IEEE P802.11
Wireless LANs

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| CR for CID 15730  |
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Abstract

The submission provides a resolution to CID 15730.

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. The introduction and the explanation of the proposed changes are 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.***

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| **CID** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 15730 | 27.14.3.2 | 363.49 | During a long TWT SP, the AP may transmit an OPS frame that indicates to a STA in TWT SP that the AP will not transmit anything for the non-AP STA for the duration of the opportunistic power save SP, i.e. 20ms. This may cause a long pause to the TWT SP and shorten the remaining time in TWT SP to be too short to transmit the remainder of the traffic. As the outcome, the STA may need to switch to active mode to get enough transmission time. Once STA is in active mode, then it can only follow the OPS instructions.To simplify the TWT SP handling it would be better if the opportunistic power save just terminates the ongoing TWT SP and the STA would not wake up to receive the remainder of the TWT SP. This way the TWT schedule is not affected by the OPS frame transmission and the following waking ups can be done according to TWT schedule. | Change the reception of the OPS frame.If a STA in PS mode has TWT SP ongoing and receives a FILS Discovery or OPS frame indicating that the AP will not transmit anything to the STA, then all ongoing TWT SPs are terminated and the AP will serve the STA earliest at the next TWT SP or after the duration indicated in the OPS frame which ever occurs first. | Revised. - TGax editor to make changes as shown in 11-18/1661r0. |

**Discussion:**

The maximum duration of the TWT SP is cirka 64 TUs. The OPS period duration is likely 10 - 30 ms.

If a STA in PS mode uses short TWT SPs, the OPS period is likely so long that a STA may wake up at the next TWT SP. Here the OPS frame works similarly as the TWT SP termination.

In case of long TWT SPs, the OPS may pause a TWT SP and schedule more precisely when a STA gets service within the TWT SP. There are disadvantages, if the remaining duration of the TWT SP after the OPS pause is very short:

* The number of non-AP STA wake ups / Awake-Doze transitions are increased. Each wake up consumes additional power
* The TXOP obtaining and successful data transmission duting a short period is difficult. AP may not be able to transmit in a short duration and the remaining time is wasted

The AP should transmit the remaining small data without OPS pause in the TWT SP and allow the non-AP STA to sleep to the next TWT SP.

A recommendation to avoid short TWT SP remainders should be enough, to keep the OPS protocol simple.



Figure 1 – Example of a short remainder of the TWT SP duration. AP sends an OPS frame during a long TWT SP. The red circle shows the short TWT SP duration when a STA needs to be Awake.

**Proposed normative text addition**

* AP operation for opportunistic power save

***Instructions to the ax-Editor: Add the text shown below as a new second paragraph of the clause.***

The AP should not send an OPS or FILS Discovery frame that has the STA AID in the TIM element set to 0, if the STA in power save mode has a TWT SP ongoing and the remaining TWT SP duration after the OPS period is shorter than 5 TUs.