IEEE P802.11
Wireless LANs

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Abstract

This document provides CR for CIDs related to NDP feedback report.

13415

1. **Introduction**

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

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

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

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| **CID** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 13415 | 9.3.1.23.8 | 97.34 | NDP feedback currently doesn't provide an opportunity for non-associated STAs to request a probe response, which means a large amount of probe requests and probe response messages. | Add 1 bit from 'reserved' for 'Request for Probe Response'.Change Eq. 9-ax1 to N\_STA=18\*2^BW\*(Multiplexing\_Flag)-2^BW\*'Request\_for\_Probe\_Response' |  Revised – agree with the commenter. Define a procedure to allow unassociated STAs to make resource request and to make requests for asking for a probe response. Apply the changes as defined in doc 18/548r1 |

1. **Motivation**

**Requesting for reveiving a Probe Response**

In High Density (HD) scenarios (large halls, stadiums, etc.) the overhead respective to the Probe Requests frames (and respective Probe Response frames) may be very high; this is sometimes known as the ‘Probe Storm’ problem. STAs using the ‘Active Scanning’ mechanism will transmit a Probe Request frame on each channel at least N times (in many cases N>3); an AP (or multiple APs) may respond with a Probe Response frame.

Past measurements have shown probe request and response messages can constitute a large percentage of the total frames being transmitted (e.g. 35% of the frames). It is hence desirable to reduce the number of probe request & response messages.

With this resolution we aim at reducing the number of probe request/response messages, by using some of the NDP feedback resource blocks, by any (including multiple, simultaneous) STA(s), to request a broadcast Probe Response; each STA that requires a Probe Response will randomly choose one of the resource blocks dedicated for ‘request for probe response’ and transmit on it. An AP that detects a STA(s) transmitting on such a resource, will respond with a Probe Response with the broadcast address as destination address.

**Request for more probability to access the medium with EDCA**

The justification is that unassociated STAs access the medium primarily with EDCA. With an indication that the STAs are struggling to access the medium, the AP could then re-adjust its parameters for accessing the medium to provide more chances for the unassociated STAs, or schedule MU triggers for unassociated STAs (for instance NDP feedback report for unassociated STAs)

1. **Proposed changes**

***11ax Editor: Modify 9.3.1.23.8 NDP feedback Report Poll variant as follows:***

* NDP Feedback Report Poll variant

The User Info field for NDP Feedback Report Poll Trigger frame is defined in Figure 9-52n (User Info field for the NDP Feedback Report Poll variant)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Starting AID | Reserved | Reserved | Feedback Type | Allocation for Common Requests | Reserved | Target RSSI | Multiplexing Flag |
| Bits: | 12 | 8 | 1 | 4 | 1 | 6 | 7 | 1 |

Figure 9-52n User Info field for the NDP Feedback Report Poll variant

The Allocations for Common Requests subfield indicates if allocations are reserved for unassociated STAs to perform Common Requests. If set to 1, the two last allocations of RU\_TONE\_SET\_INDEX and STARTING\_STS\_NUM are used respectively for a request for a probe response and for a request for more probability of EDCA channel access. If set to 0, no allocations are used for this purpose.

The total number of STAs, *NSTA*, that are scheduled to respond to the NDP Feedback Report Poll Trigger frame is calculated using Equation (9-ax1).

* *NSTA* = 18  2*BW*  (*Multiplexing Flag +1*)(#7108) – (2  *Allocations for Common Requests*)

where *BW* is the value indicated in the BW subfield of the NDP Feedback Report Poll Trigger frame, *Multiplexing Flag* is the value indicated in the Multiplexing Flag subfield of the NDP Feedback Report Poll Trigger frame and *Allocations for Common Requests* is the value indicated in the Allocations for Common Requests subfield of the NDP Feedback Report Poll Trigger frame.

***11ax Editor: Modify 27.5.6 NDP feedback Report procedure as follows:***

* STA behavior

A STA is scheduled to respond to the NDP Feedback Report Poll Trigger frame if its AID is greater than or equal to the starting AID and less than starting AID + *NSTA*, using the Starting AID subfield in the eliciting Trigger frame, and with *NSTA* the total number of STAs that are scheduled to respond to the NDP Feedback Report Poll Trigger frame. *NSTA* is calculated by the following equation, with BW subfield, Allocations for Common Requests and Multiplexing Flag subfield from the eliciting Trigger frame:

*NSTA* = 18  2*BW*  (*Multiplexing Flag+1*) – (2  *Allocations for Common Requests*) (#7108)

27.5.6.2.4 Transmission of the HE NDP feedback report response for Common Requests

The procedure described in this subclause is valid when the Allocations for Common Requests subfield in the Feedback Report Poll Trigger frame is set to 1.

An unassociated STA may transmit an NDP feedback report response in response to a Trigger frame with the Allocations for Common Requests subfield set to 1, shall set the TXVECTOR parameter as described in 27.5.6.2.1 (Transmission of the HE NDP feedback report response for associated STAs), except for the following parameters:

* The RU\_TONE\_SET\_INDEX parameter shall be set with the following equations:
* RU\_TONE\_SET\_INDEX = (18  2*BW*) (*Multiplexing Flag+1*) – 1*,* if the request is for receiving a probe request,
* RU\_TONE\_SET\_INDEX = (18  2*BW*) (*Multiplexing Flag+1*) if the request is for more probability to access the medium with EDCA.
* The STARTING\_STS\_NUM parameter shall be set to the Multiplexing flag subfield in the User Info field of the eliciting Trigger Frame
* FEEDBACK\_STATUS shall be set to 1.

A STA transmitting an NDP feedback report response to a Trigger frame shall modulate the assigned tones as descried in 27.5.6.2.2 (Modulation of the assigned tones).

* + - * 1. Reception of Common Requests

Following the transmission from an AP of an NDP Feedback Report Poll Trigger frame with the Allocations for Common Requests subfield set to 1, multiple unassociated STAs may simultaneously send NDP feedback report responses using the RU\_TONE\_SET\_INDEX and the STARTING\_STS\_NUM assigned to the request for probe response, and multiple unassociated STAs may simultaneously send NDP feedback report responses to the AP using the RU\_TONE\_SET\_INDEX and the STARTING\_STS\_NUM assigned to the request for more probability to access the medium with EDCA.

Based on the RXVECTOR parameter NDP\_REPORT, which provides the detected status array for the resources of each spatial stream and tone set assigned by the Trigger frame, the AP can derive if at least one request was made for a probe response and if at least one request was made for more probability to access the medium with EDCA.(17/1307r1)

If at least one request was made for a probe response, the AP should schedule for transmission a broadcast probe response frame, in the following 20 ms.

If at least one request was made for more probability to access the medium with EDCA, the AP knows that at least one unassociated STAs is trying to access the medium with EDCA, and may intentionally temporarily reduce the aggressiveness of its EDCA function.