IEEE P802.11  
Wireless LANs

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| **Grant Frame related clarifiications** | | | | |
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Abstract

This submission addresses different issues found in use of Grant and Grant Ack frames and aligns the definition among different link access types

*Grant frame definition contradicts with few other places the Grant use is defined, propose to change the definition to align with normative text*

**8.3.1.13 Grant frame format**

*Editor modify text from P608L40 as follows:*

For individually addressed Grant frames:

1. If the Grant frame is used to obtain a TXOP, the Duration/ID field is set to a value subject to the TXOP limit as described in 9.22.2.8 (TXOP limits). In all other cases within a CBAP, the Duration/ID field is set to value equal of Duration/ID field of the immediately preceding frame minus TXTIME(Grant frame) minus aSIFSTime.
2. If the Grant frame is sent within an SP, the value of the Duration/ID field is set according to the rules in 9.36.7 (Dynamic allocation of service period (11ad), 9.36.8 (Dynamic truncation of service period (11ad), and 9.36.9 (Dynamic extension of service period (11ad) as appropriate depending on the Grant frame usage.
3. If the Grant frame is sent within an ATI, the value the Duration/ID is set according to the rules in 9.36.3 (ATI transmission rules)

For group addressed Grant frames, the Duration/ID field is set to a value that is equal to the time between PHY-TXEND.indication primitive of the Grant frame and the start of the allocation as indicated by the value of the Allocation Duration subfield within the Dynamic Allocation Info field.

**8.5.2 Dynamic Allocation Info field**

*Editor change at P1083L36*

When the Dynamic Allocation Info subfield is transmitted within a Grant frame by an AP or PCP in an ATI or GP, the Allocation Duration subfield contains the granted duration of the SP or CBAP allocation in microseconds (see 9.36.7 (Dynamic allocation of service period), 9.36.8 (Dynamic truncation of service period), and 9.36.9 (Dynamic extension of service period), 9.36.3 (ATI transmission rules)). Possible values range from 0 to 32 767 for an SP allocation and a CBAP allocation. A value of 0 in the Allocation Duration subfield transmitted within a Grant frame means that the STA can transmit one PPDU followed by any relevant acknowledgment plus one RTS/DMG CTS handshake.

When the Dynamic Allocation Info subfield is transmitted within a Grant frame in a CBAP, the value of the Allocation Duration field indicates the purpose of the Grant frame transmission. Two purposes are possible:

1. Beyond current TXOP: in this case, the Allocation Duration subfield values range from 0 to 32 767. The value of the Allocation Duration field plus the Duration field of the Grant frame indicates the time offset from the PHY-TXEND.indication primitive of the Grant frame when the STA transmitting the Grant frame will attempt to initiate access for communication with the STA indicated by the RA field of the Grant frame.
2. Within current TXOP: in this case, the Allocation Duration subfield is set to 32 768.

When the Dynamic Allocation Info subfield is transmitted within a Grant frame with RA set to broadcast address by a source or destination STA of an SP, the Allocation Duration subfield values range from 0 to 32 767.

When the Dynamic Allocation Info subfield is transmitted within a Grant frame with RA set to unicast address by a source STA of an SP, the Allocation Duration subfield is set to 32768.

**8.3.1.19 Grant Ack frame format**

*P611L7*

*Discussion: There is no reason to limit use of Grant Ack frame to beamforming, the Grant Ack plays the same role in any scenario of use of the Grant frame.*

*Editor change text at P611L7 as follows:*

The Grant Ack frame is sent as a response to the reception of a Grant frame.

*Editor add new paragraph at end of 8.5.5 Beamforming Control field:*

When the BF Control field is transmitted in a Grant Ack frame in response to a Grant frame with the Beamforming Training field equal to 0, the following fields are reserved: IsInitiatorTXSS, IsResponderTXSS, Total Number of Sectors, and Number of RX DMG Antennas.

**9.36.3 ATI transmission rules**

*Discussion:*

*In the current definition*

1. *A non-AP and non-PCP STA shall not transmit during the ATI except in response to a received individually addressed frame.*
2. *Duration of any frame sent in ATI shall not spread beyond ATI.*

*Grant frame that provides allocation inside ATI contradicts with 1, if it provides allocation outside of ATI contradicts with 2.*

*Clarified definition in 9.36.7.3 solves the issue.*

*P1451L16 Editor insert new paragraph as follows:*

The transmission of Grant frame during the ATI follows the rules described in 9.36.7.3 Grant period (GP)

**9.36.4 DTI transmission rules**

*Discussion:*

*Grant frame can be sent to PCP and AP as to any other STA so any DMG STA needs to process the Grant frame*

*Editor change text at P1451L10 :*

A DMG STA shall be capable of processing Grant frames. A non-AP and non-PCP DMG STA shall be capable of processing the Poll frames and the Extended Schedule element.

*Editor add paragraph after last paragraph in 9.36.4*

A STA that receives a Grant frame and that has the Grant Ack Supported field equal to 1 in the STA’s DMG Capabilities element shall respond with a Grant Ack frame SIFS interval after reception of the Grant frame.

In the transmitted Grant Ack frame, the STA shall copy the Source AID, Destination AID, and Beamforming Training fields from the Grant frame that the Grant Ack frame is being sent in response to.

A STA that receives a group addressed Grant frame shall not respond with Grant Ack frame.

A STA that receives a Grant frame and that does not have the Grant Ack Supported field equal to 1 in the STA’s DMG Capabilities element shall not respond with a Grant Ack frame.

**9.36.5 Contention based access period (CBAP) transmission rules**

*Discussion*

*Existent rule: A TXOP may be obtained … or by a DMG STA receiving a Grant frame .. The existent rule is not compliant with EDCA access. The EDCA rules shall apply even if the access is dynamically scheduled by the Grant frame.*

*Editor change text at P1453L1:*

A TXOP may be obtained by a DMG STA winning an instance of EDCA contention (see 9.22.2 (HCF contention based channel access (EDCA))))

**9.36.7 Dynamic allocation of service period**

**9.36.7.1 General**

*P1462L21*

*Discussion:*

*Use of Grant in A-BFT is not defined correctly. Grant frame cannot be delivered in A-BFT, suggest to exclude reference to A-BFT from the note.*

*Editor change text at P1462L21:*

NOTE—A STA can receive a Grant frame in periods of the beacon interval other than the GP, in which case the STA uses the time allocated through the Grant frame.

*P1462L50*

*Discussion:*

*The current definition of starting access when back to awake state is not inline with EDCA rules. The rule is defined in few places of the standard as “a STA that is changing from Doze to Awake in order to transmit shall perform CCA until a frame sequence is detected by which it can correctly set its NAV, or until a period of time equal to the ProbeDelay has transpired.”*

*Editor change text at P1462L50:*A STA that enters the Doze state at any time during a CBAP and then returns to the Awake state later during that same CBAP shall perform CCA until a frame sequence is detected by which it can correctly set its NAV, or until a period of time equal to the ProbeDelay has expired before it initiates a transmission.

**9.36.7.3 Grant period (GP)**

*Discussion: make definitions in this sub clause aligned with Grant frame dynamical scheduling definition provided in 9.36.4 DTI transmission rules.*

*Editor change text at P1465L14*

In each transmitted Grant frame, the AP or PCP shall set the Duration field within the Grant frame to a time that covers the duration of all remaining Grant frame and Grant Ack frame transmissions, if any, plus all appropriate IFSs (9.3.2.3 (IFS)).

*Editor change text from P1465L19 as follows*

… and the Allocation Duration field set to a value that if added to the value of the Duration field An allocation that is indicated in this manner begins at the time that is equal to the PHY-TXEND.indication (MDR) primitive of the Grant frame plus the value from the Duration field of the Grant frame

*Editor change text starting from P1465L37 as follows:*

… to indicate SP, and the Allocation Duration field set to a value of 32768 as defined in 8.5.2. The Duration field in the Grant frame shall be set to the time remaining in the SP minus TXTIME (Grant frame) minus aSIFSTime. Upon transmission of the Grant frame with the Beamforming Training field equal to 0, for the remainder of the SP the roles of source DMG STA and destination DMG STA are swapped between the STAs.

*Editor change text starting from P1465L47 as follows:*

… the AllocationType field set to indicate CBAP, and the Allocation Duration field set to a value of 32768 as defined in 8.5.2. The Duration field in the Grant frame shall be set to the time remaining in the TXOP minus TXTIME (Grant frame) minus aSIFSTime. . Upon transmission of the Grant frame with the Beamforming Training field equal to 0, for the remainder of the TXOP the roles of TXOP holder and TXOP responder are swapped between the STAs.

**9.36.9 Dynamic extension of service period**

*Discussion: make definitions in this sub clause aligned with Grant frame dynamical scheduling definition provided in 9.36.4 DTI transmission rules.*

*Editor at end of the paragraph that starts with “The AP or PCP may grant the request for an extension of … “ add at P1466L35*

If a Grant Ack frame is transmitted following reception of the Grant frame, the frame shall be configured as specified in 9.36.4.

*Editor change text at P1454L67*

The Duration field in the transmitted Grant frame shall be set to the remaining time in the SP. The Allocation Duration field of the Grant frame shall be set to the additional channel time allocated by the AP or PCP following the end of the SP. If a Grant Ack frame is transmitted following reception of the Grant frame the frame shall be configured as specified in 9.36.4.

**9.38.2.2.2 Initiator TXSS**

*Discussion: make definitions in this sub clause aligned with Grant frame dynamical scheduling definition provided in 9.36.4 DTI transmission rules.*

*Editor change from P1486L47 as follows:*

During a CBAP, an initiator may obtain a TXOP with an initiator TXSS or use an existent TXOP for the initiator TXSS. If transmission of a Grant frame to the responder is used to initiate the TXSS the Beamforming Training and IsInitiatorTXSS fields of the BF Control field set to 1. If a Grant Ack frame is transmitted by the responder it shall comply with 9.36.4. In the Grant Ack frame, the responder shall set the Beamforming Training field to 1. The initiator starts the initiator TXSS SIFS interval after transmission of the Grant frame or after the reception of the Grant Ack frame if the Grant Ack Supported field in the responder’s DMG Capabilities element is 1 or PIFS interval after the transmission the Grant frame otherwise.

**9.38.2.2.3 Initiator RXSS**

*Discussion: make definitions in this sub clause aligned with Grant frame dynamical scheduling definition provided in 9.36.4 DTI transmission rules.*

*Editor change from P1487L62 as follows:*

During a CBAP, an initiator shall not obtain a TXOP with an initiator RXSS. When transmission of a Grant frame to the responder is used to initiate the RXSS the Beamforming Training field set to 1 and the IsInitiatorTXSS field set to 0. If a Grant Ack frame is transmitted by the responder it shall comply with 9.36.4. In the Grant Ack frame, the responder shall set the Beamforming Training field to 1. The initiator starts the initiator RXSS SIFS interval after transmission of the Grant frame or after the reception of the Grant Ack frame if the Grant Ack Supported field in the responder’s DMG Capabilities element is 1 or PIFS interval after the transmission the Grant frame otherwise.

**References:**

IEEE P802.11-REVmc/D4.0, January 2015