IEEE P802.11  
Wireless LANs

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| Clause 5 Proposed Changes | | | | |
| Date: 2015-03-12 | | | | |
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Abstract

This document contains proposed changes to Clause 5, for TGak consideration

R0 – Initial discussion document.

R1 – Updates per face-to-face review

R2 – Restructured clauses/subclauses per face-to-face decision

R3 – minor wording changes per face-to-face discussion

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| --- | --- | --- | --- | --- |
| 33 | 14.17 | 5.2 | Since the real problem is that the non-GLK 802.11 MAC Service does not meet all the requirements of a MAC Service that can support 802.1Q Bridging. | Add text to 5.2 the describes two different MAC Service semantics - GLK and non-GLK. The non-GLK MAC Service supports LPD, does not prevent group-addressed frame reflection, ability to carry SA and DA that do not match either end of the WM link (through the use of four address format), etc. The GLK MAC Service supports EPD, does prevent reflected group-addressed frames, etc. Then, there is yet another MAC Service for GLK APs, which adds the port-vector parameter. So, there are three different MAC Services in 802.11.  The effects of this impact language in clause 4 that talks about the MAC Service. For example, in 4.3.21.4.2, the difference between a GLK IBSS and a non-GLK IBSS is this difference in the service provided. Review clause 4 (and perhaps other parts of the document) for such places where the MAC Service differences should be discussed. |

**Discussion:**

After discussion, it has been agreed that the concept at the 802.1Q level that is needed for the station vector parameter is the service\_access\_point\_identifier parameter described in 802.1Q-2012-Ed. So, this concept is the basis for the proposal below.

**Proposed changes:**

***Change text as follows:***

**5.1 Overview of MAC services**

**5.1.1.1 General**

This service provides peer LLC entities or bridges with the ability to exchange MSDUs. To support this service, the local MAC uses the underlying PHY-level services to transport an MSDU to a peer MAC entity, where it is delivered to the peer LLC or bridge.

***Change text as follows:***

**5.1.5.2 Non-AP non-GLK STA role**

The MAC data plane architecture of a non-AP non-GLK STA is …

***Change the caption on Figure 5-3 to add “Non-GLK”.***

***Change text as follows:***

**5.1.5.3 Non-GLK AP role**

In a non-GLK AP, the MAC …

***Change the caption on Figure 5-4 to add “Non-GLK”.***

***Insert new Clause after the last subclause of 5.1.5, as follows:***

**5.1.5.5a GLK STA role**

In a GLK STA, the MAC data plane architecture includes provision of the GLK MAC service interface to an 802.1AC IEEE 802.11 General Link convergence function in its role-specific behavior block, as shown in Figure 5-6a (Role-specific behavior block for GLK STA).This block performs destination address filtering as described in 9.2.8 (MAC data service), and provides access to the 802.1AC convergence function and ultimately to the bridge ports for MSDUs that are not addressed to this STA.



**Figure 5-6a—Role-specific behavior block for GLK STA**

***Change text as follows:***

**5.2 MAC data service specification**

**5.2.1 General**

The IEEE Std 802.11 MAC supports the following service primitives as defined in ISO/IEC 8802-2: 1998:  
— MA-UNITDATA.request  
— MA-UNITDATA.indication  
— MA-UNITDATA-STATUS.indication

IEEE Std 802.11 places restrictions and semantics on the parameter values for these primitives, as described in 5.2.2 (MA-UNITDATA.request) to 5.2.4 (MA-UNITDATA-STATUS.indication).

**5.2.2 GLK MAC data service specification**

In a GLK STA, the MAC data plane architecture includes a MAC service with an additional parameter, a set of service\_access\_point\_identfiers.

A GLK STA coordinates with the 802.1AC [Bn] IEEE 802.11 General Link convergence function to create a virtual point-to-point LAN for each GLK link to an associated or peered GLK STA. This point-to-point LAN is presented by the convergence function as a unique ISS SAP which is ultimately mapped to an 802.1Q bridge port. Each such SAP is identified by a locally unique service\_access\_point\_identifier, generated by the STA and the convergence function.

When GLK is in use, the MAC service primitives presented have an additional parameter: station vector. On an MA-UNITDATA.request, this parameter is a set of service\_access\_point\_identifiers specifying the one or more GLK links that are to be used for this request. On an MA-UNITDATA.indication, it is a vector of exactly one service\_access\_point\_identifier specifying the GLK link that carried this MSDU.

**5.2.3 MA-UNITDATA.request**

**5.2.3.1 Function**

This primitive requests a transfer of an MSDU from a local LLC sublayer entity or bridge to a single peer LLC sublayer entity or bridge, or multiple peer LLC sublayer entities or bridges in the case of group addresses.

**5.2.3.2 Semantics of the service primitive**

The parameters of the primitive are as follows:

MA-UNITDATA.request(

source address,

destination address,

routing information,

data,

priority,

service class,

station vector

)

The source address (SA) parameter specifies an individual MAC sublayer address of the sublayer entity from which the MSDU is being transferred.

The destination address (DA) parameter specifies either an individual or a group MAC sublayer entity address.

The routing information parameter specifies the route for the data transfer (a null value indicates source routing is not to be used). For IEEE Std 802.11, the routing information parameter shall be null.

The data parameter specifies the MSDU to be transmitted by the MAC sublayer entity. The length of the MSDU shall be less than or equal to the value shown in Table 8-19 (Maximum data unit sizes (in octets) and durations (in microseconds)).

The priority parameter specifies the requested priority of the data unit transfer. The allowed values of priority are described in 5.1.1.4 (Interpretation of priority parameter in MAC service primitives).

The service class parameter specifies the requested service class of the data unit transfer. The allowed values of service class are described in 5.1.1.5 (Interpretation of service class parameter in MAC service primitives in a STA) and 5.1.3 (MSDU ordering).

The station vector parameter is present if GLK is in use, and provides a set of service\_access\_point\_identifiers (as defined in 802.1Q) indicating the set of virtual point-to-point LANs for this data transfer, which are mapped to the set of GLK links over which the MSDU is transferred.

**5.2.3.3 When generated**

This primitive is generated by the LLC sublayer entity or bridge when an MSDU is to be transferred to a peer LLC sublayer entity or entities, or to a peer bridge or bridges.

**5.2.3.4 Effect of receipt**

On receipt of this primitive, the MAC sublayer entity determines whether it is able to fulfill the request according to the requested parameters. A request that cannot be fulfilled according to the requested parameters is discarded, and this action is indicated to the LLC sublayer entity using an MA-UNITDATASTATUS.indication primitive that describes why the MAC was unable to fulfill the request. If the request can be fulfilled according to the requested parameters, the MAC sublayer entity properly formats a frame and passes it to the lower layers for transfer to a peer MAC sublayer entity or entities (see 5.1.4 (MSDU format)), and indicates this action to the LLC sublayer entity or bridge using an MA-UNITDATASTATUS.indication primitive with transmission status set to Successful.

At an AP for which dot11SSPNInterfaceActivated is true, upon receipt of an MA-UNITDATA.request primitive having an individually addressed destination address and a priority of Contention or ContentionFree, the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthBestEffortRate in the dot11InterworkingEntry identified by the destination MAC address of the frame to be transmitted. The specific mechanism to perform rate limiting is outside the scope of this standard.

— If the rate limiting mechanism does not discard the frame, then dot11NonAPStationBestEffort- MSDUCount shall be incremented by 1 and dot11NonAPStationBestEffortOctetCount shall be incremented by the number of octets in the MSDU.

— If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedBestEffort- MSDUCount shall be incremented by 1 and dot11NonAPStationDroppedBestEffortOctetCount shall be incremented by the number of octets in the MSDU.

At an AP for which dot11SSPNInterfaceActivated is true, upon receipt of an MA-UNITDATA.request primitive having an individually addressed destination address for which the priority is an integer in the range of 0 to 7, inclusive, then the AP’s MAC sublayer shall derive the access category from the priority using the mapping in Table 9-1 (UP-to-AC mappings). The AP’s MAC sublayer shall retrieve the MIB variables listed below from the dot11InterworkingEntry identified by the destination MAC address of the frame to be transmitted and perform the following operations:

— If the access category is AC\_VO, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthVoiceRate; the specific mechanism to perform rate limiting is outside the scope of this standard. If the rate limiting mechanism does not discard the frame, then dot11NonAPStationVoiceMSDUCount shall be incremented by 1 and dot11NonAPStationVoiceOctetCount shall be incremented by the number of octets in the MSDU. If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedVoiceMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedVoiceOctetCount shall be incremented by the number of octets in the MSDU.

— If the access category is AC\_VI, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthVideoRate; the specific mechanism to perform rate limiting is outside the scope of this standard. If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationVideoMSDUCount shall be incremented by 1 and dot11NonAPStationVideoOctetCount shall be incremented by the number of octets in the MSDU. If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedVideoMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedVideoOctetCount shall be incremented by the number of octets in the MSDU.

— If the access category is AC\_BE, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthBestEffortRate; the specific mechanism to perform rate limiting is outside the scope of this standard. If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationBestEffortMSDUCount shall be incremented by 1 and dot11NonAPStationBestEffortOctetCount shall be incremented by the number of octets in the MSDU. If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedBestEffortMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedBestEffortOctetCount shall be incremented by the number of octets in the MSDU.

— If the access category is AC\_BK, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthBackgroundRate; the specific mechanism to perform rate limiting is outside the scope of this standard. If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationBackgroundMSDUCount shall be incremented by 1 and dot11NonAPStationBackgroundOctetCount shall be incremented by the number of octets in the MSDU. If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedBackgroundMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedBackgroundOctetCount shall be incremented by the number of octets in the MSDU.

At an AP for which dot11SSPNInterfaceActivated is true, upon receipt of an MA-UNITDATA.request primitive having an individually addressed destination address whose priority is an integer in the range of 8 to 15, inclusive, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationAuthMaxHCCAHEMMRate; the specific mechanism to perform rate limiting is outside the scope of this standard.

— If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationHCCAHEMMMSDUCount shall be incremented by 1, and dot11NonAPStationHCCAHEMMOctetCount shall be incremented by the number of octets in the MSDU.

— If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedHCCAHEMMMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedHCCAHEMMOctetCount shall be incremented by the number of octets in the MSDU.

**5.2.4 MA-UNITDATA.indication**

**5.2.4.1 Function**

This primitive defines the transfer of an MSDU from the MAC sublayer entity to the LLC sublayer entity or bridge, or entities or bridges in the case of group addresses. In the absence of error, the contents of the data parameter are logically complete and unchanged relative to the data parameter in the associated MA-UNITDATA.request primitive.

**5.2.4.2 Semantics of the service primitive**

The parameters of the primitive are as follows:

MA-UNITDATA.indication(

source address,

destination address,

routing information,

data,

reception status,

priority,

service class,

station vector

)

The SA parameter is an individual address as specified by the SA field of the incoming frame.

The DA parameter is either an individual or a group address as specified by the DA field of the incoming frame.

The routing information parameter specifies the route that was used for the data transfer. The MAC sublayer entity shall set this field to null.

The data parameter specifies the MSDU as received by the local MAC entity.

The reception status parameter indicates the success or failure of the received frame. The MAC always reports “success” because all failures of reception are discarded without generating MAUNITDATA.indication primitive.

The priority parameter specifies the receive processing priority that was used for the data unit transfer. The allowed values of priority are described in 5.1.1.4 (Interpretation of priority parameter in MAC service primitives).

The service class parameter specifies the receive service class that was used for the data unit transfer. The allowed values of service class are described in 5.1.1.5 (Interpretation of service class parameter in MAC service primitives in a STA) and 5.1.3 (MSDU ordering).

The station vector parameter is present if GLK is in use, and comprises a set of service\_access\_point\_identifiers (as defined in 802.1Q) indicating only the single virtual point-to-point LAN for this data transfer, which is mapped from the GLK link over which the MSDU was received.

**5.2.4.3 When generated**

The MA-UNITDATA.indication primitive is passed from the MAC sublayer entity to the LLC sublayer entity or entities, or bridge or bridges, to indicate the arrival of a frame at the local MAC sublayer entity. Frames are reported only if they are validly formatted at the MAC sublayer, received without error, received with valid (or null) security and integrity information, and, if GLK is not in use, their destination address designates the local MAC sublayer entity.

**5.2.4.4 Effect of receipt**

The effect of receipt of this primitive by the LLC sublayer or bridge is dependent on the content of the MSDU.

At an AP for which dot11SSPNInterfaceActivated is true, upon receipt of a frame of type data having a group DA, the AP’s MAC sublayer shall discard the frame if dot11NonAPStationAuthSourceMulticast is false in the dot11InterworkingEntry identified by the source MAC address of the received frame. If dot11NonAPStationAuthSourceMulticast is true, the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationAuthMaxSourceMulticastRate in the dot11InterworkingEntry identified by the source MAC address of the received frame. The specific mechanism to perform rate limiting is outside the scope of this standard.

— If the rate limiting mechanism does not discard the frame, then dot11NonAPStationMulticast- MSDUCount shall be incremented by 1 and dot11NonAPStationMulticastOctetCount shall be incremented by the number of octets in the MSDU.

— If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedMulticast- MSDUCount. shall be incremented by 1 and dot11NonAPStationDroppedMulticastOctetCount shall be incremented by the number of octets in the MSDU.

At an AP for which dot11SSPNInterfaceActivated is true, upon receipt of an individually addressed frame of type data and a priority of Contention or ContentionFree, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthBestEffortRate in the dot11InterworkingEntry identified by the source MAC address of the received frame. The specific mechanism to perform rate limiting is outside the scope of this standard.

— If the rate limiting mechanism does not discard the frame, then dot11NonAPStationBestEffort-MSDUCount shall be incremented by 1 and dot11NonAPStationBestEffortOctetCount shall be incremented by the number of octets in the MSDU.

— If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedBestEffort-MSDUCount shall be incremented by 1 and dot11NonAPStationDroppedBestEffortOctetCount shall be incremented by the number of octets in the MSDU.

At an AP for which dot11SSPNInterfaceActivated is true, upon receipt of an individually addressed frame of type data, for which the priority is an integer in the range of 0 to 7, inclusive, then the AP’s MAC sublayer shall derive the access category from the priority using the mapping in Table 9-1 (UP-to-AC mappings). The AP’s MAC sublayer shall retrieve the MIB variables from the dot11InterworkingEntry identified by the source MAC address of the received frame and perform the following operations:

— If the access category is AC\_VO, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthVoiceRate; the specific mechanism to perform rate limiting is outside the scope of this standard. If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationVoiceMSDUCount shall be incremented by 1 and dot11NonAPStationVoiceOctetCount shall be incremented by the number of octets in the MSDU. If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedVoiceMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedVoiceOctetCount shall be incremented by the number of octets in the MSDU.

— If the access category is AC\_VI, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthVideoRate; the specific mechanism to perform rate limiting is outside the scope of this standard. If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationVideoMSDUCount shall be incremented by 1 and dot11NonAPStationVideoOctetCount shall be incremented by the number of octets in the MSDU. If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedVideoMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedVideoOctetCount shall be incremented by the number of octets in the MSDU.

— If the access category is AC\_BE, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthBestEffortRate; the specific mechanism to perform rate limiting is outside the scope of this standard. If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationBestEffortMSDUCount shall be incremented by 1 and dot11NonAPStationBestEffortOctetCount shall be incremented by the number of octets in the MSDU. If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedBestEffortMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedBestEffortOctetCount shall be incremented by the number of octets in the MSDU.

— If the access category is AC\_BK, then the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationMaxAuthBackgroundRate; the specific mechanism to perform rate limiting is outside the scope of this standard. If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationBackgroundMSDUCount shall be incremented by 1 and dot11NonAPStationBackgroundOctetCount shall be incremented by the number of octets in the MSDU. If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedBackgroundMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedBackgroundOctetCount shall be incremented by the number of octets in the MSDU.

At an AP for which dot11SSPNInterfaceActivated is true, upon receipt of an individually addressed frame of type data for which the priority is an integer in the range of 8 to 15, inclusive, the AP’s MAC sublayer shall perform rate limiting to enforce the resource utilization limit in dot11NonAPStationAuthMaxHCCAHEMMRate; the specific mechanism to perform rate limiting is outside the scope of this standard.

— If the rate-limiting mechanism does not discard the frame, then dot11NonAPStationHCCAHEMMMSDUCount shall be incremented by 1, and dot11NonAPStationHCCAHEMMOctetCount shall be incremented by the number of octets in the MSDU.

— If the rate limiting mechanism discards the frame, then dot11NonAPStationDroppedHCCAHEMMMSDUCount shall be incremented by 1 and dot11NonAPStationDroppedHCCAHEMMOctetCount shall be incremented by the number of octets in the MSDU.

**5.2.5 MA-UNITDATA-STATUS.indication**

**5.2.5.1 Function**

This primitive has local significance and provides the LLC sublayer or bridge with status information for the corresponding preceding MA-UNITDATA.request primitive.

**5.2.5.2 Semantics of the service primitive**

The parameters of the primitive are as follows:

MA-UNITDATA-STATUS.indication(

source address,

destination address,

transmission status,

provided priority,

provided service class

)

The SA parameter is an individual MAC sublayer entity address as specified in the associated MA-UNITDATA.request primitive. The DA parameter is either an individual or group MAC sublayer entity address as specified in the associated MA-UNITDATA.request primitive.

The transmission status parameter is used to pass status information back to the local requesting LLC sublayer entity or bridge. IEEE Std 802.11 specifies the following values for transmission status:

a) Successful.

b) Undeliverable (excessive data length).

c) Undeliverable (non-null source routing).

d) Undeliverable: unsupported priority (for priorities other than Contention or ContentionFree at a non-QoS STA; or for priorities other than Contention, ContentionFree, or an integer in the range 0 to 15 at a QoS STA).

e) Undeliverable: unsupported service class (for service classes other than ReorderableGroupAddressed or StrictlyOrdered for non-QoS STAs and service classes other than QoSAck or QoSNoAck for QoS STAs).

f) Unavailable priority (for ContentionFree when no PC or HC is available, or an integer in the range 1 to 15 at a STA that is associated in a non-QoS BSS, or an integer in the range 8 to 15 at a STA that is a member of an IBSS, in which case the MSDU is transmitted with a provided priority of Contention).

g) Undeliverable: unavailable service class (for StrictlyOrdered service when the STA’s power management mode is other than “active” for non-QoS STAs; QoS STAs do not return this value as they do not provide the StrictlyOrdered service).

h) Undeliverable (no BSS available).

i) Undeliverable (cannot encrypt with a null key).

j) At a STA where dot11RejectUnadmittedTraffic is true, Undeliverable: unadmitted traffic (for a requested priority in the range 0 to 7 at a STA because there is no admitted TS for this priority and admission control is required for the AC).

k) For an AP in which dot11SSPNInterfaceActivated is true, Undeliverable (violation of limit specified by dot11NonAPStationMaxAuthVoiceRate in the dot11InterworkingTable for the non-AP STA identified by the destination address of the MA-UNITDATA.request primitive).

l) For an AP in which dot11SSPNInterfaceActivated is true, Undeliverable (violation of limit specified by dot11NonAPStationMaxAuthVideoRate in the dot11InterworkingTable for the non-AP STA identified by the destination address of the MA-UNITDATA.request primitive).

m) For an AP in which dot11SSPNInterfaceActivated is true, Undeliverable (violation of limit specified by dot11NonAPStationMaxAuthBestEffortRate in the dot11InterworkingTable for the non-AP STA identified by the destination address of the MA-UNITDATA.request primitive).

n) For an AP in which dot11SSPNInterfaceActivated is true, Undeliverable (violation of limit specified by dot11NonAPStationBackgroundRate in the dot11InterworkingTable for the non-AP STA identified by the destination address of the MA-UNITDATA.request primitive).

o) For an AP in which dot11SSPNInterfaceActivated is true, Undeliverable (violation of limit specified by dot11nonAPStationAuxMaxHCCAHEMMrate in the dot11InterworkingTable for the non-AP STA identified by the destination address of the MA-UNITDATA.request primitive).

If the transmission status parameter is Successful, the provided priority parameter specifies the priority used for the associated data unit transfer (Contention, ContentionFree, or an integer in the range 0 to 15); otherwise the provided priority parameter is not present. If the transmission status parameter is Successful, the provided service class parameter specifies the class of service for the associated data unit transfer; otherwise the provided service class parameter is not present. In non-QoS STAs, the value of this parameter is ReorderableGroupAddressed or StrictlyOrdered. In QoS STAs, it is QoSAck or QoSNoAck.

**5.2.5.3 When generated**

The MA-UNITDATA-STATUS.indication primitive is passed from the MAC sublayer entity to the LLC sublayer entity or bridge to indicate the status of the service provided for the corresponding MA-UNITDATA.request primitive.

**5.2.5.4 Effect of receipt**

The effect of receipt of this primitive by the LLC sublayer or bridge is dependent upon the type of operation employed by the LLC sublayer entity or bridge.

**Proposed resolution: Revised**

Make the changes as shown in 11-15/0415r3.