IEEE P802.11
Wireless LANs

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| Doze Transition Signaling MoreData |
| Date: 2018-10-16 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Matthew Fischer | Broadcom |  |  | Matthew.fischer@broadcom.com |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

 |

Abstract

Proposed language to create a mechanism to signal PS State change using MoreData.

The proposed changes address CID 15757 of LB233 on TGax D3.0.

Changes are referenced to TGax D3.2.

**REVISION NOTES:**

**R0**:

initial

**END OF REVISION NOTES**

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. This introduction is 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.***

**CIDs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 15757 | Jarkko Knecht | 27.7.4 | 326.20 | The TWT Information frame is a management frame which handling/reception/parsing the content in the receiving STA takes time. A STA may transmit a TWT Information frame to teminate an ongoing TWT SP. For the receiving device the processing time of the TWT Information frame may be too long for immediate TWT SP termination. The immediate SP termination would be better to do through EOSP or more data bits which handling time is much shorter. | Please change that EOSP (or PM) bit controls the termination of the currently ongoing TWT SP and the TWT Information frame controls the future TWT SPs, i.e. whether the STA be available at future TWT SP. Please allow a STA to terminate the ongoing SP without a transmission of the TWT Information frame. | Revise - TGax editor to make changes as shown in 11-18/1820r0 that are marked with CID 15757 which use the MoreData subfield to signal a transition to Doze state. TWT information behavior is unaltered, and still may be used in the original context as another method for TWT SP termination in addition to the requested use of indicating suspend and resume. |

**Discussion:**

The existing TWT SP early termination by a non-AP STA uses the management action frame TWT Information. The mechanism has more overhead than is preferred and the information is located within the body of the frame. Management frames are typically processed by higher layers of a MAC implementation, and therefore have a longer time to take effect.

The EOSP bit proposed is not generally available to be used by a non-AP STA given the existing definition of the QoS Control field.

The MoreData bit is a more suitable option which also has the advantage of allowing signaling in non-Data Types.

A capability bit is included.

**Proposed Changes to TGax D3.2:**

***TGax editor: within TGax D3.2, add the following new definition in the appropriate location within 3.2 Definitions specific to IEEE 802.11:***

**3.2 Definitions specific to IEEE 802.11**

**Doze transition signalling (DTS) STA**: An HE STA with dot11DozeTransitionSignalingActivated equal to true that is associated with an AP from which it has received an Extended Capability element that indicates support for Doze Transition Signaling. **(#15757)**

***TGax editor: within TGax D3.2, add the following new abbreviation in the appropriate location within 3.4 Abbreviations and acronyms:***

**3.4 Abbreviations and acronyms**

DTS Doze Transition Signaling **(#15757)**

**9.4.2.27 Extended Capabilities element**

***TGax editor: within TGax D3.2, add another row to Table 9-135 – Extended Capabilities field as shown:***

**Table 9-153—Extended Capabilities field**

|  |  |  |
| --- | --- | --- |
| **Bit** | **Information** | **Notes** |
| 77 | TWT Requester Support | A STA sets the TWT Requester Support field to 1 when dot11TWTOptionActivated is true, dot11HEOptionImplemented is true and TWT requester functionality is supported. Otherwise, the STA sets the TWT Requester Support field to 0. See 10.43 (Target wake time (TWT)). |
| 78 | TWT Responder Support | A STA sets the TWT Responder Support field to 1 when dot11TWTOptionActivated is true, dot11HEOptionImplemented is true and TWT responder functionality is supported. Otherwise, the STA sets the TWT Responder Support field to 0. See 10.43 (Target wake time (TWT)). |
| 79 | OBSS Narrow Bandwidth RU In OFDMA Tolerance Support | An AP STA sets the OBSS Narrow Bandwidth RU In OFDMA Toler-ance Support field to 1 if dot11OBSSNarrowBWRUinOFDMAToler-ated is true, and sets it to 0 otherwise.A non-AP STA sets the OBSS Narrow Bandwidth RU In OFDMA Tolerance Support field to 0. |
| <ANA> | Doze Transition Signaling Support | An HE STA sets the Doze Transition Signaling Support field to 1 if dot11DozeTransitionSignalingActivated is true and sets it to 0 otherwise. **(#15757)** |

***TGax editor: within TGax D3.2, add the following text to the indicated location within subclause 9.2.4.1.8 More Data subfield as shown:***

**9.2.4.1.8 More Data subfield**

The More Data subfield is 1 bit in length and is used differently by a DMG, S1G, and other STAs.(11ah)

A non-DMG and non-S1G(11ah) STA uses the More Data subfield to indicate to a STA in PS mode that more BUs are buffered for that STA at the AP. The More Data subfield is valid in individually addressed Data or Management frames transmitted by an AP to a STA in PS mode. A value of 1 indicates that at least one additional buffered BU is present for the same STA.

A non-DMG and non-S1G(11ah) STA optionally sets the More Data subfield to 1 in individually addressed Data frames(#1451) transmitted by a CF-Pollable STA to the PC in response to a CF-Poll to indicate that the STA has at least one additional buffered MSDU available for transmission in response to a subsequent CFPoll.

An AP optionally sets the More Data subfield to 1 in Ack frames sent to a non-DMG non-HE STA and in Ack, BlockAck and Multi-STA BlockAck frames sent to an HE STA. An HE AP indicates that it supports setting the More Data subfield to 1 in these control response frames by setting the More Data Ack subfield to 1 in the QoS Info field of elements it includes in frames transmitted to the STA. The QoS Info field is present in the QoS Capability, EDCA Parameter Set, and MU EDCA Parameter Set elements transmitted by an HE AP.

The AP can set the More Data subfield to 1 to indicate that it has a pending transmission for the STA if it ~~from which it~~ has received a frame that contains a QoS Capability element in which the More Data Ack subfield is equal to 1 from the STA and ~~that has one or more ACs that are delivery enabled and that is in PS mode to indicate that the AP has a pending transmission for the STA~~ one of the following conditions is true:

* The STA is in PS mode and has one or more ACs that are delivery enabled (see 11.2.2.6 (AP operation during the CP)).
* The STA is in PS mode and is a TWT requester or a TWT scheduled STA (see 27.7 (TWT operation))

A TDLS peer STA optionally sets the More Data subfield to 1 in Ack frames sent to a non-HE STA and in Ack, BlockAck, and Multi-STA BlockAck frames sent to an HE STA. An HE TDLS peer STA indicates that it supports setting the More Data subfield to 1 in these control response frames by setting the More Data Ack subfield to 1 in the QoS Info field of the QoS Capability element it includes in frames transmitted to the STA.

The TDLS peer STA can set the More Data subfield to 1 to indicate that it has pending transmission for the STA if it has received from the STA a TDLS Setup Request frame or TDLS Setup Response frame ~~that has TDLS peer PSM enabled and~~ that has the More Data Ack subfield equal to 1 in the QoS Capability element ~~of its transmitted TDLS Setup Request frame or TDLS Setup Response frame to indicate that it has a pending transmission for the STA.~~ and one of the following conditions is true:

* The STA has TDLS peer PSM enabled (see 11.2.3.6 (AP operation during the CP))
* The STA is in PS mode and is a TWT requester or a TWT scheduled STA (see 27.7 (TWT operation)).

The More Data subfield is 1 in individually addressed frames transmitted by a mesh STA to a peer mesh STA that is either in light sleep mode or in deep sleep mode for the corresponding mesh peering, when additional BUs remain to be transmitted to this peer mesh STA.

The More Data subfield is set to 1 in individually addressed frames transmitted by a VHT AP to a VHT STA when both support the VHT TXOP power save feature (as determined from their VHT Capabilities elements) to indicate that at least one additional buffered BU is present for the STA. See 11.2.3.17 (VHT TXOP power save).

A DTS STA that is a non-DMG STA and is a non-S1G STA and is a PS STA optionally sets the More Data subfield to 1 in an individually addressed frame to its associated AP to indicate that the STA will transition from the awake state to the doze state immediately following the successful acknowledgement of the frame or immediately after the transmission of the frame when no immediate response is expected. A STA indicates that it supports setting the More Data subfield to 1 in these frames to signal a doze state transition by setting the Doze Transition Signaling Support subfield to 1 in the Extended Capabilities element that it includes in frames transmitted to the AP. See 11.2.3.19a (Doze Transition Signaling). **(#15757)**

A non-DMG and non-S1G(11ah) STA sets the More Data subfield to 0 in all other individually addressed frames.

***TGax editor: within TGax D3.2, modify the following text:***

**11.2.3.5.1 Power management with APSD procedures**

When the GCR-A delivery method is used, the scheduled Service Interval field is 0. If a STA has a GCR agreement with an AP for a group address using the GCR-A delivery method, there is no defined end of the scheduled SP. The STA in PS mode shall enter the awake state and shall remain awake in order to receive the buffered group addressed BUs until the AP changes the delivery method of the stream to a method other than GCR-A or until the GCR agreement is canceled or until a frame transmitted by the STA with the More Data subfield set to 1 is successfully acknowledged or successfully transmitted when no immediate response is expected, provided that the STA is a DTS STA. **(#15757)**

**11.2.3.6 AP operation**

***TGax editor: within TGax D3.2, add the following text to the itemized list as item m):***

m) If an MPDU with a More Data subfield equal to 1 is received from a PS STA that is a DTS STA then after acknowledgement of the receipt of the MPDU, or immediately, if no acknowledgement is expected, the AP shall assume that the STA has transitioned to the doze state and shall cease delivery of any frames to the STA until it is determined that the STA is in the awake state **(#15757)**

**11.2.3.7 Receive operation for STAs in PS mode**

***TGax editor: within TGax D3.2, add the following text at the end of the subclause:***

A DTS STA may set the More Data subfield to 1 to signal a transition to the doze state as described in 11.2.3.19a Doze Transition Signaling. **(#15757)**

**11.2.3.8 Receive operation using APSD**

***TGax editor: within TGax D3.2, modify the text as shown:***

c) The STA shall remain awake until it receives a QoS Data frame or QoS Null frame addressed to it, with the EOSP subfield equal to 1 or until it receives an acknowledgement to the transmission of a frame with the More Data subfield equal to 1if the STA is a DTS STA or immediately after the transmission of a frame with the More Data subfield equal to 1 if the STA is a DTS STA and no immediate response is expected. **(#15757)**

***TGax editor: within TGax D3.2, insert the following editing instruction and new subclause:***

***Insert a new subclause at the end of 11.2.3.19:***

**11.2.3.19a Doze Transition Signaling (#15757)**

An HE STA with dot11DozeTransitionSignalingActivated equal to true supports Doze Transition Signaling using the More Data subfield and shall set the Doze Transition Signaling Support subfield to 1 in transmitted Extended Capability elements. If the STA is associated with an AP from which it has received an Extended Capability element that indicates support for Doze Transition Signaling, the STA is called a DTS STA.

A DTS STA that is a PS STA may set the More Data subfield to 1 in individually addressed frames transmitted to an associated AP from which it has received an Extended Capability element with the value 1 in the Doze Transition Signaling Support subfield.

A DTS STA that transmits a value of 1 in the More Data subfield in a frame intended for reception by its associated AP may transition to doze state immediately following the receipt of the acknowledgement of the frame, or immediately following the transmission of the frame when no immediate response is expected.

**27.7.5 Power save operation during TWT SPs**

***TGax editor: within TGax D3.2, in subclause 27.7.5 Power save operation during TWT SPs, modify the text as shown:***

A TWT requesting STA or a TWT scheduled STA shall classify any of the following events as a TWT SP termination event:

1) The successful exchange of a TWT Information frame with the TWT responding STA or the TWT scheduling AP (see 27.7.4 (Use of TWT Information frames)).

2) The transmission by the TWT requesting STA or TWT scheduled STA of an acknowledgment in response to an individually addressed QoS Data or QoS Null frame sent by the TWT responding STA or TWT scheduling AP, respectively, that had the EOSP subfield equal to 1.

3) The transmission by the TWT requesting STA or TWT scheduled STA of an acknowledgment in response to an individually addressed frame that is neither a QoS Data frame nor a QoS Null frame, sent by the TWT responding STA or TWT scheduling AP, respectively, with the More Data field equal to 0.

4) The reception of an individually addressed or broadcast QoS Data or QoS Null frame sent by the TWT responding STA or TWT scheduling AP, that does not solicit an immediate response and with the EOSP subfield equal to 1.

5) The reception of an individually addressed frame that is neither a QoS Data frame nor a QoS Null frame, sent by the TWT responding STA or TWT scheduling AP, that does not solicit an immediate response and with the More Data field equal to 0.

6) The reception of a Trigger frame sent by the TWT responding STA or TWT scheduling AP that has the More TF field equal to 0 and is not intended for the TWT requesting STA or TWT scheduled STA provided that the TWT requesting STA or TWT scheduled STA is either awake for an announced trigger-enabled TWT SP but did not transmit an indication that it is in the awake state to the TWT responding STA or TWT scheduling AP or is awake for an unannounced trigger-enabled TWT SP.

7) The successful acknowledgement from the TWT scheduling STA or the TWT responding STA of the reception of a frame transmitted by the TWT scheduled STA or the TWT requesting STA, respectively, if the TWT scheduled STA or the TWT requesting STA, respectively, is a DTS STA and the More Data subfield of the frame is equal to 1

8) The transmission of a frame by the TWT scheduled STA or the TWT requesting STA, respectively, if the TWT scheduled STA or the TWT requesting STA, respectively, is a DTS STA and the More Data subfield of the frame is equal to 1 and no immediate response is expected. **(#15757)**

**TGax Editor: *Add a new MIB variable in C.3 MIB Detail within the dot11StationConfigEntry group as shown:***

**C.3 MIB Detail**

dot11DozeTransitionSignalingActivated OBJECT-TYPE **(#15757)**

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable. Its value is determined by device capabilities.

This attribute, when true, indicates that the STA implementation is capable of signaling a transition to the doze state through the More Data subfield and capable of interpreting the signaling of a transition to doze state using the same subfield. The capability is disabled, otherwise."

DEFVAL { false }

::= { dot11StationConfigEntry <XX>}

**End of proposed changes.**