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RADIUS Attributes for IEEE 802 Networks
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Abstract

RFC 3580 provides guidelines for the use of the Remote Authentication Dialin User Service (RADIUS) within IEEE 802 local area networks (LANs). This document proposes additional attributes for use within IEEE 802 networks, as well as clarifications on the usage of the EAP-Key-Name attribute, updating RFC 4072. The attributes defined in this document are usable both within RADIUS and Diameter.

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1. Introduction

In situations where it is desirable to centrally manage authentication, authorization and accounting (AAA) for IEEE 802 [IEEE-802] networks, deployment of a backend authentication and accounting server is desirable. In such situations, it is expected that IEEE 802 authenticators will function as AAA clients.

"IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines" [RFC3580] defined guidelines for the use of the Remote Authentication Dialin User Service (RADIUS) within networks utilizing IEEE 802 local area networks. This document defines additional attributes suitable for usage by IEEE 802 authenticators acting as AAA clients. The attributes defined in this document are usable both within RADIUS and Diameter.

1.1. Terminology

This document uses the following terms:

Access Point (AP)
: A Station that provides access to the distribution services via the wireless medium for associated Stations.

Association
: The service used to establish Access Point/Station mapping and enable Station invocation of the distribution system services.

authenticator
: An authenticator is an entity that require authentication from the supplicant. The authenticator may be connected to the supplicant at the other end of a point-to-point LAN segment or wireless link.

authentication server
: An authentication server is an entity that provides an authentication service to an authenticator. This service verifies from the credentials provided by the supplicant, the claim of identity made by the supplicant.

Station (STA)
: Any device that contains an IEEE 802.11 conformant medium access control (MAC) and physical layer (PHY) interface to the wireless medium (WM).

Supplicant
: A supplicant is an entity that is being authenticated by an authenticator. The supplicant may be connected to the authenticator at one end of a point-to-point LAN segment or 802.11 wireless link.

1.2. Requirements Language

In this document, several words are used to signify the requirements of the specification. The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

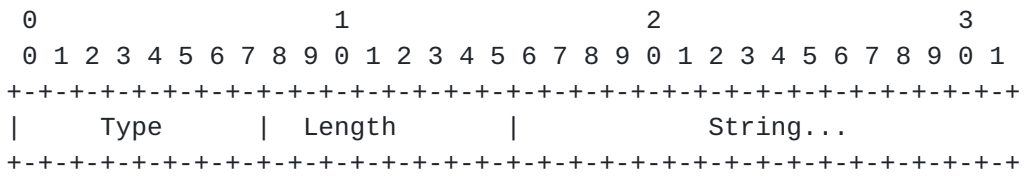
2. RADIUS attributes

2.1. Allowed-Called-Station-Id

Description

The Allowed-Called-Station-Id Attribute allows the RADIUS server to specify the authenticator MAC addresses and/or networks to which the user is allowed to connect. One or more Allowed-Called-Station-Id attributes MAY be included in an Access-Accept or CoA-Request packet.

A summary of the Allowed-Called-Station-Id Attribute format is shown below. The fields are transmitted from left to right.



Code

TBD1

Length

>=3

String

The String field is one or more octets, containing the layer 2 endpoint that the user's call is allowed to be terminated on, as specified in the definition of Called-Station-Id in [RFC2865] Section 5.30 and [RFC3580] Section 3.20. In the case of IEEE 802, the Allowed-Called-Station-Id Attribute is used to store the Medium Access Control (MAC) address in ASCII format (upper case only), with octet values separated by a "-". Example: "00-10-A4-23-19-C0". Where restrictions on both the network and authenticator MAC address usage are intended, the network name

MUST be appended to the authenticator MAC address, separated from the MAC address with a ":". Example: "00-10-A4-23-19-C0:AP1". Where no MAC address restriction is intended, the MAC address field MUST be omitted, but ":" and the network name field MUST be included. Example: ":AP1". Within IEEE 802.11 [IEEE-802.11], the SSID constitutes the network name; within IEEE 802.1X [IEEE-802.1X], the Network-Id Name (NID-Name) constitutes the network name. Since a NID-Name can be up to 253 octets in length, when used with [IEEE-802.1X], there may not be sufficient room within the Allowed-Called-Station-Id Attribute to include a MAC address.

If the user attempts to connect to the NAS from a Called-Station-Id that does not match one of the Allowed-Called-Station-Id attributes, then the user MUST NOT be permitted to access the network.

The Allowed-Called-Station-Id Attribute can be useful in the following situations:

[1] Where users can connect to a NAS without an Access-Request being sent by the NAS to the RADIUS server (e.g. where key caching is supported within IEEE 802.11 or IEEE 802.1X [IEEE-802.1X]). To ensure that an attacker cannot gain entry to a network they have not authenticated to, key cache entries are typically only usable within the network to which the user originally authenticated (e.g. the originally selected network name is implicitly attached to the key cache entry). Also, if it is desired that access to a network name not be available from a particular authenticator MAC address, then the authenticator can be set up not to advertise that particular network name.

[2] Where pre-authentication may be supported (e.g. IEEE 802.1X pre-authentication). In this situation, the network name typically will not be included in a Called-Station-Id Attribute within the Access-Request, so that the RADIUS server will not know the network that the user is attempting to access. As a result, the RADIUS server may desire to restrict the networks to which the user can subsequently connect.

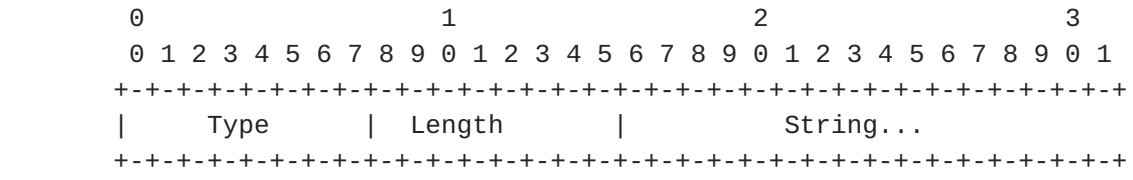
[3] Where the network portion of the Called-Station-Id is present within an Access-Request, the RADIUS server can desire to authorize access to a network different from the one that the user selected.

2.2. EAP-Key-Name

Description

The EAP-Key-Name Attribute, defined in "Diameter Extensible Authentication Protocol (EAP) Application" [RFC4072], contains the EAP Session-Id, as described in "Extensible Authentication Protocol (EAP) Key Management Framework" [RFC5247]. Exactly how this Attribute is used depends on the link layer in question.

It should be noted that not all link layers use this name. An EAP-Key-Name Attribute MAY be included within Access-Request, Access-Accept and CoA-Request packets. A summary of the EAP-Key-Name Attribute format is shown below. The fields are transmitted from left to right.



Code

102 [RFC4072]

Length

>=3

String

The String field is one or more octets, containing the EAP Session-Id, as defined in "Extensible Authentication Protocol (EAP) Key Management Framework" [RFC5247]. Since the NAS operates as a pass-through in EAP, it cannot know the EAP Session-Id before receiving it from the RADIUS server. As a result, an EAP-Key-Name Attribute sent in an Access-Request MUST only contain a single NUL character. A RADIUS server receiving an Access-Request with an EAP-Key-Name Attribute containing anything other than a single NUL character MUST silently discard the Attribute. In addition, the RADIUS server SHOULD include this Attribute in an Access-Accept or CoA-Request only if an EAP-Key-Name Attribute was present in the Access-Request. Since a NAS will typically only include a EAP-Key-Name Attribute in an Access-Request in situations where the Attribute is required to provision service, if an EAP-Key-Name Attribute is included in an Access-Request but is not present in the Access-Accept, the NAS SHOULD treat the Access-Accept as

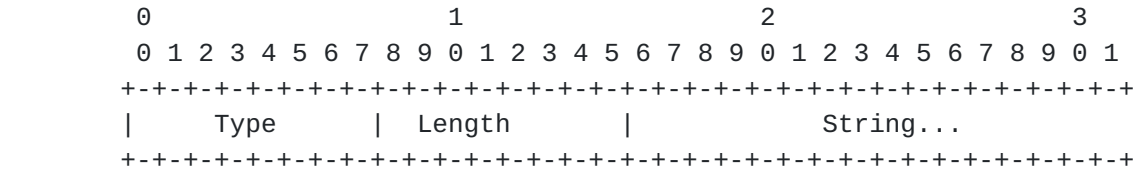
though it were an Access-Reject. If an EAP-Key-Name Attribute was not present in the Access-Request but is included in the Access-Accept, then the NAS SHOULD silently discard the EAP-Key-Name Attribute.

2.3. EAP-Peer-Id

Description

The EAP-Peer-Id Attribute contains a Peer-Id generated by the EAP method. Exactly how this name is used depends on the link layer in question. See [RFC5247] for more discussion. The EAP-Peer-Id Attribute MAY be included in Access-Request, Access-Accept and Accounting-Request packets. More than one EAP-Peer-Id Attribute MUST NOT be included in an Access-Request; one or more EAP-Peer-Id attributes MAY be included in an Access-Accept.

It should be noted that not all link layers use this name, and existing EAP method implementations do not generate it. Since the NAS operates as a pass-through in EAP [RFC3748], it cannot know the EAP-Peer-Id before receiving it from the RADIUS server. As a result, an EAP-Peer-Id Attribute sent in an Access-Request MUST only contain a single NUL character. A home RADIUS server receiving an Access-Request an EAP-Peer-Id Attribute containing anything other than a single NUL character MUST silently discard the Attribute. In addition, the home RADIUS server SHOULD include one or more EAP-Peer-Id attributes in an Access-Accept only if an EAP-Peer-Id Attribute was present in the Access-Request. If a NAS receives EAP-Peer-Id Attribute(s) in an Access-Accept without having included one in an Access-Request, the NAS SHOULD silently discard the Attribute(s). A summary of the EAP-Peer-Id Attribute format is shown below. The fields are transmitted from left to right.



Code

TBD2

Length

>=3

String

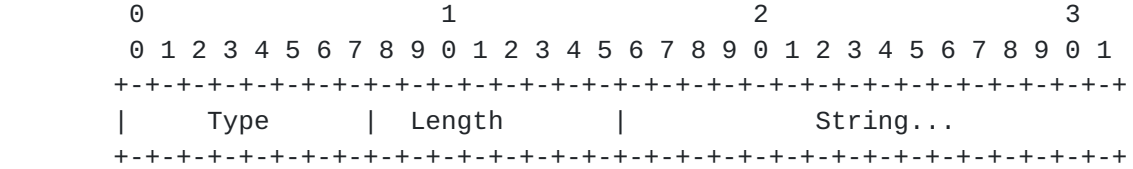
The String field is one or more octets containing a EAP Peer-Id exported by the EAP method. For details, see [RFC5247] Appendix A. A robust implementation SHOULD support the field as undistinguished octets. Only a single EAP Peer-Id may be included per Attribute.

2.4. EAP-Server-Id

Description

The EAP-Server-Id Attribute contains a Server-Id generated by the EAP method. Exactly how this name is used depends on the link layer in question. See [RFC5247] for more discussion. The EAP-Server-Id Attribute is only allowed in Access-Request, Access-Accept, and Accounting-Request packets. More than one EAP-Server-Id Attribute MUST NOT be included in an Access-Request; one or more EAP-Server-Id attributes MAY be included in an Access-Accept.

It should be noted that not all link layers use this name, and existing EAP method implementations do not generate it. Since the NAS operates as a pass-through in EAP [RFC3748], it cannot know the EAP-Server-Id before receiving it from the RADIUS server. As a result, an EAP-Server-Id Attribute sent in an Access-Request MUST contain only a single NUL character. A home RADIUS server receiving in an Access-Request an EAP-Server-Id Attribute containing anything other than a single NUL character MUST silently discard the Attribute. In addition, the home RADIUS server SHOULD include this Attribute an Access-Accept only if an EAP-Server-Id Attribute was present in the Access-Request. A summary of the EAP-Server-Id Attribute format is shown below. The fields are transmitted from left to right.



Code

TBD3

Length

>=3

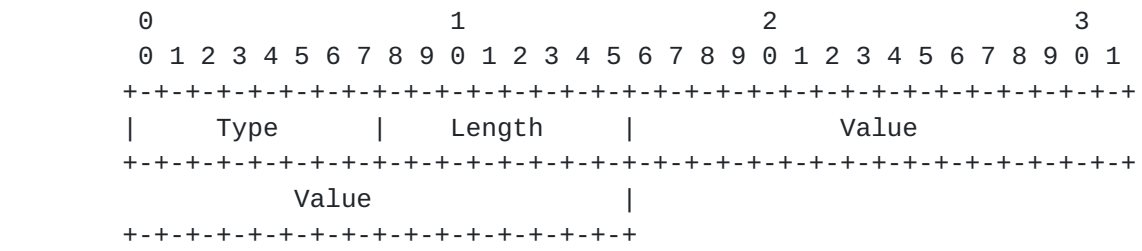
String

The String field is one or more octets, containing a EAP Server-Id exported by the EAP method. For details, see [RFC5247] Appendix A. A robust implementation SHOULD support the field as undistinguished octets.

2.5. Mobility-Domain-Id

Description

A single Mobility-Domain-Id Attribute MAY be included in an Access-Request or Accounting-Request, in order to enable the NAS to provide the RADIUS server with the Mobility Domain Identifier (MDID), defined in Section 8.4.2.49 of [IEEE-802.11]. A summary of the Mobility-Domain-Id Attribute format is shown below. The fields are transmitted from left to right.



Code

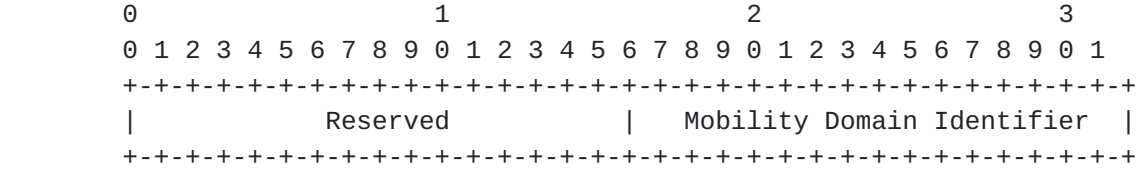
TBD4

Length

6

Value

The Value field is four octets, containing a 32-bit unsigned integer. The two most significant octets MUST be set to zero by the sender, and are ignored by the receiver; the two least significant octets contain the Mobility Domain Identifier (MDID) defined in Section 8.4.2.49 of [IEEE-802.11].

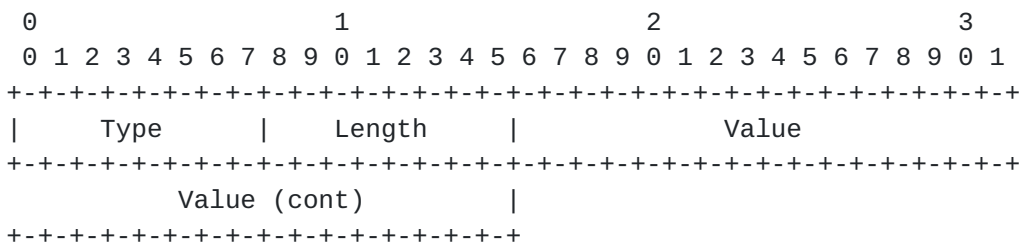


2.6. Preauth-Timeout

Description

This Attribute sets the maximum number of seconds which pre-authentication state is required to be kept by the NAS, without being utilized within a user session. For example, when [IEEE-802.11] pre-authentication is used, if a user has not attempted to utilize the Pairwise Master Key (PMK) derived as a result of pre-authentication within the time specified by the Preauth-Timeout Attribute, the PMK MAY be discarded by the Access Point. However, once the session is underway, the Preauth-Timeout Attribute has no bearing on the maximum session time for the user, or the maximum time during which key state may be kept prior to re-authentication. This is determined by the Session-Timeout Attribute, if present.

This Attribute MAY be sent by the server to the NAS in an Access-Accept. A summary of the Preauth-Timeout Attribute format is shown below. The fields are transmitted from left to right.



Code

TBD5

Length

6

Value

The field is 4 octets, containing a 32-bit unsigned integer encoding the maximum time in seconds that pre-authentication state should be retained by the NAS.

2.7. Network-Id-Name

Description

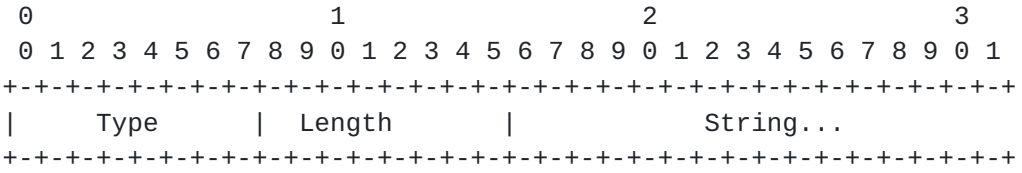
The Network-Id-Name Attribute is utilized by implementations of

IEEE-802.1X [IEEE-802.1X] to specify the name of a Network-Id (NID-Name).

Unlike the IEEE 802.11 SSID (which is a maximum of 32 octets in length), the NID-Name may be up to 253 octets in length. Consequently, if the MAC address is included within the Called-Station-Id Attribute, it is possible that there will not be enough remaining space to encode the NID-Name as well. Therefore when used with IEEE 802.1X [IEEE-802.1X], the Called-Station-Id Attribute SHOULD contain only the MAC address, with the Network-Id-Name Attribute used to transmit the NID-Name. The Network-Id-Name Attribute MUST NOT be used to encode the IEEE 802.11 SSID; as noted in [RFC3580], the Called-Station-Id Attribute is used for this purpose.

Zero or one Network-Id-Name Attribute is permitted within a RADIUS Access-Request or Accounting-Request packet. When included within an Access-Request packet, the Network-Id-Name Attribute represents a hint of the NID-Name to which the Supplicant should be granted access. In order to indicate which network names the Supplicant is permitted to access, the Allowed-Called-Station-Id Attribute is provided within an Access-Accept. When included within an Accounting-Request packet, the Network-Id-Name Attribute represents the NID-Name to which the Supplicant has been granted access.

A summary of the Network-Id-Name Attribute format is shown below. The fields are transmitted from left to right.



Code

TBD6

Length

>=3

String

The String field is one or more octets, containing a NID-Name. For details, see [IEEE-802.1X]. A robust implementation SHOULD support the field as undistinguished octets.

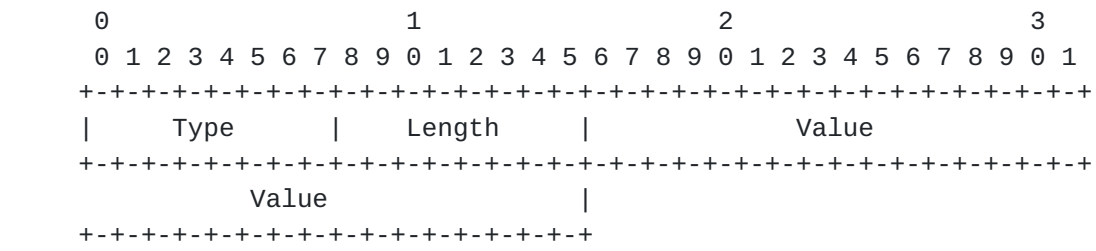
2.8. Access-Info

Description

The Access-Info Attribute is utilized by implementations of IEEE-802.1X [IEEE-802.1X] to specify the Access status information field within an Access Information Type Length Value Tuple (TLV) to be sent to the user within MACsec Key Agreement (MKA) or EAPoL-Announcement frames.

A single Access-Info Attribute is permitted within a RADIUS Access-Accept, Access-Challenge, Access-Reject or Accounting-Request packet.

A summary of the Access-Info Attribute format is shown below. The fields are transmitted from left to right.



Code

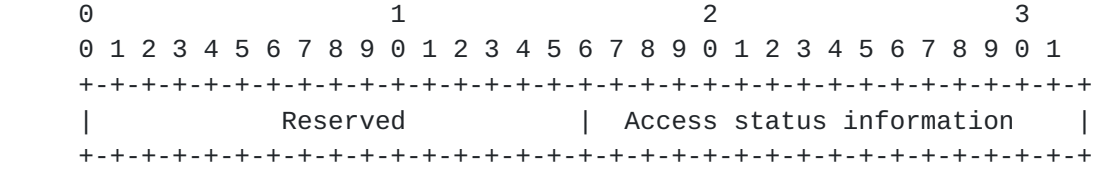
TBD7

Length

6

Value

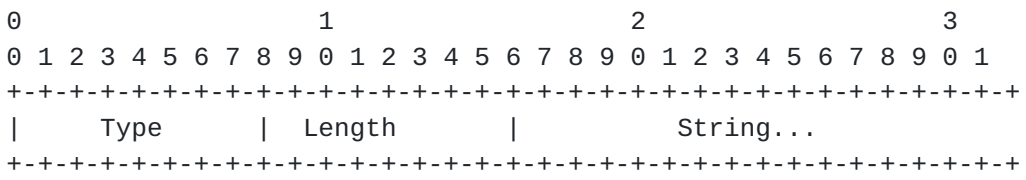
The Value field is four octets, containing a 32-bit unsigned integer. The two most significant octets MUST be set to zero by the sender, and are ignored by the receiver; the two least significant octets contain the Access status information defined in Table 11-9 of Section 11.12.2 of [IEEE-802.1X].



2.9. WLAN-SSID

Description

The WLAN-SSID attribute contains the Service Set Identifier (SSID) which identifies a specific 802.11 extended service set (ESS). A single WLAN-SSID Attribute is permitted within an Access-Accept or Accounting-Request packet.



Code

TBD8

Length

3 to 34

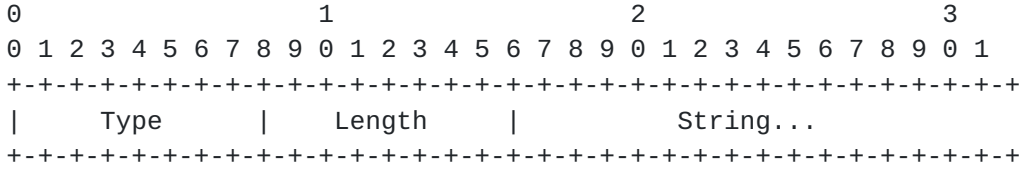
String

The String field is between 1 and 32 octets in length. The actual format of the information is site or application specific, and a robust implementation MUST support the field as undistinguished octets.

2.10. WLAN-HESSID

Description

The WLAN-HESSID attribute contains a MAC address that identifies the Homogenous Extended Service Set. The HESSID is a globally unique identifier that in conjunction with the WLAN-SSID, may be used to provide network identification for a subscription service provider network (SSPN), as described in Section 8.4.2.94 of [IEEE-802.11]. A single WLAN-HESSID Attribute is permitted within an Access-Accept or Accounting-Request packet.



Code

TBD9

Length

19

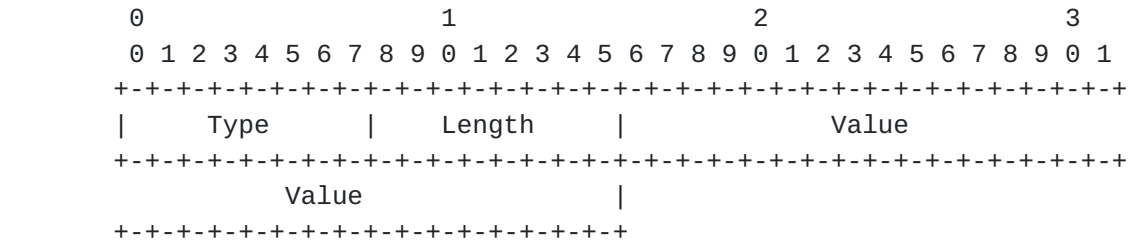
String

The String field is encoded in upper-case ASCII characters with the octet values separated by dash characters, as described in RFC 3580 [RFC3580]. Example: "00-10-A4-23-19-C0".

2.11. WLAN-Venue-Info

Description

The WLAN-Venue-Info attribute identifies the category of venue hosting the WLAN, as defined in Section 8.4.1.34 of [IEEE-802.11].



Code

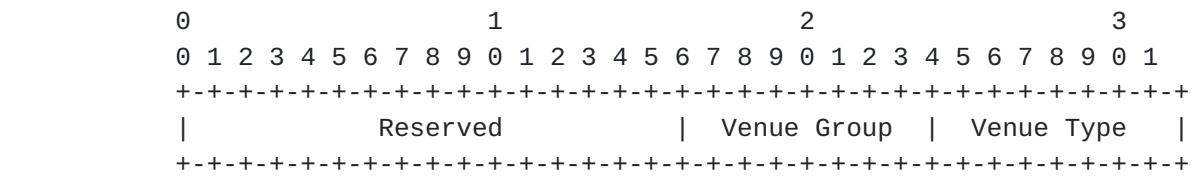
TBD10

Length

6

Value

The Value field is four octets, containing a 32-bit unsigned integer. The two most significant octets MUST be set to zero by the sender, and are ignored by the receiver; the two least significant octets contain the Venue Group and Venue Type fields.



Venue Group

The Venue Group field is a single octet and describes the broad category of the venue, e.g. "Assembly". See Section 8.4.1.34 [IEEE-802.11] for Venue Group codes and descriptions.

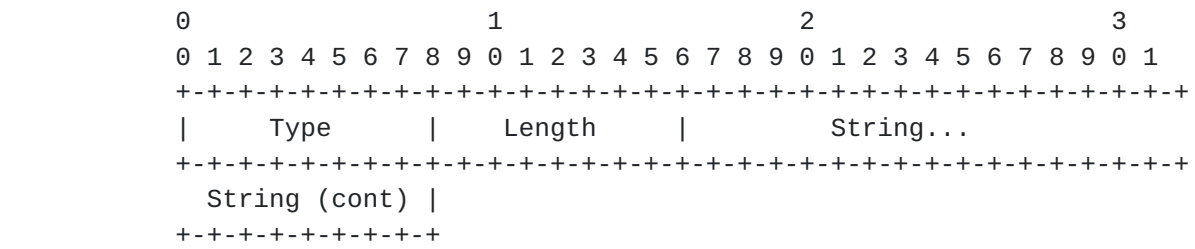
Venue Type

The Venue Type field is a single octet and describes the venue in a finer granularity within the Venue Group, e.g. "Library". See Section 8.4.1.34 of [IEEE-802.11] for Venue Type codes and descriptions.

2.12. WLAN-Venue-Language

Description

The WLAN-Venue-Language attribute is an ISO-14962-1997 [ISO-14962-1997] encoded string that defines the language used in the WLAN-Venue-Name attribute. Zero or more WLAN-Venue-Language attributes may be included in an Access-Request or Accounting-Request and each one indicates the language of the WLAN-Venue-Name attribute that follows it.



Code

TBD11

Length

4-5

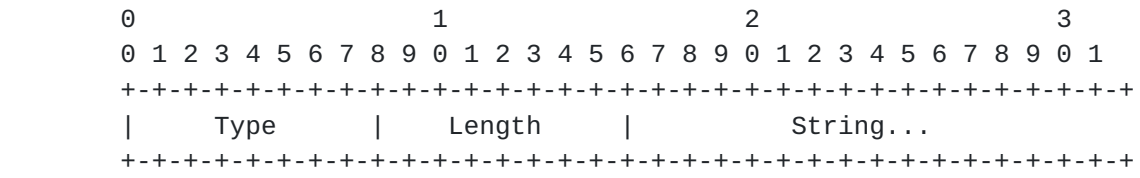
String

The String field is a two or three character language code selected from ISO-639 [ISO-639]. A two character language code has a zero ("null" in ISO-14962-1997) appended to make it 3 octets in length.

2.13. WLAN-Venue-Name

Description

The WLAN-Venue-Name attribute provides additional metadata on the BSS. For example, this information may be used to assist a user in selecting the appropriate BSS with which to associate. Zero or more WLAN-Venue-Name attributes may be included in an Access-Request or Accounting-Request in the same or different languages.



Code

TBD12

Length

>=3

String

The String field is a UTF-8 formatted field containing the venue's name. The maximum length of this field is 252 octets.

2.14. WLAN-Reason-Code

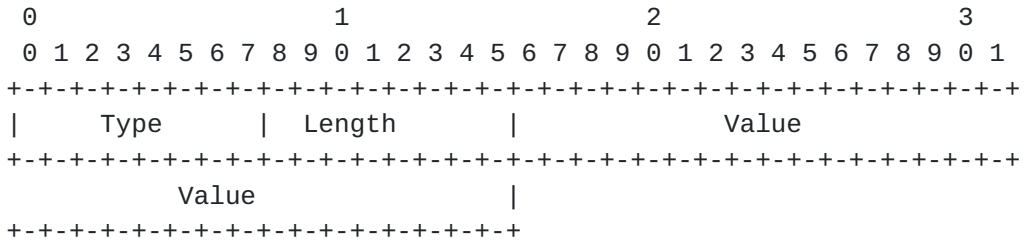
Description

The WLAN-Reason-Code Attribute contains information on the reason why a station has been refused network access and has been disassociated or de-authenticated. This can occur due to policy or for reasons related to the user's subscription.

A WLAN-Reason-Code Attribute MAY be included within an Access-Reject or Disconnect-Request packet, as well as within an Accounting-Request packet. Upon receipt of an Access-Reject or Disconnect-Request packet containing a WLAN-Reason-Code Attribute, the WLAN-Reason-Code value is copied by the Access Point into the

Reason Code field of a Disassociation or Deauthentication frame (see clause 8.3.3.4 and 8.3.3.12 respectively in [IEEE- 802.11]), which is subsequently transmitted to the station.

A summary of the WLAN-Reason-Code Attribute format is shown below. The fields are transmitted from left to right.



Code

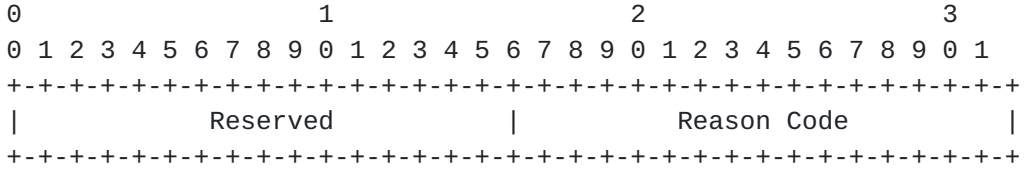
TBD13

Length

6

Value

The Value field is four octets, containing a 32-bit unsigned integer. The two most significant octets MUST be set to zero by the sender, and are ignored by the receiver; the two least significant octets contain the Reason Code values defined in Table 8-36 of Section 8.4.1.7 of [IEEE-802.11].



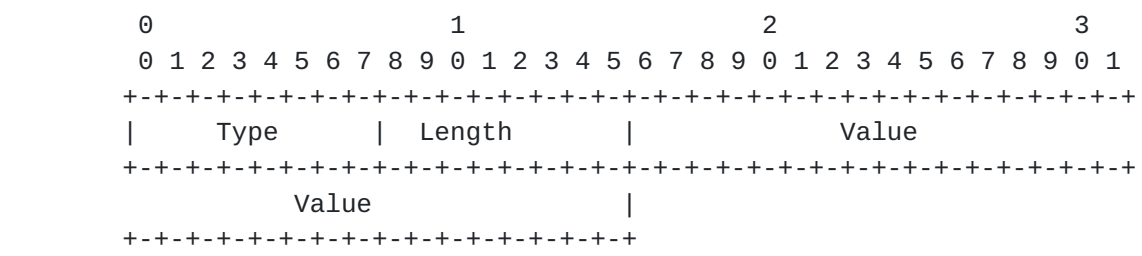
2.15. WLAN-Pairwise-Cipher

Description

The WLAN-Pairwise-Cipher Attribute contains information on the pairwise cipher suite used to establish the robust security network association (RSNA) between the AP and mobile device.

A WLAN-Pairwise-Cipher Attribute MAY be included within Access-Request and Accounting-Request packets. A summary of the WLAN-Pairwise-Cipher Attribute format is shown below.

The fields are transmitted from left to right.



Code

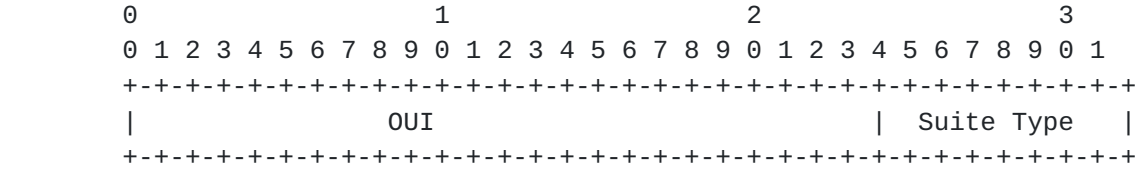
TBD14

Length

6

Value

The Value field is four octets, containing a 32-bit unsigned integer, formatted as specified in Figure 8-187 within Section 8.4.2.27.2 of [IEEE-802.11], with values drawn from Table 8-99.

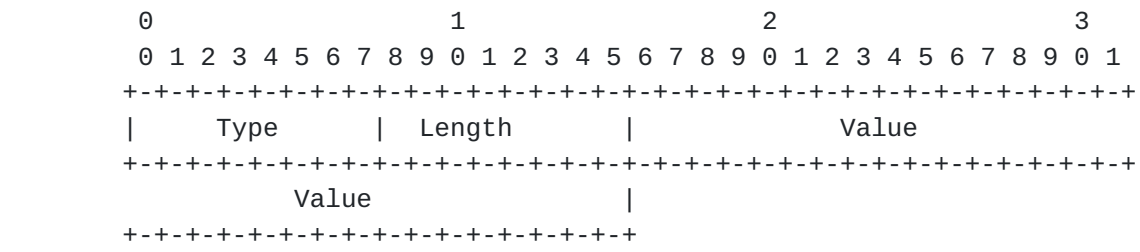


2.16. WLAN-Group-Cipher

Description

The WLAN-Group-Cipher Attribute contains information on the group cipher suite used to establish the robust security network association (RSNA) between the AP and mobile device.

A WLAN-Group-Cipher Attribute MAY be included within Access-Request and Accounting-Request packets. A summary of the WLAN-Group-Cipher Attribute format is shown below. The fields are transmitted from left to right.



Code

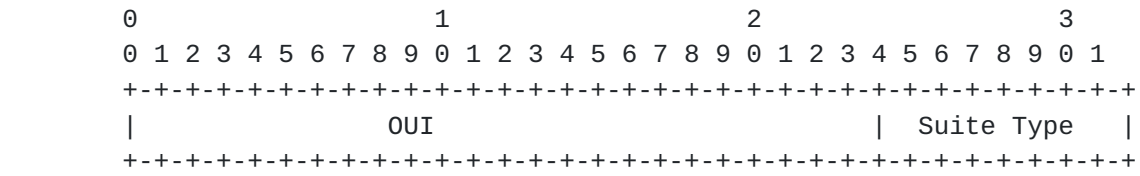
TBD15

Length

6

Value

The Value field is four octets, containing a 32-bit unsigned integer, formatted as specified in Figure 8-187 within Section 8.4.2.27.2 of [IEEE-802.11], with values drawn from Table 8-99.

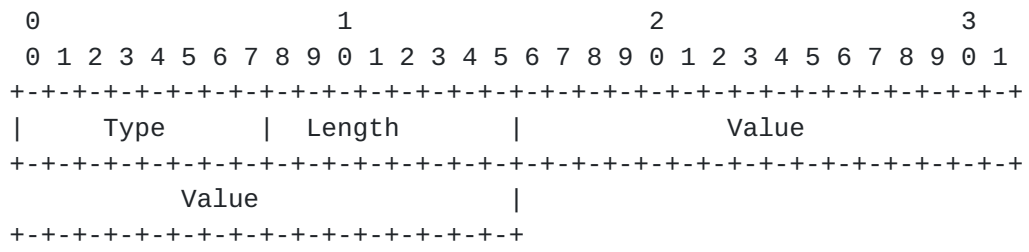


2.17. WLAN-AKM-Suite

Description

The WLAN-AKM-Suite Attribute contains information on the authentication and key management suite used to establish the robust security network association (RSNA) between the AP and mobile device.

A WLAN-AKM-Suite Attribute MAY be included within Access-Request and Accounting-Request packets. A summary of the WLAN-AKM-Suite Attribute format is shown below. The fields are transmitted from left to right.



Code

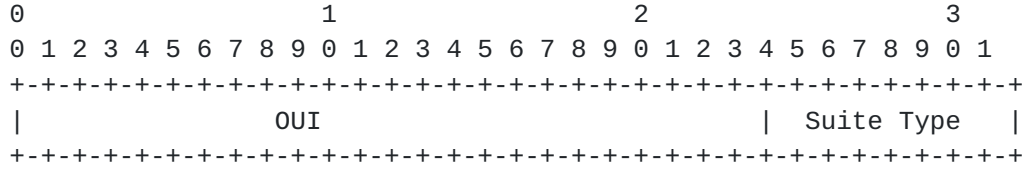
TBD16

Length

6

Value

The Value field is four octets, containing a 32-bit unsigned integer, formatted as specified in Figure 8-187 within Section 8.4.2.27.2 of [IEEE-802.11], with values drawn from Table 8-101.



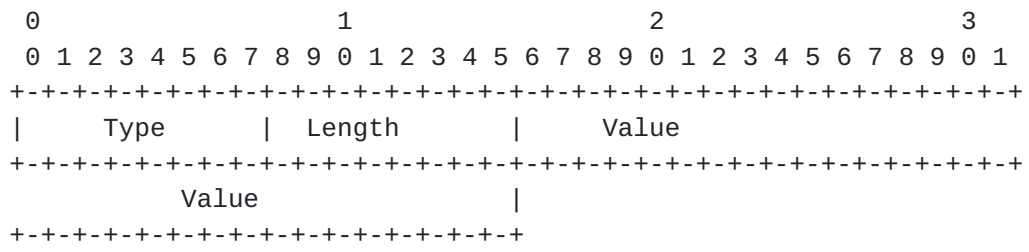
2.18. WLAN-Group-Mgmt-Cipher

Description

The WLAN-Group-Mgmt-Cipher Attribute contains information on group management cipher used to establish the robust security network association (RSNA) between the AP and mobile device.

A WLAN-Group-Mgmt-Cipher Attribute MAY be included within Access-Request and Accounting-Request packets. Presence of the attribute indicates that the station negotiated to use management frame protection during association.

A summary of the WLAN-Group-Mgmt-Cipher Attribute format is shown below. The fields are transmitted from left to right.



Code

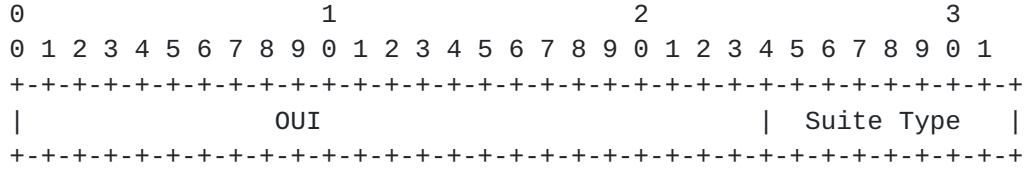
TBD17

Length

6

Value

The Value field is four octets, containing a 32-bit unsigned integer, formatted as specified in Figure 8-187 within Section 8.4.2.27.2 of [IEEE-802.11], with values drawn from Table 8-99.

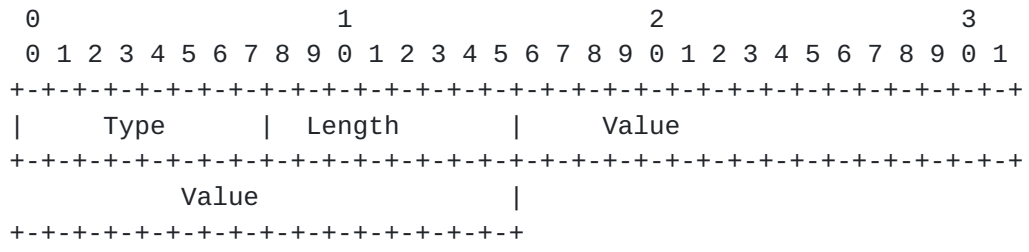


2.19. WLAN-RF-Band

Description

The WLAN-RF-Band Attribute contains information on the RF band used by the Access Point for transmission and reception of information to and from the mobile device.

A WLAN-RF-Band Attribute MAY be included within Access-Request and Accounting-Request packets. A summary of the WLAN-RF-Band Attribute format is shown below. The fields are transmitted from left to right.



Code

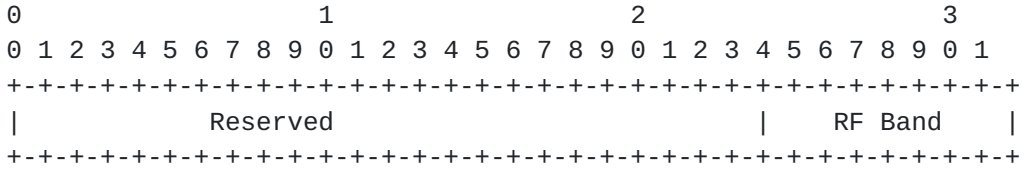
TBD18

Length

6

Value

The Value field is four octets, containing a 32-bit unsigned integer. The three most significant octets MUST be set to zero by the sender, and are ignored by the receiver; the least significant octet contains the RF Band field, whose values are defined in Table 8-53a of [IEEE-802.11ad].



3. Table of attributes

The following table provides a guide to which attributes may be found in which kinds of packets, and in what quantity.

Access-Request	Access-Accept	Access-Reject	Access-Challenge	#	Attribute
0	0+	0	0	TBD1	Allowed-Called-Station-Id
0-1	0-1	0	0	102	EAP-Key-Name
0-1	0+	0	0	TBD2	EAP-Peer-Id
0-1	0+	0	0	TBD3	EAP-Server-Id
0-1	0	0	0	TBD4	Mobility-Domain-Id
0-1	0-1	0	0	TBD5	Preauth-Timeout
0-1	0	0	0	TBD6	Network-Id-Name
0	0-1	0-1	0-1	TBD7	Access-Info
0-1	0	0	0	TBD8	WLAN-SSID
0-1	0	0	0	TBD9	WLAN-HESSID
0-1	0	0	0	TBD10	WLAN-Venue-Info
0+	0	0	0	TBD11	WLAN-Venue-Language
0+	0	0	0	TBD12	WLAN-Venue-Name
0	0	0-1	0	TBD13	WLAN-Reason-Code
0-1	0	0	0	TBD14	WLAN-Pairwise-Cipher
0-1	0	0	0	TBD15	WLAN-Group-Cipher
0-1	0	0	0	TBD16	WLAN-AKM-Suite
0-1	0	0	0	TBD17	WLAN-Group-Mgmt-Cipher
0-1	0	0	0	TBD18	WLAN-RF-Band

CoA-Req	Dis-Req	Acct-Req	#	Attribute
0+	0	0	TBD1	Allowed-Called-Station-Id
0-1	0	0	102	EAP-Key-Name
0	0	0+	TBD2	EAP-Peer-Id
0	0	0+	TBD3	EAP-Server-Id
0	0	0-1	TBD4	Mobility-Domain-Id
0	0	0	TBD5	Preauth-Timeout
0	0	0-1	TBD6	Network-Id-Name
0-1	0	0-1	TBD7	Access-Info
0	0	0-1	TBD8	WLAN-SSID
0	0	0-1	TBD9	WLAN-HESSID
0	0	0-1	TBD10	WLAN-Venue-Info
0	0	0+	TBD11	WLAN-Venue-Language
0	0	0+	TBD12	WLAN-Venue-Name
0	0-1	0-1	TBD13	WLAN-Reason-Code
0	0	0-1	TBD14	WLAN-Pairwise-Cipher
0	0	0-1	TBD15	WLAN-Group-Cipher
0	0	0-1	TBD16	WLAN-AKM-Suite
0	0	0-1	TBD17	WLAN-Group-Mgmt-Cipher
0	0	0-1	TBD18	WLAN-RF-Band

The following table defines the meaning of the above table entries.

0	This Attribute MUST NOT be present in packet.
0+	Zero or more instances of this Attribute MAY be present in the packet.
0-1	Zero or one instance of this Attribute MAY be present in the packet.

4. Diameter Considerations

The EAP-Key-Name Attribute is already defined as a RADIUS Attribute within Diameter EAP [RFC4072]. When used in Diameter, the other attributes defined in this specification can be used as Diameter AVPs from the Code space 1-255 (RADIUS Attribute compatibility space). No additional Diameter Code values are therefore allocated. The data types and flag rules for the attributes are as follows:

		AVP Flag rules				
Attribute Name	Value Type	MUST	MAY	SHLD NOT	MUST NOT	Encr
Allowed-Called-Station-Id	UTF8String	M	P		V	Y
EAP-Peer-Id	UTF8String	M	P		V	Y
EAP-Server-Id	UTF8String	M	P		V	Y
Mobility-Domain-Id	Unsigned32	M	P		V	Y
Preauth-Timeout	Unsigned32	M	P		V	Y
Network-Id-Name	UTF8String	M	P		V	Y
Access-Info	Unsigned32	M	P		V	Y
WLAN-SSID	UTF8String	M	P		V	Y
WLAN-HESSID	UTF8String	M	P		V	Y
WLAN-Venue-Info	Unsigned32	M	P		V	Y
WLAN-Venue-Language	UTF8String	M	P		V	Y
WLAN-Venue-Name	UTF8String	M	P		V	Y
WLAN-Reason-Code	Unsigned32	M	P		V	Y
WLAN-Pairwise-Cipher	Unsigned32	M	P		V	Y
WLAN-Group-Cipher	Unsigned32	M	P		V	Y
WLAN-AKM-Suite	Unsigned32	M	P		V	Y
WLAN-Group-Mgmt-Cipher	Unsigned32	M	P		V	Y
WLAN-RF-Band	Unsigned32	M	P		V	Y

The attributes in this specification have no special translation requirements for Diameter to RADIUS or RADIUS to Diameter gateways; they are copied as is, except for changes relating to headers, alignment, and padding.

What this specification says about the applicability of the attributes for RADIUS Access-Request packets applies in Diameter to AA-Request [RFC4005] or Diameter-EAP-Request [RFC4072]. What is said about Access-Challenge applies in Diameter to AA-Answer [RFC4005] or Diameter-EAP-Answer [RFC4072] with Result-Code AVP set to DIAMETER_MULTI_ROUND_AUTH.

What is said about Access-Accept applies in Diameter to AA-Answer or Diameter-EAP-Answer messages that indicate success. Similarly, what is said about RADIUS Access-Reject packets applies in Diameter to AA-Answer or Diameter-EAP-Answer messages that indicate failure.

What is said about COA-Request applies in Diameter to Re-Auth-Request [RFC4005]. What is said about Accounting-Request applies to Diameter Accounting- Request [RFC4005] as well.

5. IANA Considerations

This document uses the RADIUS [RFC2865] namespace, see <http://www.iana.org/assignments/radius-types>. This specification requires assignment of a RADIUS attribute types for the following attributes:

Attribute	Type
Allowed-Called-Station-Id	TBD1
EAP-Peer-Id	TBD2
EAP-Server-Id	TBD3
Mobility-Domain-Id	TBD4
Preauth-Timeout	TBD5
Network-Id-Name	TBD6
Access-Info	TBD7
WLAN-SSID	TBD8
WLAN-HESSID	TBD9
WLAN-Venue-Info	TBD10
WLAN-Venue-Language	TBD11
WLAN-Venue-Name	TBD12
WLAN-Reason-Code	TBD13
WLAN-Pairwise-Cipher	TBD14
WLAN-Group-Cipher	TBD15
WLAN-AKM-Suite	TBD16
WLAN-Group-Mgmt-Cipher	TBD17
WLAN-RF-Band	TBD18

Since this specification relies on values assigned by IEEE 802, no registries are established for maintenance by the IANA.

6. Security Considerations

Since this document describes the use of RADIUS for purposes of authentication, authorization, and accounting in IEEE 802 networks, it is vulnerable to all of the threats that are present in other RADIUS applications. For a discussion of these threats, see [RFC2607], [RFC2865], [RFC3162], [RFC3579], [RFC3580] and [RFC5176].

While it is possible for a RADIUS server to make decisions on whether to Accept or Reject an Access-Request based on the values of the WLAN-Pairwise-Cipher, WLAN-Group-Cipher, WLAN-AKM-Suite, WLAN-Group-Mgmt-Cipher and WLAN-RF-Band Attributes the value of doing this is limited. In general, an Access-Reject should not be necessary, except where Access Points and Stations are misconfigured so as to enable connections to be made with unacceptable values. Rather than rejecting access on an ongoing basis, users would be better served by fixing the misconfiguration.

Where access does need to be rejected, the user should be provided with an indication of why the problem has occurred, or else they are likely to become frustrated. For example, if the values of the WLAN-Pairwise-Cipher, WLAN-Group-Cipher, WLAN-AKM-Suite or WLAN-Group-Mgmt-Cipher Attributes included in the Access-Request are not acceptable to the RADIUS server, then a WLAN-Reason-Code Attribute with a value of 29 (Requested service rejected because of service provider cipher suite or AKM requirement) SHOULD be returned in the Access-Reject. Similarly, if the value of the WLAN-RF-Band Attribute included in the Access-Request is not acceptable to the RADIUS server, then a WLAN-Reason-Code Attribute with a value of 11 (Disassociated because the information in the Supported Channels element is unacceptable) SHOULD be returned in the Access-Reject.

7. References

7.1. Normative references

[IEEE-802] IEEE Standards for Local and Metropolitan Area Networks: Overview and Architecture, ANSI/IEEE Std 802, 1990.

[IEEE-802.11] Information technology - 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, IEEE Std. 802.11-2012, 2012.

[IEEE-802.11ad] Information technology - 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, Amendment 3: Enhancements for Very High Throughput in the 60 GHz Band, IEEE Std. 802.11ad-2012, 2012.

[IEEE-802.1X] IEEE Standard for Local and Metropolitan Area Networks - Port-Based Network Access Control, IEEE 802.1X-2010, February 2010.

[ISO-639] ISO, "Codes for the Representation of Names of Languages".

[ISO-14962-1997] ISO, "Space data and information transfer systems - ASCII encoded English", 1997.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119, March, 1997.

[RFC2865] Rigney, C., Rubens, A., Simpson, W. and S. Willens, "Remote Authentication Dial In User Service (RADIUS)", RFC 2865, June 2000.

[RFC4072] Eronen, P., Hiller, T. and G. Zorn, "Diameter Extensible Authentication Protocol (EAP) Application", RFC 4072, August 2005.

[RFC5247] Aboba, B., Simon, D. and P. Eronen, "EAP Key Management Framework", RFC 5247, August 2008.

7.2. Informative references

[RFC2607] Aboba, B. and J. Vollbrecht, "Proxy Chaining and Policy Implementation in Roaming", RFC 2607, June 1999.

[RFC3162] Aboba, B., Zorn, G. and D. Mitton, "RADIUS and IPv6", RFC 3162, August 2001.

[RFC3579] Aboba, B. and P. Calhoun, "RADIUS Support for Extensible Authentication Protocol (EAP)", RFC 3579, September 2003.

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3748, June 2004.

[RFC4005] Calhoun, P., Zorn, G., Spence, D., and D. Mitton, "Diameter Network Access Server Application", RFC 4005, August 2005.

[RFC5176] Chiba, M., Dommety, G., Eklund, M., Mitton, D. and B. Aboba, "Dynamic Authorization Extensions to Remote Authentication Dial In User Service (RADIUS)", RFC 5176, January 2008.

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