IEEE P802.11
Wireless LANs

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| Comment resolution for SBP reporting |
| Date: 2022-09-13 |
| Author(s): |
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|  |  |  |  |  |

Abstract

This submission resolves comments of CID 410, 590, 598, 602, 744, 596, 597, 641.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Change in “11.21.19.3 SBP procedure reporting” to reflect that SBP reporting is not a phase of a TB measurement instance.
* Rev 2: SBP reporting may occur as:
	+ 1). at the end of each instance;
	+ 2). one or more separate TXOPs after each instance;
	+ 3). at the end of multiple instances within one TXOP;
	+ 4). one or more separate TXOPs after multiple instances within the AVW.
* Rev 3: Editorial changes.
* Rev 4:
	+ Add new elements as 9.4.2.332 (Availability Window element) and 9.4.2.333 (Assigned Availability Window element);
	+ Update the MLME related text in 11.21.19.2 (SBP procedure setup) and 11.21.19.3 (SBP procedure reporting);
	+ Add CID 596;
	+ Change Figure 9-1002ax and Table 9-401t based on the change of Sensing Measurement Report Control field made by 22/0977.
* Rev 5: Reverse the changes for MLME related description in 11.21.19.2 SBP procedure setup.
* Rev 6: Add B0-Bn indication in Figure 9-1002cq and Figure 9-1002cr.

# Discussion

One SP shows majority support for the proposal in 22/0883r2 “SBP Reporting Procedure”:

* **Straw Poll 1: Do you agree with the following?**
	+ SBP initiator shall indicate the **required measurement periodicity** andmay indicate its **periodic measurement availability window** in SBP request. The detailed signaling is TBD.
	+ If SBP responder accepts the SBP request, it shall **adhere** **to** the periodicity requested by the SBP initiator and indicate the **starting time of the scheduled first measurement instance** of the measurement setup in SBP response. The detailed signaling is TBD.
	+ The SBP reporting shall be added to the measurement instances corresponding to the measurement setup initiated by the SBP procedure.
		- SBP responder may transmit **multiple** SBP report frames sequentially as shown in slide 5.
		- SBP responder may transmit **one or more A-MPDUs,** each carrying multiple SBP report frames as shown in slide 6.
	+ A STA shall use the **same** **approach of PN** for measurement report frame and SBP report frame.

**Result:** the SP is supported unanimously.

# 410

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 410 | Michael Montemurro | 61.36 | Given the Sensing Measurement Setup Request/Response/Termination are defined as Protected Dual of Public Action frames, the equivalent Action frame is not required. Just use Public Action or Action. Same with SBP. | Define all messages as Protected Dual of Public Action frames. Action frames are not required since these frames can be sent pre-association or post-association when an SA is negotiated. | ***Rejected****:* As agreed in motion #61, both protected and public action frames are required. Public action frames would be used in non-RSNA network, and we need the frames in Class 1. |

# 590

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| **590** | Chaoming Luo | 57.33 | A row for SBP report request frame and a row for SBP report frame are required. | Insert a row for SBP report request frame and a row for SBP report frame | ***Revised****:* SBP report frame is added. SBP report request is not needed.*TGbf editor to make the changes shown in IEEE 802.11-22/0977r6 under all headings that include CID 590.* |

### 9.6.7.1 Public Action frames

*TGbf Editor: Please modify “Table 9-447—Public Action field values” of 11bf D0.2 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) |

# 598

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| **598** | Chaoming Luo | 61.62 | A row for SBP report request frame and a row for SBP report frame are required. | Insert a row for SBP report request frame and a row for SBP report frame | ***Revised****:* SBP report frame is added into Protected Sensing frame category.*TGbf editor to make the changes shown in IEEE 802.11-22/0977r6 under all headings that include CID 598.* |

**Discussion:**

Since we agreed that “A STA shall use the same approach of PN for measurement report frame and SBP report frame”, the SBP report frame should belong to Protected Sensing frame instead of Protected Dual of Public Action frame, so we change the Table 9-623k instead of Table 9-487.

**Resolution:**

### 9.6.36.1 Protected Sensing Action field

*TGbf Editor: Please modify “Table 9-623k—Protected Sensing Action field values” of 11bf D0.2 as following:*

**Table 9-623k—Protected Sensing Action field values**

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 0 | Reserved |
| 1 | Protected Sensing Measurement Report frame. It is carried in a Management Action No Ack frame.  |
| 2 | Protected DMG Sensing Measurement Report frame. It is carried in a Management Action frame.  |
| 3 | Protected SBP Report frame. It is carried in a Management Action No Ack frame. (#598) |
| ~~3~~4-255 | Reserved |

# 602, 744

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| **602** | Chaoming Luo | 64.21 | Also add Protected Dual of MS Request/Response/Termination, Protected Dual of SBP report request, Protected Dual of SBP Report | As commented. | ***Rejected****:* Protected SBP Report belongs to Protected Sensing frames, so no modification is needed. |
| **744**  | Alireza Raissinia | 64.22 | Add "Protected Sensing Measurement Setup Request", "Protected Sensing Measurement Setup Response" and Protected Sensing Measurement Setup Termination" as part of Protected Dual of Public Action frame part of class 1a | As per comment | ***Revised****:* Agree with the commenter.*TGbf editor to make the changes shown in IEEE 802.11-22/0977r6 under all headings that include CID 744.* |

### 11.3.3 Frame filtering based on STA state

*TGbf Editor: Please modify the Class 1a frames of 11bf D0.2 as following:*

In an infrastructure BSS when PTKSA from PASN authentication exists.

1) Protected Fine Timing frames (9.6.34)

2) Unicast SA Query (11.13)

3) Protected Sensing frames (9.6.36 (Protected Sensing frame details))

4) Protected Dual of Public Action frame whose Public Action field value is one of the following:

<ANA> (Protected SBP Request), <ANA> (Protected SBP Response), <ANA> (Protected SBP Termination), <ANA> (Protected Sensing Measurement Setup Request), <ANA> (Protected Sensing Measurement Setup Response), <ANA> (Protected Sensing Measurement Setup Termination). (#744)

5) DMG Action frames (9.6.19 (DMG Action frame details))(#341)

# 596, 597

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| **596** | Chaoming Luo | 60.65 | SBP Initiator needs to know the scheduling info. | Add the scheduling information if the SBP initiator does not participate in sensing. | ***Revised****:*The assigned availability window contains the sheduling info.*TGbf editor to make the changes shown in IEEE 802.11-22/0977r6 under all headings that include CID 596.* |
| **597** | Chaoming Luo | 61.01 | Need an SBP report request frame and an SBP report frame | Insert an SBP report request frame and an SBP report frame. | ***Revised****:* SBP report frame is defined. SBP request and response frames are modified accordingly. *TGbf editor to make the changes shown in IEEE 802.11-22/0977r6 under all headings that include CID 597.* |

**Discussion**:

1. As discussed in 22/883r2, AP may send SBP report frames sequentially to the SBP initiator. A ‘last report’ bit indicates there is no more SBP report frame to be sent in the current availability window. There may be multiple measurement instances in one availability window, SBP report frame(s) may be sent SIFS after each TB reporting phase, and also may be sent in a separate TXOP after multiple measurement instances if a longer transmission time is needed. E.g., the time estimation for transmit a CSI report of size 40096 (BW=80, Ntx=8, Nrx=8, Nb=10, Ng=4) with MCS 7 and 3.2 μs GI are as following:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  (26-tone, Nss 1) |  (26-tone, Nss 4) |  (26-tone, Nss 8) | (242-tone, Nss 1) | (242-tone, Nss 4) | (242-tone, Nss 8) |
| Mb/s  | 7.5 | 30 | 60 | 73.1 | 292.5 | 585 |
| transmission time (us) | 42769 | 10692 | 5346 | 4388 | 1097 | 548 |
|  |  |  |  |  |  |  |
|  | (484-tone, Nss 1) | (484-tone, Nss 4) | (484-tone, Nss 8) | (996-tone, Nss 1) | (996-tone, Nss 4) | (996-tone, Nss 8) |
| Mb/s  | 146.3 | 585 | 1 170 | 306.3 | 1 225.0 | 612.5 |
| transmission time (us) | 2193 | 548 | 274 | 1047 | 262 | 524 |

1. As discussed in 22/883r2, AP may send SBP report frames in one or moreA-MPDUs. Identification of different reports in one SBP report frame should be considered.
	1. Consider to reuse and modify the Sensing Measurement Report element appropriately.



* 1. According to D0.1, for delayed reporting, sensing measurement reports of multiple sensing measurement setups of a sensing responder may be included in a single Sensing Measurement Report frame.=> Which means measurement setup ID should be included in sensing measurement report element.
	2. For SBP reporting, measurement reports of one measurement instance from multiple sensing receivers (e.g., reports of TB sounding) and from multiple sensing transmitters (e.g., reports of NDPA sounding) may be aggregated into one A-MPDU by AP. => Which means sensing receiver ID should be included in SBP report, and also sensing transmitter ID and the corresponding timestamp of sensing measurement, to assist the processing of measurement results in SBP initiator.
	3. An HE MMPDU may not be long enough (around 3839 or 7935 octets for 2.4GHz, 3895 or 7991 or 11 454 octets for 5GHz or 6GHz) to carry one CSI report (42 ~ 40416 octets). So, a CSI report may be split to pieces to be carried in multiple MMPDUs. And to assemble the pieces, report ID may be considered as linkage.

**Resolution**:

*TGbf Editor: Please modify the first paragraph of clause 9.4.2.318 in 11bf D0.2 as following:*

### 9.4.2.318 Sensing Measurement Report element

The Sensing Measurement Report element contains a single sensing measurement report. The format of the Sensing Measurement Report element is defined in 9-1002aw (Sensing Measurement Report element format). The Sensing Measurement Report element is included in the Sensing Measurement Report frame, as described in 9.6.7.51 (Sensing Measurement Report frame format), ~~and in~~ the Protected Sensing Measurement Report frame, as described in 9.6.36.2 (Protected Sensing Measurement Report frame), the SBP Report frame, as described in 9.6.7.56 (Sensing by Proxy (SBP) Report frame format), and the Protected SBP Report frame, as described in 9.6.36.4 (Protected Sensing by Proxy (SBP) Report frame format). (#597)

*TGbf Editor: Please modify the Figure 9-1002aw in 11bf D0.2 as following:*



**Figure 9-1002aw— Sensing Measurement Report element format** (#597)

*TGbf Editor: Please modify the Table 9-401t in 11bf D0.2 as following:*

**Table 9-401t—Sensing Measurement Report Control field if the Sensing Measurement Report Type field is 0**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Size (bits)** | **Definition** | **Meaning** |
| BW | 4 | Bandwidth |  (Encoding of BW subfield is TBD) |
| … | … | … | … |
| Last SBP Report(#597) | 1 | Indicates the last SBP report in the current availability window | The Last SBP Report subfield is set to 1 in an SBP Report frame sent in the SBP reporting procedure, if there is no more SBP Report frame to be sent in the current sensing availability window. Otherwise, it is set to 0. This subfield is reserved if sent in a Sensing Measurement Report frame. |
| Reserved | 4 |  | Reserved |

*TGbf Editor: Please insert the following before P46L34 in clause 9.4.2.318 of 11bf D0.2:*

The Sensing Measurement Setup ID field is set to the Measurement Setup ID value corresponding to the sensing measurement setup, based on which sensing measurement instance that generates the current sensing measurement result is performed. (#597)

The Sensing Measurement Report field is used to report sensing measurements obtained by a sensing

receiver. This field is TBD.

*TGbf Editor: Please insert the following subclause into 11bf D0.2*

### 9.6.7.56 Sensing by Proxy (SBP) Report frame format (#597)

The SBP Report frame is an Action No Ack of category Public transmitted to provide WLAN sensing measurements. The format of the SBP frame Action field is defined in Figure 9-1139j (SBP Report frame Action field format).



**Figure 9-1139j— SBP Report 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 SBP Report field contains one or more of the Sensing Measurement Report elements described in 9.4.2.318 (Sensing Measurement Report element).

*TGbf Editor: Please insert the following subclause into 11bf D0.2*

### 9.6.36.4 Protected Sensing by Proxy (SBP) Report frame format (#597)

The Protected SBP Report frame is an Action No Ack frame of category Protected Sensing transmitted to provide WLAN sensing measurements. The format of the frame after the action field is identical to the format of the SBP Report frame as described in 9.6.7.56 (Sensing by Proxy (SBP) Report frame format).

### 9.4.2 Elements

**9.4.2.1 General**

*TGbf Editor: Please insert the following rows in Table 9-128 (Element IDs) of 11bf D0.2:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Element ID** | **Element ID****Extension** | **Extensible** | **Fragmentable** |
| Availability Window element (see 9.4.2.332 (Availability Window element)) (#597) | 255 | <ANA> | Yes | No |
| Assigned Availability Window element (see 9.4.2.333 (Assigned Availability Window element)) (#597) | 255 | <ANA> | Yes | No |

*TGbf Editor: Please insert the following subclause into 11bf D0.2:*

### 9.4.2.332 Availability Window element (#596, #597)

The format of the Availability Window element is shown in Figure 9-1002cm (Availability Window element format).



**Figure 9-1002cm — Availability Window element format**

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

The Availability Information field format is shown in Figure 9-1002cn (Availability Information field format).



**Figure 9-1002cn—Availability Information field format**

The Count subfield in the Availability Information field indicates the size in bits of the Availability Bitmap subfield. The value of this subfield is denoted as “count”.

Within SBP Request frames, each Availability Bit in the Availability Bitmap subfield indicates the transmitting STA’s availability for SBP reporting and/or TB sensing measurement instance with the recipient STA. The value indicated by each bit in the Availability Bitmap is in units of 10 TUs. Bit Bk (where 0 ≤ k ≤ count-1) represents the transmitting STA’s periodic availability in the interval [tstart,k , tend,k] repeated every N TUs; see Equation (9-3cb):

tstart,k = tstart,0 + 10k TU,

tend,k = tstart,0 + 10(k+1) TU,

tstart,0 = time 0 per the recipient STA’s TSF

N = 10 × count. (9-3cb)

A value of 1 in an Availability Bit indicates transmitting STA’s availability at time tstart,k for a duration of 10 TUs, while a value of 0 indicates transmitting STA’s unavailability at time tstart,k for a duration of 10 TUs.

The Padding subfield may be present in order to render the length of the Availability Bitmap subfield to be a multiple of 8. The value of the bits in the Padding field is reserved.

*TGbf Editor: Please insert the following subclause into 11bf D0.2:*

### 9.4.2.332 Assigned Availability Window element (#596, #597)

The format of the Assigned Availability Window element is shown in Figure Figure 9-1002co (Assigned Availability Window element format).



**Figure 9-1002co — Assigned Availability Window element format**

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

The Assigned Availability Information field format is shown in Figure 9-1002cp (Assigned Availability Information field format).



**Figure 9-1002cp—Assigned Availability Information field format**

The Header subfield format in the Assigned Availability Information field is shown in Figure 9-1002cq (Header subfield format).



**Figure 9-1002cq—Header subfield format**

The Count subfield in the Header subfield indicates the number of Availability Window Information subfields included in the Assigned Availability information field.

The Availability Window Information subfield format is shown in Figure 9-1002cr (Availability Window Information subfield format)



**Figure 9-1002cr—Availability Window Information subfield format**

The Partial TSF Timer subfield indicates the TSF timer of the transmitting STA at the start of the first availability window. The Partial TSF Timer subfield value is derived as follows, so as to have units of TUs: from the 64 TSF timer bits at the start of the first availability window, remove the most significant 38 bits and the least significant 10 bits.

The Duration subfield in the Availability Window Information subfield indicates the duration of the corresponding availability window in units of 100 μs (giving it a value from 0 to ~12.7 ms). The value of 0 is reserved.

The Periodicity subfield in the Availability Window Information subfield indicates the periodicity of that availability window in units of 100 TU (Giving it a value from 0 to ~26.1 s).

*TGbf Editor: Please modify the Figure 9-1139f in 11bf D0.2 as following:*

### 9.6.7.53 SBP Request frame format



**Figure 9-1139f— SBP Request frame Action field format** (#596, #597)

*TGbf Editor: Please modify the text after P72L2 in clause 9.6.7.53 11bf D0.2 as following:*

The Dialog Token field is set to a nonzero value chosen by the STA sending the SBP request to identify the request/response transaction.

The Availability Window element is defined in 9.4.2.331 (Availability Window element). (#596, #597)

Other fields are TBD.

*TGbf Editor: Please modify the Figure 9-1139g in 11bf D0.2 as following:*

### 9.6.7.54 SBP Response frame format

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**Figure 9-1139g— SBP Response frame Action field format** (#596, #597)

*TGbf Editor: Please modify the text after P72L41 in clause 9.6.7.54 11bf D0.2 as following:*

The Measurement Setup ID field is set to the Measurement Setup ID value corresponding to the sensing

measurement setup(#861) initiated by the AP that accepts the corresponding SBP request. The Measurement Setup ID field is present in an SBP Response frame only if the Status Code field is equal to SUCCESS.

The Assigned Availability Window element is defined in 9.4.2.332 (Assigned Availability Window element). It is present in an SBP Response frame if the status code is equal to SUCCESS, can be present if the status code is equal to PREFERRED\_MEASUREMENT\_SETUP\_PARAMETERS\_SUGGESTED, and it is not present otherwise. (#596, #597)

Other fields are TBD.

# 641

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| **CID** | **Commenter** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| **641** | Chaoming Luo | 73.33 | The SBP reporting procedure needs to be defined. | A proposal will be submitted. | ***Revised****:* The SBP reporting procedure is defined. *TGbf editor to make the changes shown in IEEE 802.11-22/0977r6 under all headings that include CID 641.* |

*TGbf Editor: Please modify clause 11.21.19.2 of 11bf D0.2 as following:*

### 11.21.19.2 SBP procedure setup

…

An SBP responder that sends an SBP Response frame with status code SUCCESS should initiate a WLAN sensing procedure with one or more non-AP STAs using operational parameters derived from those indicated within the SBP Request frame that requested the SBP procedure. The SBP responder shall be the sensing initiator of the WLAN sensing procedure.

The SBP initiator shall include one Availability Window element in the SBP request frame indicating its availability for SBP reporting and/or TB sensing measurement instance . The periodicity of the availability windows requested by the SBP initiator is expressed in units of 10 TUs in the Count subfield in the Availability Information field of the Availability Window element. The value of the Count subfield in the Availability Information field of the Availability Window element shall be a multiple of the Beacon Interval of the SBP responder in units of 10 TUs. The requested sensing measurement periodicity is the same as the requested periodicity of the availability windows. (#641)

An SBP responder that sends an SBP Response frame with status code SUCCESS shall include an Assigned Availability Window element in the SBP response frame. The Assigned Availability Information field in the Assigned Availability Window element shall contain exactly one Availability Window Information subfield. The Availability Window Information subfield represents the availability window assigned by the SBP responder to the SBP initiator.. (#641)

Figure 9-788edk (Example of a bitmap with 200 TU periodicity signalled in the ISTA Availability Window element), 9-788edl (Example of mapping of ISTA’s availability bitmap to RSTA’s TSF) and 9-788edm (Example of how an RSTA assigns an Availability Window to an ISTA) together also show an example of how an SBP responder assigns an availability window from the received Availability Window element of the SBP initiator. (#641)

An SBP responder shall reject a request for SBP from an SBP initiator if the SBP responder cannot assign the SBP initiator to an availability window that overlaps with a 10 TUs interval in which the SBP initiator is available (as signalled by the Availability Window element in the SBP request frame). (#641)

If the SBP responder rejects a request for SBP from and SBP initiator by setting the Status Code field in the SBP response frame to PREFERRED\_MEASUREMENT\_SETUP\_PARAMETERS\_SUGGESTED, the SBP responder may include an Assigned Availability Window element in the SBP response frame. The Assigned Availability Information field in the Assigned Availability Window element shall contain one or more Availability Window Information subfields. Each Availability Window Information subfield represents an availability window that the SBP responder can assign to that SBP initiator if requested by the SBP initiator in future. (#641)

The SBP initiator may participate in the WLAN sensing procedure as a sensing responder.

*TGbf Editor: Please modify the clause 11.21.19.3 in 11bf D0.2 as following*

**11.21.19.3 SBP procedure reporting**

Upon receipt of an MLME-SBPREPORT.request primitive, the SBP responder shall initiate the SBP reporting procedure by transmitting an SBP Report frame to the SBP initiator indicated by the PeerSTAAddress parameter.

The SBP reporting procedure may commence a SIFS time after the last phase of a TB sensing measurement instance corresponding to the measurement setup initiated by the SBP responder, if the transmission of at least one SBP report frame does not exceed the acquired TXOP. If a longer transmission time is needed, then the approach of the SBP reporting allows the scheduling of one or more link accesses within the assigned sensing availability window to complete the transmission. If the acquired TXOP consists of more than one TB sensing measurement instance corresponding to the measurement setup initiated by the SBP responder, the SBP reporting procedure may commence a SIFS time after the last phase of the last one TB sensing measurement instances corresponding to the measurement setup initiated by the SBP responder. If the assigned sensing availability window consist of more than one TXOP, then the approach of the SBP reporting allows the scheduling of one or more channel accesses within the assigned sensing availability window to complete the transmission. (#641)

In the SBP reporting procedure, the SBP responder may transmit sequentially (i.e., a SIFS separated) multiple SBP report frames to the SBP initiator. An SBP report frame may include one or more Sensing Measurement Report fields to convey to the SBP initiator the sensing measurement reports of the corresponding sensing measurement instance, each of the Sensing Measurement Report fields contains: either a sensing measurement report generated by a sensing receiver corresponding to the sensing measurement instance, or a segment of the measurement report generated by a sensing receiver corresponding to the sensing measurement instance. (#641)

In the SBP reporting procedure, the SBP responder may transmit sequentially (i.e., a SIFS separated) one or more A-MPDUs, each carrying multiple SBP report frames. (#641)

SP:

Do you support resolutions to the following CIDs and incorporate the text changes into the latest TGbf draft: 410, 590, 598, 602, 744, 596, 597, 641 in 11-22/977r6 [8 CIDs]

Y/N/A