**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **TG4q (Technical Guidance Document) Draft** |
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| Re: | Task Group 15.4q Technical Guidance for Proposals |
| Abstract | TG4q - technical guidance for PHY proposals.  |
| Purpose | To capture essential PHY requirements derived from the CFA responses, parameterized into a set of PHY characteristics that technical proposals can address. Guide discussion within task group, help proposers and provide a framework for evaluation of proposals by the TG. |
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Technical Guidance Document

# Introduction

## Purpose

This document provides technical guidance summarizing the key parameters of the PHY and necessary MAC Layer changes for IEEE 802.15.4q to serve the applications presented in response to the call for applications. It focuses on criteria to derive the key parameters which will distinguish IEEE 802.15.4q PHY from the existing IEEE 802.15.4 physical layers. This document provides all proposers with the necessary information on the technical objectives of IEEE 802.15.4q amendment.

## Methodology

The methodology is based on a consensus approach to defining a minimal set of features, characteristics, performance and constraints to be considered when making a proposal. This document provides:

* A functional view of the PHY characteristics, in the form of specific parameters which define externally verifiable performance and interoperability considerations ;
* Performance descriptions which characterize the ULP physical layer with any required MAC changes.

The parameters discussed in this document are essential parameters for the design of physical layer and also satisfy IEEE 802.15.4q PAR. The parameters are as follows

* Range
* Data Rate
* Symbol/chip rate
* Modulation/coding
* Synchronization and Timing
* PHY frame structure
* Transmit Power
* PSD
* Chan availability
* Sensitivity
* Interoperability
* Co-existence
* Low Power capability
* Operational bands.

**Range**:

The range of at least *30* m shall be supported by the specification for the lowest mandatory data rate in a free space path loss environment. The lowest mandatory data rate definition is provided in the Bit Rate section. The Range of *10 m* should be demonstrated in the channel models proposed in channel model document. The range should be measured at -5 dBm EIRP including all the antennas, if multiple antennas are used.

**Bit Rate:**

Over the air data rate and data rate deliverable to the MAC should be specified. The proposer shall specify the necessary packet size for a PSDU of TBD octets expressed as efficiency. The proposer shall show which application listed in annex will be supported.

**Symbol/chip rate**

The proposer shall specify the symbol/chip rate.

**Modulation/ Coding**

The proposer shall specify the utilized modulation/coding scheme.

**Synchronization and Timing**

All receiver synchronization systems (including timing, frequency and frame sync) should not degrade sensitivity level by more than TBD on average. Sensitivity level should be measured using packets with TBD length PSDU at a TBD percent packet error ratio. The proposer shall state the required synchronization and timing accuracy for all types of devices whether or not they are symmetric.

**PHY Frame Structure**

The proposer shall specify PHY frame structure.

**Transmit Power**

The device shall support minimum – 5dbm EIRP specified in the range parameter.

**PSD**

The device shall abide by relevant spectral regulations in the region it is operating. Additionally, ACR (adjacent channel rejection) and ALCR (alternate channel rejection) shall be disclosed.

**Channel Availability**

The proposer shall specify the minimum number of co-located networks without causing and degradation in performance.

**Sensitivity**

The proposers shall specify the sensitivity defined as the minimum power to achieve a 1% PER with a 20 octet PSDU given a noise figure of 10 dB.

**Interoperability**

The proposers shall describe the interoperable features of the proposal including any optional behaviors. For instance, it should be made clear whether the data rate can dynamically be changes.

**Coexistence**

The Physical layer amendment shall define the level of co-existence of the proposed network with other IEEE 802 networks.

**Low Power capability**

The power consumption of the physical layer shall comply with the PAR. The peak and average power consumption of both transmitter and receiver shall be specified. The transmit power at the antenna shall be at 0 dBm.

**Operational Bands**

At least one of the operational bands stated in the PAR shall be supported.