IEEE 802.11AH

As highlighted in the previous blog post, there is a new emerging standard in the M2M arena based on the IEEE 802.11 standards family. This standard is being developed under the IEEE 802.11ah group, and aims to define the physical (PHY) and medium access control (MAC) layers that operate at radio frequencies below 1 GHz. One of the goals of this standard is to ensure that the transmission ranges up to 1 km and that the data rates per user are above 100 kbit/s.

The standard is currently being drafted, but some essential details about this new standard are already available, which we will highlight in this blog post. It is important to emphasize that although the IEEE 802.11ah standard will define operations below 1 GHz, it will not use the TV white space bands (54-698 MHz in the US), which are targeted instead by IEEE 802.11af.

The PHY transmission in IEEE 802.11ah is an OFDM based waveform consisting of a total of 64 tones/sub-carriers (including tones allocated as pilot, guard and DC), which are spaced by 31.25 kHz. The modulations supported include BPSK, QPSK and 16 to 256 QAM. It will support multi user MIMO and single user beam forming.

In [1] is stated that stations will support the reception of 1 MHz and 2 MHz PHY transmissions. The channelization (i.e. operating frequency) depends on the region. In Europe it will be within 863-868 MHz, allowing either five 1 MHz channels or two 2 MHz channels. While in the US the available band will be within 902-928 MHz, allowing either twenty-six 1MHz channels or thirteen 2MHz channels. In Japan, the available band is within 916.5-927.5 MHz, with eleven 1MHz channels. In

China the available band will be within 755-787 MHz, with thirty-two 1 MHz channels. South Korea and Singapore also have specific channelizations that can be found in [1].

The MAC layer will include a power saving mechanism and an alternative approach to perform channel access, which will allow an access point to support thousands of stations, as required for M2M applications. The channel access also supports a mode of operation where only a restricted number of stations can transmit.

There are several use cases for this standard [2], which include:

- Sensor Networks – where the IEEE 802.11ah is used as the communication medium for the transmission of short-burst data messages from sensors, which include smart metering;
- Backhaul networks for sensors – where the IEEE 802.11ah can be used to create the backhaul of mesh networks created by IEEE 802.15.4 networks;
- Extended Wi-Fi range for cellular traffic off-loading – where the IEEE 802.11ah can be used to off-load traffic from a cellular network. The caveat is that the performance should be at least comparable with the one from the cellular network;
- M2M communications – Whereas current systems are optimized more for human-to-human (H2H) communications, IEEE 802.11ah standard will mainly consider sensing applications.
- Rural communication – Wireless communication in rural areas has led to some effort that is also titled as bridging the digital divide. Large potential is given by sub 1 GHz due to the wider supported range.

Source : http://massm2m.wordpress.com/2013/01/25/first-impressions-on-the-ieee-802-11ah-standard-amendment/