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 |
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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)