.

A WTP profile MUST contain the Base MAC address of the WTP because the CAPWAP message received from the WTP contains its Base MAC address and the AC uses the Base MAC address to find the corresponding WTP profile.

Section 4.6.40 of [RFC5415] omits indicating that the WTP's Base MAC address must be included in the WTP Board Data message element. This is a known errata item and should be fixed in any future revision of the RFC 5415."

REFERENCE

"Section 4.6.40 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpProfileEntry 3 }

capwapBaseWtpProfileWtpModelNumber OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the model number of a WTP.

A WTP profile MUST include the WTP's model number, which reflects the number of Physical Layer (PHY) radios on the WTP. In this way, the creation of a WTP profile triggers the AC to automatically create the same number of WTP Virtual Radio Interfaces corresponding to the WTP's PHY radios without manual intervention. With the ifIndexes of WTP Virtual Radio Interfaces, the operator could configure and manage the WTP's PHY radios through the wireless binding MIB modules."

REFERENCE

"Section 4.6.40 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpProfileEntry 4 }

capwapBaseWtpProfileWtpName OBJECT-TYPE

SYNTAX LongUtf8String (SIZE(1..512))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the name of the WTP."

REFERENCE

"Section 4.6.45 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpProfileEntry 5 }

capwapBaseWtpProfileWtpLocation OBJECT-TYPE
SYNTAX LongUtf8String (SIZE(1..1024))
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Represents the location of the WTP."
REFERENCE
"Section 4.6.30 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseWtpProfileEntry 6 }

capwapBaseWtpProfileWtpStaticIpEnable OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Represents whether the WTP SHOULD use a static IP address
or not. A value of false disables the static IP address,
while a value of true enables it."
REFERENCE
"Section 4.6.48 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseWtpProfileEntry 7 }

capwapBaseWtpProfileWtpStaticIpType OBJECT-TYPE
SYNTAX InetAddressType {ipv4(1)}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Represents the static IP address type used by the WTP.
Only ipv4(1) is supported by the object.
Although the CAPWAP protocol [RFC5415] supports both IPv4
and IPv6, note that the CAPWAP field modeled by this
object does not support IPv6, so the object does not
support ipv6(2)."
REFERENCE
"Section 4.6.48 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseWtpProfileEntry 8 }

capwapBaseWtpProfileWtpStaticIpAddress OBJECT-TYPE
SYNTAX InetAddress (SIZE(4))
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"When capwapBaseWtpProfileWtpStaticIpEnable is true,
it represents the static IP address to be assigned to the WTP.
The format of this IP address is determined by the
corresponding instance of object

capwapBaseWtpProfileWtpStaticIpType."

REFERENCE

"Section 4.6.48 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpProfileEntry 9 }

capwapBaseWtpProfileWtpNetmask OBJECT-TYPE

SYNTAX InetAddress (SIZE(4))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"When capwapBaseWtpProfileWtpStaticIpEnable is true,
it represents the netmask to be assigned to the WTP.
The format of this netmask is determined by the
corresponding instance of object
capwapBaseWtpProfileWtpStaticIpType."

REFERENCE

"Section 4.6.48 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpProfileEntry 10 }

capwapBaseWtpProfileWtpGateway OBJECT-TYPE

SYNTAX InetAddress (SIZE(4))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"When capwapBaseWtpProfileWtpStaticIpEnable is true,
it represents the gateway to be assigned to the WTP.
The format of this IP address is determined by the
corresponding instance of object
capwapBaseWtpProfileWtpStaticIpType."

REFERENCE

"Section 4.6.48 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpProfileEntry 11 }

capwapBaseWtpProfileWtpFallbackEnable OBJECT-TYPE

SYNTAX INTEGER {
 enabled(1),
 disabled(2)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents whether to enable or disable automatic CAPWAP
fallback in the event that a WTP detects its preferred AC
and is not currently connected to it.

The following enumerated values are supported:

enabled(1) - The fallback mode is enabled

disabled(2) - The fallback mode is disabled"

REFERENCE

"Section 4.6.42 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { enabled }

::= { capwapBaseWtpProfileEntry 12 }

capwapBaseWtpProfileWtpEchoInterval OBJECT-TYPE

SYNTAX Unsigned32

UNITS "second"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the minimum time, in seconds, between sending Echo Request messages to the AC that the WTP has joined."

REFERENCE

"Section 4.7.7 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { 30 }

::= { capwapBaseWtpProfileEntry 13 }

capwapBaseWtpProfileWtpIdleTimeout OBJECT-TYPE

SYNTAX Unsigned32

UNITS "second"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the idle timeout value that the WTP SHOULD enforce for its active stations."

REFERENCE

"Section 4.7.8 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { 300 }

::= { capwapBaseWtpProfileEntry 14 }

capwapBaseWtpProfileWtpMaxDiscoveryInterval OBJECT-TYPE

SYNTAX Unsigned32 (2..180)

UNITS "second"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the maximum time allowed between sending Discovery Request messages, in seconds."

REFERENCE

"Section 4.7.10 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { 20 }

::= { capwapBaseWtpProfileEntry 15 }

capwapBaseWtpProfileWtpReportInterval OBJECT-TYPE

SYNTAX Unsigned32

UNITS "second"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the interval for WTP to send the Decryption Error report."

REFERENCE

"Section 4.7.11 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { 120 }

::= { capwapBaseWtpProfileEntry 16 }

capwapBaseWtpProfileWtpStatisticsTimer OBJECT-TYPE

SYNTAX Unsigned32

UNITS "second"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the interval the WTP uses between the WTP Event Requests it transmits to the AC to communicate its statistics, in seconds."

REFERENCE

"Section 4.7.14 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { 120 }

::= { capwapBaseWtpProfileEntry 17 }

capwapBaseWtpProfileWtpEcnSupport OBJECT-TYPE

SYNTAX INTEGER {
 limited(0),
 fullAndLimited(1)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Represents the support for the Explicit Congestion Notification (ECN) bits, as defined in [RFC3168].

The following enumerated values are supported:

 limited(0) - Limited ECN support

 fullAndLimited(1) - Full and limited ECN support

Note that the CAPWAP field [RFC5415] modeled by this object takes zero as starting value; this MIB object follows that rule."

REFERENCE

"Section 4.6.25 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpProfileEntry 18 }

capwapBaseWtpProfileRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object is used to create, modify, and/or delete a row

in this table.

The value of capwapBaseWtpProfileName, capwapBaseWtpProfileWtpName and capwapBaseWtpProfileWtpLocation can be changed when this object is in state 'active' or in 'notInService'.

The other objects in a row can be modified only when the value of this object in the corresponding conceptual row is not 'active'. Thus, to modify one or more of the objects in this conceptual row:

- a. change the row status to 'notInService'
- b. change the values of the row
- c. change the row status to 'active'

The capwapBaseWtpProfileRowStatus may be changed to 'active' if the managed objects capwapBaseWtpProfileName, capwapBaseWtpProfileWtpMacAddress, capwapBaseWtpProfileWtpModelNumber, capwapBaseWtpProfileWtpName, and capwapBaseWtpProfileWtpLocation in the conceptual row have been assigned valid values.

Deleting a WTP profile in use will disconnect the WTP from the AC. So the network management system SHOULD ask the operator to confirm such an operation.

When a WTP profile entry is removed from the table, the corresponding WTP Virtual Radio Interfaces are also removed from the capwapBaseWirelessBindingTable and ifTable [RFC2863].

Also, the related object instances SHOULD be removed from the wireless binding MIB modules such as the IEEE 802.11 MIB module [IEEE.802-11.2007]."

```
::= { capwapBaseWtpProfileEntry 19 }
```

```
-- End of capwapBaseWtpProfileTable table
```

```
-- capwapBaseWtpStateTable table
```

```
capwapBaseWtpStateTable OBJECT-TYPE
```

```
SYNTAX SEQUENCE OF CapwapBaseWtpStateEntry
```

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

```
STATUS current
```

```
DESCRIPTION
```

```
"A table of objects that indicate the AC's CAPWAP FSM state
for each WTP, and helps the operator to query a WTP's
current configuration."
```

```
::= { capwapBaseWtps 2 }
```

```
capwapBaseWtpStateEntry OBJECT-TYPE
```

SYNTAX	CapwapBaseWtpStateEntry
MAX-ACCESS	not-accessible
STATUS	current

DESCRIPTION

"A set of objects that displays the AC's CAPWAP FSM state for each WTP.

Also, the operator could query the current configuration of a WTP by using the identifier of the corresponding WTP profile."

```
INDEX { capwapBaseWtpStateWtpId }
 ::= { capwapBaseWtpStateTable 1 }
```

```
CapwapBaseWtpStateEntry ::= SEQUENCE {
    capwapBaseWtpStateWtpId
    capwapBaseWtpStateWtpIpAddressType
    capwapBaseWtpStateWtpIpAddress
    capwapBaseWtpStateWtpLocalIpAddressType
    capwapBaseWtpStateWtpLocalIpAddress
    capwapBaseWtpStateWtpBaseMacAddress
    capwapBaseWtpState
    capwapBaseWtpStateWtpUpTime
    capwapBaseWtpStateWtpCurrWtpProfileId
}
```

capwapBaseWtpStateWtpId OBJECT-TYPE

SYNTAX	CapwapBaseWtpIdTC
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	

"Represents the unique identifier of a WTP."

```
 ::= { capwapBaseWtpStateEntry 1 }
```

capwapBaseWtpStateWtpIpAddressType OBJECT-TYPE

SYNTAX	InetAddressType
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"Represents the IP address type of a WTP.

Only `ipv4(1)` and `ipv6(2)` are supported by the object."

```
 ::= { capwapBaseWtpStateEntry 2 }
```

capwapBaseWtpStateWtpIpAddress OBJECT-TYPE

SYNTAX	InetAddress
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"Represents the IP address of a WTP that corresponds to the IP address in the IP packet header.

The format of this IP address is determined by the corresponding instance of object capwapBaseWtpStateWtpIpAddressType."

REFERENCE

"Section 4 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpStateEntry 3 }

capwapBaseWtpStateWtpLocalIpAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the local IP address type of a WTP.

Only ipv4(1) and ipv6(2) are supported by the object."

::= { capwapBaseWtpStateEntry 4 }

capwapBaseWtpStateWtpLocalIpAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the local IP address of a WTP and models the CAPWAP Local IPv4 Address or CAPWAP Local IPv6 Address fields [RFC5415].

If a Network Address Translation (NAT) device is present between WTP and AC, the value of

capwapBaseWtpStateWtpLocalIpAddress will be different from the value of capwapBaseWtpStateWtpIpAddress.

The format of this IP address is determined by the corresponding instance of object

capwapBaseWtpStateWtpLocalIpAddressType."

REFERENCE

"Sections 4.6.11 and 4.6.12 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpStateEntry 5 }

capwapBaseWtpStateWtpBaseMacAddress OBJECT-TYPE

SYNTAX PhysAddress (SIZE(6|8))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the WTP's Base MAC Address, which MAY be assigned to the primary Ethernet interface.

The instance of the object corresponds to the Base MAC Address sub-element in the CAPWAP protocol [RFC5415]."

REFERENCE

"Section 4.6.40 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpStateEntry 6 }

capwapBaseWtpState OBJECT-TYPE

SYNTAX INTEGER {
 dtls(1),
 join(2),
 image(3),
 configure(4),
 dataCheck(5),
 run(6),
 reset(7),
 dtlsTeardown(8),
 unknown(9)
 }

MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Represents the various possibilities of the AC's CAPWAP FSM state for each WTP.

The following enumerated values are supported:

- dtls(1) - DTLS negotiation states, which include DTLS setup, authorize, DTLS connect
- join(2) - The WTP is joining with the AC
- image(3) - The WTP is downloading software
- configure(4) - The WTP is getting configuration from the AC
- dataCheck(5) - The AC is waiting for the Data Channel Keep Alive Packet
- run(6) - The WTP enters the running state
- reset(7) - The AC transmits a reset request message to the WTP
- dtlsTeardown(8) - DTLS session is torn down
- unknown(9) - Operator already prepared configuration for the WTP, while the WTP has not contacted the AC until now"

REFERENCE

"Section 2.3.1 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpStateEntry 7 }

capwapBaseWtpStateWtpUpTime OBJECT-TYPE

SYNTAX TimeTicks

MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Represents the time (in hundredths of a second) since the WTP has been in the running state (corresponding to the value run(6) of capwapBaseWtpState)."

::= { capwapBaseWtpStateEntry 8 }

capwapBaseWtpStateWtpCurrWtpProfileId OBJECT-TYPE

```

SYNTAX      CapwapBaseWtpProfileIdTC
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Represents the current identifier of a WTP profile.
     The operator could query a WTP's current configuration
     with the identifier of a WTP profile."
 ::= { capwapBaseWtpStateEntry 9 }

```

```
-- End of capwapBaseWtpStateTable Table
```

```
-- capwapBaseWtpTable Table
```

```

capwapBaseWtpTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF CapwapBaseWtpEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table of objects that display properties of the WTPs
         in running state."
    ::= { capwapBaseWtps 3 }

```

```

capwapBaseWtpEntry OBJECT-TYPE
    SYNTAX      CapwapBaseWtpEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A set of objects that displays properties of the WTPs
         in running state."
    INDEX { capwapBaseWtpCurrId }
    ::= { capwapBaseWtpTable 1 }

```

```

CapwapBaseWtpEntry ::= SEQUENCE {
    capwapBaseWtpCurrId          CapwapBaseWtpIdTC,
    capwapBaseWtpPhyIndex        PhysicalIndex,
    capwapBaseWtpBaseMacAddress  PhysAddress,
    capwapBaseWtpTunnelModeOptions CapwapBaseTunnelModeTC,
    capwapBaseWtpMacTypeOptions  CapwapBaseMacTypeTC,
    capwapBaseWtpDiscoveryType   INTEGER,
    capwapBaseWtpRadiosInUseNum  Gauge32,
    capwapBaseWtpRadioNumLimit   Unsigned32,
    capwapBaseWtpRetransmitCount Counter32
}

```

```

capwapBaseWtpCurrId OBJECT-TYPE
    SYNTAX      CapwapBaseWtpIdTC
    MAX-ACCESS  not-accessible

```

STATUS current

DESCRIPTION

"Represents the unique identifier of a WTP in running state."

::= { capwapBaseWtpEntry 1 }

capwapBaseWtpPhyIndex OBJECT-TYPE

SYNTAX PhysicalIndex

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the unique physical index of a physical entity in the ENTITY-MIB module [RFC4133].

Information about a specific WTP such as its software version could be accessed through this index."

::= { capwapBaseWtpEntry 2 }

capwapBaseWtpBaseMacAddress OBJECT-TYPE

SYNTAX PhysAddress (SIZE(6|8))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the WTP's Base MAC Address, which MAY be assigned to the primary Ethernet interface.

The instance of the object corresponds to the Base MAC Address sub-element in the CAPWAP protocol [RFC5415]."

REFERENCE

"Section 4.6.40 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpEntry 3 }

capwapBaseWtpTunnelModeOptions OBJECT-TYPE

SYNTAX CapwapBaseTunnelModeTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the tunneling modes of operation supported by the WTP."

REFERENCE

"Section 4.6.43 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpEntry 4 }

capwapBaseWtpMacTypeOptions OBJECT-TYPE

SYNTAX CapwapBaseMacTypeTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the MAC mode of operation supported by the WTP."

REFERENCE

"Section 4.6.44 of CAPWAP Protocol Specification, RFC 5415."

```
::= { capwapBaseWtpEntry 5 }
```

capwapBaseWtpDiscoveryType OBJECT-TYPE

```
SYNTAX      INTEGER {  
                unknown(0),  
                staticConfig(1),  
                dhcp(2),  
                dns(3),  
                acRef(4)  
            }
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents how the WTP discovers the AC.

The following enumerated values are supported:

```
unknown(0)      - Unknown  
staticConfig(1) - Static configuration  
dhcp(2)         - DHCP  
dns(3)          - DNS  
acRef(4)        - AC referral
```

Note that the CAPWAP field [RFC5415] modeled by this object takes zero as starting value; this MIB object follows that rule."

REFERENCE

"Section 4.6.21 of CAPWAP Protocol Specification, RFC 5415."

```
::= { capwapBaseWtpEntry 6 }
```

capwapBaseWtpRadiosInUseNum OBJECT-TYPE

```
SYNTAX      Gauge32 (0..255)
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the number of radios in use on the WTP."

REFERENCE

"Section 4.6.41 of CAPWAP Protocol Specification, RFC 5415."

```
::= { capwapBaseWtpEntry 7 }
```

capwapBaseWtpRadioNumLimit OBJECT-TYPE

```
SYNTAX      Unsigned32 (0..255)
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the maximum radio number supported by the WTP."

REFERENCE

"Section 4.6.41 of CAPWAP Protocol Specification, RFC 5415."

```
::= { capwapBaseWtpEntry 8 }
```

capwapBaseWtpRetransmitCount OBJECT-TYPE

```
SYNTAX          Counter32
UNITS           "retransmissions"
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION     "Represents the number of retransmissions for a given
                 CAPWAP packet."
REFERENCE       "Section 4.8.8 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseWtpEntry 9 }
```

-- End of capwapBaseWtpTable table

-- capwapBaseWirelessBindingTable Table

```
capwapBaseWirelessBindingTable OBJECT-TYPE
SYNTAX          SEQUENCE OF CapwapBaseWirelessBindingEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "A table of objects that display the mappings between
                 WTP Virtual Radio Interfaces and PHY radios, and the
                 wireless binding type for each PHY radio.
                 As capwapBaseWirelessBindingTable stores the mappings between
                 PHY radios (Radio IDs) and the ifIndexes of WTP Virtual Radio
                 Interfaces, the operator can get the ifIndex information by
                 querying this table. Such a query operation SHOULD run from
                 radio ID 1 to radio ID 31 according to [RFC5415],
                 and stop when an invalid ifIndex value (0) is returned.
                 Values of all objects in this table are persistent at
                 restart/reboot."
 ::= { capwapBaseWtps 4 }
```

```
capwapBaseWirelessBindingEntry OBJECT-TYPE
SYNTAX          CapwapBaseWirelessBindingEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "A set of objects that displays the mapping between
                 a specific WTP Virtual Radio Interface and a PHY
                 radio, and the wireless binding type for the PHY radio."
INDEX {
    capwapBaseWtpProfileId,
    capwapBaseWirelessBindingRadioId
}
 ::= { capwapBaseWirelessBindingTable 1 }
```

```

CapwapBaseWirelessBindingEntry ::= SEQUENCE {
    capwapBaseWirelessBindingRadioId          CapwapBaseRadioIdTC,
    capwapBaseWirelessBindingVirtualRadioIfIndex InterfaceIndex,
    capwapBaseWirelessBindingType             INTEGER
}

```

```

capwapBaseWirelessBindingRadioId OBJECT-TYPE
    SYNTAX          CapwapBaseRadioIdTC
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Represents the identifier of a PHY radio on a WTP, which
         is required to be unique on a WTP.
         For example, WTP A and WTP B use a same value of
         capwapBaseWirelessBindingRadioId for their first radio."
    REFERENCE
        "Section 4.3 of CAPWAP Protocol Specification, RFC 5415."
    ::= { capwapBaseWirelessBindingEntry 1 }

```

```

capwapBaseWirelessBindingVirtualRadioIfIndex OBJECT-TYPE
    SYNTAX          InterfaceIndex
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "Represents the index value that uniquely identifies a
         WLAN Virtual Radio Interface. The interface identified by
         a particular value of this index is the same interface as
         identified by the same value of the ifIndex.
         Before WTPs contact the AC to get configuration,
         the operator configures WTP profiles for them.
         The creation of a WTP profile triggers the system to
         automatically create a specific number of WTP Virtual Radio
         Interfaces and add a new row object in the
         capwapBaseWirelessBindingTable without manual intervention.
         As most MIB modules use the ifIndex to identify an interface
         for configuration and statistical data (for example, the IEEE
         802.11 MIB module [IEEE.802-11.2007]), it will be easy to
         reuse other wireless binding MIB modules through the WTP
         Virtual Radio Interface in the Centralized WLAN
         Architecture."
    ::= { capwapBaseWirelessBindingEntry 2 }

```

```

capwapBaseWirelessBindingType OBJECT-TYPE
    SYNTAX          INTEGER {
                        dot11(1),
                        epc(3)
                    }
    MAX-ACCESS      read-only

```

STATUS current

DESCRIPTION

"Represents the wireless binding type for the radio.

The following enumerated values are supported:

dot11(1) - IEEE 802.11

epc(3) - EPCGlobal"

REFERENCE

"Section 4.3 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWirelessBindingEntry 3 }

-- End of capwapBaseWirelessBindingTable Table

-- capwapBaseStationTable Table

capwapBaseStationTable OBJECT-TYPE

SYNTAX SEQUENCE OF CapwapBaseStationEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of objects that display stations that are accessing the wireless service provided by the AC."

REFERENCE

"Section 4.6.8 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtps 5 }

capwapBaseStationEntry OBJECT-TYPE

SYNTAX CapwapBaseStationEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A set of objects that displays a station that is associated with the specific radio on the WTP.

Note that in some cases such as roaming that a station may simultaneously associate with two WTPs for some (short) time.

The MIB implementation MUST ensure there is only one valid and meaningful entry for a specific station."

INDEX { capwapBaseStationId }

::= { capwapBaseStationTable 1 }

CapwapBaseStationEntry ::= SEQUENCE {

capwapBaseStationId CapwapBaseStationIdTC,

capwapBaseStationWtpId CapwapBaseWtpIdTC,

capwapBaseStationWtpRadioId CapwapBaseRadioIdTC,

capwapBaseStationAddedTime DateAndTime,

capwapBaseStationVlanName SnmpAdminString

}

capwapBaseStationId OBJECT-TYPE
SYNTAX CapwapBaseStationIdTC
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Represents the unique identifier of the station."
REFERENCE
"Section 4.6.8 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseStationEntry 1 }

capwapBaseStationWtpId OBJECT-TYPE
SYNTAX CapwapBaseWtpIdTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Represents the unique identifier of a WTP in running state."
::= { capwapBaseStationEntry 2 }

capwapBaseStationWtpRadioId OBJECT-TYPE
SYNTAX CapwapBaseRadioIdTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Represents the identifier of a PHY radio on a WTP, which
is required to be unique on a WTP.
For example, WTP A and WTP B use a same value of
capwapBaseStationWtpRadioId for their first radio."
REFERENCE
"Section 4.3 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseStationEntry 3 }

capwapBaseStationAddedTime OBJECT-TYPE
SYNTAX DateAndTime
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Represents the time when the station is added."
REFERENCE
"Section 4.6.8 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseStationEntry 4 }

capwapBaseStationVlanName OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE(0..32))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Represents VLAN name to which the station is associated."
REFERENCE

"Section 4.6.8 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseStationEntry 5 }

-- End of capwapBaseStationTable Table

-- capwapBaseWtpEventsStatsTable

capwapBaseWtpEventsStatsTable OBJECT-TYPE
 SYNTAX SEQUENCE OF CapwapBaseWtpEventsStatsEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "A table of objects that display the WTPs' events statistics."
 REFERENCE
 "Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseWtps 6 }

capwapBaseWtpEventsStatsEntry OBJECT-TYPE
 SYNTAX CapwapBaseWtpEventsStatsEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "A set of objects that displays the events statistics
 of a WTP."
 REFERENCE
 "Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."
 INDEX { capwapBaseWtpCurrId }
 ::= { capwapBaseWtpEventsStatsTable 1 }

CapwapBaseWtpEventsStatsEntry ::= SEQUENCE {
 capwapBaseWtpEventsStatsRebootCount Counter32,
 capwapBaseWtpEventsStatsInitCount Counter32,
 capwapBaseWtpEventsStatsLinkFailureCount Counter32,
 capwapBaseWtpEventsStatsSwFailureCount Counter32,
 capwapBaseWtpEventsStatsHwFailureCount Counter32,
 capwapBaseWtpEventsStatsOtherFailureCount Counter32,
 capwapBaseWtpEventsStatsUnknownFailureCount Counter32,
 capwapBaseWtpEventsStatsLastFailureType INTEGER
 }

capwapBaseWtpEventsStatsRebootCount OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Represents the number of reboots that have occurred due to a
 WTP crash."

Note that the CAPWAP field [RFC5415] modeled by this counter takes the value 65535 to indicate that the information is not available on the WTP. This MIB object does not follow this behavior, which would not be standard in SMIV2. If the WTP does not have the information, the agent will not instantiate the object."

REFERENCE

"Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpEventsStatsEntry 1 }

capwapBaseWtpEventsStatsInitCount OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the number of reboots that have occurred at the request of a CAPWAP protocol message, such as a change in configuration that requires a reboot or an explicit CAPWAP protocol reset request.

Note that the CAPWAP field [RFC5415] modeled by this counter takes the value 65535 to indicate that the information is not available on the WTP. This MIB object does not follow this behavior, which would not be standard in SMIV2. If the WTP does not have the information, the agent will not instantiate the object."

REFERENCE

"Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpEventsStatsEntry 2 }

capwapBaseWtpEventsStatsLinkFailureCount OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the number of times that a CAPWAP protocol connection with an AC has failed due to link failures."

REFERENCE

"Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseWtpEventsStatsEntry 3 }

capwapBaseWtpEventsStatsSwFailureCount OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the number of times that a CAPWAP protocol connection with an AC has failed due to software-related reasons."

REFERENCE

"Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseWtpEventsStatsEntry 4 }

capwapBaseWtpEventsStatsHwFailureCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Represents the number of times that a CAPWAP protocol connection with an AC has failed due to hardware-related reasons."

REFERENCE

"Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseWtpEventsStatsEntry 5 }

capwapBaseWtpEventsStatsOtherFailureCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Represents the number of times that a CAPWAP protocol connection with an AC has failed due to known reasons, other than the AC-initiated, link, software or hardware failures."

REFERENCE

"Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseWtpEventsStatsEntry 6 }

capwapBaseWtpEventsStatsUnknownFailureCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Represents the number of times that a CAPWAP protocol connection with an AC has failed for unknown reasons."

REFERENCE

"Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseWtpEventsStatsEntry 7 }

capwapBaseWtpEventsStatsLastFailureType OBJECT-TYPE

SYNTAX INTEGER {
 unsupported(0),
 acInit(1),
 linkFailure(2),
 swFailure(3),
 hwFailure(4),
 otherFailure(5),
 unknown(255)

```

    }
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "Represents the failure type of the most recent WTP failure.
               The following enumerated values are supported:
               unsupported(0) - Not supported
               acInit(1)     - The AC initiated
               linkFailure(2) - Link failure
               swFailure(3)   - Software failure
               hwFailure(4)   - Hardware failure
               otherFailure(5) - Other failure
               unknown(255)   - Unknown (e.g., WTP doesn't keep track
                               of info)
               Note that the CAPWAP field [RFC5415] modeled by this
               object takes zero as starting value; this MIB object
               follows that rule."

```

REFERENCE

```

"Section 4.6.47 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseWtpEventsStatsEntry 8 }

```

```
-- End of capwapBaseWtpEventsStatsTable table
```

```
-- capwapBaseRadioEventsStatsTable table
```

```

capwapBaseRadioEventsStatsTable OBJECT-TYPE
SYNTAX        SEQUENCE OF CapwapBaseRadioEventsStatsEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "A table of objects that display statistics on the radios'
               behaviors and reasons why the WTP radio has been reset.
               To get the events statistics of all radios on a specific WTP
               (identified by the capwapBaseWtpCurrId), a query
               operation SHOULD run from radio ID 1 to radio ID 31 until there
               is no data returned. The radio ID here corresponds to the
               object capwapBaseRadioEventsWtpRadioId. If the previous MIB
               operations such as query on the capwapBaseWirelessBindingTable
               know the exact value of each radio ID, the query operation on
               the capwapBaseRadioEventsStatsTable could use that value
               of Radio IDs."
REFERENCE
"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseWtps 7 }

```

```

capwapBaseRadioEventsStatsEntry OBJECT-TYPE
SYNTAX        CapwapBaseRadioEventsStatsEntry

```

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"A set of objects that displays the statistical data of events that happened on a specific radio of a WTP."

INDEX { capwapBaseWtpCurrId, capwapBaseRadioEventsWtpRadioId }
 ::= { capwapBaseRadioEventsStatsTable 1 }

CapwapBaseRadioEventsStatsEntry ::= SEQUENCE {
 capwapBaseRadioEventsWtpRadioId CapwapBaseRadioIdTC,
 capwapBaseRadioEventsStatsResetCount Counter32,
 capwapBaseRadioEventsStatsSwFailureCount Counter32,
 capwapBaseRadioEventsStatsHwFailureCount Counter32,
 capwapBaseRadioEventsStatsOtherFailureCount Counter32,
 capwapBaseRadioEventsStatsUnknownFailureCount Counter32,
 capwapBaseRadioEventsStatsConfigUpdateCount Counter32,
 capwapBaseRadioEventsStatsChannelChangeCount Counter32,
 capwapBaseRadioEventsStatsBandChangeCount Counter32,
 capwapBaseRadioEventsStatsCurrNoiseFloor Integer32,
 capwapBaseRadioEventsStatsDecryptErrorCount Counter32,
 capwapBaseRadioEventsStatsLastFailureType INTEGER
 }

capwapBaseRadioEventsWtpRadioId OBJECT-TYPE

SYNTAX CapwapBaseRadioIdTC

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Represents the identifier of a PHY radio on a WTP, which is required to be unique on a WTP.

For example, WTP A and WTP B use the same value of capwapBaseRadioEventsWtpRadioId for their first radio."

REFERENCE

"Section 4.3 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 1 }

capwapBaseRadioEventsStatsResetCount OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the number of times that the radio has been reset."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 2 }

capwapBaseRadioEventsStatsSwFailureCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Represents the number of times that the radio has failed due to software-related reasons."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 3 }

capwapBaseRadioEventsStatsHwFailureCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Represents the number of times that the radio has failed due to hardware-related reasons."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 4 }

capwapBaseRadioEventsStatsOtherFailureCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Represents the number of times that the radio has failed due to known reasons, other than software or hardware failure."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 5 }

capwapBaseRadioEventsStatsUnknownFailureCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Represents the number of times that the radio has failed for unknown reasons."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 6 }

capwapBaseRadioEventsStatsConfigUpdateCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Represents the number of times that the radio configuration has been updated."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 7 }

capwapBaseRadioEventsStatsChannelChangeCount OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the number of times that the radio channel has been changed."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 8 }

capwapBaseRadioEventsStatsBandChangeCount OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the number of times that the radio has changed frequency bands."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 9 }

capwapBaseRadioEventsStatsCurrNoiseFloor OBJECT-TYPE

SYNTAX Integer32

UNITS "dBm"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the noise floor of the radio receiver in units of dBm."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseRadioEventsStatsEntry 10 }

capwapBaseRadioEventsStatsDecryptErrorCount OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the number of decryption errors that have occurred on the WTP. Note that this field is only valid in cases where the WTP provides encryption/decryption services."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseRadioEventsStatsEntry 11 }

capwapBaseRadioEventsStatsLastFailureType OBJECT-TYPE

SYNTAX INTEGER {
 unsupported(0),
 swFailure(1),
 hwFailure(2),
 otherFailure(3),
 unknown(255)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Represents the failure type of the most recent radio failure.
 The following enumerated values are supported:

 unsupported(0) - Not supported
 swFailure(1) - Software failure
 hwFailure(2) - Hardware failure
 otherFailure(3) - Other failure
 unknown(255) - Unknown

Note that the CAPWAP field [RFC5415] modeled by this
 object takes zero as starting value; this MIB object follows
 that rule."

REFERENCE

"Section 4.6.46 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseRadioEventsStatsEntry 12 }

-- End of capwapBaseRadioEventsStatsTable table

-- End of WTP Objects Group

-- CAPWAP Base Parameters Group

capwapBaseParameters OBJECT IDENTIFIER

::= { capwapBaseObjects 3 }

capwapBaseAcMaxRetransmit OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents the maximum number of retransmissions for a given
 CAPWAP packet before the link layer considers the peer dead.
 The value of the object is persistent at restart/reboot."

REFERENCE

"Section 4.8.7 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { 5 }

::= { capwapBaseParameters 1 }

capwapBaseAcChangeStatePendingTimer OBJECT-TYPE

SYNTAX Unsigned32

UNITS "second"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents the maximum time, in seconds, the AC will wait for the Change State Event Request from the WTP after having transmitted a successful Configuration Status Response message.

The value of the object is persistent at restart/reboot."

REFERENCE

"Section 4.7.1 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { 25 }

::= { capwapBaseParameters 2 }

capwapBaseAcDataCheckTimer OBJECT-TYPE

SYNTAX Unsigned32

UNITS "second"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents The number of seconds the AC will wait for the Data Channel Keep Alive, which is required by the CAPWAP state machine's Data Check state.

The AC resets the state machine if this timer expires prior to transitioning to the next state.

The value of the object is persistent at restart/reboot."

REFERENCE

"Section 4.7.4 of CAPWAP Protocol Specification, RFC 5415."

DEFVAL { 30 }

::= { capwapBaseParameters 3 }

capwapBaseAcDTLSSessionDeleteTimer OBJECT-TYPE

SYNTAX Unsigned32

UNITS "second"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents the minimum time, in seconds, the AC MUST wait for DTLS session deletion.

The value of the object is persistent at restart/reboot."

REFERENCE

"Section 4.7.6 of CAPWAP Protocol Specification, RFC 5415."

```
DEFVAL { 5 }  
::= { capwapBaseParameters 4 }
```

capwapBaseAcEchoInterval OBJECT-TYPE

```
SYNTAX      Unsigned32  
UNITS       "second"  
MAX-ACCESS  read-write  
STATUS      current  
DESCRIPTION  
    "Represents the minimum time, in seconds, between sending Echo  
    Request messages to the AC with which the WTP has joined.  
    The value of the object is persistent at restart/reboot."  
REFERENCE  
    "Section 4.7.7 of CAPWAP Protocol Specification, RFC 5415."  
DEFVAL { 30 }  
::= { capwapBaseParameters 5 }
```

capwapBaseAcRetransmitInterval OBJECT-TYPE

```
SYNTAX      Unsigned32  
UNITS       "second"  
MAX-ACCESS  read-write  
STATUS      current  
DESCRIPTION  
    "Represents the minimum time, in seconds, in which a  
    non-acknowledged CAPWAP packet will be retransmitted.  
    The value of the object is persistent at restart/reboot."  
REFERENCE  
    "Section 4.7.12 of CAPWAP Protocol Specification, RFC 5415."  
DEFVAL { 3 }  
::= { capwapBaseParameters 6 }
```

capwapBaseAcSilentInterval OBJECT-TYPE

```
SYNTAX      Unsigned32  
UNITS       "second"  
MAX-ACCESS  read-write  
STATUS      current  
DESCRIPTION  
    "Represents the minimum time, in seconds, during which the AC  
    SHOULD ignore all CAPWAP and DTLS packets received from the  
    WTP that is in the Sulking state.  
    The value of the object is persistent at restart/reboot."  
REFERENCE  
    "Section 4.7.13 of CAPWAP Protocol Specification, RFC 5415."  
DEFVAL { 30 }  
::= { capwapBaseParameters 7 }
```

capwapBaseAcWaitDTLSTimer OBJECT-TYPE

```
SYNTAX      Unsigned32 (30..4294967295)
```

UNITS "second"
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION
 "Represents the maximum time, in seconds, the AC MUST wait
 without having received a DTLS Handshake message from an AC.
 This timer MUST be greater than 30 seconds.
 The value of the object is persistent at restart/reboot."
 REFERENCE
 "Section 4.7.15 of CAPWAP Protocol Specification, RFC 5415."
 DEFVAL { 60 }
 ::= { capwapBaseParameters 8 }

capwapBaseAcWaitJoinTimer OBJECT-TYPE

SYNTAX Unsigned32 (20..4294967295)
 UNITS "second"
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION
 "Represents the maximum time, in seconds, the AC will wait
 after the DTLS session has been established until it receives
 the Join Request from the WTP. This timer MUST be greater
 than 20 seconds.
 The value of the object is persistent at restart/reboot."
 REFERENCE
 "Section 4.7.16 of CAPWAP Protocol Specification, RFC 5415."
 DEFVAL { 60 }
 ::= { capwapBaseParameters 9 }

capwapBaseAcEcnSupport OBJECT-TYPE

SYNTAX INTEGER {
 limited(0),
 fullAndLimited(1)
 }
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION
 "Represents the support for the Explicit Congestion Notification
 (ECN) bits, as defined in [RFC3168].
 The value of the object is persistent at restart/reboot.
 The following enumerated values are supported:
 limited(0) - Limited ECN support
 fullAndLimited(1) - Full and limited ECN support
 Note that the CAPWAP field [RFC5415] modeled by this
 object takes zero as starting value; this MIB object follows
 that rule."
 REFERENCE
 "Section 4.6.25 of CAPWAP Protocol Specification, RFC 5415."

```
 ::= { capwapBaseParameters 10 }

-- End of CAPWAP Base Parameters Group

-- CAPWAP Statistics Group

capwapBaseStats OBJECT IDENTIFIER
 ::= { capwapBaseObjects 4 }

capwapBaseFailedDTLSAuthFailureCount OBJECT-TYPE
 SYNTAX      Counter32
 MAX-ACCESS  read-only
 STATUS      current
 DESCRIPTION
    "Represents the number of failed DTLS session establishment
     attempts due to authentication failures."
 REFERENCE
    "Section 4.8.3 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseStats 1 }

capwapBaseFailedDTLSSessionCount OBJECT-TYPE
 SYNTAX      Counter32
 MAX-ACCESS  read-only
 STATUS      current
 DESCRIPTION
    "Represents the number of failed DTLS session
     establishment attempts."
 REFERENCE
    "Section 4.8.4 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseStats 2 }

-- Notifications

capwapBaseChannelUp NOTIFICATION-TYPE
 OBJECTS      {
    capwapBaseNtfWtpId,
    capwapBaseNtfChannelType,
    capwapBaseNtfAuthenMethod
 }
 STATUS      current
 DESCRIPTION
    "This notification is sent by the AC when a CAPWAP channel
     is established.
     The notification is separated for data or control channel."
 ::= { capwapBaseNotifications 1 }

capwapBaseChannelDown NOTIFICATION-TYPE
```

```
OBJECTS      {
                capwapBaseNtfWtpId,
                capwapBaseNtfChannelType,
                capwapBaseNtfChannelDownReason
            }
STATUS      current
DESCRIPTION
    "This notification is sent by the AC when a CAPWAP channel
    is down.
    The notification is separated for data or control channel."
 ::= { capwapBaseNotifications 2 }

capwapBaseDecryptErrorReport NOTIFICATION-TYPE
OBJECTS      {
                capwapBaseNtfWtpId,
                capwapBaseNtfRadioId,
                capwapBaseNtfStationIdList
            }
STATUS      current
DESCRIPTION
    "This notification is generated when a WTP has had a
    decryption error since the last report."
REFERENCE
    "Section 4.6.17 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseNotifications 3 }

capwapBaseJoinFailure NOTIFICATION-TYPE
OBJECTS      {
                capwapBaseNtfWtpId,
                capwapBaseNtfJoinFailureReason
            }
STATUS      current
DESCRIPTION
    "This notification is generated when a WTP fails to join."
REFERENCE
    "Section 4.6.35 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseNotifications 4 }

capwapBaseImageUpgradeFailure NOTIFICATION-TYPE
OBJECTS      {
                capwapBaseNtfWtpId,
                capwapBaseNtfImageFailureReason
            }
STATUS      current
DESCRIPTION
    "This notification is generated when a WTP fails to update
    the firmware image."
REFERENCE
```

"Section 4.6.35 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseNotifications 5 }

capwapBaseConfigMsgError NOTIFICATION-TYPE

OBJECTS {
 capwapBaseNtfWtpId,
 capwapBaseNtfConfigMsgErrorType,
 capwapBaseNtfMsgErrorElements
}
STATUS current

DESCRIPTION

"This notification is generated when a WTP receives message elements in the configuration management messages that it is unable to apply locally."

REFERENCE

"Section 4.6.35 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseNotifications 6 }

capwapBaseRadioOperableStatus NOTIFICATION-TYPE

OBJECTS {
 capwapBaseNtfWtpId,
 capwapBaseNtfRadioId,
 capwapBaseNtfRadioOperStatusFlag,
 capwapBaseNtfRadioStatusCause
}
STATUS current

DESCRIPTION

"The notification is generated when a radio's operational state has changed."

REFERENCE

"Section 4.6.34 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseNotifications 7 }

capwapBaseAuthenFailure NOTIFICATION-TYPE

OBJECTS {
 capwapBaseNtfWtpId,
 capwapBaseNtfChannelType,
 capwapBaseNtfAuthenMethod,
 capwapBaseNtfAuthenFailureReason
}
STATUS current

DESCRIPTION

"This is notification of an authentication failure event and provides the reason for it."

::= { capwapBaseNotifications 8 }

-- Objects used only in notifications

-- Notification Objects

capwapBaseNotifyVarObjects OBJECT IDENTIFIER
 ::= { capwapBaseObjects 5 }

capwapBaseNtfWtpId OBJECT-TYPE
SYNTAX CapwapBaseWtpIdTC
MAX-ACCESS accessible-for-notify
STATUS current
DESCRIPTION
 "Represents the unique identifier of a WTP."
 ::= { capwapBaseNotifyVarObjects 1 }

capwapBaseNtfRadioId OBJECT-TYPE
SYNTAX CapwapBaseRadioIdTC
MAX-ACCESS accessible-for-notify
STATUS current
DESCRIPTION
 "Represents the identifier of a PHY radio on a WTP, which is
 only required to be unique on a WTP.
 For example, WTP A and WTP B can use the same value of
 capwapBaseNtfRadioId for their first radio."
REFERENCE
 "Section 4.3 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseNotifyVarObjects 2 }

capwapBaseNtfChannelType OBJECT-TYPE
SYNTAX CapwapBaseChannelTypeTC
MAX-ACCESS accessible-for-notify
STATUS current
DESCRIPTION
 "Represents the channel type for the CAPWAP protocol."
 ::= { capwapBaseNotifyVarObjects 3 }

capwapBaseNtfAuthenMethod OBJECT-TYPE
SYNTAX CapwapBaseAuthenMethodTC
MAX-ACCESS accessible-for-notify
STATUS current
DESCRIPTION
 "Represents the authentication method for the CAPWAP Channel."
 ::= { capwapBaseNotifyVarObjects 4 }

capwapBaseNtfChannelDownReason OBJECT-TYPE
SYNTAX INTEGER {
 timeout(1),
 rekeyFailure(2),
 acRebootWtp(3),
 dtlsError(4),
 maxRetransmit(5)

```

    }
MAX-ACCESS    accessible-for-notify
STATUS        current
DESCRIPTION   "Represents the reason the channel is down.
               The following enumerated values are supported:
               timeout(1)      - The keepalive timed out
               rekeyFailure(2) - Rekey process failed; channel will be
                               broken
               acRebootWtp(3)  - The AC rebooted the WTP
               dtlsError(4)    - DTLS notifications: DTLSAborted,
                               DTLSReassemblyFailure, DTLSPeerDisconnect,
                               or frequent DTLSDecapFailure
               maxRetransmit(5) - The underlying reliable transport's
                               RetransmitCount counter has reached the
                               MaxRetransmit variable"
 ::= { capwapBaseNotifyVarObjects 5 }

```

```

capwapBaseNtfStationIdList OBJECT-TYPE
SYNTAX        LongUtf8String (SIZE (6..1024))
MAX-ACCESS    accessible-for-notify
STATUS        current
DESCRIPTION   "Represents a list of station MAC addresses separated by
               semicolons."
REFERENCE    "Section 4.6.17 of CAPWAP Protocol Specification, RFC 5415."
 ::= { capwapBaseNotifyVarObjects 6 }

```

```

capwapBaseNtfAuthenFailureReason OBJECT-TYPE
SYNTAX        INTEGER {
                keyMismatch(1),
                invalidCert(2),
                reassemblyFailure(3),
                decapFailure(4),
                encapFailure(5),
                timeout(6),
                unknown(8)
              }
MAX-ACCESS    accessible-for-notify
STATUS        current
DESCRIPTION   "Represents the reason for WTP authorization failure.
               The following enumerated values are supported:
               keyMismatch(1)      - WTP's and AC's keys did not match
               invalidCert(2)     - Certification is not valid
               reassemblyFailure(3) - Fragment reassembly failure
               decapFailure(4)     - Decapsulation error

```


encapFailure(5) - Encapsulation error
 timeout(6) - WaitDTLS timer timeout
 unknown(8) - Unknown reason"

REFERENCE

"Section 2.3.1 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseNotifyVarObjects 7 }

capwapBaseNtfRadioOperStatusFlag OBJECT-TYPE

SYNTAX INTEGER {
 operable(0),
 inoperable(1)
 }

MAX-ACCESS accessible-for-notify
 STATUS current

DESCRIPTION

"Represents the operation status of a radio.

The following enumerated values are supported:

operable(0) - The radio is operable
 inoperable(1) - The radio is inoperable, and the
 capwapBaseNtfRadioStatusCause object
 gives the reason in detail

Note that the CAPWAP field [RFC5415] modeled by this
 object takes zero as starting value; this MIB object
 follows that rule."

REFERENCE

"Section 4.6.34 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseNotifyVarObjects 8 }

capwapBaseNtfRadioStatusCause OBJECT-TYPE

SYNTAX INTEGER {
 normal(0),
 hwError(1),
 swError(2),
 adminSet(3)
 }

MAX-ACCESS accessible-for-notify
 STATUS current

DESCRIPTION

"Represents the reason why the radio is out of service.

The following enumerated values are supported:

normal(0) - Normal status
 hwError(1) - Radio failure
 swError(2) - Software failure
 adminSet(3) - Administratively set

Note that the CAPWAP field [RFC5415] modeled by this
 object takes zero as starting value; this MIB object
 follows that rule."

REFERENCE

"Section 4.6.34 of CAPWAP Protocol Specification, RFC 5415."
::= { capwapBaseNotifyVarObjects 9 }

capwapBaseNtfJoinFailureReason OBJECT-TYPE

SYNTAX INTEGER {
 unspecified(1),
 resDepletion(2),
 unknownSource(3),
 incorrectData(4),
 sessionIdInUse(5),
 unsupportedHw(6),
 unsupportedBinding(7)
}

MAX-ACCESS accessible-for-notify

STATUS current

DESCRIPTION

"Represents the reason of join failure.

The following enumerated values are supported:

unspecified(1)	- Unspecified failure
resDepletion(2)	- Resource depletion
unknownSource(3)	- Unknown source
incorrectData(4)	- Incorrect data
sessionIdInUse(5)	- Session ID already in use
unsupportedHw(6)	- WTP hardware not supported
unsupportedBinding(7)	- Binding not supported"

REFERENCE

"Section 4.6.35 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseNotifyVarObjects 10 }

capwapBaseNtfImageFailureReason OBJECT-TYPE

SYNTAX INTEGER {
 invalidChecksum(1),
 invalidLength(2),
 other(3),
 inStorage(4)
}

MAX-ACCESS accessible-for-notify

STATUS current

DESCRIPTION

"Represents the reason of image failure.

The following enumerated values are supported:

invalidChecksum(1)	- Invalid checksum
invalidLength(2)	- Invalid data length
other(3)	- Other error
inStorage(4)	- Image already present"

REFERENCE

"Section 4.6.35 of CAPWAP Protocol Specification, RFC 5415."

::= { capwapBaseNotifyVarObjects 11 }

```
capwapBaseNtfConfigMsgErrorType OBJECT-TYPE
    SYNTAX      INTEGER {
        unknownElement(1),
        unsupportedElement(2),
        unknownValue(3),
        unsupportedValue(4)
    }
    MAX-ACCESS   accessible-for-notify
    STATUS       current
    DESCRIPTION
        "Represents the type of configuration message error.
        The following enumerated values are supported:
        unknownElement(1) - Unknown message element
        unsupportedElement(2) - Unsupported message element
        unknownValue(3) - Unknown message element value
        unsupportedValue(4) - Unsupported message element value"
    REFERENCE
        "Section 4.6.36 of CAPWAP Protocol Specification, RFC 5415."
    ::= { capwapBaseNotifyVarObjects 12 }

capwapBaseNtfMsgErrorElements OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS   accessible-for-notify
    STATUS       current
    DESCRIPTION
        "Represents the message elements sent by the AC in the
        Configuration Status Response message that caused the error."
    REFERENCE
        "Section 4.6.36 of CAPWAP Protocol Specification, RFC 5415."
    ::= { capwapBaseNotifyVarObjects 13 }

-- Notification Control
capwapBaseNotifyControlObjects OBJECT IDENTIFIER
    ::= { capwapBaseObjects 6 }

capwapBaseChannelUpDownNotifyEnable OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
        "Represents whether the Channel Up / Channel Down notification
        should be generated.
        A value of true(1) means that the notification is enabled.
        A value of false(2) means that the notification is disabled.
        The value of the object is persistent at restart/reboot."
    DEFVAL { false }
    ::= { capwapBaseNotifyControlObjects 1 }
```

capwapBaseDecryptErrorNotifyEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents whether the decryption error notification should be generated.

A value of true(1) means that the notification is enabled.

A value of false(2) means that the notification is disabled.

The value of the object is persistent at restart/reboot."

DEFVAL { true }

::= { capwapBaseNotifyControlObjects 2 }

capwapBaseJoinFailureNotifyEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents whether the notification of a WTP join failure should be generated.

A value of true(1) means that the notification is enabled.

A value of false(2) means that the notification is disabled.

The value of the object is persistent at restart/reboot."

DEFVAL { true }

::= { capwapBaseNotifyControlObjects 3 }

capwapBaseImageUpgradeFailureNotifyEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents whether the notification of a WTP image upgrade failure should be generated.

A value of true(1) means that the notification is enabled.

A value of false(2) means that the notification is disabled.

The value of the object is persistent at restart/reboot."

DEFVAL { true }

::= { capwapBaseNotifyControlObjects 4 }

capwapBaseConfigMsgErrorNotifyEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents whether the notification of configuration message error should be generated.

A value of true(1) means that the notification is enabled.

A value of false(2) means that the notification is disabled.

The value of the object is persistent at restart/reboot."

DEFVAL { false }

::= { capwapBaseNotifyControlObjects 5 }

capwapBaseRadioOperableStatusNotifyEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents whether the notification of a radio's operational state change should be generated.

A value of true(1) means that the notification is enabled.

A value of false(2) means that the notification is disabled.

The value of the object is persistent at restart/reboot."

DEFVAL { false }

::= { capwapBaseNotifyControlObjects 6 }

capwapBaseAuthenFailureNotifyEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Represents whether the notification of authentication failure should be generated.

A value of true(1) means that the notification is enabled.

A value of false(2) means that the notification is disabled.

The value of the object is persistent at restart/reboot."

DEFVAL { true }

::= { capwapBaseNotifyControlObjects 7 }

-- Module compliance

capwapBaseCompliances OBJECT IDENTIFIER

::= { capwapBaseConformance 1 }

capwapBaseGroups OBJECT IDENTIFIER

::= { capwapBaseConformance 2 }

capwapBaseCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"Describes the requirements for conformance to the CAPWAP-BASE-MIB module."

MODULE IF-MIB -- The Interfaces MIB, RFC 2863

MANDATORY-GROUPS {

ifGeneralInformationGroup

}

```
MODULE -- this module
MANDATORY-GROUPS {
    capwapBaseAcNodeGroup,
    capwapBaseWtpProfileGroup,
    capwapBaseWtpStateGroup,
    capwapBaseWtpGroup,
    capwapBaseRadioGroup,
    capwapBaseStationGroup
}

GROUP capwapBaseAcNodeGroup2
DESCRIPTION
    "The capwapBaseAcNodeGroup2 group is optional."

GROUP capwapBaseAcNameListGroup
DESCRIPTION
    "The capwapBaseAcNameListGroup group is optional."

GROUP capwapBaseMacAclsGroup
DESCRIPTION
    "The capwapBaseMacAclsGroup group is optional."

GROUP capwapBaseWtpProfileGroup2
DESCRIPTION
    "The capwapBaseWtpProfileGroup2 group is optional."

GROUP capwapBaseWtpGroup2
DESCRIPTION
    "The capwapBaseWtpGroup2 group is optional."

GROUP capwapBaseWtpEventsStatsGroup
DESCRIPTION
    "The capwapBaseWtpEventsStatsGroup group is optional."

GROUP capwapBaseRadioEventsStatsGroup
DESCRIPTION
    "The capwapBaseRadioEventsStatsGroup group is optional."

GROUP capwapBaseParametersGroup
DESCRIPTION
    "The capwapBaseParametersGroup group is optional."

GROUP capwapBaseStatsGroup
DESCRIPTION
    "The capwapBaseStatsGroup group is optional."

GROUP capwapBaseNotificationsGroup
DESCRIPTION
```

"The capwapBaseNotificationsGroup group is optional."

GROUP capwapBaseNotifyVarsGroup

DESCRIPTION

"The capwapBaseNotifyVarsGroup group is optional.
If capwapBaseNotificationsGroup is supported,
this group must be implemented."

GROUP capwapBaseNotifyControlGroup

DESCRIPTION

"The capwapBaseNotifyControlGroup group is optional.
If capwapBaseNotificationsGroup is supported,
this group must be implemented."

::= { capwapBaseCompliances 1 }

capwapBaseAcNodeGroup OBJECT-GROUP

OBJECTS {

capwapBaseWtpSessions,
capwapBaseWtpSessionsLimit,
capwapBaseStationSessions,
capwapBaseStationSessionsLimit

}

STATUS current

DESCRIPTION

"A collection of objects that is used to represent
the basic properties of the AC from the CAPWAP
protocol perspective."

::= { capwapBaseGroups 1 }

capwapBaseAcNodeGroup2 OBJECT-GROUP

OBJECTS {

capwapBaseDataChannelDTLSPolicyOptions,
capwapBaseControlChannelAuthenOptions

}

STATUS current

DESCRIPTION

"A collection of objects that is used to represent
the other properties (such as security) of the AC from
the CAPWAP protocol perspective."

::= { capwapBaseGroups 2 }

capwapBaseAcNameListGroup OBJECT-GROUP

OBJECTS {

capwapBaseAcNameListName,
capwapBaseAcNameListPriority,
capwapBaseAcNameListRowStatus

}

STATUS current

DESCRIPTION

"A collection of objects that is used to configure the AC name list."

::= { capwapBaseGroups 3 }

capwapBaseMacAclsGroup OBJECT-GROUP

OBJECTS {
 capwapBaseMacAclStationId,
 capwapBaseMacAclRowStatus
}

STATUS current

DESCRIPTION

"A collection of objects that is used to configure the stations ACL."

::= { capwapBaseGroups 4 }

capwapBaseWtpProfileGroup OBJECT-GROUP

OBJECTS {
 capwapBaseWtpProfileName,
 capwapBaseWtpProfileWtpMacAddress,
 capwapBaseWtpProfileWtpModelNumber,
 capwapBaseWtpProfileWtpName,
 capwapBaseWtpProfileWtpLocation,
 capwapBaseWtpProfileRowStatus
}

STATUS current

DESCRIPTION

"A collection of objects that is used to configure the WTP profile."

::= { capwapBaseGroups 5 }

capwapBaseWtpProfileGroup2 OBJECT-GROUP

OBJECTS {
 capwapBaseWtpProfileWtpStaticIpEnable,
 capwapBaseWtpProfileWtpStaticIpType,
 capwapBaseWtpProfileWtpStaticIpAddress,
 capwapBaseWtpProfileWtpNetmask,
 capwapBaseWtpProfileWtpGateway,
 capwapBaseWtpProfileWtpFallbackEnable,
 capwapBaseWtpProfileWtpEchoInterval,
 capwapBaseWtpProfileWtpIdleTimeout,
 capwapBaseWtpProfileWtpMaxDiscoveryInterval,
 capwapBaseWtpProfileWtpReportInterval,
 capwapBaseWtpProfileWtpStatisticsTimer,
 capwapBaseWtpProfileWtpEcnSupport
}

STATUS current

DESCRIPTION

"A collection of optional objects that is used to
configure the WTP profile."
 ::= { capwapBaseGroups 6 }

capwapBaseWtpStateGroup OBJECT-GROUP

OBJECTS {
 capwapBaseWtpStateWtpIpAddressType,
 capwapBaseWtpStateWtpIpAddress,
 capwapBaseWtpStateWtpLocalIpAddressType,
 capwapBaseWtpStateWtpLocalIpAddress,
 capwapBaseWtpStateWtpBaseMacAddress,
 capwapBaseWtpState,
 capwapBaseWtpStateWtpUpTime,
 capwapBaseWtpStateWtpCurrWtpProfileId
}

STATUS current

DESCRIPTION

"A collection of objects that is used to represent
the WTP's state information."
 ::= { capwapBaseGroups 7 }

capwapBaseWtpGroup OBJECT-GROUP

OBJECTS {
 capwapBaseWtpBaseMacAddress,
 capwapBaseWtpTunnelModeOptions,
 capwapBaseWtpMacTypeOptions,
 capwapBaseWtpDiscoveryType,
 capwapBaseWtpRadiosInUseNum,
 capwapBaseWtpRadioNumLimit
}

STATUS current

DESCRIPTION

"A collection of objects that is used to represent
the properties information for the WTPs in running state."
 ::= { capwapBaseGroups 8 }

capwapBaseWtpGroup2 OBJECT-GROUP

OBJECTS {
 capwapBaseWtpPhyIndex,
 capwapBaseWtpRetransmitCount
}

STATUS current

DESCRIPTION

"A collection of optional objects that is used to represent
the properties of the WTPs in running state."
 ::= { capwapBaseGroups 9 }

capwapBaseRadioGroup OBJECT-GROUP

```
OBJECTS {
    capwapBaseWirelessBindingVirtualRadioIfIndex,
    capwapBaseWirelessBindingType
}
STATUS current
DESCRIPTION
    "A collection of objects that is used to represent
    the wireless binding type and the mappings between the
    ifIndexes of WLAN Virtual Radio Interfaces and PHY radios."
 ::= { capwapBaseGroups 10 }

capwapBaseStationGroup      OBJECT-GROUP
OBJECTS {
    capwapBaseStationWtpId,
    capwapBaseStationWtpRadioId,
    capwapBaseStationAddedTime,
    capwapBaseStationVlanName
}
STATUS current
DESCRIPTION
    "A collection of objects that is used to represent
    the stations' basic properties."
 ::= { capwapBaseGroups 11 }

capwapBaseWtpEventsStatsGroup  OBJECT-GROUP
OBJECTS {
    capwapBaseWtpEventsStatsRebootCount,
    capwapBaseWtpEventsStatsInitCount,
    capwapBaseWtpEventsStatsLinkFailureCount,
    capwapBaseWtpEventsStatsSwFailureCount,
    capwapBaseWtpEventsStatsHwFailureCount,
    capwapBaseWtpEventsStatsOtherFailureCount,
    capwapBaseWtpEventsStatsUnknownFailureCount,
    capwapBaseWtpEventsStatsLastFailureType
}
STATUS current
DESCRIPTION
    "A collection of objects that is used for collecting
    WTP reboot count, link failure count, hardware failure
    count, and so on."
 ::= { capwapBaseGroups 12 }

capwapBaseRadioEventsStatsGroup  OBJECT-GROUP
OBJECTS {
    capwapBaseRadioEventsStatsResetCount,
    capwapBaseRadioEventsStatsSwFailureCount,
    capwapBaseRadioEventsStatsHwFailureCount,
    capwapBaseRadioEventsStatsOtherFailureCount,
```

```
capwapBaseRadioEventsStatsUnknownFailureCount,
capwapBaseRadioEventsStatsConfigUpdateCount,
capwapBaseRadioEventsStatsChannelChangeCount,
capwapBaseRadioEventsStatsBandChangeCount,
capwapBaseRadioEventsStatsCurrNoiseFloor,
capwapBaseRadioEventsStatsDecryptErrorCount,
capwapBaseRadioEventsStatsLastFailureType
}
STATUS current
DESCRIPTION
    "A collection of objects that is used for collecting
    radio reset count, channel change count, hardware failure
    count, and so on"
 ::= { capwapBaseGroups 13 }

capwapBaseParametersGroup    OBJECT-GROUP
OBJECTS {
    capwapBaseAcMaxRetransmit,
    capwapBaseAcChangeStatePendingTimer,
    capwapBaseAcDataCheckTimer,
    capwapBaseAcDTLSSessionDeleteTimer,
    capwapBaseAcEchoInterval,
    capwapBaseAcRetransmitInterval,
    capwapBaseAcSilentInterval,
    capwapBaseAcWaitDTLSTimer,
    capwapBaseAcWaitJoinTimer,
    capwapBaseAcEcnSupport
}
STATUS current
DESCRIPTION
    "Objects used for the CAPWAP protocol's parameters."
 ::= { capwapBaseGroups 14 }

capwapBaseStatsGroup        OBJECT-GROUP
OBJECTS {
    capwapBaseFailedDTLSAuthFailureCount,
    capwapBaseFailedDTLSSessionCount
}
STATUS current
DESCRIPTION
    "Objects used for collecting the CAPWAP protocol's statistics."
 ::= { capwapBaseGroups 15 }

capwapBaseNotificationsGroup    NOTIFICATION-GROUP
NOTIFICATIONS {
    capwapBaseChannelUp,
    capwapBaseChannelDown,
    capwapBaseDecryptErrorReport,
```

```
    capwapBaseJoinFailure,
    capwapBaseImageUpgradeFailure,
    capwapBaseConfigMsgError,
    capwapBaseRadioOperableStatus,
    capwapBaseAuthenFailure
}
STATUS current
DESCRIPTION
    "A collection of notifications in this MIB module."
 ::= { capwapBaseGroups 16 }

capwapBaseNotifyVarsGroup OBJECT-GROUP
OBJECTS {
    capwapBaseNtfWtpId,
    capwapBaseNtfRadioId,
    capwapBaseNtfChannelType,
    capwapBaseNtfAuthenMethod,
    capwapBaseNtfChannelDownReason,
    capwapBaseNtfStationIdList,
    capwapBaseNtfAuthenFailureReason,
    capwapBaseNtfRadioOperStatusFlag,
    capwapBaseNtfRadioStatusCause,
    capwapBaseNtfJoinFailureReason,
    capwapBaseNtfImageFailureReason,
    capwapBaseNtfConfigMsgErrorType,
    capwapBaseNtfMsgErrorElements
}
STATUS current
DESCRIPTION
    "Objects used for notifications."
 ::= { capwapBaseGroups 17 }

capwapBaseNotifyControlGroup OBJECT-GROUP
OBJECTS {
    capwapBaseChannelUpDownNotifyEnable,
    capwapBaseDecryptErrorNotifyEnable,
    capwapBaseJoinFailureNotifyEnable,
    capwapBaseImageUpgradeFailureNotifyEnable,
    capwapBaseConfigMsgErrorNotifyEnable,
    capwapBaseRadioOperableStatusNotifyEnable,
    capwapBaseAuthenFailureNotifyEnable
}
STATUS current
DESCRIPTION
    "Objects used to enable or disable notifications."
 ::= { capwapBaseGroups 18 }

END
```

10. Security Considerations

There are a number of management objects defined in this MIB module with 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. The followings are the tables and objects and their sensitivity/vulnerability:

- Unauthorized changes to the capwapBaseWtpProfileTable and writable objects under capwapBaseAcs group MAY disrupt allocation of resources in the network. For example, a WTP's static IP address could be changed by setting the capwapBaseWtpProfileWtpStaticIpAddress object.
- Unauthorized changes to writable objects under the capwapBaseAc group MAY disrupt allocation of resources in the network. For example, an invalid value for the capwapBaseWtpSessionsLimit object will increase the AC's traffic burden.
- Unauthorized changes to the capwapBaseMacAcITable MAY prevent legal stations from being able to access the network, while illegal stations are able to access it.
- Unauthorized changes to writable objects under the capwapBaseParameters group MAY influence CAPWAP protocol behavior and status. For example, an invalid value set for the capwapBaseAcDataCheckTimer MAY influence the CAPWAP state machine.

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. The followings are the tables and objects and their sensitivity/vulnerability:

- The capwapBaseDataChannelDTLSPolicyOptions and capwapBaseControlChannelAuthenOptions under the capwapBaseAc group expose the current security option for CAPWAP data and control channels.
- The capwapBaseWtpTable exposes a WTP's important information like tunnel mode, MAC type, and so on.
- The capwapBaseWtpEventsStatsTable exposes a WTP's failure information.

- The `capwapBaseRadioEventsStatsTable` exposes a radio's failure information.

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, the 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.

11. IANA Considerations

11.1. IANA Considerations for CAPWAP-BASE-MIB Module

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER value recorded in the SMI Numbers registry:

Descriptor	OBJECT IDENTIFIER value
-----	-----
capwapBaseMIB	{ mib-2 196 }

11.2. IANA Considerations for ifType

IANA has assigned the following ifType:

Decimal	Name	Description
-----	-----	-----
254	capwapWtpVirtualRadio	WTP Virtual Radio Interface

12. Contributors

This MIB module is based on contributions from Long Gao.

13. Acknowledgements

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