Wireless Specifications

Wi-Fi Provisioning Framework Specification

WR-SP-WiFi-MGMT-I03-120216

ISSUED

Document Status Sheet

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Key to Document Status Codes

Work in Progress	An incomplete document, designed to guide discussion and generate feedback that may include several alternative requirements for consideration.
Draft	A document in specification format considered largely complete, but lacking review by Members and vendors. Drafts are susceptible to substantial change during the review process.
Issued	A stable document, which has undergone rigorous member and vendor review and is suitable for product design and development, cross-vendor interoperability, and for certification testing.
Closed	A static document, reviewed, tested, validated, and closed to further engineering change requests to the specification through CableLabs.

Trademarks

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1 SCOPE

1.1 Introduction and Purpose

This specification details the management requirements for the Wireless Fidelity (Wi-Fi) air interface and roaming requirements defined in Wi-Fi Requirements for Cable Modem Gateways specification [WiFi-GW] and WR Roaming Architecture and Interfaces Specification [WiFi-ROAM]. The purpose of this specification is to define object models and over the wire interface definitions to support the management functions of the Wi-Fi requirements. The term management functions relate to the traditional FCAPS (Fault Configuration, Accounting, Performance and Security) areas of management.

1.2 Requirements

Throughout this document, the words that are used to define the significance of particular requirements are capitalized. These words are:

"MUST"	This word means that the item is an absolute requirement of this specification.
"MUST NOT"	This phrase means that the item is an absolute prohibition of this specification.
"SHOULD"	This word means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.
"SHOULD NOT"	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
"MAY"	This word means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

2 REFERENCES

2.1 Normative References

In order to claim compliance with this specification, it is necessary to conform to the following standards and other works as indicated, in addition to the other requirements of this specification. Notwithstanding, intellectual property rights may be required to use or implement such normative references.

[802.11]	IEEE 802.11: Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications, 2007.
[802.11a]	IEEE 802.11a: High-speed Physical Layer in the 5 GHz Band, 1999.
[802.11b]	IEEE 802.11b: Higher-Speed Physical Layer Extension in the 2.4 GHz Band, 1999.
[802.11d]	IEEE 802.11d: Amendment 3: Specification for operation in additional regulatory domains, 2001.
[802.11e]	IEEE 802.11e: Amendment 8: Medium Access Control (MAC) Quality of Service Enhancements, 2005.
[802.11g]	IEEE 802.11g: Amendment 4: Further Higher Data Rate Extension in the 2.4 GHz Band, 2003.
[802.11h]	IEEE 802.11h: Amendment 5: Spectrum and Transmit Power Management Extensions in the 5Gz band in Europe, 2003.
[802.11i]	IEEE 802.11i: Amendment 6: Medium Access Control (MAC) Security Enhancements, 2004.
[802.11n]	IEEE 802.11n: Enhancement for higher throughput, 2009.
[802.1Q]	IEEE 802.1Q: Virtual Bridged Local Area Networks, 2005.
[802.1X]	IEEE 802.1X: Port-Based Network Access Control, 2004.
[OSSIv3.0]	Data-Over-Cable Service Interface Specifications, DOCSIS 3.0, Operations Support System Interface Specification CM-SP-OSSIv3.0-I17-111221, December 21, 2011, Cable Television Laboratories, Inc.
[MULPIv3.0]	Data-Over-Cable Service Interface Specifications, DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification, CM-SP-MULPIv3.0-I17-111117, November 17, 2011, Cable Television Laboratories, Inc.
[ISO/IEC 3166-1]	ISO/IEC: 3166-1 Codes for the representation of names of countries and their subdivisions – Part 1: Country codes, 2006.
[RFC 2863]	IETF RFC 2863, The Interfaces Group MIB, June 2000.
[RFC 2865]	IETF RFC 2865, Remote Authentication Dial In User Service (RADIUS), June 2000.
[TR-069 a4]	TR-069 CPE WAN Management Protocol v1.1, Issue 1, Amendment 4, July 2011, Broadband Forum Technical Report.
[TR-181i2a3]	TR-181 Device Data Model for TR-069, Issue 2, Amendment 3, July 2011, Broadband Forum Technical Report.
[WMM]	Wi-Fi Alliance: Wi-Fi Multi-Media QoS based on 802.11e, Version 1.1.

[WPA] Wi-Fi Alliance: Wi-Fi Protected Access (WPA) Enhanced Security Implementation Based on IEEE P802.11i standard, Version 3.1, August, 2004.

[WPS] Wi-Fi Alliance: Wi-Fi Protected Setup™ Specification 1.0.

2.2 Informative References

This specification uses the following informative references.

[802.11k] IEEE 802.11k: Amendment 1: Radio Resource Measurement of Wireless LANs, 2008.

[eRouter] IPv4 and IPv6 eRouter Specification, CM-SP-eRouter-I07-111117, November 17, 2011, Cable Television Laboratories, Inc.

[RFC 2578] IETF RFC 2578/ STD0058, Structure of Management Information Version 2 (SMIv2), April 1999.

[RFC 2898] IETF RFC 2898, PKCS #5: Password-Based Cryptography Specification Version 2.0, September 2000.

[RFC 4122] IETF RFC 4122, A Universally Unique IDentifier (UUID) URN Namespace, July 2005.

[RFC 4639] IETF RFC 4639, Cable Device Management Information Base for Data-Over-Cable Service Interface Specification (DOCSIS) Compliant Cable Modems and Cable Modem Termination Systems, December 2006.

[RFC 5580] IETF RFC 5580, Carrying Location Objects in RADIUS and Diameter, August 2009.

[WiFi-GW] Wi-Fi Requirements for Cable Modem Gateways, WR-SP-WiFi-GW-I02-120216, February 16, 2012, Cable Television Laboratories, Inc.

[WiFi-ROAM] WR Roaming Architecture and Interfaces Specification, PKT-SP-WiFi-ROAM-I03-120216, February 16, 2012, Cable Television Laboratories, Inc.

2.3 Reference Acquisition

- Cable Television Laboratories, Inc., 858 Coal Creek Circle, Louisville, CO 80027;
  Phone +1-303-661-9100; Fax +1-303-661-9199; http://www.cablelabs.com
- Institute of Electrical and Electronics Engineers, (IEEE), http://www.ieee.org/web/standards/home/index.html
- Wi-Fi Alliance, 3925 West Braker Lane Austin, TX 78759 USA, Phone: +1 (512) 305-0790, Fax: +1 (512) 305-0791, http://www.wi-fi.org
- Broadband Forum, 48377 Fremont Blvd, Suite 117 Fremont, CA 94538, Phone: +1.510.492.4020, Fax: +1.510.492.4001, http://www.broadband-forum.org

3 TERMS AND DEFINITIONS

This specification uses the following terms:

Multi-operator	Common agreements, requirements and operations amongst operators to support roaming.
Roaming	The use of a home network subscription to gain access to a partner network.
TR-069	Term used to refer to the CPE WAN management protocol suite defined in [TR-069 a4]

4 ABBREVIATIONS AND ACRONYMS

This specification uses the following abbreviations:

AP	Access Point
BSSID	Basic Service Set Identifier
CM	Cable Modem
CRUD	Create, Read, Update, Delete
DOCSIS	Data-Over-Cable Service Interface Specifications
DSCP	Differentiated Services Code Points
eDOCSIS	embedded DOCSIS
eRouter	An eSAFE device that is implemented in conjunction with the DOCSIS Embedded Cable Modem.
FCAPS	Fault Configuration, Accounting, Performance and Security
GI	Guard Interval
LED	Light Emitting Diode
SNMP	Simple Network Management Protocol
SRV	An SRV record or Service record is a category of data in the Internet Domain Name System specifying information on available services.
SSID	Service Set Identifier
U-APSD	Unscheduled Automatic Power Save Delivery
UL	Underwriters Laboratory
WDS	Wireless Distribution System
WEP	Wired Equivalent Privacy
Wi-Fi	Wireless Fidelity
Wi-Fi AP	Wireless Fidelity Access Point
Wi-Fi GW	Wireless Fidelity Gateway
WMM	Wi-Fi Multimedia
WPA	Wi-Fi Protected Access

5 OVERVIEW

The Wi-Fi specification suite defines requirements to integrate a Wi-Fi air interface access with the cable network. The Wi-Fi Access Point, AP, is treated as a port in a DOCSIS device. The AP communicates to the operator's core network through the DOCSIS interface. The cable modem, CM, holds the responsibility of the interface and provides wired network infrastructure to AP traffic.

This specification is focused on management requirements for Wi-Fi interface. The management features include user activation of the AP, user access via the AP, user selection of the network name, Service Set Identifier (SSID), user activation of Security settings, MSO activation of the AP, MSO configuration of an SSID for public usage, and MSO configuration of security on AP. Performance report requirements are driven by operator needs and features widely available in the Wi-Fi industry.

APs can report multiple performance parameters based on the signal strength received from a device, packets sent/received, user authentication, SSID, and QoS. These are required to be monitored for health of the AP, status of the Wi-Fi environment and to provide usage statistics to MSO. SNMP (Simple Network Management Protocol) is used to communicate parameters. The AP is configured through a CM configuration file. It is assumed that access point is integrated inside the cable modem. This specification does not address range extenders with integrated CM-WiFi device.

This specification defines the data requirements for the functional areas of operations (Fault, Configuration, Accounting, Performance and Security). The provisioning of the Wi-Fi aspects is tied to the provisioning and management process associated with the device hosting the Wi-Fi interfaces. Therefore, this specification considers a generic data model of the management requirements and provides the realization of the object models designed for the management protocol interface. For example, the SNMP modules derived from the object models in this specification can be used to manage a Wi-Fi interface hosted on a CM with an [eRouter] device.

Additional management interfaces using alternative protocols can be derived from the object model as needed.

5.1 Wi-Fi Management Features

The Wi-Fi management features are organized based on the management functional areas as shown in Table 1 below.

Table 1 - Wi-Fi Management Features

Feature	Management Functional Area	Description
Air Interface Configuration	Configuration	802.11 Air interface configuration parameters including Channel, modes of operation, rates, transmission power, etc.
SSID configuration	Configuration	Configuration of SSID domains as sub-interfaces for service separation
Capabilities and Supported Features	Configuration	List of Wi-Fi features support
Access Protection configuration	Configuration	Configuration of Access mechanisms including WEP (Wired Equivalent Privacy, WPA)Wi-Fi Protected Access), and WPA2
Resource And Traffic Priority	Configuration	Assignment of VLANs to SSIDs for traffic prioritization
Device operations	Configuration	Reset Air interface Factory default set Interfaces enabled during outages
Power Saving Status	Configuration, Performance	Configuration and status report of Power Saving
Current transmit power and RSSI (Received Signal Strength Indication)	Performance	Report of Air interface metrics that lead into measure robustness and link quality

Feature	Management Functional Area	Description
Operational Status	Configuration	Active antenna selections Current channel sections Total active associations
Performance Metrics	Performance	Report of Frames and packets counts to measure errors and failed conditions
Logging and Alerting	Fault	The record and reporting of fault conditions
Diagnostic procedures	Fault	Procedures used to collect health status to help diagnose faults
Local CPE access configuration	Configuration	CPE MAC restriction
AAA Radius Client	Security, Accounting	Client capabilities to help support authentication and accounting procedures with a network AAA server
Roaming Modes of operation	Configuration	Web page redirection Local Web Page
Access Configuration	Security	GUI access and restriction to other groups (SSID domains)

5.1.1 Configuration Management

Cable operators can configure SSIDs to be subscriber controlled, or strictly operator managed. The Wi-Fi configuration may be hosted through a local web server running on the CM itself. The user is allowed to configure basic wireless settings such as SSID name, security options and passphrase through local web admin pages for SSIDs configured by the operator as subscriber controlled. The device will receive a pre-configured SSID defined by the operator via a CM configuration file. The device needs to keep all the configured SSIDs accessible during operation.

5.1.2 Performance Management

The device is required to support an [802.11n] interface. The device configuration is persistent. The Wi-Fi configuration has to be accessible across power cycles. The device will provide an option for the MSO to poll and acquire the performance parameters defined in Annex A.

5.1.3 Fault Management

The device will provide timely alarms for any internal failures such as radio strength failure or when operating on battery such that not all end devices can be served. The device will maintain the logs on its internal web server page to provide the information related to reboots, configuration changes, intruder detection.

5.1.4 Accounting Management

The device can report usage to an AAA server if it is configured to execute RADIUS accounting client functions.

5.1.5 Security Management

The device needs to support general WiFi security such as WEP, WPA-PSK, and WPA2 for secure access of the WiFi network. The manufacturer configuration provides default security settings. MAC address based WiFi access configuration may be allowed on the subscriber controlled SSID. This helps the end user to control the devices that are attached to gateway using user defined SSID.

The device will provide the AAA server address to all incoming requests. The incoming requests may be directed to access control web page defined by MSO. This helps the roaming devices to get authenticated on MSO network.

5.2 Object Model

The Wi-Fi GW requirements contained in this specification are focused on the wireless access and bridging requirements of 802.11 interfaces [802.11]. However, there are dependencies and relationships with the features offered by the device supporting the Wi-Fi interface, for example support of NAT, routing, bridging, tunneling and multiple user domains based on SSIDs. These aspects require visualization and integration of the MAC and IP layer features of the device to transport user data. The closest approximation to a device gateway is provided by the [eRouter] specification. However, [eRouter] does not contain data models for the IP layer interaction with the Physical and MAC layer components of the gateway LAN.

5.3 Wi-Fi Management Interfaces

Figure 1 and Figure 2 below show examples Wi-Fi Management on a device within the context of the management interfaces. In Figure 1, the CM supports Wi-Fi as part of its LAN facing CPE interfaces. In Figure 2, [eRouter] is the device supporting the Wi-Fi interfaces. Note the nomenclature of provisioning and management interfaces in this section is informative and not defined in [MULPIv3.0] or [eRouter] specifications. The data elements provided by the object model defined in this specification can be provisioned, configured and monitored via the management interfaces listed in Figure 1 and Figure 2 as described on each interface definition below.

Figure 1 shows the management interfaces for the CM (managed device).

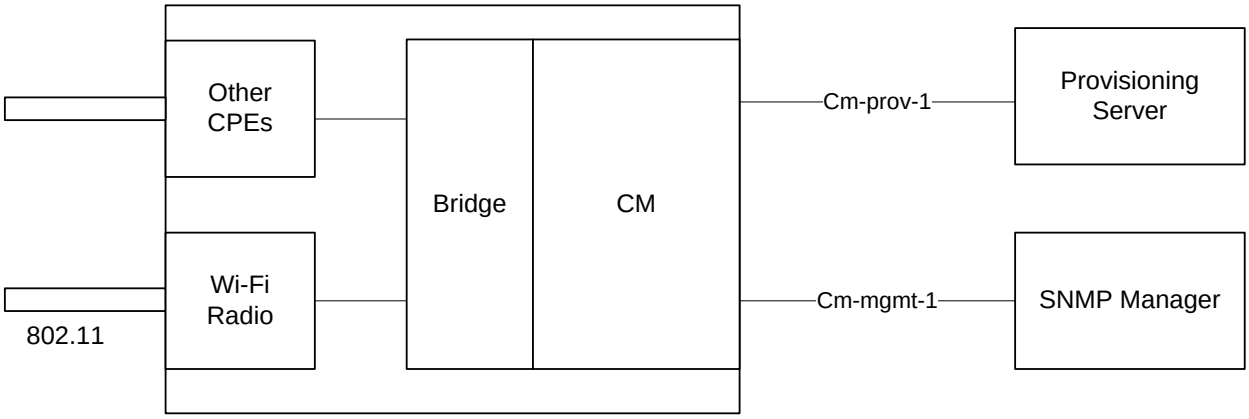

Figure 1 - CM Provisioning and Management Interfaces

5.3.1 Cm-prov-1

This interface provides DHCP and FTP to the CM for provisioning and configuration at initialization. The configuration file provides the attributes to initialize and configure the Wi-Fi interfaces.

5.3.2 Cm-mgmt-1

This interface corresponds to the management interface for operational CMs. Wi-Fi interface attributes and parameters can be monitored and updated through this interface.

Figure 2 shows the management interfaces for the eRouter (managed device).

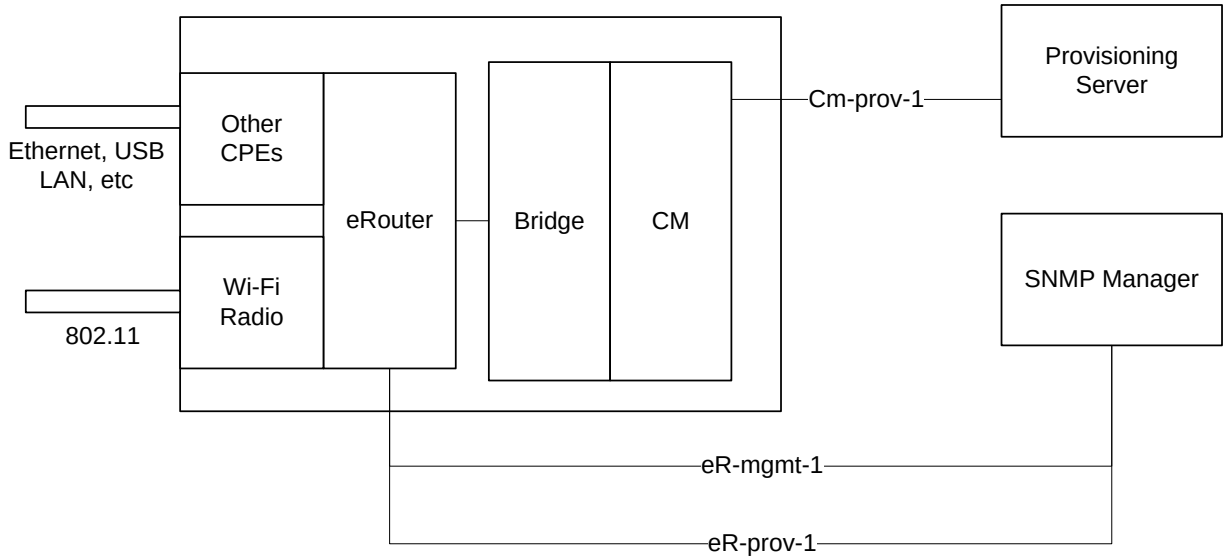

Figure 2 - eRouter Provisioning and Management Interfaces

5.3.3 Cm-prov-1

This is the same interface seen in Figure 1. In the context of eRouter this interface provides a mechanism to pass the eRouter (including Wi-Fi interface parameters) configuration parameters via the CM configuration file to the eRouter device. The DHCP functions are limited to the eCM component. See [eRouter] for details.

5.3.4 eR-prov-1

This interface provides DHCP to the eRouter component.

5.3.5 eR-mgmt-1

This interface corresponds to the management interface for operational eRouter. Wi-Fi interface attributes and parameters can be monitored and updated through this interface.

6 REQUIREMENTS

This section contains normative management requirements on the Wi-Fi GW management interface.

6.1 Object Model requirements

Annex A defines the Wi-Fi GW object model in a protocol independent way. Objects definitions for SNMP and TR-69 management protocols are derived or related to the object model in Annex A.

The Wi-Fi GW MUST support the object model defined in Annex A.

The object model in Annex A is based on [TR-181i2a3], specifically, the [TR-181i2a3] Device. WiFi objects provide the basis of the Wi-Fi Physical interface requirements for the Wi-Fi GW. Other aspects of [TR-181i2a3] such as device level management, other than Wi-Fi physical interfaces, IP networking, and Applications and protocols management, are beyond the scope of this specification. Refer to [eRouter] specification for object model requirements at the Gateway level.

6.1.1 IEEE 802.11 MIB Modeling Considerations

The IEEE 802.11 MIB module [802.11] does not provide a view of the configuration elements expected for device level management, but focuses on the lower level protocol primitives needed to configure the MAC and PHY layers. Therefore, the [TR-181i2a3] model is more appropriate for Wi-Fi management.

Certain areas of the 802.11 MIB module required by operators are not covered by [TR-181i2a3]. For example, RTS threshold and DTIM interval are not defined in [TR-181i2a3]. The Wi-Fi GW data model includes objects for these items in Annex A. In other cases requirements reference IEEE 802.11 MIB objects whenever SNMP is supported by the Wi-Fi GW. Corresponding mapping in Annex A and Annex D is made for the Wi-Fi GW supporting [TR-181i2a3], such as performance metrics based on [802.11k].

6.1.2 Wi-Fi Interface Model

This section details the Wi-Fi interface management requirements to accomplish separation and isolation of user domain traffic. The requirements in this section are driven by cable operator deployment models. The data models leverage design considerations from [TR-181i2a3]. User domains in Figure 3 below refer to the IP Forwarding layer defined in this model for traffic isolation between SSID domains. The forwarding model is outside the scope of this specification and is detailed in [eRouter].

For example, a residential user resides in the Residential Domain where LAN hosts (wired and wireless) are in the same network. Public Domain represents Internet with wireless access using an SSID other than the Residential Domain. Similarly, a Roaming Domain supports subscribers from a partner network with a roaming contract. A separate SSID is designated for roaming.

Public, Residential and Roaming Domains subscribers are attached to the same Wi-Fi radio. Thus, an interface hierarchy from layer 1 through layer 3 is needed to accomplish user domain traffic isolation. [TR-181i2a3] defines SSIDs as logical interfaces on top of the Wi-Fi radio. Traffic marking can be achieved by layering Bridging and VLAN connections on top of SSID interface; traffic isolation is reached by layering IP Interfaces on top of bridges down to the SSID domains accompanied by traffic forwarding rules. The SSID Domain is further model in [TR-181i2a3] as part of Virtual Access Points. The Virtual Access Points are isolated from each other by means of the IP interface and Bridge configuration. See details in [eRouter].

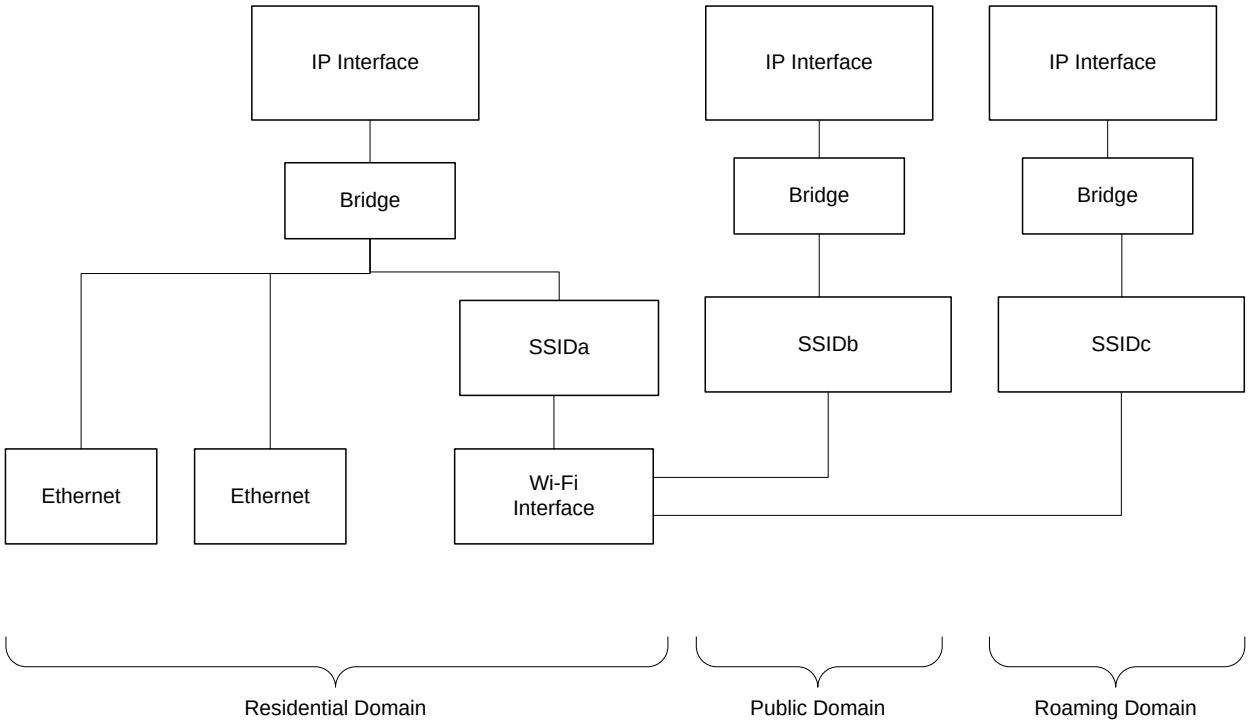

Figure 3 - User Domain Interface Model

Figure 3 also shows example of user domains configuration. By default Ethernet ports are always associated with the subscriber domain, as part of same domain there is an SSID logical interface (SSIDa). Public and Roaming domain configurations are shown as well.

6.2 Management Interface Protocols Requirements

6.2.1 Requirements for SNMP Protocol

The Wi-Fi GW requirements reside in a managed device (e.g., [eRouter]). The Wi-Fi GW that supports the SNMP interface MUST support the MIB objects listed in Table 2 and defined in Annex B. Table 2 shows the mapping between the objects of the object model in and their SNMP MIB objects definitions from Annex B.

Table 2 - SNMP Object Requirements

Object Model	SNNP MIB Object	Requirement
Based on [TR-181i2a3]		
WiFi	clabWIFIWiFiTable	MUST
Radio	clabWIFIRadioTable	MUST
RadioStats	clabWIFIRadioStatsTable	MAY
RadioStats	Counters from ifTable and ifXTable [RFC 2863]	MUST
SSID	clabWIFISSIDTable	MUST
SSIDStats	clabWIFISSIDStatsTable	MUST
AccessPoint	clabWIFIAccessPointTable	MUST
AccessPointSecurity	clabWIFIAccessPointsecurityTable	MUST
AccessPointWPS	clabWIFIAccessPointWPSTable	MUST

Object Model	SNNP MIB Object	Requirement
AssociatedDevice	clabWIFIAssociatedDeviceTable	MUST
EndPoint	Not defined	-
EndPointSecurity	Not defined	-
Profile	Not defined	-
ProfileSecurity	Not defined	-
EndPoint PWS	Not defined	-
InterfaceStack	IfStackTable [RFC 2863]	-
CableLabs Extensions to [TR-181i2a3]		
DataRateStats	clabWIFIDataRateStatsTable	SHOULD
PeriodicStats	clabWIFIPeriodicStatsTable	SHOULD
SSIDPolicy	clabWIFISSIDPolicyTable	MUST
ClientSessions	clabWIFIClientSessionsTable	MUST
ClientStats	clabWIFIClientStatsTable	SHOULD
RadiusClient	clabWIFIRadiusClientTable	MUST
WIFIEventNotif	clabWIFIWIFIEventNotif	MUST
	clabWIFIInterfaceStack	MAY
Not in Annex A object model (see InterfaceStack [TR-181i2a3])	ifStackStatusTable [RFC 2863]	MUST

The mapping between the SNMP requirements listed in Annex A and the requirements in [802.11] is not completely one-to-one. Below are a few examples:

- The [TR-181i2a3] Device. WiFi.Radio object reuses most attributes from the IF-MIB [RFC 2863] ifTable, ifXTable and ifStackStatusTable. However, the attributes are arranged differently in Table 2.
- Interface counters at the PHY layer overlap. In this case, the preferred model of reporting is the conventional [RFC 2863].
- The IF-MIB does not define an interface type for the SSID layer defined in [TR-181i2a3].
- Extended statistics and roaming authentication come from MSOs and are not part of [TR-181i2a3] requirements. Annex A and Annex B contain those extensions.

6.2.1.1.1 Interface Creation and IfTable Relationship

The ifTable defined in [RFC 2863] does not provide a method to create new interfaces or logical interfaces on top of the Physical WiFi interfaces such as SSIDs, Bridges and LAN/WAN IP Interfaces. The [TR-181i2a3] Device.WiFi.SSID, Device.Bridging and Device.IP objects define the artifacts to create logical interfaces and their stack relationships. The Wi-Fi GW MUST support SSID logical interfaces as defined in [TR-181i2a3] and relies on the GW (e.g., eRouter) to support stacking Bridges and WAN/LAN IP interfaces to define the SSID service topology.

6.2.1.1.2 Interface Numbering

This specification defines interface numbering for the purpose of creating deterministic configuration and operation procedures. This is similar to the reserved interface numbers found in [OSSIv3.0].

The Wi-Fi GW MUST allocate the interfaces numbers indicated in Table 3.

Table 3 - Interface Numbering Requirements

Interface Numbers	Purpose
2XX	IP Interfaces in the LAN side
3XX	IP Interfaces in the WAN Side
1XY	Wi-Fi interfaces and SSID interfaces • XX corresponds to the Wi-Fi radio Interface with XX in (0..99). • YY corresponds to the SSIDlogical interfaces for Wi-Fi radio XX with YY in range 0..99 10000 corresponds to the Wi-Fi Radio with ifAlias = wlan0 10001 corresponds to the Wi-Fi SSID sub-interface 1 on Wi-Fi radio 10000 Interface numbering for devices with more of 100 Radios and/or 99 SSID per radio is vendor specific

Other specifications that reference the Wi-Fi Interface requirements need to observe the interface numbering indicated in Table 3.

6.2.1.1.3 Interface Naming

This specification uses regular, well defined conventions for interface naming. Interface names are typically used in web portals, console ports, etc. Even though this specification follows the CableLabs interface numbering schema for data models, the equivalent text names are explicitly defined to simplify operations. The Wi-Fi GW MUST follow the interface naming convention listed in Table 4. The Wi-Fi gateway MUST report the interface name in ifName IF-MIB per [RFC 2863].

Table 4 - Interface Naming Requirements

Interface Name (ifName)	Purpose
lan(n)	IP Interfaces in the LAN side (n) is the one or two digit representation of XX in the interface number 2XX ; e.g., lan0
wan(n)	IP Interfaces in the WAN Side (n) is the one or two digit representation of XX in the interface number 2XX; e.g., wan0
wlan(n).(m)	Wi-Fi interfaces and sub-interfaces (n) corresponds to the one or two digit representation of XX in the interface number 1XXYY (m) corresponds to the one or two digit representation of YY in the interface number 1XXYY For Wi-Fi Interfaces '.(m)' is omitted. Examples: • wlan0 corresponds to ifIndex 10000 • wlan0.1. corresponds to ifIndex 10001

6.2.1.1.4 Other Interface Requirements

The Wi-Fi GW MUST support the ifTable parameters listed in Table 5 as specified in [RFC 2863].

Table 5 - ifTable Parameters

Interface Numbers	ifType	ifDescr	Counters
IP Interfaces in the LAN side	ipForward(142)	LAN IP interface	per [RFC 2863]
IP Interfaces in the WAN Side	ipForward(142)	WAN IP interface	per [RFC 2863]
Wi-Fi interfaces	ieee80211(71)	Wi-Fi Radio Interface	per [RFC 2863]
Wi-Fi sub-interfaces	ieee80211(71)	Wi-Fi SSID sub-interface	per [RFC 2863]

The Wi-Fi GW MUST support the ifTable and ifXtable counters specified in the Interface MIB [RFC 2863] for the Wi-Fi interfaces and sub-interfaces.

6.2.1.1.5 ifStackTable Requirements

The Wi-Fi interface MUST report read-only instances of the interface stack represented in [RFC 2863].

6.2.1.1.6 IpNetToPhysicalTable Requirements

The ipNetToPhysicalTable is similar to the requirements in the Host object (see Annex A). The Wi-Fi GW MUST support the IpNetToPhysicalTable. The Wi-Fi GW SHOULD support the Host and Host objects defined in Annex A.

6.2.1.1.7 Residential Domain Requirements

The Wi-Fi GW MUST map by default non-Wi-Fi interfaces (e.g., Ethernet, USB LAN device interfaces) to the Wi-Fi Residential domain. However, the Wi-Fi GW MAY allow the configuration of non-Wi-Fi interfaces other than the Wi-Fi Residential Domain via the LANDevice object defined in Annex A.

6.2.2 Requirements for TR-069

The Wi-Fi GW MUST support the Device.WiFi objects of [TR-181i2a3] with the exception of the Device.WiFi.EndPoint objects which are optional.

The Wi-Fi GW MUST support the TR-069 data object extensions defined in Annex D based on Annex A.

6.2.3 Wi-Fi Diagnosis

The Wi-Fi GW MUST adhere to the recommendations for LED (Light Emitting Diodes) operations for LAN CPEs defined in [OSSIv3.0].

6.2.4 Wi-Fi Object Model Compliance Requirements

This section defines minimal compliance requirements for the object model defined in Annex A. Those compliance requirements are then expressed the proper notation of the corresponding management interface (SNMP as defined in Section 6.2.1 and [TR-069 a4] per section 6.2.2).

6.2.4.1 WiFi Radio Relation to SSID and AccessPoint Objects

Section 6.2.1 describes the [TR-181i2a3] generic model for interfaces association. In particular SSIDs can be associated to any available radio. Further, [TR-181i2a3] defines the mechanism to configure an AccessPoint object by referencing a particular SSID. This section defines implement requirements to allow the static associations of SSIDs to Radio and AccessPoint objects of Annex A.

The Wi-Fi GW MAY predefine AccessPoint and SSID object instances and reject requests for addition and deletion of existing instances.

The Wi-Fi GW MAY define a Wi-Fi instance which is applied to a specific radio, a set of SSIDs and a set of AccessPoints instances. Within a Wi-Fi instance all SSIDs and AccessPoints instances MAY be statically associated with a unique radio instance. For example, one SSID instance MAY not be associated with two radio instances.

The Wi-Fi GW MAY define a static association of each AccessPoint instance with a single SSID instance.

If multiple SSIDs (AccessPoint) are associated with a single radio, the Wi-Fi GW MAY use the following AccessPoint parameters from the lowest index of the AccessPoint object instances, and reject the sets to those parameters on the other SSID instances; in case the configuration of those parameters is not supported per SSID/AccessPoint.

- WMMEnable attribute
- UAPSDEnable attribute
- WPS object

Table 6 shows the Management interface implications of the requirements above.

Table 6 - Radio, SSID and AccessPoint Objects Minimal Compliance

Requirement	TR-069 Profiles	SNMP Compliance
No AccessPoint and SSID creation and deletion of Instances	WiFiSSID:1 Profile Device.WiFi.SSID.{i}. requirement = “present”	clabWIFISSIDRowStatus Not Implemented
	WiFiSSID:1 Profile Device.WiFi.AccessPoint.{i}. requirement = “present”	clabWIFIAccessPointWPSRowStatus Not Implemented
SSID static association to Radio	WiFiSSID:1 Profile Device.WiFi.SSID.{i}.LowerLayers requirement = “readOnly”	clabWIFISSIDLowerLayers read-only
AccessPoint static association to SSID	WiFiSSID:1 Profile Device.WiFi.AccessPoint.{i}.SSIDReference requirement = “readOnly”	clabWIFIAccessPointSSIDReference read-only

6.2.4.2 WiFi Optional Objects Requirements

The Wi-Fi GW MAY support the objects included in Table 7. If the WiFi GW supports the objects listed in Table 7, the Wi-Fi GW MUST comply as minimum with the conditions listed in the Table 7.

Table 7 - Wi-Fi GW Optional Object Requirements

Requirement	TR-069 Profiles	SNMP Compliance
Auto Channel Selection Not supported Device.WiFi.Radio{i}.AutoChannelSupported = ‘false’	WiFiSSID:1 Profile Device.WiFi.Radio{i}.AutoChannelEnable Not implemented	clabWIFIRadioAutoChannelEnable Not Implemented
	WiFiSSID:1 Profile Device.WiFi.Radio{i}.AutoChannelRefreshPeriod requirement = “readOnly”	clabWIFIRadioAutoChannelRefreshPeriod Not Implemented
	WiFiSSID:1 Profile Device.WiFi.Radio{i}.OperatingChannelBandwidth requirement = “readOnly”	clabWIFIRadioOperatingChannelBandwidth 20Mhz, 40Mhz

Requirement	TR-069 Profiles	SNMP Compliance
	WiFiSSID:1 Profile Device.WiFi.Radio{i}.ExtensionChannel requirement = “”	clabWIFIRadioExtensionChannel AboveControlChannel, BelowControlChannel
	WiFiSSID:1 Profile Device.WiFi.Radio{i}.GuardInterval requirement = “readOnly”	clabWIFIRadioGuardInterval 400nsec, 800nsec read-only
Modulation Code Schema readOnly	WiFiSSID:1 Profile Device.WiFi.Radio{i}.MSC requirement = “readOnly”	clabWIFIRadioMSC -1 read-only
Regulatory Domain readOnly, reports factory settings	WiFiSSID:1 Profile Device.WiFi.Radio{i}.RegulatoryDomain requirement = “readOnly”	clabWIFIRadioRegulatoryDomain read-only
WPS Configuration	WiFiSSID:1 Profile Device.WiFi.AccessPoint{i}.ConfigMethodsEnabled requirement = “readOnly”	clabWIFIAccessPointWPSConfigMethodsEnabled read-only
WiFiEndPointNumberOfEntries not supported	WiFiSSID:1 Profile Device.WiFi. WiFiEndPointNumberOfEntries Not implemented	clabWIFIWiFiEndPointNumberOfEntries Not Implemented
Radio GuardInterval not supported	WiFiSSID:1 Profile Device.WiFi.Radio{i}.GuardInterval Not implemented	clabWIFIRadioGuardInterval Not Implemented
Alias not supported	WiFiSSID:1 Profile Device.WiFi.Radio{i}.Alias Not implemented	clabWIFIRadioAlias Not Implemented
	WiFiSSID:1 Profile Device.WiFi.SSID{i}.Alias Not implemented	clabWIFISSIDAlias Not Implemented
	WiFiSSID:1 Profile Device.WiFi.AccessPoint{i}.Alias Not implemented	clabWIFIAccessPointAlias Not Implemented
LowerLayers readOnly	WiFiSSID:1 Profile Device.WiFi.Radio{i}.LowerLayers requirement = “readOnly”	clabWIFIRadioLowerLayers requirement = “readOnly”
	WiFiSSID:1 Profile Device.WiFi.SSID{i}.LowerLayers requirement = “readOnly”	clabWIFISSIDLowerLayers requirement = “readOnly”
Packet RadioStats not supported	WiFiSSID:1 Profile Device.WiFi.RadioStats{i}.PacketsSent Not implemented	clabWIFIRadioStatsPacketsSent Not Implemented
	WiFiSSID:1 Profile Device.WiFi.RadioStats{i}.PacketsReceived Not implemented	clabWIFIRadioStatsPacketsReceived Not Implemented
	WiFiSSID:1 Profile Device.WiFi.RadioStats{i}.DiscardPacketsSent Not implemented	clabWIFIRadioStatsDiscardPacketsSent Not Implemented

Requirement	TR-069 Profiles	SNMP Compliance
	WiFiSSID:1 Profile Device.WiFi.RadioStats{i}.DiscardPacketsReceived Not implemented	clabWIFIRadioStatsDiscardPacketsReceived Not Implemented
Packet SSIDStats not supported	WiFiSSID:1 Profile Device.WiFi.SSIDStats{i}.PacketsSent Not implemented	clabWIFISSIDStatsPacketsSent Not Implemented
	WiFiSSID:1 Profile Device.WiFi.SSIDStats{i}.PacketsReceived Not implemented	clabWIFISSIDStatsPacketsReceived Not Implemented
SSID Reference readOnly	WiFiSSID:1 Profile Device.WiFi.AccessPoint{i}.SSIDReference requirement = “readOnly”	clabWIFIAccessPointSSIDReference requirement = “readOnly”
DataRateStats not supported	WiFiSSID:1 Profile Device.WiFi.DataRateStats Not implemented	clabWIFIDataRateStats Not Implemented
PeriodicStats not supported	WiFiSSID:1 Profile Device.WiFi.PeriodicStats Not implemented	clabWIFIPeriodicStats Not Implemented
SSIDPolicy not supported	WiFiSSID:1 Profile Device.WiFi.SSIDPolicy Not implemented	clabWIFISSIDPolicy Not Implemented
ClientSessions not supported	WiFiSSID:1 Profile Device.WiFi.ClientSessions Not implemented	clabWIFIClientSessions Not Implemented
ClientStats not supported	WiFiSSID:1 Profile Device.WiFi.ClientStats Not implemented	clabWIFIClientStats Not Implemented
RadiusClient not supported	WiFiSSID:1 Profile Device.WiFi.RadiusClient Not implemented	clabWIFIRadiusClient Not Implemented
WIFIEventNotif not supported	WiFiSSID:1 Profile Device.WiFi.WIFIEventNotif Not implemented	clabWIFIWIFIEventNotif Not Implemented

6.2.4.3 WiFi Objects Reduced Compliance Requirements

The Wi-Fi GW MUST comply as minimum with the conditions specified in Table 8 for the objects therein listed.

Table 8 - Wi-Fi GW Object Requirements

Requirement	TR-069 Profiles	SNMP Compliance
SSID readWrite access	WiFiSSID: 1 Profile Device.WiFi.SSID{i} requirement = readWrite	clabWIFISSIDTable Requirement = RW
AccessPoint readWrite access	WiFiAccessPoint: 1 Profile Device.WiFi.AccessPoint{i} requirement = readWrite	clabWIFIAccessPointTable Requirement = RW

Requirement	TR-069 Profiles	SNMP Compliance
AccessPointSecurity readWrite	WiFiAccessPoint: 1 Profile Device.WiFi.AccessPoint{i}.Security requirement = readWrite	clabWIFIAccessPointSecurityTable Requirement = RW
SecurityExtension readWrite	CableWiFiExtensions:1 Profile Device.WiFi.AccessPoint(i).Security.X_cablelabs-com_SecurityExtension requirement = readWrite	
CommitSettings	Not supported	Requirement = per Annex A

Annex A Wi-Fi Interface Model

A.1 Object Model Overview

The object model specified here defines capabilities to manage the Wi-Fi air interface for residential, enterprise and public deployments. The model is driven by operator requirements and leverages aspects from [TR-181i2a3], 802.11 MIBs per [802.11] and [RFC 2863]. Many definitions are taking directly from [TR-181i2a3] and [802.11]. Whenever the original specs are vague on functionality or behavior, this specification enhances those definitions.

A.2 Object Model Definitions

A.2.1 Object Model Data Types

There are no data types defined for this object model.

A.2.2 Object Model Class Diagram

The Wi-Fi GW Object model in [TR-181i2a3] defines four areas:

- The Radio, corresponds to the physical wireless interface.
- The SSID, defines the WiFi Service Set per [802.11].
- The Access Point, defines the administration of an SSID as an individual access point.
- The End Point, defines the management of stations.

This specification does not model the End Point classes and are deemed optional. In addition, the Radio, SSID and Access Point components are expanded with cable-specific requirements shown in color in Figure 4.

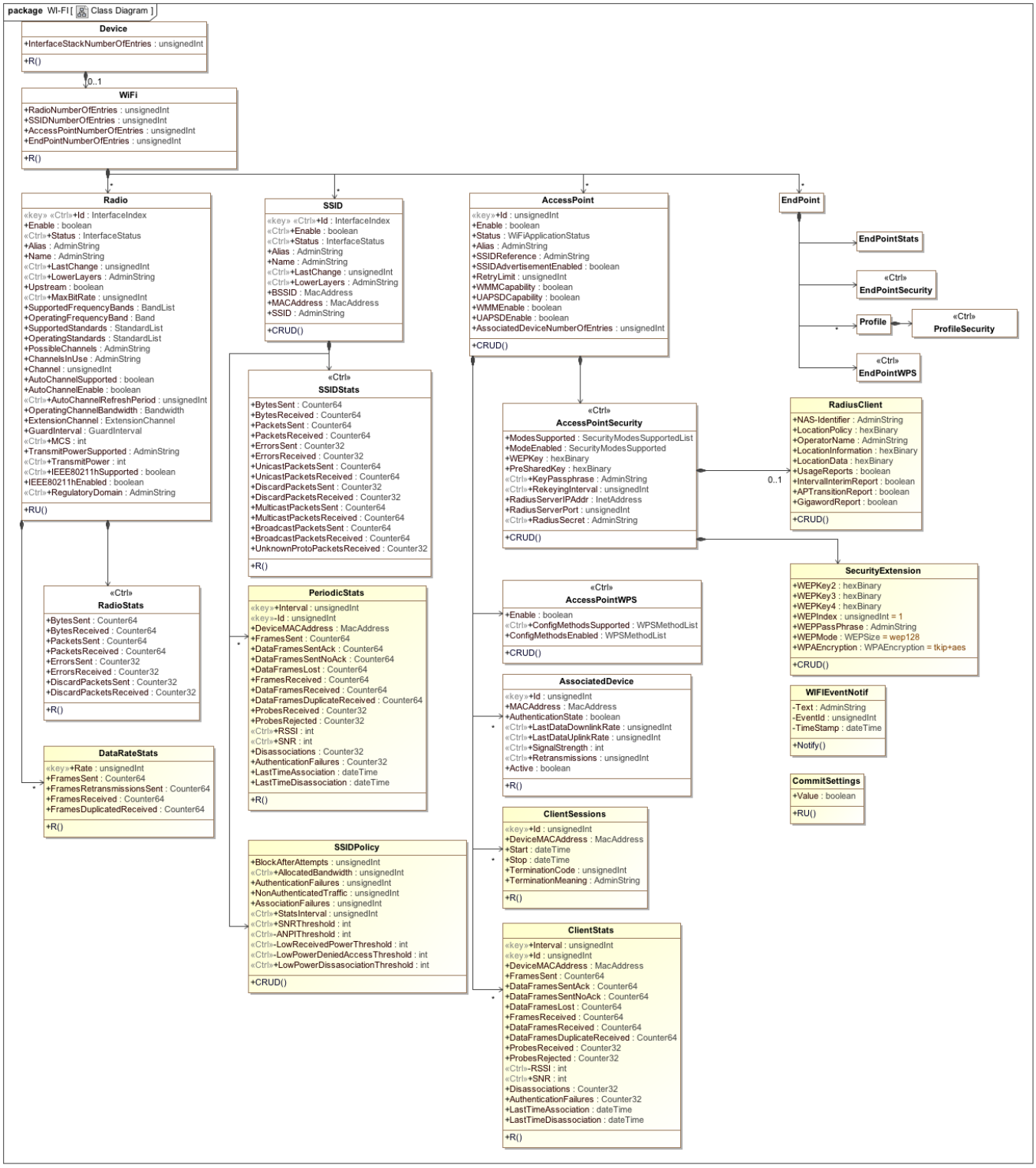

Figure 4 - Object Model Class Diagram

A.2.3 Object Model Description

A.2.3.1 *WiFi Object*

The WiFi object is defined in [TR-181i2a3] as Device.WiFi.

- Object Operations:

RU (Read, Update)

Table 9 - WiFi Object

Attribute Name	Type	Access	Type Constraints	Units	Default
RadioNumberOfEntries	unsignedInt	R			
SSIDNumberOfEntries	unsignedInt	R			
AccessPointNumberOfEntries	unsignedInt	R			
EndPointNumberOfEntries	unsignedInt	R			

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 9 above.

A.2.3.2 *Radio Object*

The Radio object is defined in [TR-181i2a3] as Device.WiFi.Radio{i}.

- Object Operations:

CRUD (Create, Read, Update, Delete)

Table 10 - Radio Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Id	InterfaceIndex	key			
Enable	boolean	RU			
Status	Enum	R	Up(1) Down(2) Unknown(4) Dormant(5) NotPresent(6) LowerLayerDown(7) Error(8)		
Alias	AdminString	RU	SIZE(0..64)		
Name	AdminString	R	SIZE(0..64)		
LastChange	unsignedInt	R		seconds	
LowerLayers	AdminString	RU	SIZE(0..1024)		
Upstream	boolean	R			
MaxBitRate	unsignedInt	R		Mbps	
SupportedFrequencyBands	AdminString	R	2.4Ghz 5Ghz		
OperatingFrequencyBand	Enum	RU	2.4Ghz(1) 5Ghz(2)		

Attribute Name	Type	Access	Type Constraints	Units	Default
SupportedStandards	AdminString	R	a(1) b(2) g(3) n(5)		
OperatingStandards	Enum	RU	a(1) b(2) g(3) n(5)		
PossibleChannels	AdminString	R	SIZE(0..1024)		
ChannelsInUse	AdminString	R	SIZE(0..1024)		
Channel	unsignedInt	RU	1..255		
AutoChannelSupported	boolean	R			
AutoChannelEnable	boolean	RU			
AutoChannelRefreshPeriod	unsignedInt	RU		seconds	
OperatingChannelBandwidth	Enum	RU	20Hhz(1) 40Mhz(2) Auto(3)		Auto
ExtensionChannel	Enum	RU	AboveControlChannel(1) BelowControlChannel(2) Auto(3)		Auto
GuardInterval	Enum	RU	400nsec(1) 800nsec(2)0 Auto(3)		Auto
MCS	int	RU	-1..31		
TransmitPowerSupported	AdminString	R	SIZE(0..64)		
TransmitPower	unsignedInt	RU	1..100	percentage	
IEEE80211hSupported	boolean	R			
IEEE80211hEnabled	boolean	RU			
RegulatoryDomain	AdminString	RU			

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 10 above.

A.2.3.3 *RadioStats Object*

The RadioStats object is defined in [TR-181i2a3] as Device.WiFi.Radio{i}.Stats.

- Object Operations:

R (Read)

Table 11 - RadioStats Object

Attribute Name	Type	Access	Type Constraints	Units	Default
BytesSent	Counter64	R			
BytesReceived	Counter64	R			
PacketsSent	Counter64	R			
PacketsReceived	Counter64	R			

Attribute Name	Type	Access	Type Constraints	Units	Default
ErrorsSent	Counter32	R			
ErrorsReceived	Counter32	R			
DiscardPacketsSent	Counter32	R			
DiscardPacketsReceived	Counter32	R			

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 11 above.

A.2.3.4 *SSID Object*

The SSID object is defined in [TR-181i2a3] as Device.WiFi.SSID{i}.

- Object Operations:

CRUD: (Create, Read, Update, Delete)

Table 12 - SSID Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Id	InterfaceIndex	key			
Enable	boolean	CRUD			
Status	Enum	R	Up(1) Down(2) Unknown(4) Dormant(5) NotPresent(6) LowerLayerDown(7) Error(8)		
Alias	AdminString	CRUD	0..64		
Name	AdminString	R	0..64		
LastChange	unsignedInt	R		seconds	
LowerLayers	AdminString	CRUD	0..1024		
BSSID	MacAddress	R			
MACAddress	MacAddress	R			
SSID	AdminString	CRUD	0..32		

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 12 above.

A.2.3.5 *SSIDStats Object*

The SSIDstats object is defined in [TR-181i2a3] as Device.WiFi.SSID{i}.Stats.

- Object Operations:

R: (Read)

Table 13 - SSIDStats Object

Attribute Name	Type	Access	Type Constraints	Units	Default
BytesSent	Counter64	R			
BytesReceived	Counter64	R			
PacketsSent	Counter64	R			
PacketsReceived	Counter64	R			
ErrorsSent	Counter32	R			
ErrorsReceived	Counter32	R			
UnicastPacketsSent	Counter64	R			
UnicastPacketsReceived	Counter64	R			
DiscardPacketsSent	Counter32	R			
DiscardPacketsReceived	Counter32	R			
MulticastPacketsSent	Counter64	R			
MulticastPacketsReceived	Counter64	R			
BroadcastPacketsSent	Counter64	R			
BroadcastPacketsReceived	Counter64	R			
UnknownProtoPacketsReceived	Counter32	R			

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 13 above.

A.2.3.6 *AccessPoint Object*

The AccessPoint object is defined in [TR-181i2a3] as Device.WiFi.AccessPoint{i}.

- Object Operations:

CRUD (Create, Read, Update, Delete).

Table 14 - AccessPoint Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Id	unsignedInt	key			
Enable	boolean	CRUD			
Status	Enum	R	Disabled(1) Enabled(2) Error_Misconfigured(3) Error(4)		
Alias	AdminString	CRUD	0..64		
SSIDReference	Reference	CRUD	AccessPoint.SSIDReference=SSID.Id		
SSIDAdvertisementEnabled	boolean	CRUD			
RetryLimit	unsignedInt	CRUD	0..7		
WMMCapability	boolean	R			
UAPSDCapability	boolean	R			
WMMEnable	boolean	CRUD			
UAPSDEnable	boolean	CRUD			
AssociatedDeviceNumberOfEntries	unsignedInt	R			

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 14 above.

A.2.3.7 *AccessPointSecurity Object*

The AccessPointSecurity object is defined in [TR-181i2a3] as Device.WiFi.AccessPoint{i}.Security.

- Object Operations:

CRUD: (Create, Read, Update, Delete)

Table 15 - AccessPointSecurity Object

Attribute Name	Type	Access	Type Constraints	Units	Default
ModesSupported	SnmpAdminString	R	None(1) WEP-64(2) WEP-128(3) WPA-Personal(4) WPA2-Personal(5) WPA-WPA2-Personal(6) WPA-Enterprise(7) WPA2-Enterprise(8) WPA-WPA2-Enterprise(9)		
ModeEnabled	Enum	CRUD	None(1) WEP-64(2) WEP-128(3) WPA-Personal(4) WPA2-Personal(5) WPA-WPA2-Personal(6) WPA-Enterprise(7) WPA2-Enterprise(8) WPA-WPA2-Enterprise(9)		
WEPKey	hexBinary	CRUD	0 | 5 | 13		
PreSharedKey	hexBinary	CRUD	0 | 32		
KeyPassphrase	AdminString	CRUD	0..63		
RekeyingInterval	unsignedInt	CRUD		seconds	
RadiusServerIPAddr	InetAddress	CRUD			
RadiusServerPort	unsignedInt	CRUD			
RadiusSecret	AdminString	CRUD			

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 15 above.

A.2.3.8 *AccessPointWPS Object*

The AccessPointWPS object is defined in [TR-181i2a3] as Device.WiFi.AccessPoint{i}.WPS

- Object Operations:

RU (Read, Update)

Table 16 - AccessPointPWS Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Enable	boolean	RU			
ConfigMethodsSupported	SnmpAdminString	R	USBFlashDrive(1) Ethernet(2) ExternalNFCToken(3) IntegratedNFCToken(4) NFCInterface(5) PIN(7) PushButton(8)		
ConfigMethodsEnabled	WPSMethodList	RU	USBFlashDrive(1) Ethernet(2) ExternalNFCToken(3) IntegratedNFCToken(4) NFCInterface(5) PIN(7) PushButton(8)		

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 16 above.

A.2.3.9 *AssociatedDevice Object*

The AssociatedDevice object is defined in [TR-181i2a3] as Device.WiFi.AccessPoint{i}.AssociatedDevice{i}

Object Operations:

R: (Read)

Table 17 - AssociatedDevice Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Id	unsignedInt	key			
MACAddress	MacAddress	R			
AuthenticationState	boolean	R			
LastDataDownlinkRate	unsignedInt	R		kbps	
LastDataUplinkRate	unsignedInt	R		kbps	
SignalStrength	int	R		dBm	
Retransmissions	unsignedInt	R		packets	
Active	boolean	R			

Please refer to [TR-181i2a3] for the definition of the parameters listed in Table 17 above.

A.2.3.10 *DataRateStats Object*

This object contains statistics for each speed rate of an 802.11 LAN interface.

- Object Operations:

R: (Read)

Table 18 - DataRateStats Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Rate	UnsignedInt	key		Mbps	
FramesSent	Counter64	R		frames	
FramesRetransmissionsSent	Counter64	R		frames	
FramesReceived	Counter64	R		frames	
FramesDuplicatedReceived	Counter64	R		frames	

- Rate

The Rate key represents the data speed for the statistics collected. The value is reported in integer units of Mbps.

- FramesSent

The FramesSent parameter indicates the total number of frames transmitted out of the interface (not marked as duplicated). The value of this counter may be reset to zero when the CPE is rebooted.

- FramesRetransmissionsSent

The FramesRetransmissionSent parameter indicates the total number of frames retransmitted out of the interface (marked as duplicated). The value of this counter may be reset to zero when the CPE is rebooted.

- FramesReceived

The FramesReceived parameter indicates the total number of frames received on this interface (not marked as duplicated). The value of this counter may be reset to zero when the CPE is rebooted.

- FramesDuplicatedReceived

The FramesDuplicatedReceived parameter indicates the total number of duplicated frames received on this interface. The value of this counter may be reset to zero when the CPE is rebooted.

A.2.3.11 *PeriodicStats Object*

This object contains periodic statistics for an 802.11 SSID on a CPE device. Note that these statistics refer to the link layer, not to the physical layer. This object does not include the total byte and packet statistics, which are, for historical reasons, in the parent object.

- Object Operations:

R: (Read)

Table 19 - PeriodicStats Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Interval	unsignedInt	key	0|24|48|96		
Id	unsignedInt	key			
DeviceMACAddress	MacAddress	R			
FramesSent	Counter64	R		frames	
DataFramesSentAck	Counter64	R		frames	
DataFramesSentNoAck	Counter64	R		frames	
DataFramesLost	Counter64	R		frames	
FramesReceived	Counter64	R		frames	
DataFramesReceived	Counter64	R		frames	
DataFramesDuplicateReceived	Counter64	R		frames	

Attribute Name	Type	Access	Type Constraints	Units	Default
ProbesReceived	Counter32	R		probes	
ProbesRejected	Counter32	R		probes	
RSSI	int	R		dBm	
SNR	int	R		dB	
Disassociations	Counter32	R		disassociations	
AuthenticationFailures	Counter32	R		authenticationfailures	
LastTimeAssociation	dateTime	R			
LastTimeDisassociation	dateTime	R			

- Interval

This key indicates the Interval where the measurements were accumulated The interval of measurements is synchronized with the wall clock. The total number of intervals is based on a 24 hour period. At an interval of 15 minutes 96 intervals (1..96) are defined, at 30 minutes, 48 intervals (1..48) and 24 intervals (1..24) for 1 hour measurement interval. Devices with no capabilities to report measurements per interval will report the value 0 for the interval attribute of the unique statistics instance.

- Id

The Id key represents a unique identifier for a client Mac address in a given statistics measurement interval.

- DeviceMACAddress

The DeviceMACAddress represents the MAC address of an associated client device.

- FramesSent

FrameSent is the total number of frames transmitted out of the interface. For conventional 802.11 MAC (a,b,g) this counter corresponds to the total of MSDUs (MAC Service Data Unit) being transmitted. For High Throughput transmissions this corresponds to the A-MSDU (Aggregation MSDU). The value of this counter MAY be reset to zero when the CPE is rebooted.

- DataFramesSentAck

DataFramesSentAck is the total number of MSDU frames marked as duplicates and non duplicates acknowledged. The value of this counter MAY be reset to zero when the CPE is rebooted.

- DataFramesSentNoAck

DataFramesSentNoAck is the total number of MSDU frames retransmitted out of the interface (i.e., marked as duplicate and non-duplicate) and not acknowledged but not including those defined in dataFramesLost. The value of this counter MAY be reset to zero when the CPE is rebooted.

- DataFramesLost

DataFramesLost is the total number of MSDU frames retransmitted out of the interface that where not acknowledged and discarded for reaching max number of retransmissions. The value of this counter MAY be reset to zero when the CPE is rebooted.

- FramesReceived

FramesReceived is the total number of frames received by the interface. For conventional 802.11 MAC (a,b,g) this counter corresponds to the total of MSDUs (MAC Service Data Unit) being transmitted. For High Throughput transmissions (n) this corresponds to A-MSDUs (Aggregation MSDU) and MSDUs. The value of this counter MAY be reset to zero when the CPE is rebooted.

- DataFramesReceived

DataFramesReceived is the total number of MSDU frames received and marked as non-duplicates. The value of this counter MAY be reset to zero when the CPE is rebooted.

- DataFramesDuplicateReceived

DataFramesDuplicateReceived is the total number of duplicated frames received on this interface. The value of this counter MAY be reset to zero when the CPE is rebooted.

- ProbesReceived

ProbesReceived is the total number of probes received.

- ProbesRejected

ProbesRejected is the total number of probes rejected.

- RSSI

The Received Signal Strength indicator is the energy observed at the antenna receiver for a current transmission.

- SNR

The signal to Noise Ratio (SNR) parameter represents the strength of the signal compared to received noise.

- Disassociations

Disassociations represents the total number of client disassociations.

- AuthenticationFailures

AuthenticationFailures indicates the total number of authentication failures.

- LastTimeAssociation

The LastTimeAssociation parameter represents the last time the client was associated.

- LastTimeDisassociation

LastTimeDisassociation parameter represents the last time the client disassociate from the interface. The all zeros value indicates the client is currently associated.

A.2.3.12 *SSIDPolicy Object*

The SSIDPolicy object defines the configuration of policies, behaviors and event thresholds controlled per SSID.

- Object Operations:

CRUD: (Create, Read, Update, Delete)

Table 20 - SSIDPolicy Object

Attribute Name	Type	Access	Type Constraints	Units	Default
BlockAfterAttempts	unsignedInt	CRUD			0
AllocatedBandwidth	unsignedInt	CRUD		Mbps	0
AuthenticationFailures	unsignedInt	CRUD			0
NonAuthenticatedTraffic	unsignedInt	CRUD			0
AssociationFailures	unsignedInt	CRUD			0
StatsInterval	unsignedInt	CRUD		minutes	0
SNRThreshold	int	CRUD		dB	-100
ANPIThreshold	int	CRUD		dBm	-100
LowReceivedPowerThreshold	int	CRUD		dBm	-100
LowPowerDeniedAccessThreshold	int	CRUD		dBm	-100
LowPowerDissasociationThreshold	int	CRUD		dBm	-100

- BlockAfterAttempts

The BlockAfterAttempts parameter indicates the maximum number of attempts a client is allowed to attempt registration before being denied access. Exceeding this value generates one event. Events from same client should not reoccur more than once an hour. The value zero indicates no connection attempts restrictions.

- AllocatedBandwidth

The AllocatedBandwidth parameter indicates the maximum bandwidth reserved for a particular interface. The value zero indicates no limit.

- AuthenticationFailures

The AuthenticationFailures parameter indicates the number of authentication failures a station simultaneously produces to generate the event. Events from same client should not reoccur more than once an hour. The value 0 indicates threshold and events of this type are not generated.

- NonAuthenticatedTraffic

The NonAuthenticatedTraffic parameter represents the number of non-authenticated messages received from a station to generate an event. Events from same client should not reoccur more than once an hour. The value 0 indicates no threshold is set and events of this type are not generated.

- AssociationFailures

The AssociationFailures indicates the number of simultaneous association failures from a station to generate an event. Events from same client should not reoccur more than once an hour. The value 0 indicates no threshold is set and events of this type are not generated.

- StatsInterval

The StatsInterval parameter indicates the interval value to collect per-interval statistics. The value 0 indicates no interval and values reported are snapshots at the time of the request.

- SNRThreshold

The SNR parameter indicates the threshold to report SNR. The value -100 indicates no threshold, and events of this type are not generated.

- ANPIThreshold

The ANPI parameter indicates the threshold to report the Average Noise plus Interference. The value -100 indicates no threshold, and events of this type are not generated.

- LowReceivedPowerThreshold

The LowReceivedPowerThreshold parameter indicates the power level threshold to generate an event whenever the station received power is below the threshold. The value -100 indicates no threshold, and events of this type are not generated.

- LowPowerDeniedAccessThreshold

The LowPowerDeniedAccessThreshold parameter indicates the power level threshold to deny client association whenever the station received power is below the threshold. The value -100 indicates no threshold, and events of this type are not generated.

- LowPowerDissasociationThreshold

The LowerPowerDissasociationThreshold parameter indicates the threshold to report Disassociation due to low power. The Wi-Fi GW should refuse associations when the power level is below this RSSI level. The value -100 indicates no threshold, and events of this type are not generated.

A.2.3.13 *Client Sessions Object*

The ClientSessions object represents the current and closed sessions (association connections). When the maximum number of instances is reached, the oldest closed session instance is replaced by a newly created client association.

- Object Operations:

R: (Read)

Table 21 - ClientSessions Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Id	unsignedInt	key			
DeviceMACAddress	MacAddress	R			
Start	dateTime	R			
Stop	dateTime	R			
TerminationCode	unsignedInt	R			
TerminationMeaning	AdminString	R	0..32		

- Id

The Id key identifies a single client MAC Address.

- DeviceMACAddress

The DeviceMACAddress parameter indicates the MAC address of an associated client device.

- Start

The Start parameter indicates the time when the session started.

- Stop

The Stop parameter indicates the time when the session ended. When the session is active, the value reported is all zeros.

- TerminationCode

The TerminationCode parameter indicates the Reason Code or the Status Code that lead to ending the association of the station. Reason Code and Status Code overlap. The context of the type of termination is provided by the TerminationMeaning attribute. The value zero indicates the session is active.

- TerminationMeaning

The TerminationMeaning parameter indicates the meaning of the Reason Code or Status Code for the ended session. The zero-length string is used when the instance corresponds to an active session.

A.2.3.14 *ClientStats Object*

The ClientStats object contains accumulative statistics for each client station served by the Wi-Fi GW. A station is reported only after it is associated for the first time.

- Object Operations:

R: (Read) Aging instances is vendor specific but expected to remain if possible, however, clients with At active current associations have priority over disassociated clients. There are no persistent requirements for this object. This object supports at least the greater between 30 and the maximum number of simultaneous associated clients.

Table 22 - ClientStats Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Interval	unsignedInt	key	0|24|48|96		
Id	unsignedInt	key			
DeviceMACAddress	MacAddress	R			
FramesSent	Counter64	R		frames	
DataFramesSentAck	Counter64	R		frames	
DataFramesSentNoAck	Counter64	R		frames	
DataFramesLost	Counter64	R		frames	
FramesReceived	Counter64	R		frames	
DataFramesReceived	Counter64	R		frames	
DataFramesDuplicateReceived	Counter64	R		frames	
ProbesReceived	Counter32	R		probes	
ProbesRejected	Counter32	R		probes	
RSSI	int	R		dBm	
SNR	int	R		dB	
Disassociations	Counter32	R		disassociations	
AuthenticationFailures	Counter32	R		authenticationfailures	
LastTimeAssociation	dateTime	R			
LastTimeDisassociation	dateTime	R			

- Interval

The Interval parameter indicates when the measurements were accumulated. The interval of measurements is synchronized with the wall clock. The total number of intervals is based on a 24 hour period. At an interval of 15 minutes 96 intervals (1..96) are defined, at 30 minutes, 48 intervals (1..48) and 24 intervals (1..24) for 1 hour measurement interval. Devices with no capable to report measurements per interval will report the value 0 for the interval attribute.

- Id

The Id key identifies a single client MAC Address.

- DeviceMACAddress

The DeviceMACAddress parameter indicates the MAC address of an associated client device.

- FramesSent

The FramesSent parameter indicates the total number of frames transmitted out of the interface. For conventional 802.11 MAC ([802.11a], [802.11b], and [802.11g]) this counter corresponds to the total of MSDUs being transmitted. For High Throughput transmissions this corresponds to the A-MSDU. The value of this counter may be reset to zero when the CPE is rebooted.

- DataFramesSentAck

The DataFramesSentAck parameter indicates the total number of MSDU frames marked as duplicates and non duplicates acknowledged. The value of this counter may be reset to zero when the CPE is rebooted.

- DataFramesSentNoAck

The DataFramesSentNoAck parameter indicates the total number of MSDU frames retransmitted out of the interface (i.e., marked as duplicate and non-duplicate) and not acknowledged, but does not exclude those defined in the DataFramesLost parameter. The value of this counter may be reset to zero when the CPE is rebooted.

- DataFramesLost

The DataFramesLost parameter indicates the total number of MSDU frames retransmitted out of the interface that were not acknowledged and discarded for reaching max number of retransmissions. The value of this counter may be reset to zero when the CPE is rebooted.

- FramesReceived

The FramesReceived parameter indicates the total number of frames received by the Wi-Fi interface. For conventional 802.11 MAC ([802.11a], [802.11b], and [802.11g]) this counter corresponds to the total of MSDUs being transmitted. For High Throughput transmissions (n), this corresponds to A-MSDUs and MSDUs. The value of this counter may be reset to zero when the CPE is rebooted.

- DataFramesReceived

The DataFramesReceived parameter indicates the total number of MSDU frames received and marked as non-duplicates. The value of this counter may be reset to zero when the CPE is rebooted.

- DataFramesDuplicateReceived

The DataFramesDuplicateReceived parameter indicates the total number of duplicated frames received on this interface. The value of this counter may be reset to zero when the CPE is rebooted.

- ProbesReceived

The ProbesReceived parameter indicates the total number of probes received.

- ProbesRejected

The ProbesRejected parameter indicates the total number of probes rejected.

- RSSI

The Received Signal Strength Indicator, RSSI, parameter is the energy observed at the antenna receiver for a current transmission.

- SNR

The signal to Noise Ratio (SNR) parameter indicates the signal strength received from a client compared to the noise received.

- Disassociations

The Disassociations parameter indicates the total number of client disassociations.

- AuthenticationFailures

The AuthenticationFailures parameter indicates the total number of authentication failures.

- LastTimeAssociation

The LastTimeAssociation parameter indicates the last time the client was associated.

- LastTimeDisassociation

The LastTimeDisassociation parameter indicates the last time the client disassociated from the interface. The all zeros value indicates the client is currently associated.

A.2.3.15 *RadiusClient Object*

This object is the extension of Radius Client operation for the Access Point 802.1x Authenticator for WPA Enterprise. An instance is relevant when the attribute AccessPointSecurity. ModeEnabled is 'WPA-Enterprise' or 'WPA2-Enterprise' or 'WPA-WPA2-Enterprise'.

- Object Operations:

CRUD: (Create, Read Update, Delete)

Table 23 - RadiusClient Object

Attribute Name	Type	Access	Type Constraints	Units	Default
NAS-Identifier	AdminString	CRUD	0..255		
LocationPolicy	hexBinary	CRUD	0..64		
OperatorName	AdminString	CRUD	0..32		
LocationInformation	hexBinary	CRUD	0..253		
LocationData	hexBinary	CRUD	0..253		
UsageReports	boolean	CRUD			false
IntervalInterimReport	boolean	CRUD			false
APTransitionReport	boolean	CRUD			false
GigawordReport	boolean	CRUD			false

- NAS-Identifier

The NAS-Identifier parameter corresponds to the Radius attribute NAS-Identifier used in Access request messages. The device always sends the Radius parameter NAS-IP-Address and will send the NAS-Identifier parameter when this attribute is set to other than the zero-length string. The NAS-Identifier attribute can be used as a hint to indicate the authentication server the SSID domain where user tries to authenticate, i.e., when more than one SSID domains are using the same Radius server instance.

- LocationPolicy

The LocationPolicy corresponds to the string value of the RADIUS Basic-Location-Policy-Rules attribute per [RFC 5580].

- OperatorName

The OperatorName parameter corresponds to the string value of the RADIUS Operator-Name attribute per [RFC 5580].

- LocationInformation

The LocationInformation parameter corresponds to the string value of the RADIUS Location-Information attribute per [RFC 5580].

- LocationData

The Location Data parameter corresponds to the string value of the RADIUS LocationData attribute per [RFC 5580].

- UsageReports

The UsageReports parameter indicates whether the client send usage data ('true') or not ('false').

- IntervalInterimReport

The IntervalInterimReport parameter indicates whether the client sends Interim reports at periodic time intervals. A value of ('true') indicates Interim reports are sent based upon a periodic time interval.

- APTransitionReport

A (‘true’) value for the APTransitionReport parameter indicates the client sends Interim reports when the stations transitions to a different Access point.

- GigawordReport

A (‘true’) value for Gigaword Report indicates the client sends Interim reports when the 32-bit counters rollover.

A.2.3.16 *WIFIEventNotif Object*

This object represents the Wi-Fi GW notification.

- Object Operations:

None

Table 24 - WIFIEventNotif Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Text	AdminString	Notify	0..255		
EventId	unsignedInt	Notify			
TimeStamp	dateTime	Notify			

- Text

This attribute represents the Event Message of the event.

- EventId

The identifier of the event

- TimeStamp

Date and Time when the event was generated (not the time when the event was dispatched).

A.2.3.17 *SecurityExtension Object*

This object defines IEEE security attributes not defined in TR-181 data model for completeness.

This object includes :

- Additional WEP keys: TR-181 assumes WEP key index 1 is only used. WEPKey corresponds to key 1 and this object defines keys 2, 3 and 4.

- WEP Key index selection: To specify the WEP key used.

- WEP Key mode: 64 or 128 bit keys.

-WPA Encryption : AES or TKIP+AES

- Object Operations:

CRUD: (Create, Read Update, Delete)

Table 25 - SecurityExtension Object

Attribute Name	Type	Access	Type Constraints	Units	Default
WEPKey2	hexBinary	CRUD	SIZE (0 | 5 | 13)		
WEPKey3	hexBinary	CRUD	SIZE (0 | 5 | 13)		
WEPKey4	hexBinary	CRUD	SIZE (0 | 5 | 13)		
WEPIndex	unsignedInt	CRUD	1..4		
WEPPassPhrase	AdminString	CRUD	SIZE(0 | 5..63)		
WPAEncryption	Enum	CRUD	aes(1) tkip+aes(2)		tkip+aes

- WEPKey2

The WEP key 2 expressed as a hexadecimal string.

- WEPKey3

The WEP key 3 expressed as a hexadecimal string.

- WEPKey4

The WEP key 4 expressed as a hexadecimal string.

- WEPIndex

This attribute defines the selected WEP key.

- WEPPassPhrase

This attribute defines a human readable password to derive the WEP keys, following well-known key generation algorithm for this purpose.

When this attribute is a zero-length string, WEP keys are used directly. Otherwise, the values of the WEP keys cannot be changed directly and an error on write is returned.

- WPAEncryption

This attribute defines the encryption algorithm used for WPA.

A.2.3.18 *CommitSettings Object*

This Object defines a commit function to apply the latest changes to WiFi system.

- Object Operations:

RU: (Read Update)

Table 26 - CommitSettings Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Value	Boolean	RU			

- Value

This attribute when set to 'true' flushes the WiFi settings in non-volatile memory and reinitialize the WiFi system with the new set of values without reboot.

This attribute reports a value 'false' when WiFi attributes have been changed but the changes are not active (i.e.,. not flushed in non-volatile and not part of the active configuration).

Systems that support immediate commit upon any attribute change will report this attribute as 'true' always, and silently accepts sets to 'true'.

A.2.4 CLAB-WIFI-MIB

```
CLAB-WIFI-MIB DEFINITIONS ::= BEGIN
IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    NOTIFICATION-TYPE,
    Unsigned32,
    Integer32,
    Counter32,
    Counter64
                        FROM SNMPv2-SMI
    OBJECT-GROUP,
    MODULE-COMPLIANCE,
    NOTIFICATION-GROUP
                        FROM SNMPv2-CONF
    SnmpAdminString
                        FROM SNMP-FRAMEWORK-MIB

    MacAddress,
    DateAndTime,
    TruthValue,
    RowStatus
                        FROM SNMPv2-TC

    InetAddressType,
    InetAddress,
    InetPortNumber

                        FROM INET-ADDRESS-MIB
    InterfaceIndex
                        FROM IF-MIB

    clabProjWireless
                        FROM CLAB-DEF-MIB;

    clabWIFIMib MODULE-IDENTITY

    LAST-UPDATED  "201201030000Z" -- Jan 3, 2012

    ORGANIZATION "Cable Television Laboratories, Inc."
    CONTACT-INFO
            "Broadband Network Services
             Cable Television Laboratories, Inc.
             858 Coal Creek Circle,
             Louisville, CO 80027, USA
             Phone: +1 303-661-9100
             Email: mibs@cablelabs.com"
     DESCRIPTION
            "This MIB module contains the management objects
             for the Wi-Fi interface."
     REVISION "201201030000Z" -- Jan 3, 2012
     DESCRIPTION
            "Revised Version includes ECN
             WiFi-MGMT-N-11.0006-5
             and published as part of WR-SP-WiFi-MGMT-I03-YYMMDD"
     REVISION "201009270000Z" -- Sept 27, 2010
     DESCRIPTION
            "Revised Version includes ECN
             WiFi-MGMT-N-11.0002-4
             and published as part of WR-SP-WiFi-MGMT-I02-101006"
     REVISION "201007290000Z" -- July 29, 2010
     DESCRIPTION
             "Initial version, published as part of the CableLabs
             Wi-Fi Provisioning Framework Specification
```

```
            WR-SP-WiFi-MGMT-I01-100729
            Copyright 2010 Cable Television Laboratories, Inc.
            All rights reserved."


    ::= { clabProjWireless 1 }


-- Textual Conventions

-- Object Definitions
clabWIFINotifications OBJECT IDENTIFIER ::= { clabWIFIMib 0 }
clabWIFIObjects OBJECT IDENTIFIER ::= { clabWIFIMib 1 }

clabWIFIWiFi OBJECT IDENTIFIER ::= {clabWIFIObjects 1 }

clabWIFIWiFiRadioNumberOfEntries    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.RadioNumberOfEntries."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIWiFi 1 }

clabWIFIWiFiSSIDNumberOfEntries    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSIDNumberOfEntries."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIWiFi 2 }

clabWIFIWiFiAccessPointNumberOfEntries    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPointNumberOfEntries."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIWiFi 3 }

clabWIFIWiFiEndPointNumberOfEntries    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.EndPointNumberOfEntries."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIWiFi 4 }

clabWIFIRadioTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIRadioEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIObjects 2 }

clabWIFIRadioEntry    OBJECT-TYPE
```

```
    SYNTAX      ClabWIFIRadioEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIRadioTable."
    INDEX {
            clabWIFIRadioId
          }
    ::= {clabWIFIRadioTable 1 }

ClabWIFIRadioEntry ::= SEQUENCE {
    clabWIFIRadioId
                InterfaceIndex,
    clabWIFIRadioEnable
                TruthValue,
    clabWIFIRadioStatus
                INTEGER,
    clabWIFIRadioAlias
                SnmpAdminString,
    clabWIFIRadioName
                SnmpAdminString,
    clabWIFIRadioLastChange
                Unsigned32,
    clabWIFIRadioLowerLayers
                SnmpAdminString,
    clabWIFIRadioUpstream
                TruthValue,
    clabWIFIRadioMaxBitRate
                Unsigned32,
    clabWIFIRadioSupportedFrequencyBands
                SnmpAdminString,
    clabWIFIRadioOperatingFrequencyBand
                INTEGER,
    clabWIFIRadioSupportedStandards
                SnmpAdminString,
    clabWIFIRadioOperatingStandards
                INTEGER,
    clabWIFIRadioPossibleChannels
                SnmpAdminString,
    clabWIFIRadioChannelsInUse
                SnmpAdminString,
    clabWIFIRadioChannel
                Unsigned32,
    clabWIFIRadioAutoChannelSupported
                TruthValue,
    clabWIFIRadioAutoChannelEnable
                TruthValue,
    clabWIFIRadioAutoChannelRefreshPeriod
                Unsigned32,
    clabWIFIRadioOperatingChannelBandwidth
                INTEGER,
    clabWIFIRadioExtensionChannel
                INTEGER,
    clabWIFIRadioGuardInterval
                INTEGER,
    clabWIFIRadioMCS
                Integer32,
    clabWIFIRadioTransmitPowerSupported
                SnmpAdminString,
    clabWIFIRadioTransmitPower
                Unsigned32,
    clabWIFIRadioIEEE80211hSupported
                TruthValue,
    clabWIFIRadioIEEE80211hEnabled
                TruthValue,
    clabWIFIRadioRegulatoryDomain
                SnmpAdminString
```

```
      }

clabWIFIRadioId    OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The key for a unique instance of this object.
        This value corresponds to the Interface Index
        (i.e., ifIndex in SMIv2). "
    ::= {clabWIFIRadioEntry 1 }

clabWIFIRadioEnable    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Enable"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 2 }

clabWIFIRadioStatus    OBJECT-TYPE
    SYNTAX      INTEGER  {
                           up(1),
                           down(2),
                           unknown(4),
                           dormant(5),
                           notPresent(6),
                           lowerLayerDown(7),
                           error(8)
                         }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Status."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 3 }

clabWIFIRadioAlias    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..64))
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Alias."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 4 }

clabWIFIRadioName    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..64))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Name."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 5 }

clabWIFIRadioLastChange    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.LastChange."
```

```
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 6 }

clabWIFIRadioLowerLayers    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..1024))
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.LowerLayers."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 7 }

clabWIFIRadioUpstream    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Upstream"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 8 }

clabWIFIRadioMaxBitRate    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "Mbps"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.MaxBitRate."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 9 }

clabWIFIRadioSupportedFrequencyBands    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.RadioSupportedFrequencyBands."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 10 }

clabWIFIRadioOperatingFrequencyBand    OBJECT-TYPE
    SYNTAX      INTEGER  {
                           n2dot4Ghz(1),
                           n5Ghz(2)
                         }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.Radio.{i}.OperatingFrequencyBand"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 11 }

clabWIFIRadioSupportedStandards    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.SupportedStandards"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
```

```
    ::= {clabWIFIRadioEntry 12 }

clabWIFIRadioOperatingStandards    OBJECT-TYPE
    SYNTAX      INTEGER  {
                           a(1),
                           b(2),
                           g(3),
                           n(5)
                         }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.OperatingStandards"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 13 }

clabWIFIRadioPossibleChannels    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..1024))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.PossibleChannels"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 14 }

clabWIFIRadioChannelsInUse    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..1024))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.ChannelsInUse"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 15 }

clabWIFIRadioChannel    OBJECT-TYPE
    SYNTAX      Unsigned32 (1..255)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Channel"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 16 }

clabWIFIRadioAutoChannelSupported    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.AutoChannelSupported"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 17 }

clabWIFIRadioAutoChannelEnable    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.AutoChannelEnable"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 18 }
```

```
clabWIFIRadioAutoChannelRefreshPeriod    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.Radio.{i}.AutoChannelRefreshPeriod"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 19 }

clabWIFIRadioOperatingChannelBandwidth    OBJECT-TYPE
    SYNTAX      INTEGER  {
                           n20Hhz(1),
                           n40Mhz(2),
                           auto(3)
                         }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.Radio.{i}.OperatingChannelBandwidth"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    DEFVAL      { auto }
    ::= {clabWIFIRadioEntry 20 }

clabWIFIRadioExtensionChannel    OBJECT-TYPE
    SYNTAX      INTEGER  {
                           aboveControlChannel(1),
                           belowControlChannel(2),
                           auto(3)
                         }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.ExtensionChannel"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    DEFVAL      { auto }
    ::= {clabWIFIRadioEntry 21 }

clabWIFIRadioGuardInterval    OBJECT-TYPE
    SYNTAX      INTEGER  {
                           n400nsec(1),
                           n800nsec(2),
                           auto(3)
                         }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.RadioGuardInterval"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    DEFVAL      { auto }
    ::= {clabWIFIRadioEntry 22 }

clabWIFIRadioMCS    OBJECT-TYPE
    SYNTAX      Integer32 (-1..31)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.RadioMCS "
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 23 }
```

```
clabWIFIRadioTransmitPowerSupported    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..64))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.Radio.{i}.TransmitPowerSupported"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 24 }

clabWIFIRadioTransmitPower    OBJECT-TYPE
    SYNTAX      Unsigned32 (1..100)
    UNITS       "percentage"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.TransmitPower"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 25 }

clabWIFIRadioIEEE80211hSupported    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.IEEE80211hSupported"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 26 }

clabWIFIRadioIEEE80211hEnabled    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.IEEE80211hEnabled"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 27 }

clabWIFIRadioRegulatoryDomain    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.RegulatoryDomain"
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioEntry 28 }

clabWIFIRadioStatsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIRadioStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Stats."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIObjects 3 }

clabWIFIRadioStatsEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIRadioStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
```

```
    DESCRIPTION
        "The Conceptual row of clabWIFIRadioStatsTable."
    REFERENCE
        "TR-181 Issue 2"
    INDEX {
            clabWIFIRadioId
          }
    ::= {clabWIFIRadioStatsTable 1 }

ClabWIFIRadioStatsEntry ::= SEQUENCE {
    clabWIFIRadioStatsBytesSent
                Counter64,
    clabWIFIRadioStatsBytesReceived
                Counter64,
    clabWIFIRadioStatsPacketsSent
                Counter64,
    clabWIFIRadioStatsPacketsReceived
                Counter64,
    clabWIFIRadioStatsErrorsSent
                Counter32,
    clabWIFIRadioStatsErrorsReceived
                Counter32,
    clabWIFIRadioStatsDiscardPacketsSent
                Counter32,
    clabWIFIRadioStatsDiscardPacketsReceived
                Counter32
      }

clabWIFIRadioStatsBytesSent    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Stats.BytesSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioStatsEntry 1 }

clabWIFIRadioStatsBytesReceived    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Stats.BytesReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioStatsEntry 2 }

clabWIFIRadioStatsPacketsSent    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Stats.PacketsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioStatsEntry 3 }

clabWIFIRadioStatsPacketsReceived    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.Radio.{i}.Stats.PacketsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
```

```
    ::= {clabWIFIRadioStatsEntry 4 }

clabWIFIRadioStatsErrorsSent    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Stats.ErrorsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioStatsEntry 5 }

clabWIFIRadioStatsErrorsReceived    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.Radio.{i}.Stats.ErrorsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioStatsEntry 6 }

clabWIFIRadioStatsDiscardPacketsSent    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.Radio.{i}.Stats.DiscardPacketsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioStatsEntry 7 }

clabWIFIRadioStatsDiscardPacketsReceived    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.Radio.{i}.Stats.DiscardPacketsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIRadioStatsEntry 8 }

clabWIFISSIDTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFISSIDEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIObjects 4 }

clabWIFISSIDEntry    OBJECT-TYPE
    SYNTAX      ClabWIFISSIDEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFISSIDTable."
    INDEX {
            clabWIFISSIDId
          }
    ::= {clabWIFISSIDTable 1 }

ClabWIFISSIDEntry ::= SEQUENCE {
    clabWIFISSIDId
```

```
                InterfaceIndex,
    clabWIFISSIDEnable
                TruthValue,
    clabWIFISSIDStatus
                INTEGER,
    clabWIFISSIDAlias
                SnmpAdminString,
    clabWIFISSIDName
                SnmpAdminString,
    clabWIFISSIDLastChange
                Unsigned32,
    clabWIFISSIDLowerLayers
                SnmpAdminString,
    clabWIFISSIDBSSID
                MacAddress,
    clabWIFISSIDMACAddress
                MacAddress,
    clabWIFISSIDSSID
                SnmpAdminString,
    clabWIFISSIDRowStatus
                RowStatus
      }

clabWIFISSIDId    OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The key for a unique instance of this object.
        This value corresponds to the Interface Index
        (i.e., ifIndex in SMIv2). "
    ::= {clabWIFISSIDEntry 1 }

clabWIFISSIDEnable    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Enable."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDEntry 2 }

clabWIFISSIDStatus    OBJECT-TYPE
    SYNTAX      INTEGER  {
                           up(1),
                           down(2),
                           unknown(4),
                           dormant(5),
                           notPresent(6),
                           lowerLayerDown(7),
                           error(8)
                         }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Status."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDEntry 3 }

clabWIFISSIDAlias    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..64))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Alias."
```

```
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDEntry 4 }

clabWIFISSIDName    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..64))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Name."
    REFERENCE
        "TR-181 Device Data Model for TR-069."    ::= {clabWIFISSIDEntry 5 }

clabWIFISSIDLastChange    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.LastChange."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDEntry 6 }

clabWIFISSIDLowerLayers    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..1024))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.LowerLayers."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDEntry 7 }

clabWIFISSIDBSSID    OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.BSSID."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDEntry 8 }

clabWIFISSIDMACAddress    OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.MACAddress."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDEntry 9 }

clabWIFISSIDSSID    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..32))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.SSID."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDEntry 10 }

clabWIFISSIDRowStatus    OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
```

```
    STATUS      current
    DESCRIPTION
        "The status of this instance"
    ::= {clabWIFISSIDEntry 11 }

clabWIFISSIDStatsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFISSIDStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Stats."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIObjects 5 }

clabWIFISSIDStatsEntry    OBJECT-TYPE
    SYNTAX      ClabWIFISSIDStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFISSIDStatsTable."
    REFERENCE
        "TR-181 Issue2"
    INDEX {
            clabWIFISSIDId
          }
    ::= {clabWIFISSIDStatsTable 1 }

ClabWIFISSIDStatsEntry ::= SEQUENCE {
    clabWIFISSIDStatsBytesSent
                 Counter64,
    clabWIFISSIDStatsBytesReceived
                 Counter64,
    clabWIFISSIDStatsPacketsSent
                 Counter64,
    clabWIFISSIDStatsPacketsReceived
                 Counter64,
    clabWIFISSIDStatsErrorsSent
                 Counter32,
    clabWIFISSIDStatsErrorsReceived
                 Counter32,
    clabWIFISSIDStatsUnicastPacketsSent
                 Counter64,
    clabWIFISSIDStatsUnicastPacketsReceived
                 Counter64,
    clabWIFISSIDStatsDiscardPacketsSent
                 Counter32,
    clabWIFISSIDStatsDiscardPacketsReceived
                 Counter32,
    clabWIFISSIDStatsMulticastPacketsSent
                 Counter64,
    clabWIFISSIDStatsMulticastPacketsReceived
                 Counter64,
    clabWIFISSIDStatsBroadcastPacketsSent
                 Counter64,
    clabWIFISSIDStatsBroadcastPacketsReceived
                 Counter64,
    clabWIFISSIDStatsUnknownProtoPacketsReceived
                 Counter32
      }

clabWIFISSIDStatsBytesSent    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Stats.BytesSent."
```

```
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 1 }

clabWIFISSIDStatsBytesReceived    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Stats.BytesReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 2 }

clabWIFISSIDStatsPacketsSent    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Stats.PacketsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 3 }

clabWIFISSIDStatsPacketsReceived    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Stats.PacketsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 4 }

clabWIFISSIDStatsErrorsSent    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Stats.ErrorsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 5 }

clabWIFISSIDStatsErrorsReceived    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.SSID{i}.Stats.ErrorsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 6 }

clabWIFISSIDStatsUnicastPacketsSent    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.UnicastPacketsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 7 }

clabWIFISSIDStatsUnicastPacketsReceived    OBJECT-TYPE
    SYNTAX      Counter64
```

```
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.UnicastPacketsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 8 }

clabWIFISSIDStatsDiscardPacketsSent    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.DiscardPacketsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 9 }

clabWIFISSIDStatsDiscardPacketsReceived    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.DiscardPacketsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 10 }

clabWIFISSIDStatsMulticastPacketsSent    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.MulticastPacketsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 11 }

clabWIFISSIDStatsMulticastPacketsReceived    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.MulticastPacketsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 12 }

clabWIFISSIDStatsBroadcastPacketsSent    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.BroadcastPacketsSent."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 13 }

clabWIFISSIDStatsBroadcastPacketsReceived    OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.BroadcastPacketsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 14 }

clabWIFISSIDStatsUnknownProtoPacketsReceived    OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.SSID{i}.Stats.UnknownProtoPacketsReceived."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFISSIDStatsEntry 15 }

clabWIFIAccessPointTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIAccessPointEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIObjects 6 }

clabWIFIAccessPointEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIAccessPointEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIAccessPointTable."
    INDEX {
            clabWIFIAccessPointId
          }
    ::= {clabWIFIAccessPointTable 1 }

ClabWIFIAccessPointEntry ::= SEQUENCE {
    clabWIFIAccessPointId
                Unsigned32,
    clabWIFIAccessPointEnable
                TruthValue,
    clabWIFIAccessPointStatus
                INTEGER,
    clabWIFIAccessPointAlias
                SnmpAdminString,
    clabWIFIAccessPointSSIDReference
                Unsigned32,
    clabWIFIAccessPointSSIDAdvertisementEnabled
                TruthValue,
    clabWIFIAccessPointRetryLimit
                Unsigned32,
    clabWIFIAccessPointWMMCapability
                TruthValue,
    clabWIFIAccessPointUAPSDCapability
                TruthValue,
    clabWIFIAccessPointWMMEnable
                TruthValue,
    clabWIFIAccessPointUAPSDEnable
                TruthValue,
    clabWIFIAccessPointAssociatedDeviceNumberOfEntries
                Unsigned32,
    clabWIFIAccessPointRowStatus
                RowStatus
```

```
      }

clabWIFIAccessPointId    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The key for a unique instance of this object."
    ::= {clabWIFIAccessPointEntry 1 }

clabWIFIAccessPointEnable    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.Enable."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 2 }

clabWIFIAccessPointStatus    OBJECT-TYPE
    SYNTAX      INTEGER  {
                           disabled(1),
                           enabled(2),
                           errorMisconfigured(3),
                           error(4)
                         }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.Status."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 3 }

clabWIFIAccessPointAlias    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..64))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.Alias."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 4 }

clabWIFIAccessPointSSIDReference    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.Reference."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 5 }

clabWIFIAccessPointSSIDAdvertisementEnabled    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.AdvertisementEnabled."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 6 }

clabWIFIAccessPointRetryLimit    OBJECT-TYPE
```

```
    SYNTAX      Unsigned32 (0..7)
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.RetryLimit."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 7 }

clabWIFIAccessPointWMMCapability    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.WMMCapability."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 8 }

clabWIFIAccessPointUAPSDCapability    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.UAPSDCapability."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 9 }

clabWIFIAccessPointWMMEnable    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.WMMEnable."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 10 }

clabWIFIAccessPointUAPSDEnable    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.UAPSDEnable."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 11 }

clabWIFIAccessPointAssociatedDeviceNumberOfEntries    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.AssociatedDeviceNumberOfEntries."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointEntry 12 }

clabWIFIAccessPointRowStatus    OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= {clabWIFIAccessPointEntry 13 }
```

```
clabWIFIAccessPointSecurityTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIAccessPointSecurityEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.Security.."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIObjects 7 }

clabWIFIAccessPointSecurityEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIAccessPointSecurityEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIAccessPointSecurityTable."
    REFERENCE
        "802.11-2007"
    INDEX {
            clabWIFIAccessPointId
          }
    ::= {clabWIFIAccessPointSecurityTable 1 }

ClabWIFIAccessPointSecurityEntry ::= SEQUENCE {
    clabWIFIAccessPointSecurityModesSupported
                SnmpAdminString,
    clabWIFIAccessPointSecurityModeEnabled
                INTEGER,
    clabWIFIAccessPointSecurityWEPKey
                OCTET STRING,
    clabWIFIAccessPointSecurityPreSharedKey
                OCTET STRING,
    clabWIFIAccessPointSecurityKeyPassphrase
                SnmpAdminString,
    clabWIFIAccessPointSecurityRekeyingInterval
                Unsigned32,
    clabWIFIAccessPointSecurityRadiusServerIPAddrType
                InetAddressType,
    clabWIFIAccessPointSecurityRadiusServerIPAddr
                InetAddress,
    clabWIFIAccessPointSecurityRadiusServerPort
                InetPortNumber,
    clabWIFIAccessPointSecurityRadiusSecret
                SnmpAdminString,
    clabWIFIAccessPointSecurityRowstatus
                RowStatus,
    clabWIFIAccessPointSecurityWEPKey2
                OCTET STRING,
    clabWIFIAccessPointSecurityWEPKey3
                OCTET STRING,
    clabWIFIAccessPointSecurityWEPKey4
                OCTET STRING,
    clabWIFIAccessPointSecurityWEPIndex
                OCTET STRING,
    clabWIFIAccessPointSecurityWEPPassPhrase
                SnmpAdminString,
    clabWIFIAccessPointSecurityWPAEncryption
                INTEGER
   }

clabWIFIAccessPointSecurityModesSupported    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
```

```
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.ModesSupported."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 1 }

clabWIFIAccessPointSecurityModeEnabled    OBJECT-TYPE
    SYNTAX      INTEGER  {
                            none(1),
                            wep64(2),
                            wep128(3),
                            wpaPersonal(4),
                            wpa2Personal(5),
                            wpawpa2Personal(6),
                            wpaEnterprise(7),
                            wpa2Enterprise(8),
                            wpawpa2Enterprise(9)
                          }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.ModeEnabled."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 2 }

clabWIFIAccessPointSecurityWEPKey    OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (0 | 5 | 13))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.Security.WEPKey."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 3 }

clabWIFIAccessPointSecurityPreSharedKey    OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(0 | 32))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.PreSharedKey."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 4 }

clabWIFIAccessPointSecurityKeyPassphrase    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(8..63))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.KeyPassphrase."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 5 }

clabWIFIAccessPointSecurityRekeyingInterval    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.RekeyingInterval."
```

```
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 6 }

clabWIFIAccessPointSecurityRadiusServerIPAddrType    OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.RadiusServerIPAddrType."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 7 }

clabWIFIAccessPointSecurityRadiusServerIPAddr    OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.RadiusServerIPAddr."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 8 }

clabWIFIAccessPointSecurityRadiusServerPort    OBJECT-TYPE
    SYNTAX      InetPortNumber
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.RadiusServerPort."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 9 }

clabWIFIAccessPointSecurityRadiusSecret    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.Security.RadiusSecret."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointSecurityEntry 10 }

clabWIFIAccessPointSecurityRowstatus    OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= {clabWIFIAccessPointSecurityEntry 11 }

clabWIFIAccessPointSecurityWEPKey2     OBJECT-TYPE
    SYNTAX    OCTET STRING (SIZE (0 | 5 | 13))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The WEP key 2 expressed as a hexadecimal string."
    ::= {clabWIFIAccessPointSecurityEntry 12 }

clabWIFIAccessPointSecurityWEPKey3     OBJECT-TYPE
    SYNTAX    OCTET STRING (SIZE (0 | 5 | 13))
    MAX-ACCESS  read-create
```

```
    STATUS      current
    DESCRIPTION
        "The WEP key 3 expressed as a hexadecimal string."
    ::= {clabWIFIAccessPointSecurityEntry 13 }

clabWIFIAccessPointSecurityWEPKey4     OBJECT-TYPE
    SYNTAX    OCTET STRING (SIZE (0 | 5 | 13))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The WEP key 4 expressed as a hexadecimal string."
    ::= {clabWIFIAccessPointSecurityEntry 14 }

clabWIFIAccessPointSecurityWEPIndex    OBJECT-TYPE
    SYNTAX    OCTET STRING
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute defines the selected WEP key."
    ::= {clabWIFIAccessPointSecurityEntry 15 }

clabWIFIAccessPointSecurityWEPPassPhrase     OBJECT-TYPE
    SYNTAX    SnmpAdminString (SIZE(0  | 5..63))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute defines a human readable password to derive
        the WEP keys, following well-known key generation algorithm for
        this purpose.
        When this attribute is a zero-length string, WEP keys are used
        directly. Otherwise, the values of the WEP keys cannot be
        changed directly and an error on write is returned."
    ::= {clabWIFIAccessPointSecurityEntry 16 }

clabWIFIAccessPointSecurityWPAEncryption     OBJECT-TYPE
    SYNTAX    INTEGER {
                       aes(1),
                       tkipaes(2)
                      }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute defines the encryption algorithm used for WPA."
    ::= {clabWIFIAccessPointSecurityEntry 17 }


clabWIFIAccessPointWPSTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIAccessPointWPSEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.WPS."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIObjects 8 }

clabWIFIAccessPointWPSEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIAccessPointWPSEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIAccessPointWPSTable."
    REFERENCE
        "WPSv1.0"
    INDEX {
            clabWIFIAccessPointId
          }
```

```
    ::= {clabWIFIAccessPointWPSTable 1 }

ClabWIFIAccessPointWPSEntry ::= SEQUENCE {
    clabWIFIAccessPointWPSEnable
                TruthValue,
    clabWIFIAccessPointWPSConfigMethodsSupported
                SnmpAdminString,
    clabWIFIAccessPointWPSConfigMethodsEnabled
                INTEGER,
    clabWIFIAccessPointWPSRowStatus
                RowStatus
      }

clabWIFIAccessPointWPSEnable    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AccessPoint{i}.WPS.Enable."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointWPSEntry 1 }

clabWIFIAccessPointWPSConfigMethodsSupported    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.WPS.ConfigMethodsSupported."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointWPSEntry 2 }

clabWIFIAccessPointWPSConfigMethodsEnabled    OBJECT-TYPE
    SYNTAX      INTEGER  {
                            usbFlashDrive(1),
                            ethernet(2),
                            externalNFCToken(3),
                            integratedNFCToken(4),
                            nfcInterface(5),
                            pin(7),
                            pushButton(8)
                          }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AccessPoint{i}.WPS.ConfigMethodsEnabled."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAccessPointWPSEntry 3 }

clabWIFIAccessPointWPSRowStatus    OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= {clabWIFIAccessPointWPSEntry 4 }


clabWIFIAssociatedDeviceTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIAssociatedDeviceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
```

```
        "This object is defined in TR-181 Device.WiFi.AssociatedDevice{i}."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIObjects 9 }

clabWIFIAssociatedDeviceEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIAssociatedDeviceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIAssociatedDeviceTable."
    INDEX {
            clabWIFIAccessPointId, clabWIFIAssociatedDeviceId
          }
    ::= {clabWIFIAssociatedDeviceTable 1 }

ClabWIFIAssociatedDeviceEntry ::= SEQUENCE {
    clabWIFIAssociatedDeviceId
                Unsigned32,
    clabWIFIAssociatedDeviceMACAddress
                MacAddress,
    clabWIFIAssociatedDeviceAuthenticationState
                TruthValue,
    clabWIFIAssociatedDeviceLastDataDownlinkRate
                Unsigned32,
    clabWIFIAssociatedDeviceLastDataUplinkRate
                Unsigned32,
    clabWIFIAssociatedDeviceSignalStrength
                Integer32,
    clabWIFIAssociatedDeviceRetransmissions
                Unsigned32,
    clabWIFIAssociatedDeviceActive
                TruthValue
      }

clabWIFIAssociatedDeviceId    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The key for a unique instance of this object. There is one
        instance for each unique Associated device MAC Address."
    ::= {clabWIFIAssociatedDeviceEntry 1 }

clabWIFIAssociatedDeviceMACAddress    OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AssociatedDevice{i}.MACAddress."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAssociatedDeviceEntry 2 }

clabWIFIAssociatedDeviceAuthenticationState    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AssociatedDevice{i}.AuthenticationState."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAssociatedDeviceEntry 3 }

clabWIFIAssociatedDeviceLastDataDownlinkRate    OBJECT-TYPE
    SYNTAX      Unsigned32
```

```
    UNITS       "kbps"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AssociatedDevice{i}.LastDataDownlinkRate."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAssociatedDeviceEntry 4 }

clabWIFIAssociatedDeviceLastDataUplinkRate    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "kbps"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AssociatedDevice{i}.DeviceLastDataUplinkRate."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAssociatedDeviceEntry 5 }

clabWIFIAssociatedDeviceSignalStrength    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dBm"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AssociatedDevice{i}.SignalStrength."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAssociatedDeviceEntry 6 }

clabWIFIAssociatedDeviceRetransmissions    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "packets"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181
Device.WiFi.AssociatedDevice{i}.Retransmissions."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAssociatedDeviceEntry 7 }

clabWIFIAssociatedDeviceActive    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object is defined in TR-181 Device.WiFi.AssociatedDevice{i}.Active."
    REFERENCE
        "TR-181 Device Data Model for TR-069."
    ::= {clabWIFIAssociatedDeviceEntry 8 }

clabWIFIDataRateStatsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIDataRateStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object contains statistics for each speed rate of
        an 802.11 LAN interface."
    ::= {clabWIFIObjects 10 }

clabWIFIDataRateStatsEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIDataRateStatsEntry
```

```
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIDataRateStatsTable."
    INDEX {
            clabWIFIRadioId, clabWIFIDataRateStatsRate
          }
    ::= {clabWIFIDataRateStatsTable 1 }

ClabWIFIDataRateStatsEntry ::= SEQUENCE {
    clabWIFIDataRateStatsRate
                Unsigned32,
    clabWIFIDataRateStatsFramesSent
                Counter64,
    clabWIFIDataRateStatsFramesRetransmissionsSent
                Counter64,
    clabWIFIDataRateStatsFramesReceived
                Counter64,
    clabWIFIDataRateStatsFramesDuplicatedReceived
                Counter64
      }

clabWIFIDataRateStatsRate    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "Mbps"
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This key represents the data speed for the statistics
        collected. the value is reported in integer units of Mbps."
    ::= {clabWIFIDataRateStatsEntry 1 }

clabWIFIDataRateStatsFramesSent    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The FramesSent Parameter indicates the total number of frames
        transmitted out of the interface (not marked as duplicated).
The value of this counter MAY be reset to zero when the CPE is rebooted."
    ::= {clabWIFIDataRateStatsEntry 2 }

clabWIFIDataRateStatsFramesRetransmissionsSent    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The FramesRetransmissionsSent parameter indicates the total
        number of frames retransmitted out of the interface (marked
        as duplicated).
        The value of this counter MAY be reset to zero when the CPE
        is rebooted."
    ::= {clabWIFIDataRateStatsEntry 3 }

clabWIFIDataRateStatsFramesReceived    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The FramesReceived parameter indicates the total number of
        frames received on this interface (not marked as duplicated).
        The value of this counter MAY be reset to zero when the CPE is
        rebooted."
    ::= {clabWIFIDataRateStatsEntry 4 }
```

```
clabWIFIDataRateStatsFramesDuplicatedReceived    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The FramesDuplicatedReceived indicates the total number of
        duplicated frames received on this interface.
        The value of this counter MAY be reset to zero when the CPE
        is rebooted."
    ::= {clabWIFIDataRateStatsEntry 5 }

clabWIFIPeriodicStatsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIPeriodicStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object contains periodic statistics for an 802.11 SSID
        on a CPE device. Note that these statistics refer to the link
        layer, not to the physical layer. This object does not include
        the total byte and packet statistics, which are, for
        historical reasons, in the parent object."
    ::= {clabWIFIObjects 11 }

clabWIFIPeriodicStatsEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIPeriodicStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIPeriodicStatsTable."
    INDEX {
            clabWIFISSIDId,
            clabWIFIPeriodicStatsInterval,
            clabWIFIPeriodicStatsId
          }
    ::= {clabWIFIPeriodicStatsTable 1 }

ClabWIFIPeriodicStatsEntry ::= SEQUENCE {
    clabWIFIPeriodicStatsInterval
                Unsigned32,
    clabWIFIPeriodicStatsId
                Unsigned32,
    clabWIFIPeriodicStatsDeviceMACAddress
                MacAddress,
    clabWIFIPeriodicStatsFramesSent
                Counter64,
    clabWIFIPeriodicStatsDataFramesSentAck
                Counter64,
    clabWIFIPeriodicStatsDataFramesSentNoAck
                Counter64,
    clabWIFIPeriodicStatsDataFramesLost
                Counter64,
    clabWIFIPeriodicStatsFramesReceived
                Counter64,
    clabWIFIPeriodicStatsDataFramesReceived
                Counter64,
    clabWIFIPeriodicStatsDataFramesDuplicateReceived
                Counter64,
    clabWIFIPeriodicStatsProbesReceived
                Counter32,
    clabWIFIPeriodicStatsProbesRejected
                Counter32,
    clabWIFIPeriodicStatsRSSI
                Integer32,
    clabWIFIPeriodicStatsSNR
                Integer32,
```

```
    clabWIFIPeriodicStatsDisassociations
                Counter32,
    clabWIFIPeriodicStatsAuthenticationFailures
                Counter32,
    clabWIFIPeriodicStatsLastTimeAssociation
                DateAndTime,
    clabWIFIPeriodicStatsLastTimeDisassociation
                DateAndTime
      }

clabWIFIPeriodicStatsInterval    OBJECT-TYPE
    SYNTAX      Unsigned32 (0 | 24 | 48 | 96 )
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This key indicates the Interval where the measurements were
        Accumulated.
        The interval of measurements is synchronized with the wall clock.
        The total number of intervals is based on a 24 hour period.
        At an interval of 15 minutes 96 intervals (1..96)  are defined,
        at 30 minutes, 48 intervals (1..48) and 24 intervals (1..24)
        for 1 hour measurement interval.
        Devices with  no capabilities to report measurements per interval
        will report the value 0 for the interval attribute of the unique
        statistics  instance."
    ::= {clabWIFIPeriodicStatsEntry 1 }

clabWIFIPeriodicStatsId    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Id key represents a unique identifier for a client
        Mac address in a given statistics measurement interval."
    ::= {clabWIFIPeriodicStatsEntry 2 }

clabWIFIPeriodicStatsDeviceMACAddress    OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The DeviceMACAddress represents the MAC address of an
        associated client device."
    ::= {clabWIFIPeriodicStatsEntry 3 }

clabWIFIPeriodicStatsFramesSent    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "FrameSent is the total number of frames transmitted out of
        the interface.
        For conventional 802.11 MAC (a,b,g) this counter corresponds
        to the total of MSDUs (MAC Service Data Unit) being transmitted.
        For High Throughput transmissions this corresponds to the
        A-MSDU (Aggregation MSDU)
        The value of this counter MAY be reset to zero when the
        CPE is rebooted."
    ::= {clabWIFIPeriodicStatsEntry 4 }

clabWIFIPeriodicStatsDataFramesSentAck    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
```

```
        "DataFramesSentAck is the total number of MSDU frames marked
        as duplicates and non duplicates acknowledged.
        The value of this counter MAY be reset to zero when the CPE
        is rebooted."
    ::= {clabWIFIPeriodicStatsEntry 5 }

clabWIFIPeriodicStatsDataFramesSentNoAck    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "DataFramesSentNoAck is the total number of MSDU frames
        retransmitted out of the interface (i.e., marked as duplicate
        and non-duplicate) and not acknowledged but not including
        those defined in dataFramesLost.
        The value of this counter MAY be reset to zero when the
        CPE is rebooted."
    ::= {clabWIFIPeriodicStatsEntry 6 }

clabWIFIPeriodicStatsDataFramesLost    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "DataFramesLost is the total number of MSDU frames retransmitted
        out of the interface that where not acknowledged and discarded
        for reaching max number of retransmissions.
        The value of this counter MAY be reset to zero when the CPE
        is rebooted."
    ::= {clabWIFIPeriodicStatsEntry 7 }

clabWIFIPeriodicStatsFramesReceived    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "FramesReceived is the total number of frames received by the
        interface.
        For conventional 802.11 MAC (a,b,g) this counter corresponds to the
        total of MSDUs (MAC Service Data Unit) being transmitted.
        For High Throughput transmissions (n) this corresponds to A-MSDUs
        (Aggregation MSDU) and MSDUs.
        The value of this counter MAY be reset to zero when the CPE
        is rebooted."
    ::= {clabWIFIPeriodicStatsEntry 8 }

clabWIFIPeriodicStatsDataFramesReceived    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "DataFramesReceived is the total number of MSDU frames
        received and  marked as non-duplicates.
        The value of this counter MAY be reset to zero when the CPE
        is rebooted."
    ::= {clabWIFIPeriodicStatsEntry 9 }

clabWIFIPeriodicStatsDataFramesDuplicateReceived    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
```

```
        "DataFramesDuplicateReceived is the total number of duplicated
        frames received on this interface.
        The value of this counter MAY be reset to zero when the
        CPE is rebooted."
    ::= {clabWIFIPeriodicStatsEntry 10 }

clabWIFIPeriodicStatsProbesReceived    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "probes"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "ProbesReceived is the total number of probes received."
    ::= {clabWIFIPeriodicStatsEntry 11 }

clabWIFIPeriodicStatsProbesRejected    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "probes"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "ProbesRejected is the total number of probes rejected."
    ::= {clabWIFIPeriodicStatsEntry 12 }

clabWIFIPeriodicStatsRSSI    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dBm"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Received Signal Strength indicator is the energy observed
        at the antenna receiver for a current transmission."
    ::= {clabWIFIPeriodicStatsEntry 13 }

clabWIFIPeriodicStatsSNR    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dB"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The signal to Noise Ratio (SNR) parameter represents the strength
        of the signal compared to received noise."
    ::= {clabWIFIPeriodicStatsEntry 14 }

clabWIFIPeriodicStatsDisassociations    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "disassociations"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Disassociations represents the total number of client
        disassociations."
    ::= {clabWIFIPeriodicStatsEntry 15 }

clabWIFIPeriodicStatsAuthenticationFailures    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "authenticationfailures"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "AuthenticationFailures indicates the total number of
        authentication failures."
    ::= {clabWIFIPeriodicStatsEntry 16 }

clabWIFIPeriodicStatsLastTimeAssociation    OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION
        "The LastTimeAssociation parameter represents the last
        time the client was associated."
    ::= {clabWIFIPeriodicStatsEntry 17 }

clabWIFIPeriodicStatsLastTimeDisassociation    OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "LastTimeDisassociation parameter represents the last time
        the client disassociate from the interface.
The all zeros value indicates the client is currently associated. "
    ::= {clabWIFIPeriodicStatsEntry 18 }

clabWIFISSIDPolicyTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFISSIDPolicyEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The SSIDPolicy object defines the configuration of policies,
        behaviors and event thresholds controlled per SSID."
    ::= {clabWIFIObjects 12 }

clabWIFISSIDPolicyEntry    OBJECT-TYPE
    SYNTAX      ClabWIFISSIDPolicyEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFISSIDPolicyTable."
    INDEX {
            clabWIFISSIDId
          }
    ::= {clabWIFISSIDPolicyTable 1 }

ClabWIFISSIDPolicyEntry ::= SEQUENCE {
    clabWIFISSIDPolicyBlockAfterAttempts
                Unsigned32,
    clabWIFISSIDPolicyAllocatedBandwidth
                Unsigned32,
    clabWIFISSIDPolicyAuthenticationFailures
                Unsigned32,
    clabWIFISSIDPolicyNonAuthenticatedTraffic
                Unsigned32,
    clabWIFISSIDPolicyAssociationFailures
                Unsigned32,
    clabWIFISSIDPolicyStatsInterval
                Unsigned32,
    clabWIFISSIDPolicySNRThreshold
                Integer32,
    clabWIFISSIDPolicyANPIThreshold
                Integer32,
    clabWIFISSIDPolicyLowReceivedPowerThreshold
                Integer32,
    clabWIFISSIDPolicyLowPowerDeniedAccessThreshold
                Integer32,
    clabWIFISSIDPolicyLowPowerDissasociationThreshold
                Integer32,
    clabWIFISSIDPolicyRowStatus
                RowStatus
      }

clabWIFISSIDPolicyBlockAfterAttempts    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
```

```
    DESCRIPTION
        "The BlockAfterAttempts parameter indicates the maximum number
        of attempts a client is allowed to attempt registration before
        being denied access. Exceeding this value generates one event.
        Events from same client should not reoccur more than once an
        hour.
        The value zero indicates no connection attempts restrictions."
    DEFVAL      { 0 }
    ::= {clabWIFISSIDPolicyEntry 1 }

clabWIFISSIDPolicyAllocatedBandwidth    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "Mbps"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The AllocatedBandwidth parameter indicates the maximum
        bandwidth reserved for a particular interface.
The value zero indicates no limit."
    DEFVAL      { 0 }
    ::= {clabWIFISSIDPolicyEntry 2 }

clabWIFISSIDPolicyAuthenticationFailures    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The AuthenticationFailures parameter indicates the number of
        Authenticationfailures a station simultaneously produces to
        generate the event.
        Events from same client should not reoccur more than once an
        hour.
        The value 0 indicates no threshold and events of this type are
        not generated."
    DEFVAL      { 0 }
    ::= {clabWIFISSIDPolicyEntry 3 }

clabWIFISSIDPolicyNonAuthenticatedTraffic    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The NonAuthenticatedTraffic parameter represents the number
        of non-authenticated messages received from a station to generate
        an event. Events from same client should not reoccur more
        than once an hour.
        The value 0 indicates no threshold and events of this type are
        not generated."
    DEFVAL      { 0 }
    ::= {clabWIFISSIDPolicyEntry 4 }

clabWIFISSIDPolicyAssociationFailures    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The AssociationFailures indicates the number of simultaneous
        association failures from a station to generate an event.
        Events from same client should not reoccur more than once an
        hour.
        The value 0 indicates no threshold and events of this type are
        not generated."
    DEFVAL      { 0 }
    ::= {clabWIFISSIDPolicyEntry 5 }

clabWIFISSIDPolicyStatsInterval    OBJECT-TYPE
    SYNTAX      Unsigned32
```

```
    UNITS       "minutes"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The StatsInterval parameter indicates the interval value to
        collect per-interval statistics.

        The value 0 indicates no interval and values reported are
        snapshots at the time of the request. "
    DEFVAL      { 0 }
    ::= {clabWIFISSIDPolicyEntry 6 }

clabWIFISSIDPolicySNRThreshold    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dB"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The SNR parameter indicates the threshold to report SNR.
        The value -100 indicates no threshold, and events of this
        type are not generated."
    DEFVAL      { -100 }
    ::= {clabWIFISSIDPolicyEntry 7 }

clabWIFISSIDPolicyANPIThreshold    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dBm"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The ANPI parameter indicates the threshold to report the
        Average Noise plus Interference. The value -100 indicates no
        threshold, and events of this type are not generated."
    DEFVAL      { -100 }
    ::= {clabWIFISSIDPolicyEntry 8 }

clabWIFISSIDPolicyLowReceivedPowerThreshold    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dBm"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The LowReceivedPowerThreshold parameter indicates the power
        level threshold to generate an event whenever the station
        received power is below the threshold. The value -100 indicates
        no threshold is set, and events of this type are not generated."
    DEFVAL      { -100 }
    ::= {clabWIFISSIDPolicyEntry 9 }

clabWIFISSIDPolicyLowPowerDeniedAccessThreshold    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dBm"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The LowPowerDeniedAccessThreshold parameter indicates the
        power level threshold to deny client association whenever the
        station received power is below the threshold. The value -100
        indicates no threshold, and events of this type are not
        generated."
    DEFVAL      { -100 }
    ::= {clabWIFISSIDPolicyEntry 10 }

clabWIFISSIDPolicyLowPowerDissasociationThreshold    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dBm"
    MAX-ACCESS  read-create
```

```
    STATUS      current
    DESCRIPTION
        "The LowerPowerDissasociationThreshold parameter indicates
        the threshold to report Disassociation due to low power.
        The Wi-Fi GW should refuse associations when the power level
        is below this RSSI level. The value -100 indicates no
        threshold, and events of this type are not generated."
    DEFVAL      { -100 }
    ::= {clabWIFISSIDPolicyEntry 11 }

clabWIFISSIDPolicyRowStatus    OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= {clabWIFISSIDPolicyEntry 12 }

clabWIFIClientSessionsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIClientSessionsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The ClientSessions object represents the current
        and closed sessions (association connections).
        When the maximum number of instances is reached, the oldest
        closed session instance is replaced by a newly created client
        association."
    ::= {clabWIFIObjects 13 }

clabWIFIClientSessionsEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIClientSessionsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIClientSessionsTable."
    INDEX {
            clabWIFIAccessPointId, clabWIFIClientSessionsId
          }
    ::= {clabWIFIClientSessionsTable 1 }

ClabWIFIClientSessionsEntry ::= SEQUENCE {
    clabWIFIClientSessionsId
                Unsigned32,
    clabWIFIClientSessionsDeviceMACAddress
                MacAddress,
    clabWIFIClientSessionsStart
                DateAndTime,
    clabWIFIClientSessionsStop
                DateAndTime,
    clabWIFIClientSessionsTerminationCode
                Unsigned32,
    clabWIFIClientSessionsTerminationMeaning
                SnmpAdminString
      }

clabWIFIClientSessionsId    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Id key identifies a single client  MAC Address."
    ::= {clabWIFIClientSessionsEntry 1 }

clabWIFIClientSessionsDeviceMACAddress    OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION
        "The DeviceMACAddress parameter indicates the MAC address
        of an associated client device."
    ::= {clabWIFIClientSessionsEntry 2 }

clabWIFIClientSessionsStart    OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Start parameter indicates the time when the session
        started."
    ::= {clabWIFIClientSessionsEntry 3 }

clabWIFIClientSessionsStop    OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Stop parameter indicates the time when the session ended.
        If the session us current the value reported is all zeros."
    ::= {clabWIFIClientSessionsEntry 4 }

clabWIFIClientSessionsTerminationCode    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The TerminationCode parameter indicates the Reason Code or the
        Status Code that lead to ending the association of the station.
        Reason code and Status code overlaps. The context of the type of
        termination is provided by the TerminationMeaning attribute.
        The value zero indicates the session is active."
    ::= {clabWIFIClientSessionsEntry 5 }

clabWIFIClientSessionsTerminationMeaning    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..32))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The TerminationMeaning parameter indicates the meaning of the
        Reason Code or Status Code for the ended session.
        The zero-length string is used when the instance corresponds
        to an active session."
    ::= {clabWIFIClientSessionsEntry 6 }

clabWIFIClientStatsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIClientStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The ClientStats object contains accumulative statistics
        for each client station.
        A station is reported only after is associated for the
        first time. "
    ::= {clabWIFIObjects 14 }

clabWIFIClientStatsEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIClientStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIClientStatsTable."
    INDEX {
            clabWIFIAccessPointId,
            clabWIFIClientStatsInterval,
```

```
            clabWIFIClientStatsId
          }
    ::= {clabWIFIClientStatsTable 1 }

ClabWIFIClientStatsEntry ::= SEQUENCE {
    clabWIFIClientStatsInterval
                Unsigned32,
    clabWIFIClientStatsId
                Unsigned32,
    clabWIFIClientStatsDeviceMACAddress
                MacAddress,
    clabWIFIClientStatsFramesSent
                Counter64,
    clabWIFIClientStatsDataFramesSentAck
                Counter64,
    clabWIFIClientStatsDataFramesSentNoAck
                Counter64,
    clabWIFIClientStatsDataFramesLost
                Counter64,
    clabWIFIClientStatsFramesReceived
                Counter64,
    clabWIFIClientStatsDataFramesReceived
                Counter64,
    clabWIFIClientStatsDataFramesDuplicateReceived
                Counter64,
    clabWIFIClientStatsProbesReceived
                Counter32,
    clabWIFIClientStatsProbesRejected
                Counter32,
    clabWIFIClientStatsRSSI
                Integer32,
    clabWIFIClientStatsSNR
                Integer32,
    clabWIFIClientStatsDisassociations
                Counter32,
    clabWIFIClientStatsAuthenticationFailures
                Counter32,
    clabWIFIClientStatsLastTimeAssociation
                DateAndTime,
    clabWIFIClientStatsLastTimeDisassociation
                DateAndTime
      }

clabWIFIClientStatsInterval    OBJECT-TYPE
    SYNTAX      Unsigned32 (0 | 34 |48 | 96 )
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Interval parameter indicate the measurements were
        accumulated.
        The interval of measurements is synchronized with the
        wall clock
        The total number of intervals is based on a 24 hour period.
        At an interval of 15 minutes 96 intervals (1..96)  are defined,
        at 30 minutes, 48 intervals (1..48) and 24 intervals (1..24)
        for 1 hour measurement interval.
        Devices with  no capable to report measurements per interval
        will report the value 0 for the interval attribute."
    ::= {clabWIFIClientStatsEntry 1 }

clabWIFIClientStatsId    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Id key identifies a single client  MAC Address."
    ::= {clabWIFIClientStatsEntry 2 }
```

```
clabWIFIClientStatsDeviceMACAddress    OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The DeviceMACAddress parameter indicates the MAC address of
        an associated client device."
    ::= {clabWIFIClientStatsEntry 3 }

clabWIFIClientStatsFramesSent    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The FramesSent parameter indicates the total number of frames
        transmitted out of the interface.
        For conventional 802.11 MAC (a,b,g) this counter corresponds
        to the total of MSDUs (MAC Service Data Unit) being transmitted.
        For High Throughput transmissions this corresponds to the
        A-MSDU (Aggregation MSDU)
        The value of this counter MAY be reset to zero when the CPE
        is rebooted."
    ::= {clabWIFIClientStatsEntry 4 }

clabWIFIClientStatsDataFramesSentAck    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The DataFramesSentAck parameter indicates the total number of
        MSDU frames marked as duplicates and non duplicates acknowledged.
        The value of this counter MAY be reset to zero when the CPE is
        rebooted."
    ::= {clabWIFIClientStatsEntry 5 }

clabWIFIClientStatsDataFramesSentNoAck    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The DataFramesSentNoAck parameter indicates the total number of
        MSDU frames retransmitted out of the interface
        (i.e., marked as duplicate and non-duplicate) and not acknowledged
        but not including those defined in dataFramesLost.
        The value of this counter MAY be reset to zero when the CPE is
        rebooted."
    ::= {clabWIFIClientStatsEntry 6 }

clabWIFIClientStatsDataFramesLost    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The DataFramesLost parameter indicates the total number of
        MSDU frames retransmitted out of the interface that where not
        acknowledged and discarded for reaching max number of
        retransmissions.
        The value of this counter MAY be reset to zero when the CPE is
        rebooted."
    ::= {clabWIFIClientStatsEntry 7 }

clabWIFIClientStatsFramesReceived    OBJECT-TYPE
```

```
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The FramesReceived parameter indicates the total number of
        frames received by the interface.
        For conventional 802.11 MAC (a,b,g) this counter corresponds
        to the total of MSDUs (MAC Service Data Unit) being transmitted.
        For High Throughput transmissions (n) this corresponds to
        A-MSDUs (Aggregation MSDU) and MSDUs.
        The value of this counter MAY be reset to zero when the
        CPE is rebooted."
    ::= {clabWIFIClientStatsEntry 8 }

clabWIFIClientStatsDataFramesReceived    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The DataFramesReceived parameter indicates the total number
        of MSDU frames received and  marked as non-duplicates.
        The value of this counter MAY be reset to zero when the CPE
        is rebooted."
    ::= {clabWIFIClientStatsEntry 9 }

clabWIFIClientStatsDataFramesDuplicateReceived    OBJECT-TYPE
    SYNTAX      Counter64
    UNITS       "frames"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The DataFramesDuplicateReceived parameter indicates the total
        number of duplicated frames received on this interface.
        The value of this counter MAY be reset to zero when the
        CPE is rebooted."
    ::= {clabWIFIClientStatsEntry 10 }

clabWIFIClientStatsProbesReceived    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "probes"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The ProbesReceived parameter indicates the Total number of
        probes received."
    ::= {clabWIFIClientStatsEntry 11 }

clabWIFIClientStatsProbesRejected    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "probes"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The ProbesRejected parameter indicates the total number of
        probes rejected."
    ::= {clabWIFIClientStatsEntry 12 }

clabWIFIClientStatsRSSI    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dBm"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Received Signal Strength Indicator, RSSI, parameter is the
        energy observed at the antenna receiver for a current
```

```
        transmission."
    ::= {clabWIFIClientStatsEntry 13 }

clabWIFIClientStatsSNR    OBJECT-TYPE
    SYNTAX      Integer32
    UNITS       "dB"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The signal to Noise Ratio (SNR) parameter indicates the signal
        strength received from a client compared to the noise received."
    ::= {clabWIFIClientStatsEntry 14 }

clabWIFIClientStatsDisassociations    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "disassociations"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Disassociations parameter indicates the total number of
        client disassociations."
    ::= {clabWIFIClientStatsEntry 15 }

clabWIFIClientStatsAuthenticationFailures    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "authenticationfailures"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The AuthenticationFailures parameter indicates the total
        number of authentication failures."
    ::= {clabWIFIClientStatsEntry 16 }

clabWIFIClientStatsLastTimeAssociation    OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The LastTimeAssociation parameter indicates the Last time
        the client was associated."
    ::= {clabWIFIClientStatsEntry 17 }

clabWIFIClientStatsLastTimeDisassociation    OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The  LastTimeDisassociation parameter indicates the last time
        the client disassociate from the interface.
        The all zeros value indicates the client is currently
        associated. "
    ::= {clabWIFIClientStatsEntry 18 }

clabWIFIRadiusClientTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ClabWIFIRadiusClientEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object is the extension of Radius Client operation
        for the Access Point 802.1x Authenticator for WPA Enterprise.
        An instance is relevant when the attribute
        AccessPointSecurity.ModeEnabled is 'WPA-Enterprise' or
        'WPA2-Enterprise' or 'WPA-WPA2-Enterprise'."
    ::= {clabWIFIObjects 15 }

clabWIFIRadiusClientEntry    OBJECT-TYPE
    SYNTAX      ClabWIFIRadiusClientEntry
```

```
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of clabWIFIRadiusClientTable."
    INDEX {
            clabWIFIAccessPointId
          }
    ::= {clabWIFIRadiusClientTable 1 }

ClabWIFIRadiusClientEntry ::= SEQUENCE {
    clabWIFIRadiusClientNAS-Identifier
                SnmpAdminString,
     clabWIFIRadiusClientLocationPolicy
                OCTET STRING,
    clabWIFIRadiusClientOperatorName
                SnmpAdminString,
    clabWIFIRadiusClientLocationInformation
                OCTET STRING,
    clabWIFIRadiusClientLocationData
                OCTET STRING,
    clabWIFIRadiusClientUsageReports
                TruthValue,
    clabWIFIRadiusClientIntervalInterimReport
                TruthValue,
    clabWIFIRadiusClientAPTransitionReport
                TruthValue,
    clabWIFIRadiusClientGigawordReport
                TruthValue,
    clabWIFIRadiusClientRowStatus
                RowStatus
      }

clabWIFIRadiusClientNAS-Identifier    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..255))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The NAS-Identifier parameter corresponds to the Radius
        attribute NAS-Identifier used in Access request messages.
        The device always sends the Radius parameter NAS-IP-Address
        and will send the NAS-Identifier parameter when this
        attribute is set to other than the zero-length string.
        The NAS-Identifier attribute can be used as a hint to
        indicate the authentication server the SSID domain where
        the WiFi endpoint tries to authenticate, i.e.,
        when more than one SSID domains are using the same
        Radius server instance."
    ::= {clabWIFIRadiusClientEntry 1 }

clabWIFIRadiusClientLocationPolicy    OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(0..64))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The LocationPolicy  corresponds to the string value of the
        Radius Basic-Location-Policy-Rules attribute per RFC 5580"
    ::= {clabWIFIRadiusClientEntry 2 }

clabWIFIRadiusClientOperatorName    OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..32))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The OperatorName parameter corresponds to the string value of the
        Radius Operator-Name attribute per RFC 5580."
    ::= {clabWIFIRadiusClientEntry 3 }
```

```
clabWIFIRadiusClientLocationInformation    OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(0..253))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The LocationInformation parameter corresponds to the string
        value of the Radius Location-Information  attribute per
        RFC 5580."
    ::= {clabWIFIRadiusClientEntry 4 }

clabWIFIRadiusClientLocationData    OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(0..253))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The Location Data parameter corresponds to the string value of
        the Radius LocationData attribute per RFC 5580."
    ::= {clabWIFIRadiusClientEntry 5 }

clabWIFIRadiusClientUsageReports    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The UsageReports parameter indicates whether the client send
        usage data 'true' or not 'false'."
    DEFVAL      { false }
    ::= {clabWIFIRadiusClientEntry 6 }

clabWIFIRadiusClientIntervalInterimReport    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The IntervalInterimReport parameter indicates whether the client
        send Interim reports at time intervals 'true' or not 'false'."
    DEFVAL      { false }
    ::= {clabWIFIRadiusClientEntry 7 }

clabWIFIRadiusClientAPTransitionReport    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "A 'true' value for the APTransitionReport parameter indicates the
        client sends Interim reports when the stations transitions to a
        different Access point."
    DEFVAL      { false }
    ::= {clabWIFIRadiusClientEntry 8 }

clabWIFIRadiusClientGigawordReport    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "A 'true' value for Gigaword Report indicates the client sends
        Interim reports when the 32-bit counters rollover"
    DEFVAL      { false }
    ::= {clabWIFIRadiusClientEntry 9 }

clabWIFIRadiusClientRowStatus    OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= {clabWIFIRadiusClientEntry 10 }
```

```
clabWIFIWIFIEventNotif NOTIFICATION-TYPE
    OBJECTS     {
                  clabWIFIWIFIEventNotifText,
                  clabWIFIWIFIEventNotifEventId,
                  clabWIFIWIFIEventNotifTimeStamp }
    STATUS      current
    DESCRIPTION
        "This object represents the Wi-Fi GW notification."
  ::= {clabWIFINotifications 1 }

clabWIFIWIFIEventNotifgroup OBJECT IDENTIFIER ::= { clabWIFINotifications 2}


clabWIFIWIFIEventNotifText    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  accessible-for-notify
    STATUS      current
    DESCRIPTION
        "This attribute represents the Event Message of the event."
    ::= {clabWIFIWIFIEventNotifgroup 1 }

clabWIFIWIFIEventNotifEventId    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  accessible-for-notify
    STATUS      current
    DESCRIPTION
        "The identifier of the event"
    ::= {clabWIFIWIFIEventNotifgroup 2 }

clabWIFIWIFIEventNotifTimeStamp    OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  accessible-for-notify
    STATUS      current
    DESCRIPTION
        "Date and Time when the event was generated. (not the time when
        the event was dispatched)."
    ::= {clabWIFIWIFIEventNotifgroup 3 }


clabWIFIWIFICommitSettings OBJECT IDENTIFIER ::= {clabWIFIObjects 16 }

clabWIFIWIFICommitSettingsValue    OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute when set to 'true' flushes the WiFi settings in
        non-volatile memory and reinitialize the WiFi system with the
        new set of values without reboot.

        This attribute reports a value 'false' when WiFi attributes have
        been changed but the changes are not active (i.e.,. not flushed
        in non-volatile and not part of the active configuration).

        Systems that support immediate commit upon any attribute change
        will report this attribute as 'true' always, and silently
        accepts sets to 'true'."

    ::= {clabWIFIWIFICommitSettings 1 }

-- Conformance Definitions
    clabWIFIMibConformance OBJECT IDENTIFIER ::= { clabWIFIMib 2 }
clabWIFIMibCompliances OBJECT IDENTIFIER ::= { clabWIFIMibConformance 1 }
clabWIFIMibGroups      OBJECT IDENTIFIER ::= { clabWIFIMibConformance 2 }

clabWIFICompliance MODULE-COMPLIANCE
```

```
    STATUS      current
    DESCRIPTION
         "The compliance statement for the."
    MODULE -- this MODULE
    MANDATORY-GROUPS {
            clabWIFIGroup, clabWIFINotificationsGroup
            }
    ::= { clabWIFIMibCompliances 1 }

clabWIFIGroup OBJECT-GROUP
    OBJECTS {
              clabWIFIAccessPointEnable,
              clabWIFIAccessPointStatus,
              clabWIFIAccessPointAlias,
              clabWIFIAccessPointSSIDReference,
              clabWIFIAccessPointSSIDAdvertisementEnabled,
              clabWIFIAccessPointRetryLimit,
              clabWIFIAccessPointWMMCapability,
              clabWIFIAccessPointUAPSDCapability,
              clabWIFIAccessPointWMMEnable,
              clabWIFIAccessPointUAPSDEnable,
              clabWIFIAccessPointAssociatedDeviceNumberOfEntries,
              clabWIFIAccessPointRowStatus,
              clabWIFIAccessPointWPSEnable,
              clabWIFIAccessPointWPSConfigMethodsSupported,
              clabWIFIAccessPointWPSConfigMethodsEnabled,
              clabWIFIAccessPointWPSRowStatus,
              clabWIFIRadiusClientNAS-Identifier,
              clabWIFIRadiusClientLocationPolicy,
              clabWIFIRadiusClientOperatorName,
              clabWIFIRadiusClientLocationInformation,
              clabWIFIRadiusClientLocationData,
              clabWIFIRadiusClientUsageReports,
              clabWIFIRadiusClientIntervalInterimReport,
              clabWIFIRadiusClientAPTransitionReport,
              clabWIFIRadiusClientGigawordReport,
              clabWIFIRadiusClientRowStatus,
              clabWIFISSIDEnable,
              clabWIFISSIDStatus,
              clabWIFISSIDAlias,
              clabWIFISSIDName,
              clabWIFISSIDLastChange,
              clabWIFISSIDLowerLayers,
              clabWIFISSIDBSSID,
              clabWIFISSIDMACAddress,
              clabWIFISSIDSSID,
              clabWIFISSIDRowStatus,
              clabWIFIAssociatedDeviceMACAddress,
              clabWIFIAssociatedDeviceAuthenticationState,
              clabWIFIAssociatedDeviceLastDataDownlinkRate,
              clabWIFIAssociatedDeviceLastDataUplinkRate,
              clabWIFIAssociatedDeviceSignalStrength,
              clabWIFIAssociatedDeviceRetransmissions,
              clabWIFIAssociatedDeviceActive,
              clabWIFIClientSessionsDeviceMACAddress,
              clabWIFIClientSessionsStart,
              clabWIFIClientSessionsStop,
              clabWIFIClientSessionsTerminationCode,
              clabWIFIClientSessionsTerminationMeaning,
              clabWIFIRadioStatsBytesSent,
              clabWIFIRadioStatsBytesReceived,
              clabWIFIRadioStatsPacketsSent,
              clabWIFIRadioStatsPacketsReceived,
              clabWIFIRadioStatsErrorsSent,
              clabWIFIRadioStatsErrorsReceived,
              clabWIFIRadioStatsDiscardPacketsSent,
              clabWIFIRadioStatsDiscardPacketsReceived,
```

```
clabWIFISSIDStatsBytesSent,
clabWIFISSIDStatsBytesReceived,
clabWIFISSIDStatsPacketsSent,
clabWIFISSIDStatsPacketsReceived,
clabWIFISSIDStatsErrorsSent,
clabWIFISSIDStatsErrorsReceived,
clabWIFISSIDStatsUnicastPacketsSent,
clabWIFISSIDStatsUnicastPacketsReceived,
clabWIFISSIDStatsDiscardPacketsSent,
clabWIFISSIDStatsDiscardPacketsReceived,
clabWIFISSIDStatsMulticastPacketsSent,
clabWIFISSIDStatsMulticastPacketsReceived,
clabWIFISSIDStatsBroadcastPacketsSent,
clabWIFISSIDStatsBroadcastPacketsReceived,
clabWIFISSIDStatsUnknownProtoPacketsReceived,
clabWIFIPeriodicStatsDeviceMACAddress,
clabWIFIPeriodicStatsFramesSent,
clabWIFIPeriodicStatsDataFramesSentAck,
clabWIFIPeriodicStatsDataFramesSentNoAck,
clabWIFIPeriodicStatsDataFramesLost,
clabWIFIPeriodicStatsFramesReceived,
clabWIFIPeriodicStatsDataFramesReceived,
clabWIFIPeriodicStatsDataFramesDuplicateReceived,
clabWIFIPeriodicStatsProbesReceived,
clabWIFIPeriodicStatsProbesRejected,
clabWIFIPeriodicStatsRSSI,
clabWIFIPeriodicStatsSNR,
clabWIFIPeriodicStatsDisassociations,
clabWIFIPeriodicStatsAuthenticationFailures,
clabWIFIPeriodicStatsLastTimeAssociation,
clabWIFIPeriodicStatsLastTimeDisassociation,
clabWIFIClientStatsDeviceMACAddress,
clabWIFIClientStatsFramesSent,
clabWIFIClientStatsDataFramesSentAck,
clabWIFIClientStatsDataFramesSentNoAck,
clabWIFIClientStatsDataFramesLost,
clabWIFIClientStatsFramesReceived,
clabWIFIClientStatsDataFramesReceived,
clabWIFIClientStatsDataFramesDuplicateReceived,
clabWIFIClientStatsProbesReceived,
clabWIFIClientStatsProbesRejected,
clabWIFIClientStatsRSSI,
clabWIFIClientStatsSNR,
clabWIFIClientStatsDisassociations,
clabWIFIClientStatsAuthenticationFailures,
clabWIFIClientStatsLastTimeAssociation,
clabWIFIClientStatsLastTimeDisassociation,
clabWIFIRadioEnable,
clabWIFIRadioStatus,
clabWIFIRadioAlias,
clabWIFIRadioName,
clabWIFIRadioLastChange,
clabWIFIRadioLowerLayers,
clabWIFIRadioUpstream,
clabWIFIRadioMaxBitRate,
clabWIFIRadioSupportedFrequencyBands,
clabWIFIRadioOperatingFrequencyBand,
clabWIFIRadioSupportedStandards,
clabWIFIRadioOperatingStandards,
clabWIFIRadioPossibleChannels,
clabWIFIRadioChannelsInUse,
clabWIFIRadioChannel,
clabWIFIRadioAutoChannelSupported,
clabWIFIRadioAutoChannelEnable,
clabWIFIRadioAutoChannelRefreshPeriod,
clabWIFIRadioOperatingChannelBandwidth,
clabWIFIRadioExtensionChannel,
```

```
                clabWIFIRadioGuardInterval,
                clabWIFIRadioMCS,
                clabWIFIRadioTransmitPowerSupported,
                clabWIFIRadioTransmitPower,
                clabWIFIRadioIEEE80211hSupported,
                clabWIFIRadioIEEE80211hEnabled,
                clabWIFIRadioRegulatoryDomain,
                clabWIFIWiFiRadioNumberOfEntries,
                clabWIFIWiFiSSIDNumberOfEntries,
                clabWIFIWiFiAccessPointNumberOfEntries,
                clabWIFIWiFiEndPointNumberOfEntries,
                clabWIFIDataRateStatsFramesSent,
                clabWIFIDataRateStatsFramesRetransmissionsSent,
                clabWIFIDataRateStatsFramesReceived,
                clabWIFIDataRateStatsFramesDuplicatedReceived,
                clabWIFIWIFIEventNotifText,
                clabWIFIWIFIEventNotifEventId,
                clabWIFIWIFIEventNotifTimeStamp,
                clabWIFIAccessPointSecurityModesSupported,
                clabWIFIAccessPointSecurityModeEnabled,
                clabWIFIAccessPointSecurityWEPKey,
                clabWIFIAccessPointSecurityPreSharedKey,
                clabWIFIAccessPointSecurityKeyPassphrase,
                clabWIFIAccessPointSecurityRekeyingInterval,
                clabWIFIAccessPointSecurityRadiusServerIPAddrType,
                clabWIFIAccessPointSecurityRadiusServerIPAddr,
                clabWIFIAccessPointSecurityRadiusServerPort,
                clabWIFIAccessPointSecurityRadiusSecret,
                clabWIFIAccessPointSecurityRowstatus,
                clabWIFIAccessPointSecurityWEPKey2,
                clabWIFIAccessPointSecurityWEPKey3,
                clabWIFIAccessPointSecurityWEPKey4,
                clabWIFIAccessPointSecurityWEPIndex,
                clabWIFIAccessPointSecurityWEPPassPhrase,
                clabWIFIAccessPointSecurityWPAEncryption,
                clabWIFISSIDPolicyBlockAfterAttempts,
                clabWIFISSIDPolicyAllocatedBandwidth,
                clabWIFISSIDPolicyAuthenticationFailures,
                clabWIFISSIDPolicyNonAuthenticatedTraffic,
                clabWIFISSIDPolicyAssociationFailures,
                clabWIFISSIDPolicyStatsInterval,
                clabWIFISSIDPolicySNRThreshold,
                clabWIFISSIDPolicyANPIThreshold,
                clabWIFISSIDPolicyLowReceivedPowerThreshold,
                clabWIFISSIDPolicyLowPowerDeniedAccessThreshold,
                clabWIFISSIDPolicyLowPowerDissasociationThreshold,
                clabWIFISSIDPolicyRowStatus,
                clabWIFIWIFICommitSettingsValue
    }
    STATUS      current
    DESCRIPTION
             "Objects implemented in the clabWIFIGroup."
    ::= { clabWIFIMibGroups 1 }

clabWIFINotificationsGroup NOTIFICATION-GROUP
   NOTIFICATIONS { clabWIFIWIFIEventNotif }
   STATUS        current
   DESCRIPTION
           "Notifications implemented in the clabWIFINotificationsGroup."
   ::= { clabWIFIMibGroups 2 }

END
```

Annex B IEEE 802.11 MIB modules Requirements

Table 27 shows the compliance for IEEE [802.11] MIB objects. Unless otherwise noted, support for IEEE MIBs is deemed optional as current operator requirements for Wi-Fi requirements are included in Annex A.

The column Support indicates compliance requirement, with values MAY, MUST and NA (not applicable).

The column Access indicates the compliance requirement for access via SNMP request PDU messages. Possible values [RFC 2578] include 'read-only', 'read-write' and 'read-create'.

Table 27 - 802.11 MIB Requirements

802.11 MIB Objects	Support	Access
dot11StationConfigTable	MAY	read-only
dot11AuthenticationAlgorithms	MAY	read-only
dot11WEPDefaultKeysTable	MAY	read-only
WEPKeyMappings	MAY	read-only
dot11PrivacyTable	MAY	read-only
dot11MultiDomainCapability	MAY	read-only
dot11SpectrumManagement	MAY	read-only
dot11RSNAConfigTable	MAY	read-only
dot11RSNAConfigPairwiseCiphersTable	MAY	read-only
dot11RSNAConfigAuthenticationSuitesTable	MAY	read-only
dot11RSNAStatsTable	MAY	read-only
dot11RegulatoryClassesTable	MAY	read-only
dot11RRMRequestTable	MAY	read-only
dot11ChannelLoadReportTable	MAY	read-only
dot11NoiseHistogramReportTable	MAY	read-only
dot11BeaconReportTable	MAY	read-only
dot11FrameReportTable	MAY	read-only
dot11STAStatisticsReportTable	MAY	read-only
dot11LCIReportTable	MAY	read-only
dot11TransmitStreamReportTable	MAY	read-only
dot11APChannelReportTable	MAY	read-only
dot11RRMNeighborReportTable	MAY	read-only
dot11HTStationConfigTable	MAY	read-only
dot11OperationTable	MAY	read-only
dot11CountersTable	MAY	read-only
dot11GroupAddressesTable	MAY	read-only
dot11EDCATable	MAY	read-only
dot11QAPEDCATable	MAY	read-only
dot11QosCountersTable	MAY	read-only
dot11ResourceInfoTable	MAY	read-only
dot11PhyOperationTable	MAY	read-only
dot11PhyOperationTable	MAY	read-only
dot11PhyAntennaTable	MAY	read-only
dot11PhyTxPowerTable	MAY	read-only
dot11PhyFHSSTable	NA	-

802.11 MIB Objects	Support	Access
dotPhyDSSSTable	MAY	read-only
dot11PhyIRTable	NA	-
dot11RegDomainsSupportedTable	MAY	read-only
dot11AntennasListTable	MAY	read-only
dot11SupportedDataRatesTxTable	MAY	read-only
dot11SupportedDataRatesRxTable	MAY	read-only
dot11PhyOFDMTable	MAY	read-only
dot11PhyHRDSSSTable	MAY	read-only
dot11HoppingPatternTable	NA	-
dot11PhyERPTable	MAY	read-only
dot11PhyHTTable	MAY	read-only
dot11SupportedMCSTxTable	MAY	read-only
dot11SupportedMCSRxTable	MAY	read-only
dot11TransmitBeamformingConfigTable	MAY	read-only
dot11FastBSSTransitionConfigTable	MAY	read-only
dot11LCIDSETable	MAY	read-only

Annex C Events Content and Format

This section contains the definitions of events related to the Wi-Fi functionality. The events can be reported via different mechanisms, for example, Local Log, syslog, SNMP notifications, etc. Depending on the managed device containing the Wi-Fi component, the event mechanism varies. For example, a DOCSIS CM may report the events as part of a syslog message, an entry in the CM local log, or an SNMP notification.

Each row in Table 28 specifies a Wi-Fi GW event definition.

The "Process" and "Sub-Process" columns indicate in which stage the event happens. The "Priority" column indicates the priority the event is assigned. These priorities are defined in the docsDevEvLevel object of the Cable Device MIB [RFC 4639] and in the LEVEL field of the syslog.

The "Event Message" column specifies the event text. The Event Message text may include the symbols <TAGS> and any other tag, e.g., <BSSID> as defined below. Before the first tag there is always a space character. Tags are always separated by commas.

The "Message Notes and Details" column provides additional information about the event text in the "Event Message" column. Some of the text fields include variable information. The variables are explained in the "Message Notes and Details" column. For some events the "Message Notes and Details" column may include the keyword <Deprecated> to indicate this event is being deprecated and its implementation is optional.

For events where the "Event Message" or "Message Notes and Details" column includes other parameters such as <P1>, <P2>, …, <Pn>. There is a single space before and after any parameter <Px> in the Event Message text.

This specification defines the tags in Table 28 as part of the "Event Message" column:

Table 28 - Wi-Fi GW event definition

TAG	Description	Format*
<WG-MAC>	Wi-Fi GW MAC Address;	"WG-MAC=xx:xx:xx:xx:xx:xx", xx in lowercase
<STA-MAC>	MAC Address of the wireless station	"STA-MAC=xx:xx:xx:xx:xx:xx", xx in lowercase
<BSSID>	MAC Address of AP (e.g., neighbor AP);	"BSSID=xx:xx:xx:xx:xx:xx", xx in lowercase
<SSID>	SSID value (e.g., neighbor AP);	"BSSID=xx:xx:xx:xx:xx:xx", xx in lowercase
<IF>	Wi-Fi Interface Name	"IF=wlan0"
<ANPI>	Average Noise Plus Interference	"ANPI=nnn"
<ANPI>	Average Noise Plus Interference	"ANPI=nnn"
<ANPI-THRSHLD>	ANPI threshold	"ANPI-THRSHLD=mmm"
<SNR>	Signal to Noise Ratio	"SNR=nnn"
<SNR-THRSHLD>	SNR threshold	"SNR-THRSHLD=mmm"
<REASON-CODE>	Reason code of an indication of Disassociation, Deauthentication, DELTS, ELBA, or DLS Teardown per [802.11] Reason Code field section.	"REASON-CODE=nn"
<REASON-CODE-DESCR>	The meaning of the REASON-CODE per [802.11] Reason Code field section.	"REASON-CODE-DESCR=meaning Reason Code text"
<STATUS-CODE>	Status code in response to a request massage from a station per [802.11] Status Code field section.	"STATUS-CODE=nn"
<STATUS-CODE-DESCR>	The meaning of the STATUS-CODE per [802.11] Status Code field section.	"STATUS-CODE-DESCR=meaning Reason Code text"

Example Event Message:

Rouge IP Detected: WG-MAC=00:54:aa:3:78:01;BSSIS=00:af:e3:5b:55:89;SSID=Free Internet

The "Error Code Set" and Event ID are defined per [OSSIv3.0].

The "Requirement" Column indicates the normative requirement of the event.

The "Notification Name" Column indicates the identifier of the notification being sent e.g., SNMP Notification.

The Wi-Fi WG MAY append additional vendor-specific text to the end of the event text.

Table 29 - Event Format and Content

Process	Sub-Process	Priority	Event Message	Message Notes and Detail	Error Code Set	Event ID	Require-ment	Notification Name
Connection	Association	Warning	Rouge AP Detected: <WG-MAC>;<BSSID>;<SSID>		X001.1	88.000101	SHOULD	SNMP: clabWIFIWIFIEventNotif
Connection	Association Termination	Warning	<REASON-CODE-DESCR>;<REASON-CODE>;<WG-MAC>;<STA-MAC>;<IF>	See Section C.1.1	X001.2	88000102	MUST	SNMP: clabWIFIWIFIEventNotif
Connection	Association Failure	Warning	<STATUS-CODE-DESCR>;<STATUS-CODE>;<WG-MAC>;<STA-MAC>;<IF>	See Section C.1.2	X001.3	88000103	MUST	SNMP: clabWIFIWIFIEventNotif
Connection	Authenticati on Failure	Warning	Station exceeds Authentication attempts: <WG-MAC>;<STA-MAC>;<IF>	See Section C.1.3	X001.4	88000104	SHOULD	SNMP: clabWIFIWIFIEventNotif
Connection	Association Failure	Warning	Station exceeds Association: <WG-MAC>;<STA-MAC>;<IF>	See Section C.1.4	X001.5	88000105	SHOULD	SNMP: clabWIFIWIFIEventNotif
Connection	Association	Warning	Station exceeds non-authenticated traffic: <WG-MAC>;<STA-MAC>;<IF>	See Section C.1.5	X001.6	88000106	SHOULD	SNMP: clabWIFIWIFIEventNotif
Connection	Association	Warning	Black Address List Detected: <WG-MAC>;<STA-MAC>;<IF>		X001.7	88000107	SHOULD	SNMP: clabWIFIWIFIEventNotif
Connection	Association	Warning	Black Address List Changed by operator <WG-MAC>		X001.8	88000108	SHOULD	SNMP: clabWIFIWIFIEventNotif
Operation	Failure	Error	Radio Failure: <WG-MAC>;<IF>		X002.1	88000201	MUST	SNMP: clabWIFIWIFIEventNotif
Operation	Thresholds Exceeded	Warning	Noise plus Interference exceeded threshold: <ANPI>;<ANPI-THRSHLD>;<IF>	Threshold defined by A.2.3.12	X002.2	88000202	MUST	SNMP: clabWIFIWIFIEventNotif
Operation	Threshold Exceeded	Warning	SNR below threshold: <SNR>;<SNR-THRSHLD>;<STA-MAC>;<IF>	Threshold defined by A.2.3.12	X002.3	88000203	MUST	SNMP: clabWIFIWIFIEventNotif
Operation	Failure	Warning	Interface Reset (Link Up/Down)		X002.4	88000205	MUST	linkUp, linkDown [RFC 2863]

Process	Sub-Process	Priority	Event Message	Message Notes and Detail	Error Code Set	Event ID	Require-ment	Notification Name
Configuration	Updated	Information	Configuration Changed <P1>	P1: Config File | Management	X003.1	88000301	MUST	SNMP: clabWIFIWIFIEventNotif
Accounting	Failure	Error	Radius Failure:<STA-MAC>, Reason: <P1>	P1 = Vendor specific text	X003.1	88000301	MUST	SNMP: clabWIFIWIFIEventNotif

C.1 Special Event Requirements

This section details requirements of certain events of Table 29.

C.1.1 Requirements for Event X001.2

This section details management events generated when the Wi-Fi GW sends certain [802.11] unsolicited notifications to the station with particular Reason Code field value.

Theses events are specified per [802.11] notification occurrence, or per aggregation or threshold condition of those [802.11] notification messages as noted in Table 30.

The Wi-Fi GW MUST generate events of type X001.2 for the reason codes and conditions listed in Table 30.

Table 30 - Requirements for Event X001.2

Reason Code	Meaning	Occurrence	Policy	Additional Details
34	Disassociated because excessive number of frames need to be acknowledged, but are not acknowledged due to AP transmissions and/or poor channel conditions.	per occurrence	none	
5	Disassociated because AP is unable to handle all currently associated STAs	per occurrence	none	
23	IEEE 802.1X authentication per [802.1X] failed	per occurrence	none	
35	Disassociated because STA is transmitting outside the limits of its TXOPs	per occurrence	none	

C.1.2 Requirements for Event X001.3

This section details the management events generated by the Wi-Fi GW that relates to [802.11] responses to request messages from the client station with particular Status Code field value.

These events are specified per 802.11 response message occurrence, or per aggregation or threshold condition of those [802.11] notifications messages as noted in Table 31.

The Wi-Fi GTW MUST generate events of type X001.3 for the reason codes and conditions listed in Table 31.

Table 31 - Requirements for Event X001.3

Status Code	Meaning	Occurrence	Policy	Additional Details
13	Responding STA does not support the specified authentication algorithm.	Per occurrence	None	
17	Association denied because AP is unable to handle additional associated STAs.	Per occurrence	None	
34	Association denied due to excessive frame loss rates and/or poor conditions on current operating channel.	Per occurrence	None	

C.1.3 Requirements for Event X001.4

This section details the conditions to generate an event to report exceeding Authentication failures.

The Wi-Fi GW SHOULD generate events of type X001.4 for the reason codes and conditions listed in Table 32.

Table 32 - Requirements for Event X001.4

Reason Code	Meaning	Occurrence	Policy	Additional Details
14	Message integrity code (MIC) failure	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
15	4-Way Handshake timeout	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
16	Group Key Handshake timeout	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
17	Information element in 4-Way Handshake different from (Re)Association Request/Probe Response/Beacon frame	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
18	Invalid group cipher	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
19	Invalid pairwise cipher	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
20	Invalid AKMP	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
21	Unsupported RSN information element version	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
22	Invalid RSN information element capabilities	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
24	Cipher suite rejected because of the security policy	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
39	Requested from peer STA due to timeout	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	

Reason Code	Meaning	Occurrence	Policy	Additional Details
45	Peer STA does not support the requested cipher suite	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
14	Received an Authentication frame with authentication transaction sequence number out of expected sequence	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
15	Authentication rejected because of challenge failure	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
16	Authentication rejected due to timeout waiting for next frame in sequence	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
41	Invalid group cipher	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
42	Invalid pairwise cipher	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
43	Invalid AKMP	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
44	Unsupported RSN information element version	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
45	Invalid RSN information element capabilities	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	
46	Cipher suite rejected because of security policy	Count towards reaching Threshold	Threshold defined by AuthenticationFailures attribute from A.2.3.12	

C.1.4 Requirements for Event X001.5

This section details the conditions to generate an event to report exceeding Association failures.

The Wi-Fi GTW SHOULD generate events of type X001.5 for the reason codes and conditions listed in Table 33.

Table 33 - Requirements for Event X001.5

Status Code	Meaning	Occurrence	Policy	Additional Details
18	Association denied due to requesting STA not supporting all of the data rates in the BSSBasicRateSet parameter.	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	
19	Association denied due to requesting STA not supporting the short preamble option	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	
20	Association denied due to requesting STA not supporting the PBCC modulation option	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	
21	Association denied due to requesting STA not supporting the Channel Agility option	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	

Status Code	Meaning	Occurrence	Policy	Additional Details
22	Association request rejected because Spectrum Management capability is required	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	
23	Association request rejected because the information in the Power Capability element is unacceptable	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	
24	Association request rejected because the information in the Supported Channels element is unacceptable	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	
25	Association denied due to requesting STA not supporting the Short Slot Time option	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	
26	Association denied due to requesting STA not supporting the DSSS-OFDM option	Count towards reaching Threshold	Threshold defined by AssociationFailures attribute from A.2.3.12	

C.1.5 Requirements for Event X001.6

This section details the conditions to generate an event to report exceeding request from non-authenticated or non-associated station.

The Wi-Fi GTW SHOULD generate events of type X001.6 for the reason codes and conditions listed in Table 34.

Table 34 - Requirements for Event X001.6

Reason Code	Meaning	Occurrence	Policy	Additional Details
6	Class 2 frame received from nonauthenticated STA	Count towards reaching Threshold	Threshold defined by NonAuthenticatedTraffic from A.2.3.12	
7	Class 3 frame received from nonassociated STA	Count towards reaching Threshold	Threshold defined by NonAuthenticatedTraffic from A.2.3.12	
9	STA requesting (re)association is not authenticated with responding STA	Count towards reaching Threshold	Threshold defined by NonAuthenticatedTraffic from A.2.3.12	

Annex D Wi-Fi CableLabs Extensions for TR-181

```
<?xml version="1.0"?>
<dm:document SchemaLocation="urn:broadband-forum-org:cwmp:datamodel-1-2 cwmp-
datamodel-1-2.xsd rn:broadband-forum-org:cwmp:datamodel-report-0-1 cwmp-datamodel-
report.xsd" xmlns:dm="urn:broadband-forum-org:cwmp:datamodel-1-0"
             xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <description>Device:2 with cableLabs extensions</description>
  <import file="tr-181-2-0-0.xml"/>
  <import spec="urn:broadband-forum-org:tr-181-2-0" file="tr-181-2-0.xml">
    <model name="Device:2.0"/>
  </import>
  <component name="CLAB-WIFI-EXT">
    <object name="Device.WiFi.Radio.{i}.X_cablelabs-com_DataRateStats.{i}."
access="readOnly" minEntries="0" maxEntries="unbounded">
      <description>This object contains statistics for each speed rate of an 802.11
LAN interface.</description>
      <parameter name="Rate" access="readOnly">
        <description>This key represents the data speed for the statistics collected.
the value is reported in ASCII characters in units of Mbps.</description>
        <syntax>
          <string>
            <size maxLength="6"/>
          </string>
        </syntax>
      </parameter>
      <parameter name="FramesSent" access="readOnly">
        <description>The FramesSent Parameter indicates the total number of frames
transmitted out of the interface (not marked as duplicated).
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="FramesRetransmissionsSent" access="readOnly">
        <description>The FramesRetransmissionsSent parameter indicates the total
number of frames retransmitted out of the interface (marked as duplicated).
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="FramesReceived" access="readOnly">
        <description>The FramesReceived parameter indicates the total number of frames
received on this interface (not marked as duplicated).
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="FramesDuplicatedReceived" access="readOnly">
        <description>The FramesDuplicatedReceived indicates the total number of
duplicated frames received on this interface.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
    </object>
    <object name="Device.WiFi.SSID.{i}.X_cablelabs-com_PeriodicStats.{i}.">
      <description>This object contains periodic statistics for an 802.11 SSID on a
CPE device. Note that these statistics refer to the link layer, not to the physical
layer. This object does not include the total byte and packet statistics, which are,
for historical reasons, in the parent object.</description>
      <parameter name="Interval" access="readOnly">
        <description>This key indicates the Interval where the measurements were
accumulated
```

```
The interval of measurements is synchronized with the wall clock
The total number of intervals is based on a 24 hour period. At an interval of 15
minutes 96 intervals (1..96) are defined, at 30 minutes, 48 intervals (1..48) and 24
intervals (1..24) for 1 hour measurement interval.
Devices with no capabilities to report measurements per interval will report the value
0 for the interval attribute of the unique statistics instance.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="Id" access="readOnly">
        <description>The Id key represents a unique identifier for a client Mac
address in a given statistics measurement interval.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="DeviceMACAddress" access="readOnly">
        <description>The DeviceMACAddress represents the MAC address of an associated
client device.</description>
        <syntax>
          <dataType ref="MACAddress"/>
        </syntax>
      </parameter>
      <parameter name="FramesSent" access="readOnly">
        <description>FrameSent is the total number of frames transmitted out of the
interface.
For conventional 802.11 MAC (a,b,g) this counter corresponds to the total of MSDUs
(MAC Service Data Unit) being transmitted.
For High Throughput transmissions this corresponds to the A-MSDU (Aggregation MSDU).
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesSentAck" access="readOnly">
        <description>DataFramesSentAck is the total number of MSDU frames marked as
duplicates and non duplicates acknowledged.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesSentNoAck" access="readOnly">
        <description>DataFramesSentNoAck is the total number of MSDU frames
retransmitted out of the interface (i.e., marked as duplicate and non-duplicate) and
not acknowledged but not including those defined in dataFramesLost.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesLost" access="readOnly">
        <description>DataFramesLost is the total number of MSDU frames retransmitted
out of the interface that where not acknowledged and discarded for reaching max number
of retransmissions.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="FramesReceived" access="readOnly">
        <description>FramesReceived is the total number of frames received by the
interface.
For conventional 802.11 MAC (a,b,g) this counter corresponds to the total of MSDUs
(MAC Service Data Unit) being transmitted.
```

```
For High Throughput transmissions (n) this corresponds to A-MSDUs (Aggregation MSDU)
and MSDUs.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesReceived" access="readOnly">
        <description>DataFramesReceived is the total number of MSDU frames received
and marked as non-duplicates.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesDuplicateReceived" access="readOnly">
        <description>DataFramesDuplicateReceived is the total number of duplicated
frames received on this interface.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="ProbesReceived" access="readOnly">
        <description>ProbesReceived is the total number of probes
received.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="ProbesRejected" access="readOnly">
        <description>ProbesRejected is the total number of probes
rejected.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="RSSI" access="readOnly">
        <description>The Received Signal Strength indicator is the energy observed at
the antenna receiver for a current transmission.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="SNR" access="readOnly">
        <description>The signal to Noise Ratio (SNR) parameter represents the strength
of the signal compared to received noise.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="Disassociations" access="readOnly">
        <description>Disassociations represents the total number of client
disassociations.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="AuthenticationFailures" access="readOnly">
        <description>AuthenticationFailures indicates the total number of
authentication failures.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="LastTimeAssociation" access="readOnly">
```

```
        <description>The LastTimeAssociation parameter represents the last time the
client was associated.</description>
        <syntax>
          <dateTime/>
        </syntax>
      </parameter>
      <parameter name="LastTimeDisassociation" access="readOnly">
        <description>LastTimeDisassociation parameter represents the last time the
client disassociate from the interface.
The all zeros value indicates the client is currently associated.</description>
        <syntax>
          <dateTime/>
        </syntax>
      </parameter>
    </object>
    <object name="Device.WiFi.SSID{i}.X_cablelabs-com_SSIDPolicy.">
      <description>The SSIDPolicy object defines the configuration of policies,
behaviors and event thresholds controlled per SSID.</description>
      <parameter name="BlockAfterAttempts" access="readWrite">
        <description>The BlockAfterAttempts parameter indicates the maximum number of
attempts a client is allowed to attempt registration before being denied access.
Exceeding this value generates one event. Events from same client should not reoccur
more than once an hour.
The value zero indicates no connection attempts restrictions.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="AllocatedBandwidth" access="readWrite">
        <description>The AllocatedBandwidth parameter indicates the maximum bandwidth
reserved for a particular interface.
The value zero indicates no limit.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="AuthenticationFailures" access="readWrite">
        <description>The AuthenticationFailures parameter indicates the number of
Authenticationfailures a station simultaneously produces to generate the event.
Events from same client should not reoccur more than once an hour.
The value 0 indicates no threshold and events of this type are not
generated.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="NonAuthenticatedTraffic" access="readWrite">
        <description>The NonAuthenticatedTraffic parameter represents the number of
non-authenticated messages received from a station to generate an event. Events from
same client should not reoccur more than once an hour.
The value 0 indicates no threshold and events of this type are not
generated.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="AssociationFailures" access="readWrite">
        <description>The AssociationFailures indicates the number of simultaneous
association failures from a station to generate an event. Events from same client
should not reoccur more than once an hour.
The value 0 indicates no threshold and events of this type are not
generated.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="StatsInterval" access="readWrite">
```

```
        <description>The StatsInterval parameter indicates the interval value to
collect per-interval statistics.

The value 0 indicates no interval and values reported are snapshots at the time of the
request.</description>
        <syntax>
          <int/>
        </syntax>
      </parameter>
      <parameter name="SNRThreshold" access="readWrite">
        <description>The SNR parameter indicates the threshold to report SNR. The
value -100 indicates no threshold, and events of this type are not
generated.</description>
        <syntax>
          <int/>
        </syntax>
      </parameter>
      <parameter name="ANPIThreshold" access="readWrite">
        <description>The ANPI parameter indicates the threshold to report the Average
Noise plus Interference. The value -100 indicates no threshold, and events of this
type are not generated.</description>
        <syntax>
          <int/>
        </syntax>
      </parameter>
      <parameter name="LowReceivedPowerThreshold" access="readWrite">
        <description>The LowReceivedPowerThreshold parameter indicates the power level
threshold to generate an event whenever the station received power is below the
threshold. The value -100 indicates no threshold, and events of this type are not
generated.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="LowPowerDeniedAccessThreshold" access="readWrite">
        <description>The LowPowerDeniedAccessThreshold parameter indicates the power
level threshold to deny client association whenever the station received power is
below the threshold. The value -100 indicates no threshold, and events of this type
are not generated.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="LowPowerDissasociationThreshold" access="readWrite">
        <description>The LowerPowerDissasociationThreshold parameter indicates the
threshold to report Disassociation due to low power. The Wi-Fi GW should refuse
associations when the power level is below this RSSI level. The value -100 indicates
no threshold, and events of this type are not generated.</description>
        <syntax>
          <int/>
        </syntax>
      </parameter>
    </object>
    <object name="Device.WiFi.AccessPoint{i}.X_cablelabs-com_ClientSessions.{i}.">
      <description>The ClientSessions object represents the current and closed
sessions (association connections).
When the maximum number of instances is reached, the oldest closed session instance is
replaced by a newly created client association.</description>
      <parameter name="Id" access="readOnly">
        <description>The Id key identifies a single client MAC Address.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="DeviceMACAddress" access="readOnly">
        <description>The DeviceMACAddress parameter indicates the MAC address of an
associated client device.</description>
```

```
        <syntax>
          <dataType ref="MACAddress"/>
        </syntax>
      </parameter>
      <parameter name="Start" access="readOnly">
        <description>The Start parameter indicates the time when the session
started.</description>
        <syntax>
          <dateTime/>
        </syntax>
      </parameter>
      <parameter name="Stop" access="readOnly">
        <description>The Stop parameter indicates the time when the session ended.
If the session us current the value reported is all zeros.</description>
        <syntax>
          <dateTime/>
        </syntax>
      </parameter>
      <parameter name="TerminationCode" access="readOnly">
        <description>The TerminationCode parameter indicates the Reason Code or the
Status Code that lead to ending the association of the station. Reason code and Status
code overlaps. The context of the type of termination is provided by the
TerminationMeaning attribute.
The value zero indicates the session is active.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="TerminationMeaning" access="readOnly">
        <description>The TerminationMeaning parameter indicates the meaning of the
Reason Code or Status Code for the ended session. The zero-length string is used when
the instance corresponds to an active session.</description>
        <syntax>
          <string>
            <size maxLength="32"/>
          </string>
        </syntax>
      </parameter>
    </object>
    <object name="Device.WiFi.AccessPoint{i}.X_cablelabs-com_ClientStats.{i}.">
      <description>The ClientStats object contains accumulative statistics for each
client station.
A station is reported only after is associated for the first time.</description>
      <parameter name="Interval" access="readOnly">
        <description>The Interval parameter indicate the measurements were
accumulated.
The interval of measurements is synchronized with the wall clock
The total number of intervals is based on a 24 hour period. At an interval of 15
minutes 96 intervals (1..96) are defined, at 30 minutes, 48 intervals (1..48) and 24
intervals (1..24) for 1 hour measurement interval.
Devices with no capable to report measurements per interval will report the value 0
for the interval attribute.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="Id" access="readOnly">
        <description>The Id key identifies a single client MAC Address.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="DeviceMACAddress" access="readOnly">
        <description>The DeviceMACAddress parameter indicates the MAC address of an
associated client device.</description>
        <syntax>
          <dataType ref="MACAddress"/>
```

```
        </syntax>
      </parameter>
      <parameter name="FramesSent" access="readOnly">
        <description>The FramesSent parameter indicates the total number of frames
transmitted out of the interface.
For conventional 802.11 MAC (a,b,g) this counter corresponds to the total of MSDUs
(MAC Service Data Unit) being transmitted.
For High Throughput transmissions this corresponds to the A-MSDU (Aggregation MSDU)
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesSentAck" access="readOnly">
        <description>The DataFramesSentAck parameter indicates the total number of
MSDU frames marked as duplicates and non duplicates acknowledged.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesSentNoAck" access="readOnly">
        <description>The DataFramesSentNoAck parameter indicates the total number of
MSDU frames retransmitted out of the interface (i.e., marked as duplicate and non-
duplicate) and not acknowledged but not including those defined in dataFramesLost.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesLost" access="readOnly">
        <description>The DataFramesLost parameter indicates the total number of MSDU
frames retransmitted out of the interface that where not acknowledged and discarded
for reaching max number of retransmissions.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="FramesReceived" access="readOnly">
        <description>The FramesReceived parameter indicates the total number of frames
received by the interface.
For conventional 802.11 MAC (a,b,g) this counter corresponds to the total of MSDUs
(MAC Service Data Unit) being transmitted.
For High Throughput transmissions (n) this corresponds to A-MSDUs (Aggregation MSDU)
and MSDUs.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesReceived" access="readOnly">
        <description>The DataFramesReceived parameter indicates the total number of
MSDU frames received and marked as non-duplicates.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
      <parameter name="DataFramesDuplicateReceived" access="readOnly">
        <description>The DataFramesDuplicateReceived parameter indicates the total
number of duplicated frames received on this interface.
The value of this counter MAY be reset to zero when the CPE is rebooted.</description>
        <syntax>
          <unsignedLong/>
        </syntax>
      </parameter>
```

```
      <parameter name="ProbesReceived" access="readOnly">
        <description>The ProbesReceived parameter indicates the Total number of probes
received.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="ProbesRejected" access="readOnly">
        <description>The ProbesRejected parameter indicates the total number of probes
rejected.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="RSSI" access="readOnly">
        <description>The Received Signal Strength Indicator, RSSI, parameter is the
energy observed at the antenna receiver for a current transmission.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="SNR" access="readOnly">
        <description>The signal to Noise Ratio (SNR) parameter indicates the signal
strength received from a client compared to the noise received.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="Disassociations" access="readOnly">
        <description>The Disassociations parameter indicates the total number of
client disassociations.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="AuthenticationFailures" access="readOnly">
        <description>The AuthenticationFailures parameter indicates the total number
of authentication failures.</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="LastTimeAssociation" access="readOnly">
        <description>The LastTimeAssociation parameter indicates the Last time the
client was associated.</description>
        <syntax>
          <dateTime/>
        </syntax>
      </parameter>
      <parameter name="LastTimeDisassociation" access="readOnly">
        <description>The LastTimeDisassociation parameter indicates the last time the
client disassociate from the interface.
The all zeros value indicates the client is currently associated.</description>
        <syntax>
          <dateTime/>
        </syntax>
      </parameter>
    </object>
    <object name="Device.WiFi.AccessPoint{i}.Security.X_cablelabs-com_RadiusClient.">
      <description>The Radius Client information for the SSIDs Requiring Radius
authentication.</description>
      <parameter name="NAS-Identifier" access="readWrite">
        <description>The NAS-Identifier parameter corresponds to the Radius attribute
NAS-Identifier used in Access request messages. The device always sends the Radius
parameter NAS-IP-Address and will send the NAS-Identifier parameter when this
attribute is set to other than the zero-length string. The NAS-Identifier attribute
can be used as a hint to indicate the authentication server the SSID domain where user
```

```
tries to authenticate, i.e., when more than one SSID domains are using the same Radius
server instance.</description>
        <syntax>
          <string>
            <size maxLength="255"/>
          </string>
        </syntax>
      </parameter>

      <parameter name="LocationPolicy" access="readWrite">
        <description>The LocationPolicy corresponds to the string value of the Radius
Basic-Location-Policy-Rules attribute per RFC 5580</description>
        <syntax>
          <hexBinary>
            <size maxLength="64"/>
          </hexBinary>
        </syntax>
      </parameter>
      <parameter name="OperatorName" access="readWrite">
        <description>The OperatorName parameter corresponds to the string value of the
Radius Operator-Name attribute per RFC 5580.</description>
        <syntax>
          <string>
            <size maxLength="32"/>
          </string>
        </syntax>
      </parameter>
      <parameter name="LocationInformation" access="readWrite">
        <description>The LocationInformation parameter corresponds to the string value
of the Radius Location-Information attribute per RFC 5580.</description>
        <syntax>
          <hexBinary>
            <size maxLength="253"/>
          </hexBinary>
        </syntax>
      </parameter>
      <parameter name="LocationData" access="readWrite">
        <description>The Location Data parameter corresponds to the string value of
the Radius LocationData attribute per RFC 5580.</description>
        <syntax>
          <hexBinary>
            <size maxLength="253"/>
          </hexBinary>
        </syntax>
      </parameter>
      <parameter name="UsageReports" access="readWrite">
        <description>The UsageReports parameter indicates whether the client send
usage data 'true' or not 'false'.</description>
        <syntax>
          <boolean/>
        </syntax>
      </parameter>
      <parameter name="IntervalInterimReport" access="readWrite">
        <description>The IntervalInterimReport parameter indicates whether the client
send Interim reports at time intervals 'true' or not 'false'.</description>
        <syntax>
          <boolean/>
        </syntax>
      </parameter>
      <parameter name="APTransitionReport" access="readWrite">
        <description>A 'true' value for the APTransitionReport parameter indicates the
client sends Interim reports when the stations transitions to a different Access
point.</description>
        <syntax>
          <boolean/>
        </syntax>
      </parameter>
```

```
      <parameter name="GigawordReport" access="readWrite">
        <description>A 'true' value for Gigaword Report indicates the client sends
Interim reports when the 32-bit counters rollover</description>
        <syntax>
          <boolean/>
        </syntax>
      </parameter>
    </object>
    <object name="Device.WiFi.AccessPoint{i}.Security.X_cablelabs-
com_SecurityExtension.">
      <description>This object defines IEEE security attributes not defined in TR-181
data model for completeness.
This object includes :
- Additional WEP keys: TR-181 assumes WEP key index 1 is only used. WEPKey corresponds
to key 1 and this object defines keys 2, 3 and 4.
- WEP Key index selection: To specify the WEP key used.
- WEP Key mode: 64 or 128 bit keys.
-WPA Encryption : AES or TKIP+AES</description>
      <parameter name="WEPKey2" access="readWrite">
        <description>The WEP key 2 expressed as a hexadecimal string.</description>
        <syntax>
          <string>
            <size minLength="5"/>
            <size maxLength="13"/>
          </string>
        </syntax>
      </parameter>
      <parameter name="WEPKey3" access="readWrite">
        <description>The WEP key 3 expressed as a hexadecimal string.</description>
        <syntax>
          <string>
            <size minLength="5"/>
            <size maxLength="13"/>
          </string>
        </syntax>
      </parameter>
      <parameter name="WEPKey4" access="readWrite">
        <description>The WEP key 4 expressed as a hexadecimal string.</description>
        <syntax>
          <string>
            <size minLength="5"/>
            <size maxLength="13"/>
          </string>
        </syntax>
      </parameter>
      <parameter name="WEPIndex" access="readWrite">
        <description>This attribute defines the selected WEP key.</description>
        <syntax>
          <int>
            <range minInclusive="1" maxInclusive="4"/>
          </int>
        </syntax>
      </parameter>
      <parameter name="WEPPassPhrase" access="readWrite">
        <description> This attribute defines a human readable password to derive the
WEP keys, following well-known key generation algorithm for this purpose.

When this attribute is a zero-length string, WEP keys are used directly. Otherwise,
the values of the WEP keys cannot be changed directly and an error on write is
returned.
</description>
        <syntax>
          <string>
            <size minLength="5"/>
            <size maxLength="13"/>
          </string>
        </syntax>
```

```
      </parameter>
      <parameter name="WPAEncryption" access="readWrite">
        <description>This attribute defines the encryption algorithm used for
WPA.</description>
        <syntax>
          <string>
            <enumeration value="aes"/>
            <enumeration value="tkip+aes"/>
          </string>
          <default type="object" value="tkip+aes"/>
        </syntax>
      </parameter>
    </object>
    <object name="Device.WiFi.X_cablelabs-com_WIFIEventNotif.">
      <description>This object represents the Wi-Fi GW notification
object</description>
      <parameter name="Text" access="readWrite">
        <description>This attribute represents the Event Message of the
event.</description>
        <syntax>
          <string>
            <size maxLength="255"/>
          </string>
        </syntax>
      </parameter>
      <parameter name="EventId" access="readWrite">
        <description>The identifier of the event</description>
        <syntax>
          <unsignedInt/>
        </syntax>
      </parameter>
      <parameter name="TimeStamp" access="readWrite">
        <description>Date and Time when the event was generated. (not the time when
the event was dispatched).</description>
        <syntax>
          <dateTime/>
        </syntax>
      </parameter>
    </object>


    <profile name="CableWiFiExtensions:1">
      <object ref="Device.WiFi.Radio.{i}.X_cablelabs-com_DataRateStats"
requirement="present">
        <attribute ref="Rate" requirement="readOnly"/>
        <attribute ref="FramesSent" requirement="readOnly"/>
        <attribute ref="FramesRetransmissionsSent" requirement="readOnly"/>
        <attribute ref="FramesReceived" requirement="readOnly"/>
        <attribute ref="FramesDuplicatedReceived" requirement="readOnly"/>
      </object>
      <object ref="Device.WiFi.SSID.{i}.X_cablelabs-com_PeriodicStats"
requirement="present">
        <attribute ref="Interval" requirement="readOnly"/>
        <attribute ref="Id" requirement="readOnly"/>
        <attribute ref="DeviceMACAddress" requirement="readOnly"/>
        <attribute ref="FramesSent" requirement="readOnly"/>
        <attribute ref="DataFramesSentAck" requirement="readOnly"/>
        <attribute ref="DataFramesSentNoAck" requirement="readOnly"/>
        <attribute ref="DataFramesLost" requirement="readOnly"/>
        <attribute ref="FramesReceived" requirement="readOnly"/>
        <attribute ref="DataFramesReceived" requirement="readOnly"/>
        <attribute ref="DataFramesDuplicateReceived" requirement="readOnly"/>
        <attribute ref="ProbesReceived" requirement="readOnly"/>
        <attribute ref="ProbesRejected" requirement="readOnly"/>
        <attribute ref="RSSI" requirement="readOnly"/>
        <attribute ref="SNR" requirement="readOnly"/>
        <attribute ref="Disassociations" requirement="readOnly"/>
```

```
        <attribute ref="AuthenticationFailures" requirement="readOnly"/>
        <attribute ref="LastTimeAssociation" requirement="readOnly"/>
        <attribute ref="LastTimeDisassociation" requirement="readOnly"/>
      </object>
      <object ref="Device.WiFi.SSID{i}.X_cablelabs-com_SSIDPolicy"
requirement="present">
        <attribute ref="BlockAfterAttempts" requirement="readWrite"/>
        <attribute ref="AllocatedBandwidth" requirement="readWrite"/>
        <attribute ref="AuthenticationFailures" requirement="readWrite"/>
        <attribute ref="NonAuthenticatedTraffic" requirement="readWrite"/>
        <attribute ref="AssociationFailures" requirement="readWrite"/>
        <attribute ref="StatsInterval" requirement="readWrite"/>
        <attribute ref="SNRThreshold" requirement="readWrite"/>
        <attribute ref="ANPIThreshold" requirement="readWrite"/>
        <attribute ref="LowReceivedPowerThreshold" requirement="readWrite"/>
        <attribute ref="LowPowerDeniedAccessThreshold" requirement="readWrite"/>
        <attribute ref="LowPowerDissasociationThreshold" requirement="readWrite"/>
      </object>
      <object ref="Device.WiFi.AccessPoint{i}.X_cablelabs-com_ClientSessions"
requirement="present">
        <attribute ref="Id" requirement="readOnly"/>
        <attribute ref="DeviceMACAddress" requirement="readOnly"/>
        <attribute ref="Start" requirement="readOnly"/>
        <attribute ref="Stop" requirement="readOnly"/>
        <attribute ref="TerminationCode" requirement="readOnly"/>
        <attribute ref="TerminationMeaning" requirement="readOnly"/>
      </object>
      <object ref="Device.WiFi.AccessPoint{i}.X_cablelabs-com_ClientStats"
requirement="present">
        <attribute ref="Interval" requirement="readOnly"/>
        <attribute ref="Id" requirement="readOnly"/>
        <attribute ref="DeviceMACAddress" requirement="readOnly"/>
        <attribute ref="FramesSent" requirement="readOnly"/>
        <attribute ref="DataFramesSentAck" requirement="readOnly"/>
        <attribute ref="DataFramesSentNoAck" requirement="readOnly"/>
        <attribute ref="DataFramesLost" requirement="readOnly"/>
        <attribute ref="FramesReceived" requirement="readOnly"/>
        <attribute ref="DataFramesReceived" requirement="readOnly"/>
        <attribute ref="DataFramesDuplicateReceived" requirement="readOnly"/>
        <attribute ref="ProbesReceived" requirement="readOnly"/>
        <attribute ref="ProbesRejected" requirement="readOnly"/>
        <attribute ref="RSSI" requirement="readOnly"/>
        <attribute ref="SNR" requirement="readOnly"/>
        <attribute ref="Disassociations" requirement="readOnly"/>
        <attribute ref="AuthenticationFailures" requirement="readOnly"/>
        <attribute ref="LastTimeAssociation" requirement="readOnly"/>
        <attribute ref="LastTimeDisassociation" requirement="readOnly"/>
      </object>
      <object ref="Device.WiFi.AccessPoint{i}.Security.X_cablelabs-com_RadiusClient"
requirement="present">
        <attribute ref="Username" requirement="readWrite"/>
        <attribute ref="SharedSecret" requirement="readWrite"/>
        <attribute ref="ServiceType" requirement="readWrite"/>
        <attribute ref="Server" requirement="readWrite"/>
        <attribute ref="FramedProtocol" requirement="readWrite"/>
        <attribute ref="NAS-IP-Address" requirement="readWrite"/>
        <attribute ref="NAS-Port" requirement="readWrite"/>
        <attribute ref="LocationPolicy" requirement="readWrite"/>
        <attribute ref="OperatorName" requirement="readWrite"/>
        <attribute ref="LocationInformation" requirement="readWrite"/>
        <attribute ref="LocationData" requirement="readWrite"/>
        <attribute ref="UsageReports" requirement="readWrite"/>
        <attribute ref="IntervalInterimReport" requirement="readWrite"/>
        <attribute ref="APTransitionReport" requirement="readWrite"/>
        <attribute ref="GigawordReport" requirement="readWrite"/>
      </object>
```

```
      <object ref="Device.WiFi.AccessPoint{i}.Security.X_cablelabs-
com_SecurityExtension." requirement="present">
        <attribute ref="WEPKey2" requirement="readWrite"/>
        <attribute ref="WEPKey3" requirement="readWrite"/>
        <attribute ref="WEPKey4" requirement="readWrite"/>
        <attribute ref="WEPIndex" requirement="readWrite"/>
        <attribute ref="WPAEncryption" requirement="readWrite"/>
      </object>
      <object ref="Device.WiFi.X_WIFIEventNotif" requirement="present">
        <attribute ref="Text" requirement="readOnly"/>
        <attribute ref="EventId" requirement="readOnly"/>
        <attribute ref="TimeStamp" requirement="readOnly"/>
      </object>
    </profile>
  </component>
</dm:document>
```

Appendix I Acknowledgements

This specification reflects the work and contributions of many individuals. On behalf of CableLabs and its participating member companies, we would like to extend our sincere appreciation to all those who have contributed to the development of this specification. Special thanks are given to the following, ordered alphabetically by company name and individual's first names in each company:

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Appendix II Revision History

The following Engineering Change has been incorporated in WR-SP-WiFi-MGMT-I02-101005.

ECN	ECN Date	Summary
WiFi-MGMT-N-10.0002-4.doc	9/27/2010	WiFi GW TR-69 support

The following Engineering Change has been incorporated in WR-SP-WiFi-MGMT-I03-120216.

ECN	ECN Date	Summary
WiFi-MGMT-N-0006-5	1/6/2012	Clarifications and constraints to SNMP and TR-069 date models of the device gateway.