IEEE P802.11
Wireless LANs

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| 11ba Architecture Considerations |
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**Abstract**

This document contains discussion of some Wake-Up Radio (11ba) architectural concepts, and proposes changes to the current 11ba draft for these concepts.

R0: Initial revision

Discussion:

Based on discussion with a subset of TGba members at recent ARC SC meeting, it has been proposed that WUR operation on both an AP and on a non-AP STA is best modelled as a mode of operation of the STA (including the STA within the AP), and not as operation of a separate sub-system/radio. This is still being investigated, through discussions at ARC SC. To further these discussions, this document pursues this direction for modelling WUR, and proposes direction (including some changes) to the 11ba amendment draft, implementing the direction.

General approach:

The idea is to present WUR as a mode of operation on both the AP and non-AP STA.

On an AP, it is just another mode (modulation, etc.) of the PHY, and the AP will use this PHY at any time, based on the behavior description in clause 31 of the amendment. On an AP, the WUR PHY is transmit only.

A non-AP STA, similarly, WUR is another mode of the PHY. The STA can enable the PHY’s WUR receive capability at any time; it never transmits in WUR mode of operaiton. The non-AP STA can also disable all the other PHY modes (and MAC support for them), when it has negotiated the WUR power management into WUR mode with the associated AP. By disabling the other PHY modes and supporting only WUR receive, the implementation can be optimized for minimal power consumption, targeting less than 1 mW of power consumption.

Considerations of this approach:

With this model for WUR, since WUR is just a mode of a ‘regular’ PHY (and MAC), there can be no support in the amendment for a “WUR-only” STA, as either a stand-alone beaconing device (not part of an AP), or as a separate wake-up device on a non-802.11 device (separate from an 802.11 non-AP STA).

Suggested changes to the amendment draft, follow. This is not intended to be a complete list, nor to provide exact wording. This is just a description of the types of changes that appear to be needed to accomplish this approach. The specific, detailed changes would need to be worked out, once this direction is discussed, assuming it is agreed.

In Definitions:

Definitions of PCR/WUR/WURx as “a radio” need to be modified – there is only one radio, so these are not a unique/separate radio, but a mode for the PHY contained within the STA. It’s not clear these terms/definitions are even needed, but that can be determined after other clauses are updated, depending on what is most clear and convenient for the wording.

Definitions of WUR xxx channel should just reference an operating behavior, based on the PHY’s mode. (It almost is already, but could be clarified.)

WUR mode is okay nearly as-is, with appropriate wording for “the WURx” and “the PCR”, based on the above changes, so it a description of

In clause 4:

Capture the “general approach” above, instead of description like “A WUR non-AP STA includes a primary connectivity radio (PCR) component and a WURx.”

In clause 31:

Remove all “PCR component” references (like P54.43), and replace with “non-WUR mode PHY mode”. (Need to work on wording for this.) Remove “the WURx” references, and replace with “PHY in WUR mode/operation” or something similar.

In clause 32:

WUR is “just” another PHY, that supports low data rates and low power requirement for operation. Like other PHY amendments, this clause should start by stating that a WUR PHY is also some subset of other (existing) 2.4 and/or 5 GHz PHYs (optionally clause 21, 19, and/or 18, and requiring clause 17.

[An aside: 5 GHz is required by the requirement for clause 17 support. Should it be clause 17 and/or clause 18? And, why are DFS operating classes excluded?]

Add (conceptually, not exact wording): When this PHY is used in a non-AP STA, that is associated with a WUR-capable AP, and with WUR negotiated, the STA may disable all PHY modes except WUR receive when in doze state. This brings power consumption expectation to less than 1 mW.