IEEE P802.11
Wireless LANs

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| Link measurement  |
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Abstract

This document provides text clarifications and modifications in relation to the Draft P802.11ad\_D8.0.

*Discussion:*

*Link adaptation is a closed loop mechanism that allows getting MCS to be used for transmission to the intended receiver. The LA mechanism provided in the spec is not fully useful because time of the response cannot be predicted. Propose to provide an option of Fast Link Adaptation that the Link Measurement response frame will be delivered in BRPIFS time. Devices with phase array antennas that use beamforming to achieve high gain may use the mechanism to get MCS to be used with trained antennas.*

*Editor change text in the subclause 8.4.1.11 as follows:*

**8.4.1.11 Action field**

*Change the second paragraph as follows*

The Category field is set to one of the nonreserved values shown in the “Code” column of Table 8-38. Action frames of a given category are referred to as *<category name> Action frames*. For example, frames in the QoS category are called *QoS Action frames*. The “Action frame” column in Table 8-38 identifies exceptions, if any, that specific frames within a category have with respect to the “Robust” column.

***Change Table 8-38 as follows***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Code** | **Meaning** | **Sub clause** | **Robust** | **Group addressed privacy** | **Action frame** |
| 0 | Spectrum management | 8.5.2 | Yes | No |  |
| 1 | QoS | 8.5.3 | Yes | No |  |
| 2 | DLS | 8.5.4 | Yes | No |  |
| 3 | Block Ack | 8.5.5 | Yes | No |  |
| 4 | Public | 8.5.8 | No | No |  |
| 5 | Radio measurement | 8.5.7 | Yes | No | DMG: Link Measurement Request and Link Measurement Report are not robust frames |
| 6 | Fast BSS Transition | 8.5.9 | Yes | No |  |
| 7 | HT | 8.5.12 | No | No |  |
| 8 | SA Query | 8.5.10 | Yes | No |  |
| 9 | Protected Dual of Public Action | 8.5 | Yes | No |  |
| 10 | WNM | 8.5.14 | Yes | No |  |
| 11 | Unprotected WNM | 8.5.15 | No | No |  |
| 12 | TDLS | 8.5.13 | –See NOTE | No |  |
| 13 | Mesh | 8.5.17 | Yes | Yes |  |
| 14 | Multihop | 8.5.18 | Yes | Yes |  |
| 15 | Self-protected | 8.5.16 | No | No |  |
| 16 | Reserved | – | – | – |  |
| 17 | Reserved (used by WFA) | – | – | – |  |
| 18-125 | Reserved | – | – | – |  |
| 126 | Vendor-specific Protected | 8.5.6 | Yes | No |  |
| 127 | Vendor-specific | 8.5.6 | No | No |  |
| 128-255 | Error | – | – | – |  |
| NOTE—TDLS Action fields are always transported encapsulated within a data frame (see 10.22.1), so the question of whether these frame are Robust is not applicable. |

*Editor: add Link Measurement Request and Link Measurement Report as Class 1 frames in 10.3.3*

*Editor add Fast Link Adaptation field to the 8.4.2.130.2 DMG STA Capability Information field. Use B6 for Fast Link Adaptation capability. In the Figure 8-401o in B6 replace “reserved" by "Fast Link Adaptation capability field"*

*Editor add at end of the subclause 8.4.2.130.2:*

"The Fast Link Adaptation is set to 1 to indicate that the DMG STA supports Fast Link Adaptation as described in 9.37. Otherwise, it is set to 0."

*Editor add new subclause under 9.37.x*

**9.37.x Fast link adaptation**

Fast link adaptation requires a STA that issues the Link Measurement request and a STA that responds with Link Measurement Report as defined below to be RD capable.

The STA that that issues the Link Measurement request shall be RD owner and the STA that responds with Link Measurement Report shall be the RD recipient. Exchange of the Link Measurement request and report frames and other frames defined below shall follow rules of RD (9.25).

A STA that sets Fast Link Adaptation field in the DMG Capabilities element to 1 and initiates fast link adaptation shall transmit the Link Measurement Request frame of subtype Action No Ack within PPDU with the AGGREGATION parameter in the Tx Vector set to AGGREGATED. The PSDU that contains the Link measurement Request frame shall not contain any other frame that requires immediate response and shall be at least of 5.27us long.

A STA that sets Fast Link Adaptation field in the DMG Capabilities element to 1 shall respond to a Link Measurement Request frame in no longer than BRPIFS. The TPC Report element, DMG Link Margin element and other fields of the Link Measurement Report shall reflect measurements on the PPDU that contained the last received Link Measurement Request frame. If the following conditions are met, the responding STA shall keep the IFS not longer than SIFS and shall respond with a Link Measurement Report frame:

a) the Link Measurement Request frame is of subtype Action No Ack

b) the Dialog Token field in the Link Measurement Request frame is equal to 0

c) the Link Measurement Request frame is delivered in a PPDU with the AGGREGATION parameter in the Rx Vector set to AGGREGATED

The responding STA shall keep the IFS not longer than SIFS by transmitting PPDUs. . The PPDUs shall not contain any frames that require immediate response and the PSDU shall be at least of 5.27us long. All transmitted PPDUs should use the same MCS and the same TxPower.

The Link Measurement Report frame shall be of subtype Action No Ack and shall be sent using DMG MCS 1within PPDU with the AGGREGATION parameter in the Tx Vector set to AGGREGATED. PSDU that contains the Link measurement Report frame shall not contain any frame that requires immediate response and shall be at least of 5.27us long.

If at least one of these conditions is not met, the STA may respond to the Link Measurement Request frame as defined in 9.37.

NOTE The PPDUs has the AGGREGATION parameter in the Tx Vector set to AGGREGATED to allow padding the PSDUs with MPDU delimiters of size 0 to fit to the requirement to be of at least 5.27us long.

 A STA that sets the Fast Link Adaptation field in the DMG Capabilities element to 1 and that receives a Link Measurement Report frame should issue an unsolicited Link Measurement Report frame in no longer than BRPIFS after the end of the Link Measurement Report frame. The TPC Report element, DMG Link Margin element and other fields of the Link Measurement Report shall reflect measurements taken on one or more of the PPDUs that the Fast Link Adaptation responder transmitted after receiving the Link Measurement Request frame, including the Link Measurement Report frame itself. If the initiating STA needs time longer than SIFS to issue the unsolicited Link Measurement report after receiving of the Link Measurement Report frame, the STA shall keep the IFS not longer than SIFS by transmitting one or more PPDUs before issuing the unsolicited Link Measurement Report frame.



**Figure X fast link adaptation example**

**References:**

Draft P802.11ad\_D8.0