IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Proposed Draft Text on NDP Format for Sensing | | | | |
| Date: 2022-01-28 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | Email |
| Yan Xin | Huawei Technologies | 303 Terry Fox Drive, Suite#400, Ottawa, ON |  | yan.xin@huawei.com |
| Claudio da Silva | Meta Platforms |  |  | claudiodasilva@fb.com |
| Chris Beg | Cognitive Systems |  |  | chris.beg@cognitivesystems.com |
|  |  |  |  |  |

Abstract

This document proposes draft text on “NDP format for sensing” in TGbf D0.1.

R0: Initial proposed draft text.

***List of the related motions approved in TGbf***

The approved motions related to NDP for sensing, which are shown in [1] (802.11bf SFD) and [2] (802.11bf Motions List), are listed as follows:

*7.1.4.2.2 NDPA sounding phase*

NDP can be used for the channel measurement (e.g. CSI) between sensing transmitter and sensing receiver(s) in sub-7 GHz bands. NDP format for sensing is TBD (Motion 22, 21/1015r1; Motion 29, 21/1543r1).

*7.1.4.2.3 Trigger frame (TF) sounding phase*

NDP can be used for the channel measurement (e.g. CSI) between sensing transmitter(s) and sensing receiver in sub-7 GHz bands. NDP format for sensing is TBD (Motion 22, 21/1015r1; Motion 29, 21/1543r1).

**7.1.4.2 TB sensing measurement instance**

(Motion 29, 21/1543r1) Examples of possible TB sensing measurement instances are shown in Figure 3. In this figure,

* How to define the sounding order, as in example 3 or as in example 4, is TBD.
* The reporting phase in example 5 may be separated from the sounding phases (TBD).
* The polling in the reporting phase in example 5 could be addressed to responders other than those involved in the sounding (TBD).
* LTF security update is TBD.



**Figure 3: TB sensing measurement instance (examples). (Motion 29, 21/1543r1)**

**7.1.4.3 Non-TB sensing measurement instance**

(Motion 39, 21/1433r2) A non-TB sensing measurement instance is defined as follows:

* One non-AP STA is the sensing initiator and one AP is the sensing responder.
* Once the non-AP STA obtains a TXOP, it initiates a non-TB sensing measurement instance by transmitting an NDPA frame to the AP followed by an Initiator-to-Responder (I2R) NDP after SIFS. SIFS after the I2R NDP, the AP shall transmit a Responder-to-Initiator (R2I) NDP to the non-AP STA.
* If the non-AP STA is only the sensing transmitter, then the NDPA frame should configure the R2I NDP to be transmitted with minimum possible length with one LTF symbol.
* If the non-AP STA is only the sensing receiver, then the NDPA frame should configure the I2R NDP to be transmitted with minimum possible length with one LTF symbol.
* The details of the NDPA frame are TBD.
* I2R/R2I NDP formats are TBD.

***Discussion***

In the project scope of the approved WLAN Sensing (SENS) proposed PAR [3], it is described that:

“This amendment defines modifications to the IEEE 802.11 medium access control layer (MAC) and to the Directional Multi Gigabit (DMG) and enhanced DMG (EDMG) PHYs to enhance Wireless Local Area Network (WLAN) sensing (SENS) operation in license-exempt frequency bands between 1 GHz and 7.125 GHz and above 45 GHz.”

“This amendment defines modifications to the PHY service interface of the High Throughput (HT), Very High Throughput (VHT), High Efficiency (HE) and Extremely High Throughput (EHT) PHYs.”

“This amendment provides backward compatibility and coexistence with legacy IEEE 802.11 devices operating in the same band.”

For ease of implementation and maintenance of backward compatibility of coexistence with legacy IEEE 802.11 devices (including 802.11be devices), the NDP format for sensing shall be selected among the existing NDP format(s) specified in IEEE 802.11-2020 [4] and the amendments for the sub-7 GHz bands, which 802.11bf amends to, e.g., EHT Sounding NDP. The NDP format for sensing is TBD and should be decided based on further discussion in TGbf.

***Proposed draft text for 802.11 D0.1***

**11. MLME**

**11.x.y.z. Transmission of an NDP for sensing**

**x.x.x**

NDP for sensing can be used for the channel measurement (e.g. CSI) between sensing transmitter and sensing receiver(s) in sub-7 GHz bands. NDP format for sensing is TBD.

**References:**

1. 802.11-21/0504r6, Claudio da Silva, Specification Framework for TGbf.
2. 802.11-20/1847r40, Tony Xiao Han, TGbf Motions List.
3. 802.11-19/2103r12, Claudio da Silva, 802.11 SENS SG Proposed PAR.
4. IEEE Std 802.11™-2020.