xtable 1.1 software power management plan

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# summary

The following software work is planned for power management on the xBR4:

* Power off/suspend/timed wakeup
* Power on/off groups of radios based on need
* Wake-up on LAN/WAN
* Battery capacity monitoring and reporting
* External interface changes to allow the xBRC to control power management features

# power off / suspend / timed wakeup

Requirement: The xBR4 must provide the capability to supend operation of the device in a low-power mode and wakeup itself back up with out manual interaction.

Currently, the capability of turning off the device power has been added to the kernel BSP. This means, we can fully power off these devices remotely or automatically but require manual steps to come back up. Unfortunately, due to a bug in the AM3358 processor, we cannot utilize the wakeup capabilities of the on-device RTC as planned. This can be worked around by adding an external RTC to the board.

Benefits:

* Dramatic power savings without requiring manual interaction.

# Power on/off radio groups

Requirement: The xBR4 must provide the capability to power off unused radios.

The radios are currently separated into 3-4 power groups that can be powered on/off independently. This enables devices which only utilize only a portion of their antenna ports to power off sets of radios for a large power savings. Changes to the radio driver interface are planned to enable software control of these groups.

Benefits:

* Large power savings in cases where only a subset of the available radios are needed.

# Wake-up on LAN/WAN/RADIO

Requirement: The device must provide the capability to put itself in a low-power state that can be interrupted from an external source.

Methods for suspending the system (including powering down peripherals such as the radios) exist and can be potentially implemented. Possible wake-up sources, of which many have be discussed, include LAN/WAN activity (specifically the feature known as wake-up on LAN) and radio packets from a special band. The best option seems to be the wake-up on WAN capability.

This feature may take more time to implement than we have for a December 14th POC.

Benefits:

* Similar power savings (although less so) to the timed wakeup feature with more control on when the device comes back up.

# Battery capacity monitoring and reporting

Requirement: The xBR4 must provide monitoring and reporting on the external battery capacity.

Once the proper physical interface is provided, the battery level will be able to be estimated and reported to the xBRC. Changes need to be made at the driver level to expose this data to the application software for reporting.

Benefits:

* Near realtime reporting on battery state from a centralized application.

# External interface for power management

Requirement: The xBR4 must provide an external interface to manage it’s new power features

Most if not all the power features listed above will need to be controlled externally by an application over the network i.e xBRC. The required interfaces will be defined and agreed upon with the proper stakeholders and implemented using the same RESTful interfaces that currently control the operation of the device.

Benefits:

* Gives other components of the xConnect system control/reporting of the power management features of the xBR V4.