### IEEE P802.11Wireless LANs

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| 11ba D6.1 Comment Resolution for Miscellaneous CIDs |
| Date: 2020-06-04 |
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Abstract

This submission proposes resolutions for comments of TGba Draft D6.1 with the following CIDs:

7041, 7098, 7065, 7070, 7082, 7083, 7076, 7084

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Additional revision made in the teleconference call.

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 TGba D6.1 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGba D6.1 Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

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

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| **CID** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 7041 | 107.50 | 29.7 | The WUR power save mechanism is very difficult to understand. I'm not sure how a non-AP STA transisitions from "awake" to "doze" to "WUR doze" to "WUR awake" and back to "awake". Please can you add a state diagram to show the 4 states and the actions to transistion between them. | Add a figure in clause 29.7 showing how a non-AP STA transitions between "awake", "doze", "WUR awake" and "WUR doze". Unfortunately I am unable to propose such a figure, as I don't understand all the transitions. See Figure 11-13 in REVmd D3.0 (Page 2215) as an example. | Revised –Agree in principle with the commenter. We add a figure to illustrate the transition.TGba editor to make the changes shown in 11-20/0864r1 under all headings that include CID 7041. |
| 7098 | 117.42 | 28.8.4 | Clause 29.8.4 describes power management operation for a WUR non-AP STA. Two power states WUR awake and WUR doze are defined based on the references in clause 11.2.1 (REVmd D3.0). Power Save (PS) mode is referenced to clause 11.2.3.2 (non-AP STA power management modes)- REVmd D3.0. State transition diagrams are useful to understand the transition flow in and out of the doze and wake states and should be used to remove any ambiguities in the text. Figures 11-13 and 11-14 in REVmd 3.0 are good examples of transition state diagrams that could be modified to illustrate transitioning for transitioning between WUR awake and doze states. | Use Figures 11-13 and 11-14 from REVmd D3.0 as examples, add transition state diagram that is WUR Mode specific for awake and doze states. | Revised –Agree in principle with the commenter. We add a figure to illustrate the transition in 29.7 where WUR duty cycle operation controls the WUR awake and WUR doze state transition.TGba editor to make the changes shown in 11-20/0864r1 under all headings that include CID 7098. |
| 7065 |  |  | The WUR capability added by this amendment is a very useful and a necessary addition to the 802.11 specification. However, the current draft does not clearly specify the WUR capability as the amendment does not follow some key 802.11 specification practices. 1) a device may only be in one state at any given time, while this state may be the completion of the state of multiple state engines in the device, the device is only is one state at a time and the specification should clearly identify what that state is and how the device transitions between states. 2) the state of a STA that is in a device may be influenced by the device, the specification should not specify what that state is when it is not in the control of the specification, particularly when the state may be controlled by entities outside the scope of the specification (e.g. a STA that is currently in Doze state, may at any time change to Awake state if the user requires the services of the STA, hence the specification should not state that a STA shall be in Doze state). 3) The specification should only specify things in its control: e.g. the specification should say that an AP/STA shall transmits a PPDU or what an AP/STA shall do when it receives a PPDU. But it should not specify that a PPDU is receive, because this is something that can not be specified, as there is know way to know that a PPDU will be received. | Align the amendment with the three principles provided in the comment. The commenter notes that many comments attempting to align the amendment with these principles were made during the development of this amendment, and the authors of this amendment have considered them and greatly improved this amendment, however the commenter believes additional improvements must be made. | Revised –We clarify that the proposed principles are followed.First, it is better to say that a device may only be in one state at any give time for a specific functionalitry. For example, searching “state” in baseline returns the following functioinalities (to name a few):* Block ack state in 10.25.6.8 Maintaining block ack state at the originator
* Power state in 11.2.1
* Authenticaton and association state in 11.3 STA authentication and association
* State of TS life cycle in 11.4.3 TS life cycle
* State for enablement and deenablement in 11.11.2 Enablement and deenablement
* State for protected A-MSDU in Table 11-12—A-MSDU STA behavior for RSN associations
* Retransmission policy state in Table 11-13—STA recovery procedures for a changed retransmission policy

11ba defines WUR power state for WUR PPDU reception. The transition is defined in 29.7.Second, in 29.7, we only mandate the time to be in WUR awake state, which then follows the principle. Third, we note that searching “frame is received” or “frame that is received” in the baseline returns tons of results, and the description is a typical way of expressing funcaitonlty in the baseline. The general meaning is that the frame is received correctly with all FCS passed, security checking passed, and so on. Since the commenter does not specify the place to improve, we only improve the state transition with a diagram. TGba editor to make the changes shown in 11-20/0864r1 under all headings that include CID 7065. |
| 7070 | 22.38 | 3.2 | The definition of WUR mode, is very confusing, not precise, and is not useful. Based on multiple discussions with the authors of the draft, it is this commenter's understanding that the WUR mode is a mode that a WUR non-AP STA negotiates with its associated WRU AP. The mode is defined by the negotiated and agreed WUR parameters that the WUR AP and WUR non-AP STA have configured and will use when the WUR STA has activated the WUR power save mode. In the WUR power save mode the non-AP STA has the expectation that the WUR AP will buffer data traffic for the WUR STA and will only transmit WUR wakeup PPDUs to the WUR STA when appropriate (e.g. when the AP has data to transmit to the STA and the during the STA's scheduled WUR awake state time). Note that WUR mode is not equivalent to WUR power save mode. WUR mode is the state where all the WUR mode parameters have been defined and agreed. The WUR power save mode is the state in which the WUR mode operation is active, where a WUR AP will buffer data for the WUR STA in WUR power save mode, and will transmit WUR PPDUs to "wake" the STA only during the agreed WUR wake periods of the WUR duty cycle for the STA. | Define two clear definitions for WUR mode and WUR power save mode. Where WUR mode is the mode where all WUR parameters for a WUR AP/STA pair have been configured and WUR power save mode is the mode where the WUR AP will buffer PPDUs for the WUR STA and will send WUR PPDUs to the WUR STA to "wake" it when appropriate. It would also be useful to clearly define how the WUR AP and WUR STA move between WUR mode and WUR power save mode elsewhere in the draft. Proposed definitions:wake-up radio (WUR) mode: A negotiated status between a WUR access point (AP) and a WUR non-AP station (STA) in which the WUR parameters to be used by the WUR AP when the WUR non-AP STA is in WUR power save mode have been defined.wake-up radio (WUR) power save mode: A mode where a WUR access point (AP) will buffer bufferable medium access control (MAC) management protocol data units (MMPDUs) for a WUR non-AP station (STA) and will only transmit WUR PPDUs to the WUR non-AP STA during the agreed WUR awake state periods in the WUR duty cycle, based on the negotiated WUR parameters. | Rejected –We note that WUR power save mode is not defined in the spec. During the development of 11ba, the design decision is to keep the current active mode and PS mode transition unchanged. As a result, additional WUR power save mode is not defined. We understand that the author wants to clarify when a WUR AP will buffer data, and we note that this is already clarified in the baseline as shown below.*The AP shall buffer individually addressed BUs addressed to STAs operating in a PS mode. These buffered BUs shall be transmitted only at designated times.* |
| 7082 | 113.22 | 29.8.1 | In line with other comments from this commenter. A WUR non-AP STA can be in 3 modes: WUR mode (where all the WUR mode parameters has been agreed by the AP and STA and the STA is ready to enter WUR power save mode), WUR mode suspend (where all the WUR mode parameters have been agreed by the AP and STA, but the STA will not enter WUR power save mode), WUR power save mode (where the WUR AP buffers MSDUs intended for the STA, and wakes the STA by sending a WUR wakeup PPDU to the STA at the appropriate time). Only a STA in WUR mode may transition to WUR power save mode. | Replace: "A WUR non-AP STA is in WUR mode or WUR mode suspend while using WUR power management service provided by a WUR AP."With: "A WUR non-AP STA is in WUR mode, WUR power save mode or WUR mode suspend while using WUR power management service provided by a WUR AP." | Rejected –We note that WUR power save mode is not defined in the spec. During the development of 11ba, the design decision is to keep the current active mode and PS mode transition unchanged. As a result, additional WUR power save mode is not defined. We understand that the author wants to clarify when a WUR AP will buffer data, and we note that this is already clarified in the baseline as shown below. As a result, existing mechanism can be reused. *The AP shall buffer individually addressed BUs addressed to STAs operating in a PS mode. These buffered BUs shall be transmitted only at designated times.* |
| 7083 | 116.50 | 29.8.3 | In line with other comments from this commenter. This section mixes WUR AP behavior to support a WUR non-AP STA in WUR mode and WUR power save mode. By using the term "doze state" to describe the state a STA that is in WUR power save mode. | Recommend splitting this description in two. One for WUR mode and one for WRU power save mode. Also it would be helpful to specify requirement in terms of actual behavior, e.g. transmits and when received. | Rejected –We note that WUR power save mode is not defined in the spec. During the development of 11ba, the design decision is to keep the current active mode and PS mode transition unchanged. As a result, additional WUR power save mode is not defined. We understand that the author wants to clarify when a WUR AP will buffer data, and we note that this is already clarified in the baseline as shown below. As a result, existing mechanism can be reused. *The AP shall buffer individually addressed BUs addressed to STAs operating in a PS mode. These buffered BUs shall be transmitted only at designated times.* |
| 7076 | 85.12 | 11.2.1 | WUR introduces a new power state for WUR non-AP STAs. It should not change the current definition of Doze state. As this change implies that a STA in Doze state can revive WRU PPDUs. It would be much simpler to leave Doze state as it is - a state where the STA does not transmit or receive and introduce a new state WUR awake state where a WUR STA can receiver a WUR PPDU and is not able to transmit or receive non-WUR PPDUs. This would clarify the state of the STA and make clear what the STA is capable of receiving or transmitting for each state. In addition this would allow functionality of the WRU power save mode behavior to be clearly defined. Also, note that this change will require changes in Clause 29, where the WUR duty cycle for the STA will define the times that the WUR STA will cycle between WUR Awake state and Doze state. | Replace: "A STA can be in one of two power states:—Awake: STA is fully powered.—Doze: STA is not able to transmit or receive non-WUR PPDUs and consumes very low power."With: "A STA can be in one of three power states:—Awake: STA is fully powered.—Doze: STA is not able to transmit or receive and consumes very low power.—WUR Awake: WUR STA is able to receive WUR PPDUs, is not able to transmit or receive non-WRU PPDUs and consumes very low power. | Rejected –We note that we do not define additional power state so that current PS operation can be reused without any additional change to define transition between WUR awake and awake, and WUR awake and doze.  |
| 7084 | 117.42 | 29.8.4 | In line with other comments from the commenter. This section needs to be reworked to consider the changes in 11.2.1 and the possible states of the WUR non-AP STA. In line with these comments there are three allowed states: awake, doze, and WUR awake. This clause should be rewritten to describe WUR non-AP STA behavior properly. Statements that the WUR non-AP STA shall be in any state should be removed. 802.11 does not dictate the state of any device on the air interface behavior it should have. The fact that some previous amendments have done so, is not justification for continuing to specify things that can not and should not be specified. | Rewrite this clause so that it is in line with the definitions of the three allowed WUR non-AP STA states: awake, doze, WUR awake. | Rejected –We note that we do not define additional power state so that current PS operation can be reused without any additional change to define transition between WUR awake and awake, and WUR awake and doze. We also note that mandate to be in WUR awake state follows the convention that we mandate awake state in TWT service period. Note that TWT mandates STA to be in awake state during the service period so that AP can rule out the fact that STA chooses not to be in awake state. If the spec does not define it this way, then when a transmission in TWT service period fails, then AP does not know if it is because reception error or because STA choose to be in doze all the time. |

**Discussion:** *None.*

***TGba editor: Change 29.7 WUR duty cycle operation as follows (track change on):***

WUR duty cycle operation identifies(#7080) the required amount of time that the WUR power state of a WUR non-AP STA utilizing WUR mode needs to be in the WUR awake state after the WUR non-AP STA enters the doze state (see 11.2.1 (General) and 29.8 (WUR power management procedure)). An illustration of state transition diagram of WUR power state is shown in Figure 29-x. (#7041, #7098, #7065) WUR duty cycle operation also allows a WUR AP to manage WUR activity in the BSS by scheduling a WUR non-AP STA to receive WUR frames at different times.



Figure 29-x - State transition diagram of WUR power state of a WUR non-AP STA in WUR mode (#7041, #7065)