IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Proposed Spec Text  Sensing Measurement Setup | | | | |
| Date: 2022-01-21 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Insun Jang | LG Electronics | 19, Yangjae-daero 11gil, Seocho-gu, Seoul 137-130, Korea |  | insun.jang@lge.com |
| Dongguk Lim |  | dongguk.lim@lge.com |
| Jinsoo Choi |  | js.choi@lge.com |
| Sang Kim |  |  | sanggook.kim@lge.com |

Abstract

This submission proposes spec text for sensing measurement setup procedure and frame format to be incorporated into 802.11bf D0.1

Revisions:

* Rev 0: Initial version of the document.
* Rev 1 : Updated based on the comments in the call/offline. Main changes are as follows
  + Added missing Motion
  + Removed NOTE related to initiator’s role and Ack part for Action frame
  + Specified for Non-DMG STA
  + Divided role field into two subfields
* Rev 2 : Updated based on the comments in the call/offline. Main changes are as follows
  + Changed “Status Indication field” to existing “Status Code” field
  + Changed the formats of Sensing Measurement Setup frame (/w subtype)
  + Added Motion 61,63
* Rev 3 : Updated a text related to Status Code based on the comment in offline.
* Rev 4 : Live Update in the call.
* Rev 5 : Removed “Subtype” in the Sensing Measurement Setup frame
* Rev 6: Updated texts based on comments offline. Added “Protected Dual of Public Action frames”
* Rev 7: Added “Protected” in Description for Protected Dual

The proposed texts are based on the following motions

An optional negotiation process in the sensing measurement setup is defined that allows for a sensing initiator and a sensing responder to exchange and agree on operational attributes associated with a sensing measurement instance (Motion 17, 20/0370r1; Motion 23, 21/0644r4; Motion 29, 21/1543r1). The operational attributes may include initiator’s and responder’s roles, measurement report types, and other operational parameters (Motion 29, 21/1543r1).

The type of measurement result reported in a WLAN sensing procedure shall be decided by its initiator (Motion 13, 21/0147r3; Motion 29, 21/1543r1).

(Motion 36, 21/1736r2) During a sensing measurement setup, the role(s) of a sensing responder shall be determined as one of following:

* Sensing receiver
* Sensing transmitter
* Sensing transmitter and sensing receiver

The Measurement Setup ID may be used to identify attributes of the sensing measurement instances (Motion 24, 21/0644r4).

Measurement Setup ID is set by sensing initiator, the tuple <Sensing Initiator’s MAC address, Measurement Setup ID> is used to identify a specific Measurement Setup. (Motion 54, 21/ 1941r1).

The sensing transmitter and sensing receiver role(s) of a STA corresponding to a Measurement Setup ID until the sensing measurement setup is terminated shall be fixed as determined during the sensing measurement setup (Motion 37, 21/1736r2).

(Motion 41, 21/1735r3; Motion 51, 21/1828r4) The sensing measurement setup procedure consists of:

* The transmission of a sensing measurement setup request frame by the sensing initiator to a sensing responder with which it intends to perform a sensing measurement setup, followed by the transmission of an Ack frame by the intended sensing responder; and
* The transmission of a sensing measurement setup response frame by the intended sensing responder to the sensing initiator which transmitted the sensing measurement setup request frame to accept or reject the sensing measurement setup, followed by the transmission of an Ack frame by the sensing initiator.

(Motion 52, 21/1828r4) In a sensing measurement setup procedure, if the sensing responder intends to reject the assigned operational parameters included in the sensing measurement setup request frame, it may provide its preferred operational parameters in the sensing measurement setup response frame. For the accept case, whether the sensing responder may provide its preferred operational parameters or not is TBD.

(Motion 41, 21/1735r3) Sensing Measurement Setup Request and Response frames, which allow to perform a sensing measurement setup, are defined.

* The subtype of Sensing Measurement Setup Request and Response frames are Action and those are individually addressed.
* Formats of the Sensing Measurement Setup Request and Response frames are TBD.

(Motion 61, 21/1828r4) The 11bf amendment shall define both public and protected action frames, which include Sensing Measurement Setup Request/Response, Sensing Measurement Report, Sensing Measurement Setup Termination, and SBP Request/Response/Termination frames.

* Other public and protected action frames for sensing are TBD.

(Motion 63, 22/0286r1) A new action category of robust “Protected Sensing Frame” is defined to separate PN segment.

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

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

***TGbf editor: Please note that the baseline is 802.11REVme D1.0***

***TGbf editor: Please add a new subclause 11.21.x.y (Sensing Measurement Setup Procedure) under clause 11 as follows:***

11.21.x WLAN sensing (SENS) procedure

11.21.x.y Sensing Measurement Setup Procedure for non-DMG STA

Sensing measurement setup allows for a sensing initiator and a sensing responder to exchange and agree on operational attributes associated with a sensing measurement instance.

To perform a sensing measurement setup, a sensing initiator may transmit a Sensing Measurement Setup Request frame to a sensing responder with which it intends to perform a sensing measurement setup.

After receiving the sensing measurement setup request frame, 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 0 (SUCCESS) in the Sensing Measurement Setup Response frame.
* Otherwise, the sensing responder shall set the Status Code field to TBD in the Sensing Measurement Setup Response frame. The sensing responder may set the Status Code to TBD (PREFERRED\_MEASURMENT\_SETUP\_PARAMETERS\_SUGGESTED) and provide its preferred sensing measurement parameters in the Sensing Measurement Setup Response frame.

The sensing responder should transmit the Sensing Measurement Setup Response frame within TBD timeout ms in response to the Sensing Measurement Setup Request frame.

The measurement setup ID shall be assigned by a sensing initiator, the tuple <Sensing initiator’s MAC address, Measurement Setup ID> is used to identify a specific measurement setup.

During a sensing measurement setup, the role(s) of a sensing responder shall be determined by a sensing initiator as one of following (see 9.4.2.x (Sensing Measurement Parameters element)):

* Sensing receiver
* Sensing transmitter
* Sensing transmitter and sensing receiver

The assignment of sensing transmitter and/or sensing receiver role(s) of a STA corresponding to a measurement setup ID shall be fixed until the sensing measurement setup is terminated.

The assignment of measurement report type of a sensing responder as a sensing receiver corresponding to a measurement setup ID shall be fixed until the sensing measurement setup is terminated.

9.4.2 Elements

9.4.2.1 General

***TGbf editor: Please insert the following new row to Table 9-128 (Element IDs):***

**Table 9-128—Element IDs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Element ID** | **Element ID Extension** | **Extensible** | **Fragmentable** |
| Sensing Measurement Parameters (see 9.4.2.x (Sensing Measurement Parameters element)) | 255 | <ANA> | Yes | TBD |

***TGbf editor: add a new subclause 9.4.2.x (Sensing Measurement Parameters element) under subclause 9.4.2 as follows.***

9.4.2.x Sensing Measurement Parameters element

The Sensing Measurement Parameters element indicates operational attributes of the corresponding sensing measurement instances. The format of the Sensing Measurement Parameters element is shown in Figure 9-xxx (Sensing Measurement Setup element format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Sensing Measurement Parameters | TBD |
| Octets: | 1 | 1 | 1 | TBD | TBD |

Figure 9-xxx– Sensing Measurement Parameters element format

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

The format of the Sensing Measurement Parameters field is shown in 9-xxx (Sensing Measurement Parameters field format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Sensing  Transmitter | Sensing  Receiver | Measurement Report Type | TBD |
| Bits: | 1 | 1 | TBD | TBD |

Figure 9-xxx– Sensing Measurement Parameters field format

The Sensing Transmitter subfield is set to 1 to indicate a sesning transmitter role for a sensing responder coresponding to the measurment setup ID and is set to 0 otherwise.

The Sensing Receiver subfield is set to 1 to indicate a sensing receiver role for a sensing responder coresponding to the measurment setup ID and is set to 0 otherwise.

The Measurement Report Type subfield indicates the type of measurement result reported in sensing measurement instance(s) corresponding to the measurement setup ID. If the sensing initiator is a sensing receiver, it is reserved.

9.4.1.9 Status Code field

***TGbf editor: Please insert the following new row to Table 9-78 (Status codes) while maintaining the numerical order and updating the reserved range:***

|  |  |  |
| --- | --- | --- |
| **Table 9-78 – Status codes** | | |
| Status code | Name | Meaning |
| <ANA> | DENIED\_SENSING\_MEASUREMENT\_SETUP | Request denied because the requested sensing measurement setup is unacceptable. |
| <ANA> | PREFERRED\_MEASURMENT\_SETUP\_PARAMETERS\_SUGGESTED | Request denied because the requested sensing measurement setup is unacceptable, a set of preferred and acceptable sensing measurement parameters are suggested. |

* Action frame format details

9.6.7 Public Action details

9.6.7.1 Public Action frames

***TGbf editor: Please insert the following new row to Table 9-447 (Public Action field values):***

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

|  |  |
| --- | --- |
| Public Action field value | Description |
| <ANA> | Sensing Measurement Setup Request |
| <ANA> | Sensing Measurement Setup Response |
| <ANA> | Reserved |

***TGbf editor: add new subclauses 9.6.7.x (Sensing Measurement Request frame format) and 9.6.7.x (Sensing Measurement Response frame format) under subclause 9.6.7 as follows.***

9.6.7.x Sensing Measurement Setup Request frame format

The Sensing Measurement Setup Request frame is transmitted by a sensing initiator to request a sensing measurement setup. The format of the Sensing Measurement Setup Request frame Action field is shown in Table 9-xxx (Sensing Measurement Setup Request frame Action field format).

|  |  |
| --- | --- |
| Table 9-xxx – Sensing Measurement Setup Request frame Action field format | |
| Order | Information |
| 0 | Category |
| 1 | Public Action |
| 2 | Dialog Token |
| 3 | Measurement Setup ID |
| 4 | Sensing Measurement Parameters Element |

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) and set by the requesting sensing initiator.

The Measurement Setup ID field in the Sensing Measurement Setup Request frame indicates a measurement setup ID that identifies assigned parameters in the Sensing Measurement Parameters Element to be used in the corresponding sensing measurement instances as shown in Figure 9-xxx (Measurement Setup ID field format).

|  |
| --- |
| Measurement Setup ID |
| TBD |

Figure 9-xxx– Measurement Setup ID field format

The Sensing Measurement Parameters Element is defined in 9.4.2.x (Sensing Measurement Parameters Element)

9.6.7.y Sensing Measurement Setup Response frame format

The Sensing Measurement Setup Response frame is transmitted by a sensing responder in response to a Sensing Measurement Setup Request frame. The format of the Sensing Measurement Setup Response frame Action field is shown in Table 9-xxx (Sensing Measurement Setup Response frame Action field format).

|  |  |
| --- | --- |
| Table 9-xxx – Sensing Measurement Setup Response frame Action field format | |
| Order | Information |
| 0 | Category |
| 1 | Public Action |
| 2 | Dialog Token |
| 3 | Status Code |
| 4 | Sensing Measurement Parameters Element |

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) and set it to the value in the corresponding Sensing Measurement Setup Request frame.

The Status Code is defined in 9.4.1.9 (Status Code field).

The Sensing Measurement Parameters Element is defined in 9.4.2.x (Sensing Measurement Parameters Element). It is present in the Sensing Measurement Setup Response frame if the Status Code is set to TBD (PREFERRED\_MEASURMENT\_SETUP\_PARAMETERS\_SUGGESTED). Otherwise, it is not present in the Sensing Measurement Setup Response frame.

9.6.10 Protected Dual of Public Action frames

***TGbf editor: Insert new entries to Table 9-487 of P802.11REVme\_D1.0 while maintaining the numerical order and updating the reserved range:***

**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 frame | 9.6.7.x Sensing Measurement Setup Request frame format |
| <ANA> | Protected Sensing Measurement Setup Response frame | 9.6.7.y Sensing Measurement Setup Response frame format |
| <ANA> | Reserved |  |