IEEE P802.11
Wireless LANs

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| BSS Max Idle Period Negotiation Enhancements for non-S1G PHYs |
| Date: 2020-09-02 |
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Abstract

This document proposes to extend BSS Max Idle Period for non-S1G PHYs, adopting the elements from the mechanism that have been defined for S1G PHY

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rev: 2012-10-09 (Adrian Stephens)

### Introduction

BSS max idle period management has been introduced as part of the Wireless Network Management [1] to improve STA power saving and AP resource management. Extensions have been made to the mechanism in Sub 1 GHz License Exempt Operation [2] adding ability to an S1G non-AP STA to set the value of the BSS max idle period. This is desirable because otherwise an AP may use a single value to set this for the entire BSS which may not suit all devices in the BSS. For example, an IOT device such as a sensor may sleep for much longer duration than a laptop or a phone. [2] further adds a scaling factor that will increase the range of the period that can be specified.

The original mechanism developed in [1] is being used in the industry. Recently there has been more interest in adoption of the mechanism for more types of devices but using the extensions made in [2] for all PHYs.

This contribution attempts to bring in the changes that are necessary to update the mechanism so that non-AP STA can negotiate the setting of the BSS max idle period.

Note that both [1] and [2] have been rolled into [3] and we use [3] as the basis for discussion.

### Discussion

While well-intentioned, the changes that need to be brought in must be carefully considered and planned as there are implementations that already use the mechanism as defined in [1] and they should not be made non-compliant with any changes to the protocol. To this end, we intend to define a new capability MIB variable: BSS max idle period setting by non-AP STA. When this variable is set to true, then the non-AP STA will optionally include the BSS Max Period Element in the Association and Reassociation Request frames at the time of Associaton and Reassociation respectively.

The Max Idle Period field in BSS Max Idle Period element is 2 octets long. In [1] the maximum value of this field is 65,535,000 TUs, which is equivalent to 18.64 hours. By using the Unified Scaling Factor, [2] extends this period by a factor of upto 10,000. It is not clear if such a scaling factor needs to be used. In this contribution, we do not use the Unified Scaling factor, but this can be considered for a future version of the document.

### Changes required for the negotiation extensions

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 TGmd Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGmd Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGmd Editor: Editing instructions preceded by “Tgmd Editor” are instructions to the Tgmd editor to modify existing material in the Tgmd draft. As a result of adopting the changes, the Tgmd editor will execute the instructions rather than copy them to the Tgmd Draft.***

***All changes shown in tis document are with reference to Tgmd Draft 4.0.***

* + - 1. MLME-ASSOCIATE.request
				1. Semantics of the service primitive

***Tgmd Editor: Change the entry for BSSMaxIdlePeriod in the table in the subclause as shown:***

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BSSMaxIdlePeriod(11ah) | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | Indicates the preferred BSS Max idle period parameters. This parameter is optionally present if dot11WirelessManagementImplemented is true and dot11BSSMaxIdlePeriodSettingByNonAPSTA is present and is true, or if dot11S1GOptionImplemented is true; otherwise not present. |

* + - 1. MLME-ASSOCIATE.indication
				1. Semantics of the service primitive

***Tgmd Editor: Change the entry for BSSMaxIdlePeriod in the table in the subclause as shown:***

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BSSMaxIdlePeriod(11ah) | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | Indicates the preferred BSS Max idle period parameters. This parameter is optionally present if dot11WirelessManagementImplemented is true and dot11BSSMaxIdlePeriodSettingByNonAPSTA is present and is true, or if dot11S1GOptionImplemented is true; otherwise not present. |

* + - 1. MLME-REASSOCIATE.request

6.3.8.2.2 Semantics of the service primitive

***Tgmd Editor: Change the entry for BSSMaxIdlePeriod in the table in the subclause as shown:***

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BSSMaxIdlePeriod(11ah) | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | Indicates the preferred BSS Max idle period parameters. This parameter is optionally present if dot11WirelessManagementImplemented is true and dot11BSSMaxIdlePeriodSettingByNonAPSTA is present and is true, or if dot11S1GOptionImplemented is true; otherwise not present. |

* + - 1. MLME-ASSOCIATE.indication
				1. Semantics of the service primitive

***Tgmd Editor: Change the entry for BSSMaxIdlePeriod in the table in the subclause as shown:***

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BSSMaxIdlePeriod(11ah) | BSS Max Idle Period element | As defined in 9.4.2.78 (BSS Max Idle Period element) | Indicates the preferred BSS Max idle period parameters. This parameter is optionally present if dot11WirelessManagementImplemented is true and dot11BSSMaxIdlePeriodSettingByNonAPSTA is present and is true, or if dot11S1GOptionImplemented is true; otherwise not present. |

* Association Request frame format

***Tgmd Editor: Add the following at the appropriate place in*** “***Table 9-34—Association Request frame body” as shown:***

* Association Request frame body

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| TBD | BSS Max Idle Period | The BSS Max Idle Period element is optionally present if dot11WirelessManagementImplemented is true and dot11BSSMaxIdlePeriodSettingByNonAPSTA is present and is true, or optionally present if dot11S1GOptionImplemented is true |

***Tgmd Editor: Assign the next available value in Table 9-36 for the entry for “Order”***

* Reassociation Request frame format

***Tgmd Editor: Add the following at the appropriate place in*** “***Table 9-38—Reassociation Request frame body” as shown:***

|  |
| --- |
| * Reassociation Request frame body
 |
| Order | Information | Notes |
| TBD | BSS Max Idle Period | The BSS Max Idle Period element is optionally present if dot11WirelessManagementImplemented is true and dot11BSSMaxIdlePeriodSettingByNonAPSTA is present and is true, or optionally present if dot11S1GOptionImplemented is true |

***Tgmd Editor: Assign the next available value in Table 9-38 for the entry for “Order”***

* BSS max idle period management

***Tgmd Editor: Change the subclause as shown below***

If dot11WirelessManagementImplemented is true, dot11BSSMaxIdlePeriod is non-zero and dot11BSSMaxIdlePeriodSettingByNonAPSTA is present and is true, then the non-AP STA may include the BSS Max Idle Period element in the Association Request or the Reassociation Request frame.

If dot11BSSMaxIdlePeriodSettingByNonAPSTA is not present or if present, it is false and dot11BssMaxIdlePeriod (#4684)is nonzero, the STA shall include the BSS Max Idle Period element in the Association Response frame or the Reassociation Response frame. If dot11BSSMaxIdlePeriod is non-zero and dot11BSSMaxIdlePeriodSettingByNonAPSTA is present and is true, the STA shall include the BSS Max Idle Period element in the Assocation Response frame or the Reassocation Response frame. Otherwise, the STA shall not include the BSS Max Idle Period element in the Association Response frame or the Reassociation Response frame. A (11ah)non-S1G STA may send protected or unprotected keepalive frames, as indicated in the Idle Options field.

(11ah)Extended BSSMaxIdlePeriod values are those that had a nonzero unified scaling factor(#1360) (Table 9-50 (Unified Scaling Factor subfield encoding(11ah))) value signaled by an S1G STA. An ~~S1G~~ STA may include the BSS Max Idle Period element in transmitted Association Request frames and Reassociation Request frames to indicate a preferred BSSMaxIdlePeriod value.The ~~S1G~~ AP selects a value for BSSMaxIdlePeriod based on the ~~S1G~~ STA’s preferred BSSMaxIdlePeriod (if any) and the type of the S1G STA. The ~~S1G~~ AP indicates its chosen value to the S1G STA in the (Re)Association Response frame. The value chosen by the AP is the value that the AP will use in making disassociate decisions based on the timeout value equal to BSSMaxIdlePeriod for the STA that is the recipient of the Association Response frame or Reassociation Response frame. An AP may provide different values for BSSMaxIdlePeriod to different STAs and may use the value provided by the non-AP STA in the Associaton Request or the Reassociaton Request frame.

(11ah)A STA may send at least one protected or unprotected keepalive frame per BSSMaxIdlePeriod, as indicated in the Idle Options field. When a STA transmits an unprotected keepalive frame, it shall use a frame that has 48-bit TA and RA fields.

The Max Idle Period field of the BSS Max Idle Period element indicates the time period during which a STA can refrain from transmitting frames to its associated AP without being disassociated. A non-AP STA is considered inactive if the AP has not received a Data frame, PS-Poll frame, or Management frame (protected or unprotected as specified in this paragraph) of a frame exchange sequence initiated by the STA for a time period greater than or equal to the time specified by the Max Idle Period field. If the Idle Options field requires protected keepalive frames, then the AP may disassociate the STA if no protected frames are received from the STA for a (11ah)duration of BSSMaxIdlePeriod. If the Idle Options field allows unprotected or protected keepalive frames, then the AP may disassociate the STA if no protected or unprotected frames (11ah)with 48-bit TA and RA fields are received from the STA for a duration (11ah)of BSSMaxIdlePeriod.

NOTE—The AP can disassociate or deauthenticate the STA at any time for other reasons even if the STA satisfies the keep-alive frame transmission requirements.

**Annex C**

* MIB detail

***Tgmd Editor: Insert the following into Dot11StationConfigEntry as shown below:***

Dot11StationConfigEntry ::= SEQUENCE

 {

 dot11StationID MacAddress,
. . . .

 dot11LocalMACAddressPolicyActivated TruthValue,

 dot11BSSMaxIdlePeriodsettingByNonAPSTA TruthValue

}

***Tgmd Editor: Insert the following into dot11StationConfig TABLE after dot11LocalMACAddressPolicyActivated:***

dot11BSSMaxIdlePeriodsettingByNonAPSTA OBJECT-TYPE

 SYNTAX TruthValue

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

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

 This attribute, when present and is true, indicates that the station may include the BSS Max Idle Period Element in Association Request and Reassociation Reassociation frames ."

 ::= { dot11StationConfigEntry TBD}

**References:**

1. IEEE Std 802.11v™-2011: Wireless Network Management (Amendment 8)
2. IEEE Std 802.11ah™-2016: Sub 1 GHz License Exempt Operation (Amendment 2)
3. P802.11 Tgmd Draft 4.0