### **IEEE P802.11Wireless LANs**

|  |
| --- |
| Updated PDT Sensing NDPA Frame Format |
| Date: 2022-12-13 |
| Author(s): |
| Name | Affiliation | Email |
| Ali Raissinia  | Qualcomm | alirezar@qti.qualcomm.com |
| Mahmoud Kamel | InterDigital | mahmoud.kamel@interdigital.com  |
| Jung Hoon Suh | Huawei | junghoon.suh@huawei.com |
| Das Dibakar | Intel | Das, Dibakar <dibakar.das@intel.com> |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**This document is the updated version of the NDPA frame format based on D0.5**

**~~9.3.1.19 NDP Announcement frame format~~**

***~~Change all instances of “Ranging NDP Announcement frame” to “Ranging/Sensing NDP Announcement frame”(Motion 193).~~***

**9.3.1.19.1 General description**

***Change the first paragraph of 9.3.1.19.1 (General description) as defined in IEEE P802.11be/D2.2 as follows(Motion 193):***

The NDP Announcement frame has ~~four~~ five variants, the VHT NDP Announcement frame, the HE NDP

Announcement frame, the Ranging~~/Sensing~~ NDP Announcement frame, the Sensing NDP Announcement frame, and the EHT NDP Announcement frame. The ~~four~~ five formats are distinguished by the setting of the NDP Announcement Variant subfield in the Sounding Dialog Token field and the presence or absence of the STA Info field with AID subfield equal to 2045 (i.e., Special AID) with its B31 set to 1 (see Table 9-42a)). The STA Info field with AID subfield equal to 2045 is always present in a Sensing NDP Announcement frame and it is transmitted as the first STA Info field. The STA Info field with AID subfield equal to 2045 is not present in the Ranging NDP Announcement frame used for TB ranging measurement exchange but it is present in the non-TB ranging measurement exchange. ~~The Ranging/Sensing NDP Announcement frame is distinguished by an additional indication in the Special STA Info field. The Special STA Info field is always present in a Ranging/Sensing NDP Announcement frame and its AID11 subfield is equal to 2045, while the NDP Announcement frame with the STA Info field is not sent in TB Ranging exchange. The Special STA Info field is placed at the start of the list of STA Info fields in a Ranging/Sensing NDP Announcement frame.~~

The Duration, RA, and TA fields are set as in a VHT NDP Announcement frame.

The NDP Announcement frame contains at least one STA Info field. If the NDP Announcement frame contains only one STA Info field with a value less than 2008 in the AID11 subfield, then in the case of VHT, or HE or EHT NDP Announcement frames the RA field is set to the address of the STA addressed in the only STA Info field of this NDP Announcement frame (see 10.37.5.2 (Rules for VHT sounding protocol sequences), 26.7 (HE sounding operation), 35.7 (EHT sounding operation)), while in the case of Ranging NDP Announcement frames, the RA address is set to the address of the RSTA or ISTA that is the intended recipient of the frame. In the case of Sensing NDP Announcement frames, the RA address is set to the address of the AP or non-AP STA that is the intended recipient of the frame. If the NDP Announcement frame contains more than one STA Info field with a value less than 2008 in the AID11 subfield, then the RA field is set to the broadcast address.

***Change the fourth paragraph of 9.3.1.19.1 (General description) as defined in IEEE P802.11be/D2.2 as follows(Motion 193):***

~~The TA field is set to the address of the STA transmitting the NDP Announcement frame or the bandwidth~~

~~signaling TA of the STA transmitting the NDP Announcement frame. In an EHT NDP Announcement~~

~~frame transmitted by an EHT STA that is a STA 6G with 320 MHz bandwidth support in a non-HT or non-~~

~~HT duplicate format and where the scrambling sequence and SERVICE field carry the TXVECTOR parameter~~

~~CH\_BANDWIDTH\_IN\_NON\_HT, the TA field is set to a bandwidth signaling TA. In an NDP Announcement frame transmitted by a VHT STA, or an HE STA, or an EHT STA that is not a STA 6G or an EHT STA that is a STA 6G without 320 MHz bandwidth support in a non-HT or non-HT duplicate format and where the scrambling sequence carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT, the TA field is set to a bandwidth signaling TA. If a Ranging/Sensing NDP Announcement frame is addressed to a set of ISTAs/sensing responders in which at least two ISTAs/sensing responders have a TB ranging/sensing measurement exchange with a different BSSID in the Multiple BSSID set of the RSTA/sensing initiator then the TA field is the transmitted BSSID.~~

If a Sensing NDP Announcement frame is intended to a set of non-AP STAs (i.e. sensing responders) in which at least two of the non-AP STAs are included in the TB sensing measurement instance with a different BSSID in the Multiple BSSID set of the AP then the TA field is the transmitted BSSID.

***Change the sixth paragraph of 9.3.1.19.1 (General description) as defined in IEEE P802.11be/D2.2 as follows(Motion 193):***

The setting of the NDP Announcement Variant subfield in the Sounding Dialog Token field along with the presence of the STA Info field with AID subfield equal to 2045 and the setting of B31 in the STA Info field with AID subfield equal to 2045 identifies the variant of the NDP Announcement frame, refer to Table 9-42a (NDP Announcement frame variant encoding.

***Change Table 9-42a (NDP Announcement frame variant encoding) as defined in IEEE P802.11~~az~~be/~~D7.0~~D2.2 as follows(Motion 193):***

Table 9-42a—NDP Announcement frame variant encoding

|  |  |  |  |
| --- | --- | --- | --- |
| NDP Announcement Variant subfield | NDP Announcement frame variant | Presence of STA Info field with AID subfield equal to 2045Figure 9.61de | B31 in the STA Info field with AID subfield equal to 2045 Figure 9.61.de  |
| B1 | B0 |
| 0 | 0 | VHT NDP Announcement frame | No | N/A |
| 0 | 1 | Ranging NDP Announcement frame | Yes for non-TB ranging No for TB ranging | Reserved for non-TB rangingN/A for TB ranging |
| 0 | 1 | Sensing NDP Announcement frame | Yes for TB & non-TB sensing measurement instance  | Set to 1 |
| 1 | 0 | HE NDP Announcement frame | No | N/A |
| 1 | 1 | EHT NDP Announcement frame | No | N/A |

***Insert the figure below after Figure 9-61da (STA Info field format in a Ranging NDP Announcement frame when the AID11 subfield is equal or less than 2007) defined in IEEE P802.11az/D7.0(Motion 193):***

SI2SR NSTS

Reserved

SI2SR Rep

SR2SI Rep

SR2SI NSTS

Reserved

AID11

Disambig

-uation

B31

B17

B20

B22

B23

B25

Reserved

11

6

1

3

1

3

3

3

1

Bits:

Figure 9-61db STA Info field format in a Sensing NDP Announcement frame when the AID11 subfield is less than 2008

***Change the text from page 44.5 to 45.19 of IEEE P802.11az/D7.0 as follows(Motion 193):***

The Ranging~~/Sensing~~ NDP Announcement frame and Sensing NDP Announcement frame use~~s~~ the same Frame Control subtype as the VHT NDP Announcement frame. The frame format of the Ranging/Sensing NDP Announcement frame is the same as the HE NDP Announcement frame shown in Figure 9.61a (HE NDP Announcement frame format). ~~The frame format of the Ranging/Sensing NDP Announcement frame transmitted in a sensing measurement instance (see 11.55.1.5.2 (TB sensing measurement instance) and 11.55.1.5.3 (Non-TB sensing measurement instance)) follows the format of the Ranging/Sensing NDP Announcement frame transmitted in a ranging measurement instance (see 11.21.6.4.3 (TB ranging measurement exchange) and 11.21.6.4.4 (Non-TB~~

~~ranging measurement exchange)) except for a Special STA Info field whose AID11 subfield is equal to 2045, which is always included in the Ranging/Sensing NDP Announcement frame transmitted in a sensing measurement instance.~~

~~The Duration, RA, and TA fields are set as in a VHT NDP Announcement frame.~~

~~The Sounding Dialog Token Number subfield in the Sounding Dialog Token (SDT) field contains a value in~~

~~the range of 0 to 63, which identifies the Measurement Sounding phase that this transmitted Ranging/Sensing~~

~~NDP Announcement frame is part of; see 11.21.6.4.3 (TB ranging measurement exchange), and~~

~~11.21.6.4.4 (Non-TB ranging measurement exchange), 11.55.1.5.2 (TB sensing measurement instance), and~~

~~11.55.1.5.3 (Non-TB sensing measurement instance).~~

The Sounding Dialog Token Number subfield in the Sounding Dialog Token (SDT) field contains a value in the range of 0 to 63, which identifies the Measurement Sounding phase that this transmitted Ranging NDP Announcement frame is part of; see 11.21.6.4.3 (TB ranging measurement exchange), and 11.21.6.4.4 (Non-TB ranging measurement exchange).

The Sounding Dialog Token Number subfield in the Sounding Dialog Token (SDT) field contains a value in the range of 0 to 63, which identifies the Measurement Instance ID that this transmitted Sensing NDP Announcement frame is part of; see 11.55.1.5.2 (TB sensing measurement instance), and 11.55.1.5.3 (Non-TB sensing measurement instance).

The format of the STA Info field in a Ranging~~/Sensing~~ NDP Announcement frame, when the AID11 subfield

is equal to or less than 2007 and the frame is transmitted in a ranging measurement instance, is defined

in Figure 9-61da (STA Info field format in a Ranging~~/Sensing~~ NDP Announcement frame when the AID11

subfield is equal to or less than 2007 ~~and the frame is transmitted in a ranging measurement instance~~).

The format of the STA Info field in a Sensing NDP Announcement frame, when the AID11 subfield is less than 2008, is defined in Figure 9-61db (STA Info field format in a Sensing NDP Announcement frame when the AID11 subfield is less than 2008). The~~format of the Special STA Info field in a Ranging/Sensing NDP Announcement frame, when the AID11~~

~~subfield is equal to or less than 2007 and the frame is transmitted in a sensing measurement instance, is~~

~~defined in Figure 9-61db (STA Info field format in a Ranging NDP Announcement frame when the AID11~~

~~subfield is equal or less than 2007 and the frame is transmitted in a sensing measurement instance).~~

A Ranging or Sensing NDP Announcement frame contains at least one STA Info field with an AID11 subfield equal to or less than 2007 per STA that is ~~intended~~ ~~addressed~~ intended to receive this frame.

In the cases of the non-TB ranging measurement exchange, see (11.22.6.4.4 (Non-TB ranging measurement

exchange)) and of the non-TB sensing measurement instance (11.55.1.5.3 (Non-TB sensing measurement

instance)) there is always only one intended receiver and the RA field is set to the address of that STA.

In the cases of the TB ranging measurement exchange, ~~see~~ (11.22.6.4.3 (TB ranging measurement

exchange)) and of the TB sensing measurement instance (11.55.1.5.2 (TB sensing measurement instance))

the RA field is set to the broadcast address if more than one STA is intended to receive this frame; otherwise

the RA field is set to the address of the STA that is ~~intended~~ ~~addressed~~ intended to receive this frame.

If the AID11 subfield is equal or less than 2007, it identifies a STA that is ~~intended~~ ~~addressed~~ intended to receive this frame and assigns the parameters within this STA Info field to this STA. In case of the TB ranging measurement

exchange, ~~see~~ (11.22.6.4.3 (TB ranging measurement exchange)) and of the TB sensing measurement

instance (11.55.1.5.2 (TB sensing measurement instance)), the AID11 subfield contains the 11 least significant

bits of the AID of an associated STA, or the RSID/USID of an unassociated STA, that ~~when it~~ is ~~intended~~ ~~expected~~ to process the following NDP. In the case of the non-TB ranging measurement exchange, ~~see~~ (11.22.6.4.4 (Non-TB ranging measurement exchange) and of the non-TB sensing measurement instance (11.55.1.5.3 (Non-TB

sensing measurement instance)), the intended receiver is identified by the RA field and the AID11 subfield

is set to 0.

When used as part of the TB ranging measurement exchange, see 11.21.6.4.3 (TB ranging measurement

exchange), the LTF Offset, R2I NSTS and R2I Rep subfields are used to indicate the following R2I NDP’s

HE-LTF configuration; see 27.3.18a.1 (HE Ranging NDP); while the I2R NSTS and the I2R Rep subfields

are reserved.

When used as part of the TB sensing measurement instance, see 11.55.1.5.2 (TB sensing measurement

instance), for the bandwidth of the PPDU carrying the ~~of~~ NDP Announcement frame less than or equal to 160 MHz, the SI2SR NSTS and SI2SR Rep subfields are used to indicate the following SI2SR NDP’s HE-LTF configuration see 27.3.18a.1 (HE Ranging NDP); while the SR2SI NSTS and the SR2SI Rep subfields are reserved. For the bandwidth of the PPDU carrying the NDP Announcement equal to 320 MHz, the SI2SR NSTS subfield is used to indicate the following SI2SR NDP’s number of spatial streams; the SI2SR Rep, the SR2SI NSTS and the SR2SI Rep subfields are reserved.

When used as part of the non-TB ranging measurement exchange, the I2R NSTS and I2R Rep subfields are

used to indicate the following I2R NDP’s HE-LTF configuration, 27.3.18a.1 (HE Ranging NDP), while the

R2I NSTS and R2I Rep subfields indicate the HE-LTF configuration of the R2I NDP sent in response by the

RSTA, see 11.21.6.4.4 (Non-TB ranging measurement exchange).

When used as part of the non-TB sensing measurement instance, for the bandwidth of the PPDU carrying the NDP Announcement frame less than or equal to 160 MHz, the SI2SR NSTS and SI2SR Rep subfields are used to indicate the following SI2SR NDP’s HE-LTF configuration,27.3.18a.1 (HE Ranging NDP) also used for sensing measurement, while the SR2SI NSTS and SR2SI Rep subfields indicate the HE-LTF configuration of the SR2SI NDP sent in response by the AP ~~RSTA/~~(i.e.,sensing responder), see 11.55.1.5.3 (Non-TB sensing measurement instance).

The LTF Offset subfield is used in the TB ranging measurement exchange protocol with secure LTF see

11.21.6.4.5.2 (TB ranging Measurement Exchange with secure LTF); it indicates the number of HE-LTF to

skip when processing the following NDP. The LTF Offset subfield is set to 12 0 in all other cases.

The R2I NSTS and I2R NSTS subfields indicate the number of spatial streams of the corresponding NDP

and is set to the number of spatial streams minus 1.

The R2I Rep and I2R Rep subfields are set to the number of HE-LTF repetitions of the corresponding HE

Ranging NDP minus 1; see 27.3.18a.1 (HE Ranging NDP). If the I2R and R2I Rep subfields have a value

equal to 0, then there is no HE-LTF repetition in the I2R and R2I NDP respectively. For the bandwidth ~~Bandwidth~~ of the PPDU carrying the NDP Announcement frame less than or equal to 160 MHz, the SR2SI Rep and SI2SR Rep subfields are set to the number of HE-LTF repetitions of the corresponding HE Ranging ~~/Sensing~~ NDP (also used for sensing measurement) minus 1; see 27.3.18a.1 (HE Ranging NDP). If the SI2SR and SR2SI Rep subfields have a value equal to 0, then there is no HE-LTF repetition in the SI2SR and SR2SI NDP subfields respectively. When used as part of the TB sensing measurement instance, for the bandwidth of NDP Announcement frame is equal to 320 MHz, both the SI2SR Rep and the SR2SI Rep subfields are reserved.

***Change the text from page 46.10 to 46.17 of IEEE P802.11az/D7.0 as follows(Motion 193):***

The format of the STA Info field with AID11 subfield equal to 2045 is shown in Figure 9-61dd (STA Info

field format in a Ranging NDP Announcement frame if the AID subfield is 2045).

The format of the STA Info field with AID11 subfield equal to 2045 is shown in Figure 9-61de (STA Info field in a Sensing NDP Announcement frame if AID subfield is equal to 2045.

***Insert the following figure after Figure 9-61dd – STA Info field in a Ranging NDP Announcement frame if the AID11 subfield is 2045:***

AID:

2045

SI2SR NDP

TX Power

SR2SI NDP

Target RSSI

Disambiguation

Measurement

Set-up ID

B0

B11

B31

B10

B18

B19

B26

B27

B28

Bits:

11

8

8

1

B30

Sensing

3

1

Figure 9-61de STA Info field in a Sensing NDP Announcement frame with AID11 subfield equal to 2045

The ~~Special~~ STA Info field with AID11 subfield equal to 2045 is used in the non-TB ranging measurement

exchange, 11.21.6.4.4 (Non-TB ranging measurement exchange), ~~and in the non-TB sensing measurement~~

~~instance, 11.55.1.5.3 (Non-TB sensing measurement instance),~~ to carry the I2R NDP Tx Power and R2I

NDP Target RSSI subfields.

The ~~Special~~ STA Info field with AID11 subfield equal to 2045, is used in the non-TB sensing measurement

instance, 11.55.1.5.3 (Non-TB sensing measurement instance) to carry the SI2SR NDP Tx Power and SR2SI

NDP Target RSSI subfields, and also used in the TB sensing measurement instance, 11.55.1.5.2 (TB sensing measurement instance) to carry the SI2SR NDP Tx Power, while the SR2SI NDP Target RSSI subfield is reserved.

In the STA Info field with AID subfield equal to 2045, the B31 is set to 1 to indicate the Sensing NDP Announcement frame and B28 to B30 are set to the Measurement Setup ID of the corresponding sensing measurement instance (Figure 9-61de-STA Info field in a Sensing NDP Announcement frame with AID11 subfield equal to 2045).

~~In the Special STA Info field with AID11 subfield equal to 2045, B28 to B30 are set to the Measurement~~

~~Setup ID in the Sensing NDP Announcement frame, otherwise set to reserved when sent in the Ranging~~

~~NDP Announcement frame and Bit B31 is set to 1 to indicate the presence of Sensing NDP Announcement~~

~~frame and is set to 0 to indicate the presence of Ranging NDP Announcement frame as seen in Table 9-28e~~

~~(Encoding of NDP Announcement Variant subfield in Sounding Dialog Token field and Sensing subfield in~~

~~Special STA Info field for the differentiation of Sensing NDP Announcement frame variant from Non-TB~~

~~Ranging NDP Announcement frame).~~

**Delete table below**

~~~~