IEEE P802.11  
Wireless LANs

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| --- | --- | --- | --- | --- |
| Power Save Delivery for 11ay | | | | |
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Abstract

This document proposes an addition to the Triggered Unscheduled PS scheme that allow station to immediately retrieve its BU from the AP while it reside Unscheduled PS mode.

**9.3.3.6 Association Request frame format**

*Add the following row in table 9-29 as follows*

**Table 9-29—Association Request frame body *(continued)***

|  |  |  |
| --- | --- | --- |
| 24 | QoS Triggered Unscheduled | The QoS Triggered Unscheduled element is optionaly present if dot11QosOptionImplemented is true and dot11EDMGOptionImplemented is true |

**9.3.3.7 Association Response frame format**

*Add the following row in table 9-29 as follows*

**Table 9-30—Association Response frame body *(continued)***

|  |  |  |
| --- | --- | --- |
| 31 | QoS Triggered Unscheduled | The QoS Triggered Unscheduled element is optionaly present if dot11QosOptionImplemented is true and dot11EDMGOptionImplemented is true |

*Change the following section as follows*

**9.4.1.4 Capability Information field**

B0 B7 B8 B9 B10 B11 B12 B13 B15

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DMG Parameters | Spectrum Management | Triggered Unscheduled PS | Reserved | Radio Measurement | Reserved |

Bits: 8 1 1 2 1 3  
  
**Figure 9-69—Capability Information field (DMG STA)**

A DMG STA sets the Triggered Unscheduled PS subfield to 1 within the Capability Information field when  
it transmits a Capability Information field in which the Reverse Direction subfield is equal to 1 and is  
capable of delivering a BU as an RD responder on receipt of a PPDU containing an RDG MPDU with the  
Power Management subfield set to 1 and sets it to 0 otherwise. EDMG AP shall set the Triggered Unscheduled PS subfield to 1.

*Add the following section as follows*

**9.4.2.250.XYZ QoS Triggered Unscheduled (QoS-TU) IE**

The QoS Triggered Unscheduled (QoS-TU) element is used to communicate the QoS Triggered Unscheduled parameters between EDMG STA and AP/PCP.

The QoS Triggered Unscheduled IE is defined in Figure XYZ1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  | Element ID | Length | Element ID Extension | QoS-TU Parameters | QoS-TU  Max MPDU Size |
| Octets : | 1 | 1 | 1 | 1 | 2 |

**Figure XYZ1—** **QoS Triggered Unscheduled element format**

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

The QoS-TU Parameters field contains the QoS-TU AC and the QoS-TU Max A-MPDU Length Exponent subfields as shown in Figure 9-XYZ2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 | B6 | B7 |
|  | QoS-TU  Max A-MPDU Length Exponent | QoS-TU  AC\_VO Flag | QoS-TU  AC\_VI Flag | QoS-TU  AC\_BK Flag | QoS-TU  AC\_BE Flag |
| Bits : | 4 | 1 | 1 | 1 | 1 |

**Figure 9-XYZ2—QoS-TU Parameters field**

Each of the QoS-TU ACs Flag subfields is set to 1 to indicate that the corresponding AC (AC\_BE, AC\_BK, AC\_VI, or AC\_VO) is QoS triggered unscheduled enabled as described in 11.2.7.2.2, otherwise it is set to 0.

When sent by a non-PCP and non-AP EDMG STA, The QoS-TU Max A-MPDU Length Exponent subfield is set according to the QoS-TU Max A-MPDU Length Exponent subfield described in Table 1-MPDU Parameters field definition that in the EDMG Capabilities element format. This subfield indicates the maximum A-MPDU size of buffered BUs the STA is prepared to receive during QoS Unscheduled PS triggered by the STA. When sent by an EDMG PCP or EDMG AP, this field is reserved.

When sent by a non-PCP and non-AP EDMG STA, The QoS-TU Max MPDU Size subfield indicates the maximum number of buffered BUs (MPDUs) the STA is prepared to receive during QoS unscheduled PS triggered. When sent by an EDMG PCP or EDMG AP, this field is reserved.

*Change the following section as follows*

**9.6.20.2 Power Save Configuration Request frame format**

The format of the Power Save Configuration Request (PSC-REQ) frame Action field is shown in  
Table 9-387.

Table 9-387—Power Save Configuration Request frame Action field format

|  |  |
| --- | --- |
| Order | Information |
| 1 | Category |
| 2 | DMG Action |
| 3 | Dialog Token |
| 4 | DMG Power Management |
| 5 | DMG Wakeup Schedule element (optional) |
| 6 | QoS Triggered Unscheduled element (optional) |

The Category field is defined in 9.4.1.11.

The DMG Action field is defined in 9.6.20.1.

The Dialog Token field is set to a value chosen by the STA sending the frame to uniquely identify the transaction.

The length of the DMG Power Management (DPM) field is one octet. Setting the DPM field to 0 indicates a transition from power save mode to active mode. Setting the DPM field to 1 indicates a transition from active mode to power save mode. All other values are reserved.

The DMG Wakeup Schedule element is defined in 9.4.2.131 (11.2.7.2).

The QoS Triggered Unscheduled element is defined in 9.4.2.250.TBD (11.2.7.2).

**9.6.20.3 Power Save Configuration Response frame format**The format of the Power Save Configuration Response (PSC-RSP) frame Action field is shown in  
Table 9-388.

**Table 9-388—Power Save Configuration Response frame Action field format**

|  |  |
| --- | --- |
| **Order** | **Information** |
| 1 | Category |
| 2 | DMG Action |
| 3 | Dialog Token |
| 4 | Status Code |
| 5 | DMG Wakeup Schedule element (optional) |
| 6 | Antenna Sector ID Pattern element (optional) |
| 7 | QoS Triggered Unscheduled element (optional) |

The Category field is defined in 9.4.1.11.  
The DMG Action field is defined in 9.6.20.1.  
The Dialog Token field is set to the value of the Dialog Token field in the corresponding PSC-REQ frame.  
The Status Code field is defined in 9.4.1.9.

The DMG Wakeup Schedule element is defined in 9.4.2.131.  
The Antenna Sector ID Pattern element is defined in 9.4.2.157.  
The QoS Triggered Unscheduled element is defined in 9.4.2.250.TBD (11.2.7.2).

*Change the following section as follows*

**11.2.7.2.2 Non-AP and non-PCP STA operation without a wakeup schedule**

A non-PCP and non-AP STA that has used unscheduled power save to enter doze state may offer an RDG to  
its AP or PCP if the following conditions apply:

* the AP or PCP has transmitted a Capability Information field in which the Triggered Unscheduled PS field is equal to 1
* the non-AP and non-PCP has transmitted a Capability Information field in which the Reverse Direction subfield is equal to 1

The AP or the PCP may use the offered RDG to transmit one or more BUs to the non-PCP and non-AP STA  
using the reverse direction protocol defined in 10.28.  
The non-PCP and non-AP STA should continue to offer an RDG to the AP or to the PCP within the current  
TXOP while the Buffered AC subfield of the QoS Control field in frames transmitted by the AP or by the  
PCP indicates that one or more BUs are buffered for the AC for which the TXOP was gained.

An EDMG STA may include the QoS Triggered Unscheduled element in a PSC-REQ or Association Request frame transmitted to an EDMG AP or EDMG PCP to indicate an explicit request for a QoS enabled triggered schedule power save on specific ACs if the EDMG AP or EDMG PCP has transmitted a DMG Capability Information field in which the Triggered Unscheduled PS subfield is equal to 1. EDMG AP or EDMG PCP shall include the QoS Triggered Unscheduled element in the PSC-RSP or Association Response frame sent as response with the same respective QoS-TU AC bits as in the PSC-REQ or Association Request was set to 1. An EDMG STA may clear the QoS triggered schedule power save on a specific AC by sending a successful PSC-REQ frame with the relevant AC flag field set to 0.

When QoS triggered schedule PS is enabled on a specific AC, an EDMG PCP and an EDMG AP shall deliver the available buffered BU on the AC immediately following a trigger frame that grants the RDG to the EDMG PCP or EDMG AP. The EDMG PCP or EDMG AP shall not deliver to the triggering STA an A-MPDU with a size greater than indicated by the QoS-TU Max A-MPDU Length Exponent and it shall not contain more than the number of MPDUs indicated by the QoS-TU Max MPDU Size as were indicated in the QoS Triggered Unscheduled element sent in the PSC-REQ frame that established the QoS enabled triggered schedule power save.

**SP: Do you agree to incorporate the changes in 11-17-1416-00-00ay-Power Save Delivery for 11ay.docx” (U-APSD extension for EDMG) into the draft?**