IEEE P802.11
Wireless LANs

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| --- |
| Comment resolution for sensing session |
| Date: 2022-11-1 |
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|  |  |  |  |  |

Abstract

This submission resolves comments of CID 299, 308, 316, 481, 93, 141, 145, 430, 611, 774, 463, 815, 877, 21, 570, 912.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Change ‘STA-STA’ to ‘SR2SR’
* Rev 2: Add CID 463, 299, 308, 316, 481.
* Rev 3: Editorial changes
* Rev 4:
	+ Add a description for active/inactive state
	+ Add frame exchange timer
* Rev 5:
	+ Add Comeback After Exponent subfield
	+ Add Table 11-xx—Sensing Timeout Values
	+ Merge Sensing Capabilities element and Sensing Operation element into Sensing element
	+ Update unassociated STA Comeback After value and unassociated STA Comeback Before value
* Rev 6: (Key changes marked in red)
	+ Fix typo in the title of Figure 9-1002ci
	+ Change Unassociated STA Sensing Session Timeout value from 26.1 s to 100 s.
	+ Change fields’ presence in Sensing Measurement Setup Request frame
	+ Add Terminate Unassociated STA Sensing Session subfield into MS Termination frame and fix typo of subfield names.
	+ Add CID 815 and 877
	+ Minor editorial changes
* Rev 7: Change “Poll Assigned” to “Poll Required”
* Rev 8: “[Poll Assigned](#_11.21.18.4_Sensing_measurement)” is used in Sensing Measurement Parameters element and “Poll Required” is used in Sensing element.
* Rev 9: Update the revision number.

# Discussion

**SP3** shows majority support (**4A/16B/10C**) for keep sensing session as in the proposal in 21/1934r9 “Discussion on Session Setup”.

* **Which of the following options do you prefer?**
	+ **Option A**: Remove sensing session, add a subclause to describe sensing capability exchange for all STAs, and describe the active/inactive state machine for U-STA only.
	+ **Option B**: Keep sensing session for all STAs, describe sensing capability exchange in sensing session setup for all STAs, and describe the active/inactive state machine in sensing session for U-STA only.
	+ **Option C**: Abstain

**SP1, SP2, SP4 and SP5** in 21/1934r9 “Discussion on Session Setup” provide much more detail information about sensing session setup/termination, and were **supported unanimously**.

* **Do you agree with the following?**
	+ An unassociated STA (denoted as U-STA) and an AP maintain a **state machine** as shown in slide 10.
	+ An associated STA (denoted as A-STA) and an AP does NOT maintain the state machine shown in slide 10.
	+ The timeout (value is TBD) used in the exchange of measurement setup (denoted as MS) Request and MS Response is named as **frame** **exchange timeout T1**, which is also the time limit the AP shall respond the received MS Query with the MS Request. The U-STA does not wait for the MS Request for a longer time than T1 after it delivers the MS Query frame.
	+ An **U-STA** **activity timeout T2** is predefined (value is TBD), when which expires the U-STA is considered as inactive. Both the AP and U-STA maintain this activity timer locally. Both sides reset the timer when
		- an TB/non-TB MS between the AP and U-STA succeeds.
		- or the U-STA participates in a running measurement instance.
	+ An **U-STA** **comeback timeout T3** is defined (value is TBD), before which expires the U-STA is expected to transmit an MS Query frame at least once. Both the AP and U-STA maintain this comeback timer locally. Both sides reset the timer when
		- the exchange of the MS Query and the MS Request with ‘comeback=1’ has completed.
		- or the exchange of the Polling TF with ‘comeback=1’ and CTS within the polling phase of a measurement instance has completed.
* **Do you agree with the following?**
	+ An unassociated STA (denoted as U-STA) transmits the measurement setup (denoted as **MS**) **Query** frame to solicit an MS Request frame from an AP.
	+ Upon receiving an MS Query frame, the AP responds with an MS Request frame to the U-STA within frame exchange timeout T1.
		- The MS Request frame contains the USID assigned to the U-STA.
		- The MS Request frame contains one bit to inform the U-STA to **comeback before the U-STA comeback timeout T3** **expires** to solicit an MS Request frame.
	+ Upon receiving an MS Query frame, the AP can also send a MS Termination frame to the U-STA, which indicates termination of one or more MSs.
	+ The Polling TF within the polling phase of a measurement instance contains one bit to inform the U-STA to **comeback before the U-STA comeback timeout T3** **expires** to transmit an MS Query frame outside the measurement instance.
* **Do you agree with the following?**
	+ Beacon, Probe Response and (Re)Association Response frames shall carry the AP’s sensing capabilities.
	+ (Re)Association Request frame shall carry the non-AP STA’s sensing capabilities.
	+ MS Query frame shall carry the non-AP U-STA’s sensing capabilities.
* **Do you agree with the following?**
	+ Unicast Probe Response frame comprises the following field:
		- **Invitation of responder for sensing** (one bit), which indicates whether or not to invite an intended STA to join a sensing measurement as a sensing responder.
	+ The element carrying the field is TBD.

# 299, 308, 316, 481 - frames

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| **299** | Rojan Chitrakar | 57.19 | Sensing Session Setup/termination frames are missing. | Add Sensing Session Setup/termination frames. | ***Revised****:* The group has discussed the issue, and agrees:Sensing session setup/termination for associated STA is done by the assocation/disassoci-ation procedure, so no new frames should be added. And for unasssociated STA, sensing session may be explicitly terminated by MS termination frame or implicitly terminated*.* The format of MS termination frame is modified.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 299.* |
| **308** | Rojan Chitrakar | 66.49 | Details of the frames used for Sensing Session Setup are missing. | Add details of the frames used for Sensing Session Setup. | ***Revised****:* Changes for (re)association frame and measurement setup query / request / response / termination frames are made.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 308.* |
| **316** | Rojan Chitrakar | 72.45 | Details of the frames used for Sensing Session termination are missing. | Add details of the frames used for Sensing Session Setup/termination. | ***Revised****:* Same resolution as CID 308.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 316.* |
| **481** | Rajat Pushkarna | 72.54 | Frame format for sensing session termination are missing | Add frame format details for sensing session termination | ***Revised****:* Same resolution as CID 299.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 481.* |

**Resolution:**

### 9.6.7.1 Public Action frames

*TGbf Editor: Please modify “Table 9-447—Public Action field values” of 11bf D0.3 as following:*

**Table 9-447—Public Action field values**

|  |  |
| --- | --- |
| **Public Action field value** | **Description** |
| <ANA> | Sensing Measurement Setup Request |
| <ANA> | Sensing Measurement Setup Response |
| <ANA> | Sensing Measurement Report |
| <ANA> | Sensing Measurement Setup Termination |
| <ANA> | SBP Request |
| <ANA> | SBP Response |
| <ANA> | SBP Termination |
| <ANA> | SBP Report (#590) |
| <ANA> | Sensing Measurement Setup Query (#299, #308, #316, #481) |

### 9.6.10 Protected Dual of Public Action frames

*TGbf Editor: Please modify “Table 9-487” of 11bf D0.3 as following:*

**Table 9-487—Public Action field values defined for Protected Dual of Public Action frames**

|  |  |  |
| --- | --- | --- |
| **Public Action field value** | **Description** | **Defined in** |
| <ANA> | Protected Sensing Measurement Setup Request | 9.6.7.49 (Sensing Measurement Setup Request frame format) |
| <ANA> | Protected Sensing Measurement Setup Response | 9.6.7.50 (Sensing Measurement Setup Responseframe format) |
| <ANA> | Protected Sensing Measurement Setup Termination | 9.6.7.52 (Sensing Measurement Setup Termination frame format) |
| <ANA> | Protected SBP Request | 9.6.7.53 (SBP Request frame format) |
| <ANA> | Protected SBP Response | 9.6.7.54 (SBP Response frame format) |
| <ANA> | Protected SBP Termination | 9.6.7.55 (SBP Termination frame format) |
| <ANA> | Protected Sensing Measurement Setup Query | 9.6.7.57 (Sensing Measurement Setup Query frame format) (#299, #308, #316, #481) |

*TGbf Editor: Please insert the following subclause into 11bf D0.3*

### 9.6.7.57 Sensing Measurement Setup Query frame format (#299, #308, #316, #481)

The Sensing Measurement Setup Query frame is transmitted by an unassociated non-AP STA to inform its capabilities and presence to the AP to perform WLAN sensing. The format of the Sensing Measurement Setup Query frame Action field is defined in Figure 9-1139j (Sensing Measurement Setup Query frame Action field format).



**Figure 9-1139k— Sensing Measurement Setup Query frame Action field format**

The Category field is defined in 9.4.1.11 (Action field).

The Public Action field is defined in 9.6.7.1 (Public Action frames).

The Sensing Element is described in 9.4.2.330 (Sensing element).

*TGbf Editor: Please insert the following subclause into 11bf D0.3:*

### 9.4.2.330 Sensing element (#299, #308, #316, #481)

The Sensing element contains fields that are used to advertise optional sensing

capabilities and sensing operation information. The element may be present in the Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Response and Sensing Measurement Setup Query frames. The Sensing element is defined in Figure 9-1002ci (Sensing element format).



**Figure 9-1002ci—Sensing element format**

The Element ID, Length, and Element ID Extension fields are defined in 9.4.2.1 (General).

The Sensing field is defined in Figure 9-1002cj (Sensing field format).



**Figure 9-1002cj—Sensing field format**

The Invitation Of Responder For Sensing subfield is set to 1 in a Probe Response frame to indicate the need for new sensing responders, and is set to 0 to indicate new sensing responders are not needed.

### 9.3.3 (PV0) Management frames

*TGbf Editor: Please insert the following rows into* ***Table 9-60*** *(Beacon frame body),* ***Table 9-62*** *(Association Request frame),* ***Table 9-63*** *(Association Response frame body),* ***Table 9-64*** *(Reassociation Request frame body),* ***Table 9-65*** *(Reassociation Response frame body),* ***Table 9-67****—Probe Response frame body, in 11bf D0.3:*

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| <ANA> | Sensing | The element is defined in 9.4.2.330 (Sensing element) and is present ifdot11WLANSensingImplemented is true. Otherwise, the element is not present. (#299, #308, #316, #481) |

### 9.4.2 Elements

**9.4.2.1 General**

*TGbf Editor: Please insert the following row in Table 9-128 (Element IDs) of 11bf D0.3:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Element ID** | **Element ID****Extension** | **Extensible** | **Fragmentable** |
| Sensing element (see 9.4.2.330( Sensing element)) (#299, #308, #316, #481) | 255 | <ANA> | Yes | No |

### 9.6.7.49 Sensing Measurement Setup Request frame format

*TGbf Editor: Please modify Figure 9-1138a in clause ‘9.6.7.49’ of 11bf D0.3 as following:*



**Figure 9-1138a—Sensing Measurement Setup Request frame Action field format** (#299, #308, #316, #481)

The Category field is defined in 9.4.1.11 (Action field).

The Public Action field is defined in 9.6.7.1 (Public Action frames).

The Dialog Token field is defined in 9.4.1.12 (Dialog Token field)(#706).

*TGbf Editor: Please insert the following text and figure after P77L61 in clause ‘9.6.7.49’ of 11bf D0.3 as following:*

The Sensing Comeback Info field is formatted as shown in Figure 9-1138c (Sensing Comeback Info field format). (#299, #308, #316, #481)



**Figure 9-1138c—** **Sensing Comeback Info field format** (#299, #308, #316, #481)

The Comeback subfield is set to 1 in a Sensing Measurement Setup Request frame addressed to an unassociated non-AP STA by an AP, to indicate that the AP is not currently able to perform a new sensing measurement setup with this non-AP STA. Otherwise, the Comeback subfield is set to 0. (#299, #308, #316, #481)

The Unassociated STA Comeback After Exponent subfield contains an unsigned integer. It is encoded according to the conventions in 9.2.2 (Conventions). The Unassociated STA Comeback After value is equal to 2(Comeback After Exponent + 4) ms (Giving it a value from 16 ms to 2048 ms). It is a time after which the unassociated non-AP STA is expected to transmit a Sensing Measurement Setup Query frame to the AP (see 11.21.18.3 (Sensing session setup)). The Unassociated STA Comeback After Exponent subfield is reserved if the Comeback subfield is set to 0. (#299, #308, #316, #481)

The Unassociated STA Comeback Before Exponent subfield contains an unsigned integer. It is encoded according to the conventions in 9.2.2 (Conventions). The Unassociated STA Comeback Before value is equal to 2(Comeback Before Exponent + 12) ms (Giving it a value from 4096 ms to 65536 ms). It is a time before which the unassociated non-AP STA is expected to transmit a Sensing Measurement Setup Query frame to the AP (see 11.21.18.3 (Sensing session setup)). The Unassociated STA Comeback Before Exponent subfield is reserved if the Comeback subfield is set to 0. (#299, #308, #316, #481)

*TGbf Editor: Please modify P78L1 in clause ‘9.6.7.49’ of 11bf D0.3 as following:*

The Measurement Setup ID field in the Sensing Measurement Setup Request frame indicates a Measurement Setup ID that identifies assigned operational parameters in the Sensing Measurement Parameters Element to be used in the corresponding sensing measurement instances as shown in Figure 9-1138b (Measurement Setup ID field format(#76, #261, #518)). The Measurement Setup ID field is not present if the Comeback subfield of the Sensing Comeback Info field is set to 1 in a Sensing Measurement Setup Request frame addressed to an unassociated non-AP STA by an AP. (#299, #308, #316, #481)

*TGbf Editor: Please modify P78L16 in clause ‘9.6.7.49’ of 11bf D0.3 as following:*

The Sensing Measurement Parameters Element is defined in 9.4.2.317 (Sensing Measurement Parameters element). The Sensing Measurement Parameters Element is not present if the Comeback subfield of the Sensing Comeback Info field is set to 1 in a Sensing Measurement Setup Request frame addressed to an unassociated non-AP STA by an AP. (#299, #308, #316, #481)

### 9.6.7.52 Sensing Measurement Setup Termination frame format

…

*TGbf Editor: Please modify Figure 9-1139f in clause ‘9.6.7.52’ of 11bf D0.3 as following:*



**Figure 9-1139f— Measurement Setup Termination Control field format(Motion 100, #11, #46,**

**#77, #80, #492, #299, #308, #316, #481)**

*TGbf Editor: Please insert the following text and figure after P80L45 in clause ‘9.6.7.52 of 11bf D0.3 as following:*

The Terminate Unassociated STA Sensing Session subfield is set to 1 to indicate that the AP or unassociated STA requests to terminate the sensing session established between the AP and the unassociated STA. Otherwise the Terminate Unassociated STA Sensing Session subfield is reserved. If the Terminate Unassociated STA Sensing Session subfield is set to 1, the Terminate All TB Measurement Setups subfield, Terminate All non-TB Measurement Setups subfield and TB/non-TB Measurement Setup Type subfield are reserved. (#299, #308, #316, #481)

# 93, 141, 145, 430, 611, 774, 463, 815, 877 – setup procedure

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| **93** | Claudio da Silva | 66.51 | As discussed in TGbf a couple of times, the sensing session setup ultimately consists of a capability exchange. Thus, there is no need to have an explicit sensing session setup. | Delete 11.21.18.3. Delete "Sensing session setup" from other subclauses within 11.21.18 (such as in the second and third paragraphs of 11.21.18.1). Support to WLAN sensing has already been defined in "Extended Capabilities field" (Table 9-190). Procedure to exchange detailed sensing-related capabilities will need to be defined. | ***Revised****:* Agree in principle, implicit sensing session setup is introduced. And a procedure to exchange sensing related capabilities is defined.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 93.* |
| **141** | Mahmoud Kamel | 66.51 | "A sensing session is an agreement between a sensing initiator and a sensing responder" The procedure of the sensing session setup is missing | Define the sensing session setup if there is any, or simply remove this procedure. | ***Revised****:* Same resolution as CID 93.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 141.* |
| **145** | Mahmoud Kamel | 66.01 | "The detailed sensing session setup procedure is TBD.". The sensing session setup procedure is missing | Define the sensing session setup if there is any, or simply remove this procedure. | ***Revised****:* Same resolution as CID 93.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 145.* |
| **430** | Assaf Kasher | 67.01 | "The detailed sensing session setup procedure is TBD" - define the details | define details of the sesstion setup procedure including what frames are exchanged, what parameters are in those frames and what are the interdependencies of these parameters | ***Revised****:* Same resolution as CID 93.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 430.* |
| **611** | Chaoming Luo | 67.01 | The detailed sensing session setup procedure needs to be defined. | As proposed by https://mentor.ieee.org/802.11/dcn/21/11-21-1934-06-00bf-discussion-on-session-setup.pptx | ***Revised****:* Same resolution as CID 93.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 611.* |
| **774** | Dibakar Das | 66.51 | The sensing session setup prcoedure does not seem to add much value relative to the frame exchanges that will be done for measurement setup. Especially for associated STA case it does not seem this phase is needed since the STAs already have a security context and have an AID assigned. Similarly, for NTB sensing. | Remove the sensing session setup procedure from the spec and merge any functionality with the measurement setup procedure. | ***Revised****:* Same resolution as CID 93.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 774.* |
| **463** | Sang Gook Kim | 66.55 | Identify the operational parameters associated with the sensing session and provide detail information. | As in the comment. | ***Revised****:* The group has discussed and agreed, no ‘session’ specific operational parameters are identified so far, propose to remove the sentence refered by the comments.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 463.* |
| **815** | Hanqing Lou | 66.56 | do we have more detailed explanation or examples of "operational parameters"? | Please clarify | ***Revised****:* Same resolution as CID 463.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 815.* |
| **877** | RUI YANG | 66.56 | It is not clear who (sensing initiator or responder, or both) determines operational parameters. | complete the sentence by indicating which sensing entities (i.e., initiator or responder) determines the parameters. | ***Revised****:* Same resolution as CID 463.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 877.* |

**Discussion:**

Clause 11.21.18.3 ‘Sensing session setup’ in D0.3:



**Resolution:**

*TGbf Editor: Please modify P89L12 in clause ‘11.21.18.1 Overview’ of 11bf D0.3 as following:*

### 11.21.18.1 Overview

…

During WLAN sensing procedure, an associated non-AP STA is identified by its AID and an unassociated non-AP STA is identified by its unassociated STA identifier (USID). The USIDs are assigned to unassociated STAs during the sensing measurement setup exchange. The AID and USID assignment shall be nonconflicting and shall have the same size and valid range (as defined in 9.4.1.8 (AID field)). The USID usage shall follow the same rules as that of AIDs(#781).

During WLAN sensing procedure, the timeouts as described in Table 11-xx (Sensing Timeout Values) may be used. (#93, #141, #145, #430, #611, #774)

**Table 11-xx—Sensing Timeout Values**

|  |  |  |
| --- | --- | --- |
| **Name** | **Value** | **Description** |
| Sensing Frame Exchange Timeout value | 20 ms | Sensing frame exchange timeout is detected within a STA’s MAC if the corresponding response frame is not received or not sent within this time. |
| Unassociated STA Sensing Session Timeout value | 100 s | The sensing session between an unassociated STA and an AP shall be terminated if the corresponding sensing session expiry timer has expired. (see 11.21.18.3 (Sensing session setup)) |
| Unassociated STA Comeback After value | As indicated in the Measurement Setup Request | Upon reception of a Measurement Setup Request frame with Comeback subfield of the Sensing Comeback Info field set to 1, the unassociated non-AP STA should transmit a Sensing Measurement Setup Query frame to the AP after this time. (see 11.21.18.3 (Sensing session setup)). |
| Unassociated STA Comeback Before value | As indicated in the Measurement Setup Request | Upon reception of a Measurement Setup Request frame with Comeback subfield of the Sensing Comeback Info field set to 1, the unassociated non-AP STA should transmit a Sensing Measurement Setup Query frame to the AP before this time. (see 11.21.18.3 (Sensing session setup)). |
| Measurement Setup Expiry value | As indicated in the Measurement Setup Request | Upon expiry of the corresponding measurement setup expiry timer, the sensing initiator and sensing responder shall terminate the sensing measurement setup. (see 11.21.18.8 (Sensing measurement setup termination)) |

*TGbf Editor: Please modify clause ‘11.21.18.3 Sensing session setup’ of 11bf D0.3 as following:*

### 11.21.18.3 Sensing session setup

In the sensing session setup of a WLAN sensing procedure, a sensing session is established, ~~and operational parameters associated with the sensing session are determined and may be exchanged between STAs~~ and the sensing capabilities (see 9.4.2.26 (Extended Capabilities element) and 9.4.2.330 (Sensing element)) of an AP and a non-AP STA are exchanged. (#463, #815, #877, #93, #141, #145, #430, #611, #774)

An AP may set the Invitation Of Responder For Sensing subfield of the Sensing element in a Probe Response frame to 1 to indicate the need for new sensing responders and may set to 0 to indicate new sensing responders are not needed. (#93, #141, #145, #430, #611, #774)

If a non-AP STA intends to associate with an AP, the sensing session is established when the (re)association completes, i.e., the sensing session setup procedure is the association procedure. (#93, #141, #145, #430, #611, #774)

*TGbf Editor: Please insert the following Figure 11-41xxx in clause ‘11.21.18.3 Sensing session setup’ of 11bf D0.3:*



Figure 11-41xxx— Unassociated non-AP STA sensing state machine diagram

Initially a sensing session between an unassociated non-AP STA and an AP is inactive. (#93, #141, #145, #430, #611, #774)

Following a successful sensing measurement setup initiated by either an AP (see 11.21.18.4.2 (TB Measurement Setup)) or an unassociated non-AP STA (see 11.21.18.4.3 (Non-TB Measurement Setup)), the sensing session between the unassociated non-AP STA and the AP becomes active, and both sides shall start an unassociated STA activity timer for this sensing session. The unassociated STA activity timer shall be set to the Unassociated STA Sensing Session Timeout value (see Table 11-xx (Sensing Timeout Values)).

When the sensing session between an unassociated non-AP STA and an AP is active, both sides shall reset the unassociated STA activity timer for this sensing session in any of the following conditions:

-- The unassociated non-AP STA and the AP successfully establish a sensing measurement setup as specified in 11.21.18.4 (Sensing measurement setup).

-- The unassociated non-AP STA participates in a sensing measurement instance (see 11.21.18.8 (Sensing measurement setup termination))

An active sensing session becomes inactive following an unassociated STA sensing session timeout detected at the unassociated non-AP STA or the AP of the sensing session when the corresponding unassociated STA activity timer expires. (#93, #141, #145, #430, #611, #774)

A typical sensing state machine implementation of unassociated non-AP STA is provided in Figure 11-41xxx (Unassociated non-AP STA sensing state machine diagram). (#93, #141, #145, #430, #611, #774)

A sensing session is identified by the tuple: <AP’s MAC Address, non-AP STA’s identifier>, where the non-AP STA’s identifier is

 - AID of the associated non-AP STA, or

 - USID of the non-AP STA when the non-AP STA is unassociated with the AP and is assigned to be a sensing responder, or

 - MAC address of the non-AP STA when the non-AP STA is unassociated with the AP and is a sensing initiator. (#228, #729, #24, #142, #143).

~~A STA may participate in multiple sensing sessions either as a sensing initiator or as a sensing responder.~~ In a sensing session, the AP may participate in multiple measurement setups either as a sensing initiator or as a sensing responder, correspondingly the non-AP STA may participate in multiple sensing measurement setups either as a sensing responder or as a sensing initiator. (#93, #141, #145, #430, #611, #774)

~~A sensing initiator~~ An AP may maintain multiple sensing sessions, each established with a different non-AP STA, to fulfill the requirements of a WLAN sensing procedure. A non-AP STA may maintain multiple sensing sessions, each established with a different AP, to initiate or participate in different sensing measurement setups. (#93, #141, #145, #430, #611, #774)

~~The detailed sensing session setup procedure is TBD. (#463)~~

*TGbf Editor: Please modify P91L65 in clause ‘11.21.18.4 Sensing measurement setup’ of 11bf D0.3 as following:*

### 11.21.18.4 Sensing measurement setup

A sensing initiator shall transmit a Sensing Measurement Setup Request frame to a sensing responder with which it intends to initiate a sensing measurement setup(#88, #431, #453, #612, #751).The Comeback subfield of the Sensing Comeback Info field in the Sensing Measurement Setup Request frame shall be set to 0 if any of the following is true:

 - the non-AP STA is a sensing initiator

 - the non-AP STA is associated with the AP and is a sensing responder. (#93, #141, #145, #430, #611, #774)

~~After receiving the~~ Upon reception of the Sensing Measurement Setup Request frame with the Comeback subfield of the Sensing Comeback Info field set to 0, (#93, #141, #145, #430, #611, #774) the sensing responder shall transmit a Sensing Measurement Setup Response frame to the sensing initiator which transmitted the Sensing Measurement Setup Request frame, according to the following rules:

— If the sensing responder accepts the requested sensing measurement setup parameters in the received Sensing Measurement Setup Request frame, it shall set the Status Code field to SUCCESS(#522) in the Sensing Measurement Setup Response frame.

— Otherwise, the sensing responder shall set the Status Code field to DECLINED\_SENSING\_MEASUREMENT\_SETUP or PREFERRED\_MEASUREMENT\_SETUP\_PARAMETERS\_SUGGESTED

in the Sensing Measurement Setup Response frame(#613). If the Status Code field is set to

PREFERRED\_MEASUREMENT\_SETUP\_PARAMETERS\_SUGGESTED(#148, #522), the sensing responder shall provide its preferred sensing measurement parameters in the Sensing Measurement Setup Response frame(#613).

The sensing responder should transmit the Sensing Measurement Setup Response frame within a sensing frame exchange timeout (see 11.21.18.1 (Overview))in response to the Sensing Measurement Setup Request frame. If no Sensing Measurement Setup Response frame is received within this time period, or if a Sensing Measurement Setup Response frame is received with a status code other than 0 (SUCCESS), the Measurement Setup shall be considered unsuccessful(#770).

If an unassociated non-AP STA intends to participate in a sensing measurement setup initiated by an AP, it shall transmit a Sensing Measurement Setup Query frame to solicit a Sensing Measurement Setup Request frame from the AP. (#93, #141, #145, #430, #611, #774)

Upon reception of a Sensing Measurement Setup Request frame with the Comeback subfield of the Sensing Comeback Info field set to 1, a non-AP STA shall transmit a Sensing Measurement Setup Query frame to the AP after the time specified as Unassociated STA Comeback After value (see Table 11-xx (Sensing Timeout Values)) and before time specified as Unassociated STA Comeback Before value (see Table 11-xx (Sensing Timeout Values)), to solicit a Sensing Measurement Setup Request frame from the AP. Both sides start a corresponding unassociated STA comeback timer when the exchange of the Sensing Measurement Setup Query frame and the Sensing Measurement Setup Request frame with the Comeback subfield of the Sensing Comeback Info field set to 1 completes. The unassociated STA comeback timer shall be set to the Unassociated STA Comeback Before value (see Table 11-xx (Sensing Timeout Values)) indicated in the Sensing Measurement Setup Request frame. (#93, #141, #145, #430, #611, #774)

If an AP intends to invite a sensing responder which is an unassociated non-AP STA, to participate another sensing measurement setup as a sensing responder, the AP may set the Comeback subfield of the corresponding User Info field in the Sensing Polling Trigger frame in a TB sensing measurement instance to 1. (#93, #141, #145, #430, #611, #774)

If the sensing responder is an unassociated non-AP STA, the sensing initiator shall assign the sensing responder to be polled in the TB sensing measurement instance by setting Poll Assigned subfield of the Sensing Measurement Parameters field in the Sensing Measurement Setup Request frame to 1. (#93, #141, #145, #430, #611, #774)

The Measurement Setup ID(#217) shall be assigned by a sensing initiator, the <sensing initiator’s MAC address, Measurement Setup ID> tuple should be used to uniquely(#25) identify the corresponding sensing measurement setup(#861, #752).

…

*TGbf Editor: Please modify P94L60 in clause ‘11.21.18.6.2 Polling phase’ of 11bf D0.3 as following:*

### 11.21.18.6.2 Polling phase

The AP shall send a Sensing Polling Trigger frame to one or more STAs and shall allocate each RU indicated in the Polling Trigger frame to only one STA(#163). Any STA addressed by a User Info field in a Sensing Polling Trigger frame may request to participate in the TB sensing measurement instance by responding with a CTS-to-self frame in its designated RU allocation as identified in the Sensing Polling Trigger frame(#760).

*Editor’s Note: The format of Sensing Polling Trigger frame is TBD.*

If the AP intends to invite a sensing responder which is an unassociated non-AP STA, to participate another sensing measurement setup as a sensing responder, the AP may set the Comeback subfield of the corresponding User Info field in the Sensing Polling Trigger frame in a TB sensing measurement instance to 1. After reception of a Sensing Polling Trigger frame with the Comeback subfield of the corresponding User Info field set to 1, a non-AP STA should transmit a Sensing Measurement Setup Query frame to the AP outside the current availability window. (#93, #141, #145, #430, #611, #774)

*TGbf Editor: Please modify P99L14 in clause ‘11.21.18.8 Sensing measurement setup termination’ of 11bf D0.3 as following:*

### 11.21.18.8 Sensing measurement setup termination(#132)

After it is established (see 11.21.18.4 (Sensing measurement setup)), a sensing measurement setup is terminated either explicitly or implicitly. Under the explicit sensing measurement setup termination, a STA uses the Sensing Measurement Setup Termination frame for the sensing measurement setup termination. Under the implicit sensing measurement setup termination, the sensing measurement setup is terminated after the expiration of the measurement setup expiry timer(#51, #175, #568, #569).

Sensing measurement setup(s) may be terminated explicitly at any time by either the sensing initiator or the sensing responder by transmitting an individually addressed Sensing Measurement Setup Termination frame(#203, #634).

Upon reception of a Sensing Measurement Setup Query frame from an unassociated STA, the AP may transmit a Sensing Measurement Setup Termination frame to the unassociated STA within a sensing frame exchange timeout (see 11.21.18.1 (Overview)), to terminate one or more sensing measurement setup(s). (#93, #141, #145, #430, #611, #774)

# 21, 570, 912, – termination procedure

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| **21** | Rajat Pushkarna | 72.48 | Sensing session termination should provide specifics on how the termination in a sensing session would occur? If there are multiple sensing session, does it means if the sensing initiator/responder initiates a sensing termination frame does it terminates all the sensing sessions? | The details of sensing session termination shall be provided. The sensing session must terminate based on the sensing session ID and may either be initiated by a sensing initiator or a sensing responder with the sensing termination frame carrying the measurement setup ID. | ***Revised****:* One <AP, non-AP STA> pair only have one sensing session. It shall be terminated when disassocate for associated STA. For unassociated, the sensing session may be terminiated implicitly or explicitly.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 21.* |
| **570** | Dong Guk Lim | 72.50 | Define the sensing session termination procedure and delte the text in lin 50. | As in comment. | ***Revised****:* Same resolution as CID 21.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 570.* |
| **912** | Zinan Lin | 72.48 | Can any STA initiate the sensing session termination? | Add details on which device can initiate the sensing session termination and how the devices receive the sensing session termination notification | ***Revised****:* Same resolution as CID 21.*TGbf editor to make the changes shown in IEEE 802.11-22/1385r9 under all headings that include CID 912.* |

**Resolution:**

*TGbf Editor: Please modify clause ‘11.21.18.9 Sensing session termination’ of 11bf D0.3 as following:*

### 11.21.18.9 Sensing session termination

In the sensing session termination, ~~STAs~~ an AP and a non-AP STA ~~stop performing measurements and~~ (#21, #570, #912) terminate the sensing session established between them. When the sensing session between an AP and a non-AP STA is terminated, all active sensing measurement setups established between the AP and the non-AP STA shall be terminated automatically. (#21, #570, #912)

~~The detailed procedure is TBD.~~ (#21, #570, #912)

The sensing session between an AP and an associated non-AP STA shall be terminated when the non-AP STA disassociates with the AP, i.e., the sensing session termination procedure is the disassociation procedure. (#21, #570, #912)

The sensing session between an AP and an unassociated non-AP STA shall be terminated whenthe unassociated non-AP STA transitions from sensing active state to sensing inactive state, see 11.21.18.3 (Sensing session setup). (#21, #570, #912)

The sensing session between an AP and an unassociated non-AP STA may be terminated explicitly by either the AP or the unassociated non-AP STA by transmitting an individually addressed Sensing Measurement Setup Termination frame with the Terminate Unassociated STA Sensing Session subfield set to 1. (#21, #570, #912)

SP:

Do you support resolutions to the following CIDs and incorporate the text changes into the latest TGbf draft: 299, 308, 316, 481, 93, 141, 145, 430, 611, 774, 463, 815, 877, 21, 570, 912 in 11-22/*1385r9* [16 CIDs]

Y/N/A