IEEE P802.11
Wireless LANs

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| Normative Text for LB201 Comments on Active Scanning |
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Abstract

The submission contains normative text to solve active scanning related comments.

The base standard of 802.11ai has changed. The submission uses 802.11mc D2.8 as base line.

Instructions to Editor:

This submission shows the change needed to implement 802.11ai support to the 802.11mc D2.8.

The text is tried to copy as it is present in the 802.11ai D2.0. The CID is marked after the changed text.

The resolutions to the comments are provided in 11-14-

This is working version of the document, the final version will be available at IEEE meeting on July.

**6.3.3.3 MLME-SCAN.confirm**

**6.3.3.3.1 Function**

***Change the first paragraph as follows:***

This primitive returns the descriptions of the set of BSSs detected by the scan process. Multiple MLMESCAN. Confirm primitives may be issued when the MLME-SCAN.request has ReportingOption parameter set to CHANNEL\_SPECIFIC or to IMMEDIATE ~~AT\_END~~. When ReportingOption parameter is set to AT\_END a single MLMESCAN.Confirm primitive may be issued. [CID4410].

**6.3.3.3.2 Semantics of the service primitive**

***Insert the following rows at the end of the second table in this subclause:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Type | Valid Range | Description | IBSS Adoption |
| CAG Number ~~ANQP Configuration~~~~Sequence Number~~ [CID4654] | CAG Number element ~~Integer~~ [CID4654] | 0 - 255 | The value from the CAG Number element if such an element was present in the Probe Response or Beacon frame, else null. The parameter is optionally present only if dot11FILSActivated is true. [CID4654]~~The ANQP Configuration Sequence Number of the found BSS. This parameter is optionally present when dot11FILSActivated is true.~~ | Do not adopt |

**…**

**Instructions to the Editor: Change the following Description column of the BSSDescriptionSetFromFD.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Type | Valid Range | Description | IBSS Adoption |
| Primary Channel | Integer | 0 - 255 | The Primary Channel of the advertised BSS. The Primary Channel is onlydefined within the indicated Operating Class as shown in Annex E. [CID4633] | Do not adopt |

**6.3.3.3.3 When generated**

***Change as follows:***

This primitive is generated by the MLME as a result of an MLME-SCAN.request primitive or if dot11FILSActivated is true, by an MLME-SCAN-STOP.request primitive following an MLMESCAN.request primitive to ascertain the operating environment of the STA. If dot11FILSActivated is true, the primitive is invoked to provide a ~~found~~  [CID4111] vBSS report that matches the setting in the MLMESCAN.request's ReportingOption parameter.

**6.3.3.3.4 Effect of receipt**

***Change as follows:***

The SME is notified of the results of the scan procedure. If dot11FILSActivated is true, these results might ~~may~~ [CID4112] be intermediate results, according to the value of the ResultCode.

**6.3.3.4.3 When generated**

This primitive is generated by the SME in order to stop ~~as means of stopping~~  [CID4113] all ongoing active or passive scan processes in the STA.

**6.3.11.2.2 Semantics of the service primitive**

Instructions to the editor: Add the Known OUIs as shown. [CID5194]

The primitive parameters are as follows:

MLME-START.request(

 **…**

Mesh Configuration,

Known OUIs, [CID5194]

VendorSpecificInfo

Instructions to the editor: Add the Known OUIs as shown.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid range | Description |
| ... | ... | ... | ... |
| Known OUIs | A set of elements | As defined in 8.4.2.28 | Zero or more elements that Specify the OUIs and their values known by the AP. [CID5194] |
| VendorSpecificInfo | A set of elements | As defined in 8.4.2.28 | Zero or more elements. |

**10.1.4.3.1 Introduction**

Active scanning involves the generation of Probe Request frames and the subsequent processing of received Probe Response frames. FILS STAs have capabilities to avoid transmission of unnecessary Probe Request and Probe Response frames and process all Beacon, FILS Discovery, Measurement Pilot that they receive during the scannign. [CID4974] The details of the active scanning procedures are as specified in the following subclauses.

**10.1.4.3.2 Active scanning procedure**

***Instructions to Editor:***

Upon receipt of the MLME-SCAN.request primitive with ScanType indicating an active scan, a STA shall use the following procedure:

For each channel to be scanned:

a) Wait until the ProbeDelay time has expired or a PHYRxStart.indication primitive has been received.

b) Perform the Basic Access procedure as defined in 9.3.4.2 (Basic access).

c) If the STA is a FILS STA, the STA should proceed to step i) if the STA has received a broadcast addressed Probe Request frame and the following conditions are true:

1) The Probe Request frame has a Wildcard SSID or the same SSIDs as present in MLME-SCAN.request primitive.

2) If the FILS Request Parameters element is present in the Probe Request frame and all of the following conditions are true:

a) The FILS Request Parameters element has only fields that are present in the FILS Request Parameters element of the MLME-SCAN.request primitive.

b) If BSS Delay Criteria field is present in the FILS Request Parameters element of the Probe Request frame

- And the value of the BSS Delay Criteria field of the FILS Criteria field of the FILS Request Parameters element of the Probe Request frame is equal to the value of the BSS Delay Criteria field of the FILS Criteria field of the FILS Request Parameters element of the MLME-SCAN.request primitive.

- And the value of the MAX Channel Time element is smaller or equal to the value of the MAX Channel Time element of the FILS Request Parameters of the MLME-SCAN.request primitive.

c) If the HT Supported Criteria of the FILS Criteria field of the Probe Request frame has value 1 and the HT Supported Criteria of the FILS Criteria field of the has value MLME-SCAN.request primitive has value 1.

d) If the VHT Supported Criteria of the FILS Criteria field of the Probe Request frame has value 1 and the VHT Supported Criteria of the FILS Criteria field of the has value MLME-SCAN.request primitive has value 1.

e) If Minimum Data Rate field is present in the FILS Request Parameters element of the Probe Request frame and the value of Minimum Data Rate field is larger or equal to the value of the Minimum Data Rate field of the FILS Request Parameters of the MLME-SCAN.request primitive.

f) If OUI Response field is present in the FILS Request Parameters element of the Probe Request frame and the OUI Response field requests the knowledge of the same OUI elements as indicated by the OUI Response field in the FILS Criteria element of the MLME-SCAN.request primitive (10.1.3.2.4)

~~d) If the STA is a FILS STA, the STA should proceed to Step h) if the STA has received a broadcast addressed Probe Response or a Beacon or a Measurement Pilot or an FILS Discovery frame containing:~~

~~1) The SSID of the received frame is the same as present in the MLME-SCAN.request primitive.~~

~~2) If the FILS Request Parameters element is present in MLME-SCAN.request primitive, the received frame fulfills the 10.1.4.3.4 (Active scanning procedure) conditions for the FILS Request Parameters element of the MLME-SCAN.request primitive.~~

e) Send a probe request to the broadcast or individual destination address. The probe request is sent with the SSID and BSSID from the MLMESCAN.request primitive. When the SSID List is present in the MLMESCAN.request primitive, send one or more Probe Request frames, each with an SSID indicated in the SSID List and the BSSID from the MLME-SCAN.request primitive.

f) Set the Probe Timer to 0 and start the Probe Timer.

g) If PHY-CCA.indication (BUSY) has not been detected before the ProbeTimer reaches MinChannel-

Time, then proceed to step i).

h) If a STA is a FILS STA,[CID4758] while the Probe Timer is less than the MaxChannelTime:

1) Receive Probe Response, FILS Discovery and Beacon frames regardless of the receiver address. Process any received FILS Discovery, Probe Response and Beacon frames;

2) If the ReportingOption of the MLME-SCAN.request primitive is IMMEDIATE, and the scanning STA detects an ~~unreported~~ AP or information of the AP to which MLME-SCAN.confirm primitive has not been issued during the ongoing scan [CID 4761] ~~is detected~~, then issue a MLME-SCAN.confirm primitive with the Result-Code equal to INTERMEDIATE\_SCAN\_RESULT and one or more BSSDescriptionSet, BSSDescriptionFromFDSet, or BSSDescriptionFromMeasurementPilotSet containing information of the detected AP;

3) If dot11FILSActivated is true and the ReportingOption of the MLME-SCAN.request primitive [CID4760] is CHANNEL\_SPECIFIC, at the time when the Probe Timer reaches the MaxChannelTime issue an MLME-SCAN.confirm primitive, with the ResultCode equal to INTERMEDIATE\_SCAN\_RESULT and one or more BSSDescriptionSet, or BSSDescriptionFromFDSet containing information of all APs that have been discovered from the scanned channel.

i) Set the NAV to 0 and scan the next channel.

When all channels in the ChannelList have been scanned, the MLME shall issue an MLME-SCAN.confirm primitive with the one or more BSSDescriptionSet, BSSDescriptionFromFDSet, or BSSDescriptionFromMeasurementPilotSet containing all of the information ~~that can be~~ [CID5183] indicated in the elements and ~~is~~ were [CID5183] gathered during the scan.

If the MLME receives an MLME-SCAN-STOP.request primitive, the STA shall stop the scanning of the channel. The STA should discard any ~~buffered~~ Probe Request frame queued for transmission ~~without transmitting the untransmitted Probe Request frame~~ [CID4764]. If the STA is transmitting a Probe Request frame, the STA shall complete the transmission of the Probe Request frame.~~If the MLME receives an MLME-SCAN-STOP.request primitive, the STA shall immediately stop the scanning of the channel.~~ The STA shall not continue the active scanning process at unscanned channels listed in the ChannelList parameter of the MLME-SCAN.request primitive. The MLME shall issue an MLMESCAN.confirm primitive with the ResultCode set to SUCCESS and with one or more BSSDescriptionSet, BSSDescriptionFromFDSet, or BSSDescriptionFromMeasurementPilotSet[CID5186] containing all of the information gathered during the scan.

When the MaxChannelTime field of the FILS Request Parameters element of the Probe Request frame is present, the value of the MaxChannelTime field is set to the MaxChannelTime of the MLME-SCAN.request as defined in 8.4.2.174 (FILS Request Parameters element).

~~The SSID List element shall not be included in a Probe Request frame in an IBSS.~~[CID5190]





**10.1.4.3.4 Criteria for sending a probe response**

A STA that receives a Probe Request frame shall not respond if any of the following apply:

1. The STA does not match any of the following criteria:

1) The STA is an AP

2) The STA is an IBSS STA

3) The STA is a mesh STA

4) The STA is a DMG STA that is not a member of a PBSS and that is performing active scan as defined in 10.1.4.3.3 (Active scanning procedure for a DMG STA)

5) The STA is a PCP

6) The STA is a multi-band capable non-AP STA for which the last received probe request included a Multi-band element

b) The Address 1 field of the Probe Request frame contains an individual address that is not the MAC address of the STA.

c) The STA is a non-AP STA in an infrastructure BSS and the Address 1 field of the Probe Request frame contains the broadcast address.

d) The STA is a non-PCP STA in a PBSS and the Address 1 field of the Probe Request frame contains the broadcast address.

e) The STA is in an IBSS and did not transmit a Beacon or DMG Beacon frame since the last TBTT, and the Address 1 field of the Probe Request frame contains the broadcast address.

f) The STA is a mesh STA and either of the following criteria are met:

1) The Probe Request frame does not contain a Mesh ID element, or

2) The Mesh ID element in the Probe Request frame is present but does not contain the wildcard Mesh ID and does not match the Mesh ID of the MBSS with which the STA is peered.

g) The STA is not a mesh STA and none of the following criteria are met:

1) The SSID in the Probe Request frame is the wildcard SSID, or

2) The SSID in the Probe Request frame matches the SSID of the STA's, or

3) The SSID List element is present in the Probe Request frame and includes the SSID of the

STA's BSS.

h) The STA is not a mesh STA and the Address 3 field of the Probe Request frame does not contain a wildcard BSSID and does not match the BSSID of the STA's BSS.

i) The STA has dot11InterworkingServiceActivated equal to true and the Probe Request frame contains an Interworking element and an Extended Capabilities element whose Interworking field contains the value 1, and at least one of the following criteria is not met:

1) The HESSID field of the Interworking element is absent, or is present and contains the wildcard HESSID or matches the HESSID field of the InterworkingInfo parameter of the last MLME-START.request or MLME-JOIN.request primitive, or

2) The Access Network Type field of the Interworking element contains the wildcard Access Network Type or matches the Access Network Type of the STA.

j) The STA has dot11RadioMeasurementActivated equal to true and the Probe Request frame contains a DSSS Parameter Set element in which the Current Channel field contains a value that is not the same as dot11CurrentChannel.

k) The STA is a DMG STA and the transmit antenna of the DMG STA is not trained to transmit to the STA from which the Probe Request frame was received. An AP shall remain in the Awake state, and shall respond to probe requests, subject to the criteria above. An IBSS STA that sent a Beacon or DMG Beacon frame shall remain in the Awake state, and shall respond to probe requests, subject to the criteria above, until a Beacon or DMG Beacon frame with the BSSID of the STA's IBSS is received.

l) The STA is a FILS STA and the Probe Request frame contains a FILS Request Parameters element and the corresponding Probe Request frame are met:

1) The Max Delay Limit field of the FILS Request Parameters indicates a delay shorter than the selected average access delay of the responding STA. The BSS Delay Criteria field of the FILS Criteria field of the FILS Request Parameters element indicates the selected average access delay for the comparison as defined in 8.4.2.174 (FILS Request Parameters element). If the compared average access Delay indicates value 255 Measurement not available, the STA shall respond and the response shall include BSS AC Access Delay element as described in 8.4.2.43 (BSS AC Access Delay element) and Average Access Delay as described in 8.4.2.38 (BSS Average Access Delay element). If the compared Average Access Delay indicates value 254 Service unable to access channel, the response shall not be transmitted.

2) The HT Support Criteria of the FILS Criteria field of the FILS Request Parameters element is 1 and the responding STA is not a HT STA.

3) The VHT Support Criteria of the FILS Criteria field of the FILS Request Parameters element is 1 and the responding STA is not a VHT STA.

4) The Minimum Data Rate field of the FILS Request Parameters element indicates a data rate higher than the one that can be provided over the MAC\_SAP.

5) The RCPI Limit field of the FILS Request Parameters element as described in 8.4.2.174 (FILS

Request Parameters element) indicates RCPI lower than the RCPI of the Probe Request frame.

6) The values of the Known OUIs elements of the MLME-START.request that the STA has received dp not equal to the values of OUIs as specified by the OUI Response Criteria of the FILS Request Parameters element as explained in 8.4.2.174 (FILS Request Parameters element).

If the MaxChannelTime field of the FILS Request Parameters element is present in the Probe Request frame, the responding STA with dot11FILSActivated true should discard the pending untransmitted Probe Response frame to the Probe Request frame when the elapsed time measured from the end of the reception of the Probe Request frame by the MAC entity of the responding STA exceeds the time indicated by value of the MaxChannelTime field of the FILS Request Parameters element of the Probe Request frame. If the MaxChannelTime field is not present in the Probe Request frame, transmission time of the pending untransmitted Probe Response frame by the responding STA is only limited by the retransmission procedure in 9.20.2.6 (Retransmit Procedures).

A mesh STA or PCP that is awake shall respond to probe requests, subject to the criteria above.

**10.1.4.3.5 Contents of a ~~probe~~ response**

A STA that responds to a probe request according to 10.1.4.3.4 (Criteria for sending a probe response) shall transmit a Probe Response or a Beacon frame as follows:

~~— The Probe Response frame is individually addressed to the STA that generated the Probe Request frame.~~

A STA in which dot11FILSActivated is true that transmits a Probe Response frame shall either set the Address 1 field to the address of the STA that generated the probe request or shall set it to the broadcast address if the STA that generated the probe request is indicating FILS Capability. The Address 1 field shall be set to the address of the STA that generated the probe request if the STA is not indicating FILS Capability. A STA in which dot11FILSActivated is false that transmits a Probe Response frame shall set the Address 1 field to the address of the STA that generated the probe request

Each element requested in a Request element shall be included in the Probe Response or the Beacon frame if the responding STA supports that element. In the Probe Response frame, the STA shall return the requested elements in the same order as requested in the Request element. If dot11RadioMeasurementActivated is true and if the Request element of the Probe Request includes the RCPI element ID, the STA shall include in the Probe Response an RCPI element containing the measured RCPI value of the received Probe Request frame. If no measurement result is available, the RCPI value shall be set to indicate that a measurement is not available.

When the MaxChannelTime field is present in any of Probe Request frames, the STA with dot11FILSActivated true should not respond to Probe Request frames addressed to individual or broadcast address if:

1. The STA is queuing Beacon for transmission [CID5118] or the next TBTT of the responding STA is within dot11BeaconResponseDuration and is no later than any deadline of MaxChannelTime indicated in the FILS Request Parameter element of the Probe Request frames.
2. A Beacon frame contains the Element Ids requested by the Requested Element IDs

When the MaxChannelTime field is not present in the Probe Request frame, the STA should not respond to the Probe Request frame if:

1. The STA is queuing Beacon for transmission or the next TBTT[CID5118] of the responding STA is within dot11BeaconResponseDuration.
2. A Beacon frame contains the Element Ids requested by the Requested Element IDs

If a STA with dot11FILSActivated true receives two or more Probe Request frames, subject to the criteria above, and the STA has dot11OmitReplicateProbeResponses true, the responding STA may transmit a Probe Response frame or a Beacon frame as a response to all Probe Request frames. If a Probe Response frame is transmitted, then the individually addressed Probe Response frame shall be transmitted to all non-FILS STAs. [CID4303]

**References:**