IEEE P802.11  
Wireless LANs

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| Long Range Low Power (LRLP) Operation in 802.11: Use Cases and Functional Requirements: Guidelines for PAR Development | | | | |
| Date: 2015-09-17 | | | | |
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Abstract

This document provides an initial document structure for the Long Range Low Power TIG report

* **LRLP use cases and metrics**
  + Smart Grid
  + IoT
    - Home Theater use case
    - Home Security use case
    - Indoor Device Control use case
  + Building Energy Management Systems (BEMS)
  + **Metrics**
    - **Data transmission rate:** Lowdata throughput typical of applications in sensor or actuator networks, e.g., 100kbps of limited size file transfer
    - **Transmission range:** Increased transmission range must be accomplished despite a fixed transmit power.
    - **Peak power consumption:** This metric controls the power consumption during activity periods in specified duty cycle of LRLP operation
      * Battery life:Battery life time is directly related to capacity and is measured in mAh (mA hours)
        + Capacity is dependent on rate of discharging the battery (e.g., 230-240mAh at 500uA rate of discharge, while 150mAh at 3mA rate of discharge)[[1]](#footnote-1)
        + Capacity is dependent on pulse duration (ON time of an LRLP device)
    - **Average current consumption:** Battery life time is inversely related to this metric and is measured in mA. Lower average current consumption for a fixed battery capacity improves battery life time
* **LRLP requirements** 
  + Integration and backward compatibility with legacy 802.11
    - LRLP AP has both HE/legacy and LRLP capability to ensure WLAN coexistence
      * The 2.4 GHz band is the primary objective, although other bands are not ruled out. LRLP is band agnostic.
    - Mechanisms for Sub20MHz operation
    - LRLP STA not required to support legacy 20MHz Tx or Rx
    - LRLP AP will be required to support legacy 20MHz Tx & Rx
  + Long Range (approx. 10dB improvement above existing 20 MHz operation)
    - Improved coverage edge performance
  + Ultra Low Power consumption – peak and average current
    - LRLP non-AP STA supports ultra low power operation
    - Light-weight non-AP STA protocol
    - Narrowband (e.g., 2MHz) + low MCS only transceiver design can allow power reduction compared to legacy 20MHz transceiver
* **Technical feasibility** 
  + Longer Range
  + Ultra Low Power consumption
  + Details of narrowband transmission and reception
  + Integration and backward compatibility with legacy 802.11
    - LRLP non-AP STA does not have to support legacy
  + Coexistence with other 802 wireless protocols
  + Tradeoffs between low power operation and latency
    - For home security use case, fast wakeup and secure reconnection are required
* **Technical material needed to initiate standardization**
  + Supported combinations of LRLP operation in the 802.11 architecture
  + Parameterization of features and capabilities for optimizing range or low power.
  + Comparative study of all low power technologies in use today

1. IEEE 11-15/0775r1: Integrated Long Range Low Power Operation for IoT [↑](#footnote-ref-1)