IEEE P802.11  
Wireless LANs

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| Comment resolutions for miscellaneous CIDs in clause 26.17 | | | | |
| Date: 2020-03-24 | | | | |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D6.0 with the following CIDs (23 CIDs):

* 24098, 24099, 24100, 24115, 24116, 24152, 24153, 24251, 24254, 24259,
* 24260, 24261, 24266, 24283, 24284, 24285, 24286, 24453, 24497, 24524,
* 24528, 24543, 24546.

Revisions:

* Rev 0: Initial version of the document. Still working on some CIDs.

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 24098 | Lee, Wookbong | 459.56 | 6GHz non-AP STA scanning behavior is based on the assumption that  1) Short SSID from 2.4 or 5GHz band or  2) FILS/unsolicited Probe Response in every 20ms.  Current rule says if the channel is not PSC, then a non-AP STA can't send Probe Request to the broadcast destination in that channel unless it knows Short SSID or BSSID.  If there is possibility to send FILS in other than PSC, then a non-AP STA shall (passively) scan for at least 20-30TU for every 20MHz channel in 6GHz.  Currently there are two ways to send FILS/unsolicited Probe Response. 1) SU PPDU in primary channel 2) HE MU with broadcast RU However, both of them are not guaranteed sending those frame in PSC. Because, it is just a recommendation that AP "should" set up the primary channel as one of PSC, and Broadcast RU which carries FILS or Probe Response may be in a PSC.  This will increase non-AP STA's scan time as it needs to stay in every 6GHz 20MHz channel to listen FILS/unsolicited Probe Response. | Change text from "A 6 GHz-only AP should set up the BSS with a primary 20 MHz channel that coincides with a preferred scanning channel (PSC) (see 26.17.2.3.3 (Non-AP STA scanning behavior)).  NOTE--An AP might initiate a BSS with a primary channel that coincides with a PSC in order to assist STAs that are scanning the 6 GHz band to discover the BSS. The AP might subsequently switch its operating channel to a non-PSC (e.g., using a CSA mechanism) if it does not expect additional (not yet associated) STAs will need to discover the BSS."  to "A 6 GHz-only AP shall set up the BSS with a primary 20 MHz channel that coincides with a preferred scanning channel (PSC) (see 26.17.2.3.3 (Non-AP STA scanning behavior)) unless the 6 GHz-only AP transmits a FILS Discovery or a Probe Response frame in a PSC that is within the BSS operating channel width.  NOTE--An AP might initiate a BSS with a primary channel that coincides with a PSC in order to assist STAs that are scanning the 6 GHz band to discover the BSS. The AP might subsequently switch its operating channel to a non-PSC (e.g., using a CSA mechanism) if it does not expect additional (not yet associated) STAs will need to discover the BSS." | Rejected –  Those are not the only possibilities for a STA to discover the presence of an AP operating in a non-PSC:   * Tranmit Beacon frames every Beacon interval in the primary channel * Transmit FD/beacons/Probes etc, in non-HT duplicate PPDU format, wherein one of the portions of the of the PPDU fall in the PSC * Inclusion of RNRs or NRs by other APs operating in the area with that AP’s presence   Hence, the STA has lots of opportunities to find the AP independently where the AP sets the primary channel, unless the AP does not want to be discovered. |
| 24099 | Lee, Wookbong | 458.48 | Short SSID List is useful for 6GHz scanning. But currently only one short SSID can be included in Short SSID List. This will increase scan time as only one Probe Request can be sent within 20TU. Relax this restriction. | As in comment | Rejected –  This issue has been discussed at length by the task group while crafting these rules. There is a trade-off between scan time and probe storming. If the STA is allowed to include more than one short SSID in the Probe request then it will be able to poll probe responses from APs from multiple SSIDs which would defeat the purpose. This restriction is put in place as a good trade-off between scan time and avoiding probe storms arising from indiscriminate solicitations by STAs with multiple short SSIDs. |
| 24100 | Lee, Wookbong | 461.05 | The value of dot11MinPSCProbeDelay is not defined. | Define the value of dot11MinPSCProbeDelay | Rejected –  Dot11MinPSCProbeDelay values are defined in Annex C, ranging from 5484 microseconds to 100000 microseconds, with a default value of 7000 microseconds. |
| 24116 | Patil, Abhishek | 458.49 | It is not clear if the SSID element is present and if so what is the value carried in the SSID field when Short SSID element is carried in a Probe Request frame. | As in comment | Revised –  There are two cases, one when the STA knows the value of the desired SSID, in which case the SSID element does contain the value of the desired SSID, and the second case when the STA does not know the value of the desired SSID in which case there are two options: 1) set SSID to a value that indicates “don’t know the SSID” or 2) SSID element in this case is not present (only in the 6 GHz band since in the non-6 GHz band the SSID element is always present). Option 2 is more efficient in terms of overhead, but option 1 is simpler. Proposed resolution goes with option1.  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24116. |
| 24152 | McCann, Stephen | 460.12 | The value of "n = 1, ..., 15" appears to be for the maximum possible 6 GHz band allocation (e.g. from 5.925 GHz up to 7.125 GHz). What happens for other regulatory domains where not all this band allocation is permitted? | Add a new column or table to Annex E, indicating maximum values for "n" in for this calculation. | Rejected –  The locations of the channels are deterministic in terms of frequency indexing and are independent of the regulatory domain. A STA is expected to comply with the regulatory rules of a certain domain for any type of channel up to the maximum allowed in that regulatory domain and independently of the maximum range being provided in the IEEE802.11ax amendment. Hence if the STA becomes aware that a certain channel is not available in a certain regulatory domain then the STA cannot operate in that channel. |
| 24153 | McCann, Stephen | 460.14 | Regarding the sentence "A STA scanning the 6 GHz band knows where these PSCs are located since their position is fixed." This may be true for a STA in one regulatory domain, but what happens when that STA moves to another regulatiry domain that does not have the same PSC allocation (e.g. the 6 GHz band has fewer channels)? | Add a new column or table to Annex E, indicating PSC channel allocations depending on the regulatory domain. | Rejected –  The locations of the PSCs are deterministic in terms of frequency indexing and are independent of the regulatory domain. A STA is expected to comply with the regulatory rules of a certain domain for any type of channel not only for PSC. Hence if the STA becomes aware that a certain PSC is not available in a certain regulatory domain then the STA cannot operate in that channel, same as with other channels. |
| 24251 | Seok, Yongho | 461.15 | "Otherwise, if the STA has discovered the presence of an AP in that channel through means that are out of scope of the standard and the AP might be detected by the STA,"  If an AP is detected by a STA, it means that the STA has discovered the presence of the AP.  "the AP might be detected by the STA" should be removed from the condition. "might" does not have any meaning in here.  Instead, change the NOTE-2 as the following:  "An STA may discover the presence of an AP by detecting if the STA and the AP are on the same channel and in range." | As in the comment. | Rejected –  The “might” here is used to account for uncertainty of detecting the AP. E.g., the STA can assume that the AP might be detected if the STA’s location is approximately the same as the location that the STA has stored for that AP. |
| 24254 | Petrick, Albert | 458.13 | HE AP 6G is not defined in D6.0 nor is it defined in IEEE P802.11REVmd/D3.0. HE AP 6G is referenced in transmission of Beacon frames on page 458 lines 13, 16, 25 and 30. | Add definition in Clause 3 or in Clause 26.17.2.2. Example text: "HE AP 6G is an HE AP that is capable of operating in the 6 GHz band. " | Revised –  Agree in principle with the comment. Proposed resolution adds the more generic definition of a STA 6G  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24254. |
| 24259 | Patil, Abhishek | 460.38 | The condition for not sending a Probe Request frame must include Short SSID | Replace the first occurrence of "SSID" with "Short SSID and/or SSID field" and the second occurrence of "SSID" with "short SSID and/or SSID" in the sentence | Accepted |
| 24260 | Seok, Yongho | 458.34 | "An AP shall not transmit a Beacon frame in an HE SU PPDU or non-HT duplicate PPDU in the 2.4 GHz or 5 GHz bands."  "An AP" should be changed to "An HE AP 6G". Otherwise, this is not relevant with the Beacon rules in the 6 GHz band.  If it is for all AP operating in the 2.4 GHz or 5 GHz bands, it can cause a conflict with the current baseline spec. The baseline does not prohibit that the AP sends the Beacon in the non-HT duplicate PPDU. | As in the comment. | Rejected –  An HE AP 6G cannot send anything in other bands below 6 GHz. If it can then it is not an HE AP 6G.  Also the spec currently requires the AP to send beacons in non-HT PPDU, hence the AP cannot send beacons in non-HT Duplicate PPDU or in any other format (referring to mainstream amendments). These statements are explicitly stating that the AP shall not do so. |
| 24261 | Seok, Yongho | 458.12 | There is no definition of "HE AP 6G" in the sub-clause 3.2.  Please clean up the terminologies related with the STA naming in 6G band.  For example, similar to STA 2G4 and STA 5G in the baseline, defines station (STA) 6G.  And, similar to HT STA 2G4 and HE STA 5G in the baseline, defines HE STA 6G. | As in the comment. | Revised –  Agree in principle with the comment. Proposed resolution adds the more generic definition of a STA 6G  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24254 |
| 24266 | Fischer, Matthew | 456.32 | It would be good to have some way to disable EDCA access by Tgax devices in the 6GHz band to allow most efficient use of this new spectrum as new 802.11 amendments are created. | Add a signaling mechanism that allows future devices to disable EDCA in TGax devices operating in channels in 6GHz, that is, those channels that are referenced to a channel starting frequency of 5.940 Ghz as indicated in the tables in Annex E | Rejected –  Agree with the commenter that it would be good to have such a signaling, however this was discussed at length in the task group and there was no consensus within the group to provide this type of signalling. |
| 24283 | RISON, Mark | 459.21 | "An AP operating in the 6 GHz band may set dot11FILSFDFrameBeaconMaximumInterval to a nonzero  value." -- a) in general, MIB attributes may be set to whatever value their syntax permits and b) this MIB variable is defined as being written by an external management entity, not the AP. Similarly "A 6 GHz-only AP shall, unless it does not intend to be efficiently discovered by STAs using scanning in the  6 GHz band, set dot11FILSFDFrameBeaconMaximumInterval to a nonzero value that is less than or equal  to 20 TUs." and "An AP with dot11UnsolicitedProbeResponseOptionActivated equal to true shall set dot11FILSFDFrame-  BeaconMaximumInterval to a nonzero value that is less than or equal to 20 TUs." suffer from problem b) | Delete the cited sentences | Revised –  Agree in principle with the comment. Proposed resolution is to specify that the AP may set it to any value; and modified the sentence and the preceding sentence so that it is an if then else condition. As for the issue b) it is not clear what the issue is. Generally, we specify what the device does (in this case the AP) regarding its MIB variables. Please note also the move of the two sentences a couple of paragraphs above to have similar rules located in the same location in the subclause.  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24283. |
| 24284 | RISON, Mark | 459.21 | "An AP operating in the 6 GHz band may set dot11FILSFDFrameBeaconMaximumInterval to a nonzero  value." -- a) in general, MIB attributes may be set to whatever value their syntax permits and b) this MIB variable is defined as being written by an external management entity, not the AP. Similarly "A 6 GHz-only AP shall, unless it does not intend to be efficiently discovered by STAs using scanning in the  6 GHz band, set dot11FILSFDFrameBeaconMaximumInterval to a nonzero value that is less than or equal  to 20 TUs." and "An AP with dot11UnsolicitedProbeResponseOptionActivated equal to true shall set dot11FILSFDFrame-  BeaconMaximumInterval to a nonzero value that is less than or equal to 20 TUs." suffer from problem b). Also the last sentence is not restricted to 6 GHz APs | Change first two sentences to "dot11FILSFDFrameBeaconMaximumInterval shall not be set, for a 6 GHz AP, to 0."  "dot11FILSFDFrameBeaconMaximumInterval shall be set, for a 6 GHz AP that has ot11UnsolicitedProbeResponseOptionActivated true or a 6 GHz-only AP that has is to be efficiently discovered by STAs using scanning in the 6 GHz band, to a nonzero value that is less than or equal to 20 TUs."  Delete the third sentence | Revised –  Now it is a little bit clearer what the issue b) is. Either option is fine. Proposed resolution is to specify the rule as impacting the AP not having the AP set the MIB variable. Also deleted the sentence in question while putting it as an if then else statement together with the sentence that precedes it.  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24284. |
| 24285 | RISON, Mark | 458.62 | ", unless it does not intend to be efficiently discovered by STAs using scanning in the  6 GHz band," -- it is not clear what defines efficient discovery | Delete the cited phrase | Revised –  Agree in principle with the comment that it is not clear what defines efficient discovery. Proposed resolution is to add a note that states that the AP intends to be efficiently discovered if it generates FD, Beacons or Probe Responses every 20 TUs or less.  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24285. |
| 24286 | RISON, Mark | 458.62 | "shall, unless it does not intend to be efficiently discovered by STAs using scanning in the  6 GHz band," -- it is not clear what defines efficient discovery | Change the cited material to just "should" (no subclause) | Revised –  Agree in principle with the comment that it is not clear what defines efficient discovery. Proposed resolution is to add a note that states that the AP intends to be efficiently discovered if it generates FD, Beacons or Probe Responses every 20 TUs or less.  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24286. |
| 24453 | RISON, Mark | 455.58 | "if the HE AP transmits an ER beacon in an HE ER SU PPDU with a 106-  tone RU" -- that's not allowed, per 26.17.6: "An ER beacon is a Beacon frame carried in an HE ER SU PPDU using a 242-tone RU" | Delete "The AP of an ER BSS shall not transmit a Probe Response or (Re)Association Response frame in response  to a Probe Request or (Re)Association Request frame, respectively, sent by a non-HT STA, or that includes  an HE Capabilities element where the Partial Bandwidth Extended Range subfield in the HE PHY Capabili-  ties Information field is equal to 0 if the HE AP transmits an ER beacon in an HE ER SU PPDU with a 106-  tone RU." in 26.17.1 | Revised –  Agree in principle with the comment. Proposed resolution is to clarify that the rule applies to non-HE STAs (typo currently saying non-HT STAs) and removed the dependency on the partial bandwidth capability bit.  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24453. |
| 24497 | RISON, Mark | 453.51 | "A STA transmitting an HT Capabilities element and HE Capabilities element shall set the Supported Chan-  nel Width Set subfield of the HT Capabilities element to 1 if either B0 or B1 of the Supported Channel  Width Set subfield of the HE Capabilities element is 1 unless the STA is a 20 MHz-only non-AP HE STA,  in which case the Supported Channel Width Set subfield of the HT Capabilities element is set to 0." needs to be stronger | Change "is set to" to "shall be set to" in the cited text | Accepted |
| 24524 | Yee, James | 458.14 | Currently a HE AP 6G transmits beacon frames in a non-HT PPDU, non-HT duplicate PPDU, or HE SU PPDU. However, The path-loss in the mid 6 GHz band is approximately 1.5 dB higher than in the mid 5 GHz band. The use case where the two bands need to achieve range parity in order for features such as OOB discovery to work efficiently should not be excluded. HE ER SU with DCM can provide additional link budget to compensate for the extra 6 GHz path-loss and also for the link budget imbalance between 5 GHz and 6GHz band when 5 GHz BSS and 6 GHz BSS are collocated.    A similar comment was proposed during LB244 on D5.0 (CID#22058), but it was withdrawn during Nov 2019 IEEE in order for 11ax to proceed to sponsor ballot without delay. | Add rules to allow HE ER SU PPDU format with DCM to be used for Beacon transmission in 6GHz band.    Please see the proposed resolution originally for CID#22058 in 11-19/2075r0. | Rejected –  If an AP is concerned about BSS range then it should setup the BSS in the bands below 6 GHz. Generation of frames in ER SU PPDU format increases the airtime usage and is not appropriate for 6 GHz band considering the availability of below 6 Ghz spectrum that has better propagation properties. |
| 24528 | Hamilton, Mark | 453.34 | What does it mean for a functionality and/or requirement to be "unavailable", and how would the reader/implementer know which ones are? | Delete "unavailable or" | Revised –  Agree in principle that “unavailable” is not appropriate. Proposed resolution is to replace with “not applicable” which refers to procedures related to HT and VHT that are not applicable to 6 GHz band. E.g., DFS channels, generation of certain types of PPDU formats, etc.  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24528. |
| 24543 | Hamilton, Mark | 453.27 | This statement ("A STA operating in the 5 GHz or 6 GHz band that sets dot11HEOptionImplemented to true shall set both dot11VHTOptionImplemented and dot11HighThroughputOptionImplemented to true.") is contradictory (on some aspects) with this statement in 26.17.1 (P453.33) "An HE STA operating in the 6 GHz band shall inherit the functionalities of a VHT STA except that...". So, which is it? Do the statements elsewhere like "... with dot11VHTOptionImplemented set to true shall ..." and "... with dot11VHTOptionImplemented set to true shall ..." apply, or not? | Delete "or 6 GHz". For a STA operating in 6 GHz that has dot11HEOptionImplemented set to true, list what aspects of VHT and HT operation are still true, or say they all are except <the list of ones that aren't>. | Revised –  The subsequent paragraph states that the HE STA shall inherit all VHT/HT functionalities and/or requirements that are unavailable or that are superseded by equivalent requirements, which are provided in the cited subclauses. Proposed resolution is to replace “unavailable” with “not applicable” which addressed CID 24528 as well.  TGax editor to make the changes shown in 11-20/0450r0 under all headings that include CID 24543. |
| 24546 | Hamilton, Mark | 456.35 | It's not enough to just set dot11FILSProbeDelay on a STA, to know that it supports FILS discovery. If the intention is to avoid requiring full FILS support (setting dot11FILSActivated), then suggest creating a new MIB attribute, such as dot11FILSDiscoveryActivated, that indicates support for only the FD subset of FILS (and would then imply support for FILS Probe Delay). | Add a new MIB attribute, dot11FILSDiscoveryActivated, which indicates support for the FILS Discovery subset of FILS. In 26.17.2.1 third paragraph, add the requirement to set dot11FILSDiscoveryActivated to the list of 6 GHZ HE STA attributes that must be true. | Rejected –  The sentence in P456L35 is as follows:  “An HE STA with dot11HE6GOptionImplemented equal to true and operating in the 6 GHz band is a 6 GHz  HE STA.” The sentence does not refer to any FILS related functionalities or related MIB variables. |

**Discussion: *None.***

* HE BSS operation
* Basic HE BSS operation

The Beacon frames generated within an HE BSS contain an HE Operation element.

An HE STA has dot11HEOptionImplemented equal to true.

A STA that is operating in an HE BSS shall be able to receive and transmit at each of the <HE-MCS, NSS> tuple values indicated by the Basic HE-MCS And NSS Set field of the HE Operation parameter of the MLME-START.request primitive and shall be able to receive at each of the <HE-MCS, NSS> tuple values indicated by the Supported HE-MCS and NSS Set field of the HE Capabilities parameter of the MLME-START.request primitive.

The basic HE-MCS and NSS set is the set of <HE-MCS, NSS> tuples that are supported by all HE STAs that are members of an HE BSS. It is established by the STA that starts the HE BSS, indicated by the Basic HE-MCS And NSS Set field of the HE Operation parameter in the MLME-START.request primitive. Other HE STAs determine the basic HE-MCS and NSS set from the Basic HE-MCS And NSS Set field of the HE Operation element in the BSSDescription derived through the scan mechanism (see 11.1.4.1 (General)).

An HE STA shall not attempt to join (MLME-JOIN.request primitive) a BSS unless it supports (i.e., is able to both transmit and receive using) all of the <HE-MCS, NSS> tuples in the basic HE-MCS and NSS set.

NOTE—An HE STA does not attempt to (re)associate with an HE AP unless the STA supports (i.e., is able to both transmit and receive using) all of the <HE-MCS, NSS> tuples in the Basic HE-MCS And NSS Set field in the HE Operation element transmitted by the AP because the MLME-JOIN.request primitive is a necessary precursor to (re)association.

A STA operating in the 2.4 GHz band that sets dot11HEOptionImplemented to true shall set dot11HighThroughputOptionImplemented to true. A STA operating in the 5 GHz or 6 GHz band that sets dot11HEOptionImplemented to true shall set both dot11VHTOptionImplemented and dot11HighThroughputOptionImplemented to true. A non-AP STA that sets dot11HEOptionImplemented to true shall set dot11MultiBSSIDImplemented to true.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 24528, 24543):***

An HE STA operating in the 6 GHz band shall inherit the functionalities of a VHT STA except that it is exempt from following VHT and HT functionalities and/or requirements that are not applicable or that are superseded by equivalent HE functionalities and/or requirements (see Clauses 26 (High Efficiency (HE) MAC specification)and 27 (High Efficiency (HE) PHY specification)), and that it shall use the HE format instead of the VHT, HT\_GF, or HT\_MF format for PPDUs transmitted in the 6 GHz band. Additional HE functionalities and/or requirements for the 6 GHz band are defined in 26.17.2 (HE BSS operation in the 6 GHz band).*(#24528, 24543)*

A STA that is an HE AP or an HE mesh STA declares the channel widths at which it is capable of operating in the PHY Capabilities Information field of the HE Capabilities element that it transmits (see Table 9-321b (Subfields of the HE PHY Capabilities Information field)).

An HE AP operating in the 5 GHz or 6 GHz bands shall set B1 in the Supported Channel Width Set field in the PHY Capabilities Information field in the HE Capabilities element to indicate support for 40 MHz and 80 MHz channel width(#22192).

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 24497):***

A STA transmitting an HT Capabilities element and HE Capabilities element shall set the Supported Channel Width Set subfield of the HT Capabilities element to 1 if either B0 or B1 of the Supported Channel Width Set subfield of the HE Capabilities element is 1 unless the STA is a 20 MHz-only non-AP HE STA, in which case the Supported Channel Width Set subfield of the HT Capabilities element shall be set to 0.*(#24497)*

A STA transmitting a VHT Capabilities element and HE Capabilities element shall set the Supported Channel Width Set subfield of the VHT Capabilities element to indicate the same channel width as indicated in the HE Capabilities element unless the STA is a 20 MHz-only non-AP HE STA, in which case the Supported Channel Width Set subfield of the VHT Capabilities element is reserved.

At a minimum, an HE STA sets the Rx MCS Bitmask subfield of the Supported MCS Set field of its HT Capabilities element according to the setting of each Rx HE-MCS Map *b* subfield, *b*  {≤ 80 MHz, 160 MHz, 80+80 MHz}, of the Supported HE-MCS And NSS Set field of its HE Capabilities element as follows: for each Max HE-MCS For *n* SS subfield, 1 ≤ *n* ≤ 4, of each Rx HE-MCS Map *b* subfield, *b*  {≤ 80 MHz, 160 MHz, 80+80 MHz}, with a value other than 3 (no support for that number of spatial streams), the STA shall indicate support for HT MCSs 8 × (*n*– 1) to 8 × (*n*– 1) + 7 in the Rx MCS Bitmask subfield, where *n* is the number of spatial streams, except for those HT-MCSs marked as unsupported as described in 26.15.4.3 (Additional rate selection constraints for HE PPDUs).

An HE AP or an HE mesh STA shall set the VHT Operation Information Present field in the HE Operation element to 0 if a VHT Operation element is present in the frame that carries the HE Operation element or if the frame that carries the HE Operation element is sent in the 2.4 GHz band. An HE AP or HE mesh STA shall set the VHT Operation Information Present field in the HE Operation element to 1 if a VHT Operation element is not present in the frame that carries the HE Operation element and the frame is sent in the 5 GHz band.

An HE AP or an HE mesh STA that transmits an HE Operation element that has the VHT Operation Information Present field set to 1 shall do one of the following to set the BSS operating channel:

* Set the STA Channel Width subfield and Channel Center Frequency Segment 2 subfield in the HT Operation Information field in the HT Operation element, the Channel Width subfield in the VHT Operation Information field in the HE Operation element, the Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields in the VHT Operation Information field in the HE Operation element to indicate the BSS bandwidth as defined in Table 11-24 (VHT BSS bandwidth) and Table 11-26 (Extended NSS channel width) respectively based on the Extended NSS BW Support and Supported Channel Width Set fields.
* Set the STA Channel Width subfield and Channel Center Frequency Segment 2 subfield in the HT Operation Information field in the HT Operation element, the Channel Width subfield in the VHT Operation Information field in the HE Operation element, the Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields in the VHT Operation Information field in the HE Operation element to indicate the BSS bandwidth as defined in Table 11-24 (VHT BSS bandwidth) and Table 11-26 (Extended NSS channel width) respectively based on the Rx HE-MCS Map ≤ 80 MHz, Rx HE-MCS Map 160 MHz, and Rx HE-MCS Map 80+80 MHz fields.

NOTE 1—The Channel Center Frequency Segment 2 is 0 if Table 11-24 (VHT BSS bandwidth) is applied.

NOTE 2—These two methods give the same result.

The setting of the Channel Center Frequency Segment 0, Channel Center Frequency Segment 1 and Channel Center Frequency Segment 2 subfields is defined in Table 11-25 (Setting of Channel Center Frequency Segment 0, Channel Center Frequency Segment 1 and Channel Center Frequency Segment 2 subfields), except that the Max NSS support is provided by the HE STA in frames that contain an HE Capabilities element (see 9.4.2.247 (HE Capabilities element)) and an Operating Mode field (see 9.2.4.6.4.3 (Operating Mode) and 9.4.1.53 (Operating Mode field)), where in the table the maximum NSS support refers to the HE maximum NSS support instead of the VHT maximum NSS support for an HE STA.

An HE STA shall determine the channelization using the information in the Primary Channel field of the HT Operation element when operating in 2.4 GHz and the combination of the information in the Primary Channel field in the HT Operation element and the Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields in the VHT Operation Information field in the VHT Operation element if operating in the 5 GHz band (see 21.3.14 (Channelization)). An HE STA determines the channelization as defined in 26.17.2 (HE BSS operation in the 6 GHz band) if operating in the 6 GHz band.

An HE AP or an HE mesh STA shall set the Secondary Channel Offset subfield in the HT Operation Information field in the HT Operation element to indicate the secondary 20 MHz channel as defined in Table 9-168 (HT Operation element fields and subfields), if the BSS bandwidth is more than 20 MHz.

An HE STA that is a member of an HE BSS shall follow the rules in 11.40.1 (Basic VHT BSS functionality) when transmitting a 20 MHz, 40 MHz, 80 MHz, 160 MHz or 80+80 MHz HE PPDUs with the following exceptions:

* An HE TB PPDU sent in response to a triggering frame follows the rules defined in 26.5.2.3 (Non-AP STA behavior for UL MU operation).
* An 80 MHz, 160 MHz or 80+80 MHz DL HE MU PPDU with preamble puncturing may be transmitted if the primary 20 MHz or the primary 40 MHz are occupied by the transmission and certain 20 MHz subchannels of the secondary channel are idle (see Table 27-20 (HE-SIG-A field of an HE MU PPDU) and 10.23.2.5 (EDCA channel access in VHT, HE, or TVHT BSS)).

An HE STA shall not transmit to a recipient HE STA using a channel width that is not indicated as supported in the Supported Channel Width Set subfield in the HE Capabilities element received from that HE STA.

An HE STA shall not transmit to a recipient HE STA using a channel width that exceeds the BSS channel width in the Channel Width field that is contained in:

* The HE Operation element most recently exchanged with the recipient STA, if any, and if the Channel Width field is present
* Otherwise, the VHT Operation element most recently exchanged with the recipient STA, if any
* Otherwise, the HT Operation element most recently exchanged with the recipient STA, if any.

A STA shall not transmit an HE PPDU to a recipient STA that carries a frame that is not an HE Compressed Beamforming/CQI frame (see 26.7.3 (Rules for HE sounding protocol sequences)) and that exceeds the maximum MPDU length capability indicated in the VHT Capabilities element last received from the recipient STA in the 2.4 GHz or 5 GHz band or, if a VHT Capabilities element has not been received from the recipient STA, that exceeds the maximum A-MSDU length indicated in the HT Capabilities element last received from the recipient STA in the 2.4 GHz or 5 GHz band.

A STA shall not transmit an HE PPDU to a recipient STA that carries a frame that is not an HE Compressed Beamforming/CQI frame (see 26.7.3 (Rules for HE sounding protocol sequences)) and that exceeds the maximum MPDU length capability indicated in the HE 6 GHz Band Capabilities element last received from the recipient STA in the 6 GHz band.

An HE AP shall set the RIFS Mode field in the HT Operation element to 0.

An HE STA follows the rules in 11.40 (VHT BSS operation) for channel selection, determining scanning requirements, channel switching, NAV assertion and antenna indication when operating in the 5 GHz or 6 GHz band unless explicitly stated otherwise in Clause 26. An HE STA shall additionally follow the rules in 26.17.2 (HE BSS operation in the 6 GHz band) for scanning and operation in the 6 GHz band.

An HE STA shall follow the rules in 11.16 (20/40 MHz BSS operation) for channel selection, determining scanning requirements, channel switching, NAV assertion when operating in 2.4 GHz unless explicitly stated otherwise in Clause 26.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 24453):***

The AP of an ER BSS shall not transmit a Probe Response or (Re)Association Response frame in response to a Probe Request or (Re)Association Request frame, respectively, sent by a non-HE STA, (#22205) if the HE AP transmits an(#22170) ER beacon in an HE ER SU PPDU. An HE AP that is not operating an ER BSS may set the ER SU Disable subfield in the HE Operation element it transmits to 1.*(#24453)*

A STA shall have the same value of maximum VHT NSS defined by its Rx HE-MCS Map ≤ 80 MHz subfield in the HE Capabilities element as the maximum NSS value indicated by its Rx VHT-MCS Map field in the VHT Capabilities element. If a STA supports 160 MHz, the Maximum NSS defined by its Rx VHT-MCS Map field and Extended NSS BW Support field in the VHT Capabilities element at 160 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map 160 MHz subfield in the HE Capabilities element at 160 MHz. If a STA supports 80+80 MHz, the maximum NSS defined by its Rx VHT-MCS Map field and Extended NSS BW Support field in the VHT Capabilities element at 80+80 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map 80+80 MHz subfield in the HE Capabilities element at 80+80 MHz. For every NSS in VHT Capabilities elements and HE Capabilities elements transmitted by a STA, if the maximum HE-MCS is 9 or more, the maximal VHT-MCS shall be 9. Otherwise the maximal VHT-MCS shall be the same as the HE-MCS. An HE STA shall not transmit a VHT Capabilities element with the Supported Channel Width Set field equal to 1 and the Extended NSS BW Support field equal to 3 or with the Supported Channel Width Set field equal to 2 and the Extended NSS BW Support field equal to 3.

If an HE STA supports 160 MHz, the maximum NSS defined by its Rx HE-MCS Map 160 MHz subfield for an HE-MCS in the HE Capabilities element at 160 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map ≤ 80 MHz subfield for the HE-MCS in the HE Capabilities element at 80 MHz.

If an HE STA supports 80+80 MHz, the maximum NSS defined by its Rx HE-MCS Map 80+80 MHz subfield for an HE-MCS in the HE Capabilities element at 80+80 MHz shall not be more than the maximum NSS defined by its Rx HE-MCS Map ≤ 80 MHz subfield for the HE-MCS in the HE Capabilities element at 80 MHz.

* HE BSS operation in the 6 GHz band
* General

An HE STA that supports operation in the 6 GHz band sets dot11HE6GOptionImplemented to true.

An HE STA with dot11HE6GOptionImplemented equal to true and operating in the 6 GHz band is a 6 GHz HE STA.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 24254, 24261):***

An HE AP with dot11HE6GOptionImplemented equal to true and operating in the 6 GHz band is a 6 GHz HE AP.

An HE non-AP STA with dot11HE6GOptionImplemented equal to true and operating in the 6 GHz band is a 6 GHz HE non-AP STA.

An HE non-AP STA with dot11HE6GOptionImplemented equal to true and operating in the 6 GHz band is a 6 GHz HE non-AP STA.

An HE mesh STA with dot11HE6GOptionImplemented equal to true and operating in the 6 GHz band is a 6 GHz HE mesh STA.

A 6 GHz HE STA shall have dot11ExtendedChannelSwitchActivated, dot11MultiDomainCapabilityActivated and dot11OperatingClassesRequired equal to true and shall set to 1 the value of the Extended Channel Switching field in the Extended Capabilities elements it transmits.

A 6 GHz HE STA shall meet the Class A requirements in 27.3.15 (Transmit requirements for PPDUs sent in response to a triggering frame).

A 6 GHz HE AP shall indicate support for at least 80 MHz channel width.

A 6 GHz HE AP shall set the Co-Hosted BSS subfield in HE Operation element to 0.

A 6 GHz HE STA shall not transmit an HT Capabilities element, VHT Capabilities element, HT Operation element, VHT Operation element or an HE Operation element that contains a VHT Operation Information field.

A 6 GHz HE STA shall not transmit in an HE PPDU a frame other than an HE Compressed Beamforming/CQI frame (see 26.7.3 (Rules for HE sounding protocol sequences)) that exceeds the maximum MPDU length capability indicated in the HE 6 GHz Band Capabilities element(#22194) received from the recipient 6 GHz HE STA.

A 6 GHz HE AP or 6 GHZ HE mesh STA shall include the 6 GHz Operation Information field in the HE Operation elements it transmits. The AP or mesh STA shall set the Channel Width subfield, the Channel Center Frequency Segment 0, and the Channel Center Frequency Segment 1 subfields of the 6 GHz Operation Information field as defined in Table 26-14 (6 GHz BSS channel width), based on the Rx HE-MCS Map ≤ 80 MHz, Rx HE-MCS Map 160 MHz, and Rx HE-MCS Map 80+80 MHz subfields of the Supported HE MCS And NSS Set field of the HE Capabilities element transmitted by the AP. *(#24254, 24261)*

|  |  |  |
| --- | --- | --- |
| * 6 GHz BSS channel width | | |
| Channel Width field | Center Frequency Segment 1 field | BSS channel width |
| 0 | 0 | 20 MHz |
| 1 | 0 | 40 MHz |
| 2 | 0 | 80 MHz |
| 3 | CCFS1 > 0 and  |CCFS1 – CCFS0| = 8 | 160 MHz |
| 3 | CCFS1 > 0 and  |CCFS1 – CCFS0| > 16 | 80+80 MHz |
| NOTE 1—CCFS0 represents the value of the Channel Center Frequency Segment 0 field and CCFS1 represents the value of the Channel Center Frequency Segment 1 field. | | |

A 6 GHz HE STA shall determine the BSS channelization using the Primary Channel, Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields in the 6 GHz Operation Information field in the HE Operation element when operating in 6 GHz band (see 21.3.14 (Channelization) for the channelization and 27.3.23.2 (Channel allocation in the 6 GHz band) for the equation defining the channel center frequencies in the 6 GHz band).

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 24254, 24261):***

A 6 GHz HE STA shall not transmit an HT PPDU.

A 6 GHz HE STA shall not transmit a VHT PPDU.

A 6 GHz HE STA shall not transmit a DSSS PPDU.

A 6 GHz HE STA shall not transmit an HR/DSSS PPDU.

A 6 GHz HE STA shall not transmit an ERP-OFDM PPDU.

A 6 GHz HE STA shall set dot11SpectrumManagementRequired to true and operate as defined in 11.7 (TPC procedures).

A 6 GHz HE AP shall set dot11FILSOmitReplicateProbeResponses to true. *(#24254, 24261)*

A 6 GHz HE AP may respond with a (Re)Association Response frame with the Status Code field indicating DENIED\_POOR\_CHANNEL\_CONDITIONS if it receives a (Re)Association Request frame from a non-AP STA below a minimum RSSI threshold value. A 6 GHz HE AP may send a Disassociation frame with the Reason Code field indicating POOR\_RSSI\_CONDITIONS to an associated non-AP STA if it receives frames from the STA below a minimum RSSI threshold value for a sufficiently long period of time. How an AP selects a minimum RSSI threshold value or sufficient interval of time is out of scope of this specification.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 24254, 24261):***

A 6 GHz HE non-AP STA that receives a (Re)Association Response frame with the Status Code field indicating DENIED\_POOR\_CHANNEL\_CONDITIONS or a Disassociation frame with the Reason Code field indicating POOR\_RSSI\_CONDITIONS from a 6 GHz HE AP should not transmit a (Re)Association Request frame or a Probe Request frame to the AP until one of the following condition is met:

* Sufficient time has passed since it received the (Re)Association Response frame or Disassociation frame from the AP.
* The STA has determined that a (Re)Association Request frame or Probe Request frame that it transmits will be received by the AP at a sufficiently high RSSI level and in sufficiently good conditions compared with its previous transmission to the AP.(#22319)

How a 6 GHz HE non-AP STA determines sufficient time has passed or a suitable RSSI threshold is out of scope of the standard. *(#24254, 24261)*

* Beacons in the 6 GHz band

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 24254, 24261):***

A 6 GHz HE AP transmits Beacon frames as defined in 11.1 (Synchronization), which may be contained in a non-HT PPDU, non-HT duplicate PPDU, or HE SU PPDU.

A 6 GHz HE AP that transmits a Beacon frame in a non-HT PPDU follows the rules in 10.6.5.1 (Rate selection for non-STBC Beacon and non-STBC PSMP frames).

A 6 GHz HE AP that transmits a Beacon frame in a non-HT duplicate PPDU shall follow the rules in 10.6.5.1 (Rate selection for non-STBC beacon and non-STBC PSMP frames) and shall set the TXVECTOR parameter CH\_BANDWIDTH of the PPDU to a value that is up to the operating channel width of the BSS.

If a 6 GHz HE AP schedules a Beacon frame for transmission in a non-HT duplicate PPDU then it shall set the Duplicate Beacon subfield to 1 in the 6 GHz Operation Information field of the HE Operation element it transmits; otherwise the AP shall set the Duplicate Beacon subfield to 0.

A 6 GHz HE AP that transmits a Beacon frame in an HE SU PPDU shall follow the rules defined in 26.15.6 (Additional rules for HE beacons and group addressed frames).

A 6 GHz HE AP shall not transmit a Beacon frame in an HE SU PPDU or non-HT duplicate PPDU in the 2.4 GHz or 5 GHz bands.*(#24254, 24261)*

* Scanning in the 6 GHz band
* General

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 24254, 24261):***

A 6 GHz HE AP may set dot11ColocatedRNRImplemented to true and shall set dot11ShortSSIDListImplemented to true. An AP that is in the same co-located AP set as a 6 GHz HE AP shall set dot11ColocatedRNRImplemented to true and dot11ShortSSIDListImplemented to true. *(#24254, 24261)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 24116):***

A 6 GHz HE STA shall not transmit a Probe Request frame to the broadcast destination address that includes a Short SSID List element with more than one(#22511) Short SSID field. In the 6 GHz band, a Probe Request frame transmitted to the broadcast destination address that contains a Short SSID List element shall have the SSID field of the SSID element set to the SSID of a known AP or set to the value 128 if the STA does not know any SSID.

NOTE 1—In bands other than the 6 GHz band, there might be more than one Short SSID field in a Short SSID List element in a Probe Request frame to the broadcast destination address. A Probe Request frame does not contain more than one Short SSID List element (see Table 9-40 (Probe Request frame body)).

NOTE 2—The value 128 represents the Unicode <Padding Character>.*(#24116)*

* AP behavior for fast passive scanning

A 6 GHz HE AP that does not share the same co-located AP set as an AP operating in the 2.4 GHz band or 5 GHz band is referred to as a 6 GHz-only HE AP.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 24283, 24284, 24285, 24286):***

A 6 GHz-only HE AP shall, unless it does not intend to be efficiently discovered by STAs using scanning in the 6 GHz band, have dot11FILSFDFrameBeaconMaximumInterval set to a nonzero value that is less than or equal to 20 TUs.

NOTE—A 6 GHz-only HE AP intends to be efficiently discovered by STAs if it schedules for transmission FILS Discovery, Beacons, or unsolicited Probe Response frames every 20 TUs or less.*(#24285, 24286)*

If a 6 GHz HE hasthen the AP have set ; otherwise the AP may set dot11FILSFDFrameBeaconMaximumInterval to any value

*(#24283, 24284)* A 6 GHz HE AP that has dot11FILSFDFrameBeaconMaximumInterval equal to a nonzero value(#22514) shall schedule for transmission FILS Discovery frames as described in 11.46.2.1 (FILS Discovery frame transmission), except that the following apply:

* If the FILS Discovery frame is contained in a DL HE MU PPDU then it shall be included in the broadcast RU of the DL HE MU PPDU as defined in 26.15.7 (Additional rules for group addressed frames in an HE MU PPDU).
* If dot11UnsolicitedProbeResponseOptionActivated is true, all FILS Discovery frames shall be omitted and an unsolicited broadcast Probe Response frame shall be scheduled for transmission at the target transmit time instead of each FILS Discovery frame.(#22514)
* If dot11UnsolicitedProbeResponseOptionActivated is false, then a FILS Discovery frame may be omitted and an unsolicited broadcast Probe Response frame shall be scheduled for transmission at the target transmit time instead of that FILS Discovery frame.(#22420, #22512, #22521)

*(#24283, 24284)*

(#22517, #22521)A 6 GHz HE AP may send an unsolicited broadcast Probe Response frame.(#22514) The Probe Response frame may be included in the broadcast RU of a DL HE MU PPDU as defined in 26.15.7 (Additional rules for group addressed frames in an HE MU PPDU). The Probe Response may be carried in a non-HT duplicate PPDU in which case the PPDU shall have the TXVECTOR parameter CH\_BANDWIDTH set to a value that is up to the operating channel width of the BSS. *(#24254, 24261)*

A 6 GHz HE AP that transmits a FILS Discovery frame carrying an FD Capability field shall set the PHY Index subfield to 4. *(#24254, 24261)*

An AP that corresponds to a nontransmitted BSSID does not schedule for transmission FILS Discovery frames (see 11.46.2.1 (FILS Discovery frame transmission)) or unsolicited broadcast Probe Response frames (see 11.1.4.3.4 (Criteria for sending a response)).(#22520)

If a 6 GHz-only EMA AP transmits a FILS Discovery frame, then the AP shall include in the FILS Discovery frame a Reduced Neighbor Report element carrying information on all nontransmitted BSSIDs in the multiple BSSID set that are discoverable (see 11.50 (Reduced neighbor report)).(#22115)

NOTE—A FILS Discovery frame received from a 6 GHz HE AP with the Multiple BSSIDs Presence Indicator subfield equal to 1 and not carrying a Reduced Neighbor Report element implies that the AP’s Beacon frame at the advertised TBTT carries a complete list of nontransmitted BSSID profiles or that the information of the nontransmitted BSSID(s) is advertised in the 2.4 GHz or 5 GHz band by a co-located AP. *(#24254, 24261)* (#22115)

If a 6 GHz-only EMA AP transmits a Beacon or broadcast Probe Response frame carrying a partial list of nontransmitted BSSID profiles, then the AP shall include in the frame a Reduced Neighbor Report element with information on all nontransmitted BSSIDs in the multiple BSSID set that are discoverable and not carried in that frame (see 11.50 (Reduced neighbor report)).(#22115)

A 6 GHz-only HE AP should set up the BSS with a primary 20 MHz channel that coincides with a preferred scanning channel (PSC) (see 26.17.2.3.3 (Non-AP STA scanning behavior)).

NOTE—An AP might initiate a BSS with a primary channel that coincides with a PSC in order to assist STAs that are scanning the 6 GHz band to discover the BSS. The AP might subsequently switch its operating channel to a non-PSC (e.g., using a CSA mechanism) if it does not expect additional (not yet associated) STAs will need to discover the BSS. *(#24254, 24261)*

A 6 GHz HE AP shall not respond to a Probe Request frame if the frame carries a FILS Request Parameters element and the AP is unable to satisfy the response time constraint specified in the Max Channel Time field in the element (see 11.1.4.3.4 (Criteria for sending a response)). *(#24254, 24261)*

If a 6 GHz HE AP receives a Probe Request frame and responds with a Probe Response frame (per 11.1.4.3.4 (Criteria for sending a response)), the Address 1 field of the Probe Response frame shall be set to the broadcast address unless the AP is not indicating its actual SSID in the SSID element of its Beacon frames. *(#24254, 24261)* (#22522, #22523)

* Non-AP STA scanning behavior

The set of 20 MHz channels in the 6 GHz band, with channel center frequency, ch\_a = Channel starting frequency – 55 + 80 × n (MHz) are referred to as preferred scanning channels (PSCs). Channel starting frequency is defined in 27.3.23.2 (Channel allocation in the 6 GHz band), and n = 1, …, 15.

NOTE—PSCs might not all be available in a specific location due to regulatory restrictions. A STA scanning the 6 GHz band knows where these PSCs are located since their position is fixed.

A non-AP STA that is actively scanning a channel in the 6 GHz band shall operate as defined in 11.1.4.3.2 (Active scanning procedure for a non-DMG STA), unless a given rule is superseded by the rules defined in 26.17.2.3 (Scanning in the 6 GHz band).

The non-AP STA shall not transmit a Probe Request frame to the broadcast destination address with the Address 3 field set to the wildcard BSSID, and the SSID set to the wildcard SSID.

The non-AP STA shall not send a Probe Request frame to the broadcast destination address with the Address 3 field (BSSID) set to the BSSID of an AP from which it has already received a Probe Response or a Beacon frame since the start of its scanning on that channel.

The non-AP STA shall not send a Probe Request frame to the broadcast destination address with the Address 3 field (BSSID) set to the BSSID of a nontransmitted BSSID if it has already received the nontransmitted BSSID profile for that BSSID via a Beacon frame or Probe Response frame sent by the transmitted BSSID since the start of its scanning on that channel.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 24259):***

The non-AP STA shall not send a Probe Request frame to the broadcast destination address with the SSID field and/or Short SSID field and/or the Address 3 field set to the SSID and/or Short SSID and/or BSSID, respectively, of an AP for which it has received a Reduced Neighbor Report or Neighbor Report element with the Unsolicited Probe Responses Active subfield(#22518) corresponding to that AP set to 1 and that indicates that the AP is operating in that channel until the FILSProbeTimer(#22263) reaches dot11FILSProbeDelay.*(#24259)*

The non-AP STA shall not transmit more than one Probe Request frame to the broadcast destination address with the Address 3 field set to the wildcard BSSID and the SSID field not set to the wildcard SSID during each 20 TU period scanning the channel. The non-AP STA shall not transmit more than three Probe Request frames to the broadcast destination address with Address 3 field set to a non-wildcard BSSID during each 20 TU period scanning the channel.

The non-AP STA shall set dot11FILSProbeDelay to a value equal to or greater than 20 TU.

NOTE—A non-AP STA waits for at least 20 TU so that it maximizes the probability of receiving FILS Discovery or broadcast Probe Response frames, if any, sent by an AP in that channel (see 26.17.2.3.2 (AP behavior for fast passive scanning)).

If the non-AP STA is scanning a channel, then the following apply:

* If the STA has received a FILS Discovery frame indicating that an AP is operating in that channel, or if the STA has received a Reduced Neighbor Report or Neighbor Report element indicating that an AP is operating in that channel then the STA may, subject to the other rules in this clause, send a Probe Request frame to the broadcast destination address in that channel, with the SSID field set to the SSID that corresponds to that AP or with the Short SSID field of the Short SSID List element set to the short SSID that corresponds to that AP and/or with the Address 3 field set to the BSSID of that AP, starting from step c) of 11.1.4.3.2 (Active scanning procedure for a non-DMG STA)
* Otherwise, if the channel is a PSC and the STA has determined the medium to be idle for a continuous period of at least dot11MinPSCProbeDelay from the start of the scan on the channel then the STA may, subject to other rules in this subclause, send a Probe Request frame to the broadcast destination address in that channel, with the SSID field set to the SSID that corresponds to an AP or with the Short SSID field of the Short SSID List element set to the short SSID that corresponds to an AP, and/or with the Address 3 field set to the BSSID of an AP, after invoking the backoff procedure, described in 10.23.2.2 (EDCA backoff procedure) and starting from step c) of 11.1.4.3.2 (Active scanning procedure for a non-DMG STA)
* Otherwise, if the STA has discovered the presence of an AP in that channel through means that are out of scope of the standard and the AP might be detected by the STA, then the STA may send a Probe Request frame to the broadcast destination address in that channel, with the Address 3 field set to the BSSID of that AP starting from step c) of 11.1.4.3.2 (Active scanning procedure for a non-DMG STA)
* Otherwise, if the FILSProbeTimer(#22263) reaches dot11FILSProbeDelay and the channel is a PSC, then the STA may, subject to the other rules in this subclause, send a Probe Request to the broadcast destination address in that channel, starting from step c) of 11.1.4.3.2 (Active scanning procedure for a non-DMG STA),
* Otherwise, the STA shall not send a Probe Request frame to the broadcast destination address in that channel.

NOTE 1—The STA might send an individually addressed Probe Request frame to an AP for reasons other than active scan (e.g. to obtain an updated EDCA parameter set) even if it has already received a FILS Discovery, Probe Response or Beacon frame from that AP.

NOTE 2—An AP might be detected by a STA if the STA and the AP are on the same channel and in range.

If a non-AP STA sends a Probe Request frame in the 6 GHz band that includes a FILS Request Parameters element, then the non-AP STA shall set the value of PHY Support Criterion subfield(#22526) in the element to either 0 or 3.

* Out of band discovery of a 6 GHz BSS

An AP that operates in the 2.4 GHz or 5 GHz band and that is in the same co-located AP set as one or more 6 GHz HE APs shall include in Beacon and Probe Response frames that it transmits a Reduced Neighbor Report element with the Co-Located AP subfield in the BSS Parameters subfield in the TBTT Information field set to 1 to provide at least the operating channels and operating classes of those 6 GHz HE APs. *(#24254, 24261)*

NOTE—The Reduced Neighbor Report element might contain information on 6 GHz HE APs that are not in the same co-located AP set as the transmitting AP. In this case the Co-Located AP subfield is set to 0. *(#24254, 24261)*

An AP responds to a probe request by following the rules defined in 11.1.4.3.4 (Criteria for sending a response).

If neither of the following conditions is met:

* the AP transmits an individually addressed Probe Response frame to a STA that has signaled that it does not support operating in the 6 GHz band (see 9.4.2.53 (Supported Operating Classes element))
* the AP operating in the 6 GHz band does not intend to be discovered by STAs

then the following applies:

* If an AP operating in the 2.4 GHz or 5 GHz band is in the same co-located AP set as one or more 6 GHz HE APs and has the same SSID as those 6 GHz HE APs, then the Beacon and Probe Response frames transmitted by the AP or by the transmitted BSSID of the same Multiple BSSID set as the AP shall include, for each of these 6 GHz HE APs, a TBTT Information field in a Reduced Neighbor Report element with the BSSID field set to the BSSID of the 6 GHz HE AP, and with either the Short SSID field set to the short SSID of the 6 GHz HE AP or the Same SSID subfield in the BSS Parameters subfield set to 1 *(#24254, 24261)*
* If an AP operating in the 2.4 GHz or 5 GHz band is in the same co-located AP set as a 6 GHz HE AP and has a different SSID, and no other AP in the same co-located AP set and operating in the 2.4 GHz or 5 GHz band is indicating the 6 GHz HE AP in a Reduced Neighbor Report element of the Beacon and Probe Response frames they transmit, then Beacon and Probe Response frames transmitted by the AP (or by the transmitted BSSID of the same Multiple BSSID set as the AP) shall include a TBTT Information field in a Reduced Neighbor Report element with the BSSID field and the Short SSID field set to the BSSID and short SSID of the 6 GHz HE AP, respectively. *(#24254, 24261)*

If the AP reported in the TBTT Information field in the Reduced Neighbor Report element is a 6 GHz HE AP, the reporting AP shall include the BSS Parameters subfield in the TBTT Information field and shall follow the rules in 11.50 (Reduced neighbor report) to set the Multiple BSSID subfield, the Transmitted BSSID subfield, the Co-Located AP subfield(#22440) and the OCT Recommended subfield. *(#24254, 24261)*

A STA receiving a frame containing a Reduced Neighbor Report element describing a reported 6 GHz HE AP with the OCT Recommended subfield set to 1 in the BSS Parameters subfield shall follow the rules in 11.50 (Reduced neighbor report) to perform active scanning, authentication and/or association with the reported AP. *(#24254, 24261)*

An AP that operates in the 2.4 GHz or 5 GHz band and that is in the same co-located AP set as one or more 6 GHz HE APs shall include the Advertisement Protocol element in Beacon and Probe Response frames that it transmits and shall support responding with a Neighbor Report ANQP element (9.4.5.19 Neighbor Report ANQP element) carrying one or more Neighbor Report elements (see 9.4.2.36 (Neighbor Report element)) that include at least the SSID information of all the 6 GHz HE APs in the same co-located AP set, except the 6 GHz HE APs that do not(#22230) intend to be discovered.

NOTE 1—The Neighbor Report ANQP-element can also carry Neighbor Report elements containing information on 6 GHz HE APs that are not in the same co-located AP set. *(#24254, 24261)*

NOTE 2—It is recommended that the AP responds with a GAS comeback delay of zero.

NOTE 3—If the Same SSID subfield is set to 0 in the BSS Parameters of a reported 6 GHz HE AP, a non-AP STA that does not know the short SSID of the reported 6 GHz HE AP and that intends to discover the SSID of the reported 6 GHz HE AP(#22528) might:

* Use the OCT procedure described in 11.32.5 (On-channel Tunneling (OCT) operation) to send a Probe Request frame to the reported AP through over-the-air transmissions with the reporting AP, if the OCT Recommended subfield is 1 in the Neighbor AP Information field describing the reported AP.
* Use the ANQP procedure described in 11.23.3.3 (ANQP Procedure) to send an ANQP request with a Query ID corresponding to Neighbor Report to the reporting AP to retrieve the SSID of the 6 GHz HE APs, including the reported AP.
* Send a Probe Request frame to the reported AP including the BSSID of the reported AP.
* Send a Probe Request frame to the reported AP including the short SSID of the reported AP.
* Perform passive scanning in the operating channel of the reported AP. *(#24254, 24261)*

An AP may set the Unsolicited Probe Responses Active subfield(#22518) to 1 for a reported AP in a Reduced Neighbor Report element or Neighbor Report element in a frame(#22529) it transmits if all 6 GHz HE APs of the same ESS as the reported AP that operate in the same channel as the reported AP and that might be detected by a STA receiving this frame have dot11UnsolicitedProbeResponseOptionActivated(#22533)(#22517) equal to true and so are transmitting unsolicited Probe Response frames every 20 TUs (see 26.17.2.3.2 (AP behavior for fast passive scanning)). Otherwise, the AP shall set the Unsolicited Probe Responses Active subfield(#22518) to 0. *(#24254, 24261)* (#22530)

NOTE—An AP might be detected by a STA if the STA and the AP are on the same channel and in range.

An AP may set the Member Of ESS With 2.4/5 GHz Co-Located AP subfield to 1 in a Reduced Neighbor Report element in a frame it transmits(#22531), if the reported AP is a 6 GHz HE AP and is part of an ESS where each AP in the ESS that is operating in the same band as the reported AP and that might be detected by a STA receiving this frame (irrespective of the operating channel), has dot11MemberOfColocated6GHzESSOptionActivated(#22532) equal to true and also has a corresponding AP operating in the 2.4 GHz or 5 GHz band that is in the same co-located AP set as that AP. *(#24254, 24261)*

NOTE—This subfield indicates that the reported AP is part of an ESS that has no 6 GHz-only HE APs that might be detected by a STA receiving this frame. This means that all 6 GHz HE APs that are part of that ESS that might be detected by a STA receiving this frame can be discovered in the 2.4 GHz and/or 5 GHz bands. *(#24254, 24261)*

3.2 Definitions specific to IEEE Std 802.11

**TGax Editor: *Insert the following definition in this subclause (#CID 24254):***

6 GHz high efficiency (HE) station (STA): A STA that is operating on a channel that has a value of 5.940 for the entry in the “Channel starting frequency” column of any of the tables found in E.1 (Country information and operating classes).*(#24254)*