**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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Contents:

[Introduction 3](#_Toc292353314)

[Purpose 3](#_Toc292353315)

[Methodology 3](#_Toc292353316)

[Requirements Discussion 4](#_Toc292353317)

[High Level Requirements Overview 4](#_Toc292353318)

[Application Requirements Matrix 4](#_Toc292353319)

[Performance characteristics Summary 4](#_Toc292353320)

[PHY Parameters 6](#_Toc292353321)

[Background and Supporting Discussion 8](#_Toc292353322)

[Link Budget 8](#_Toc292353323)

[Channel Characteristics 8](#_Toc292353324)

[Complexity and Cost considerations 8](#_Toc292353325)

[Definitions 8](#_Toc292353326)

[References 8](#_Toc292353327)

TG4q 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. Purpose of this document is to provide all proposers with the necessary information on the technical objectives of IEEE 802.15.4q amendment.

The intent of the task group is to provide resources and the process -including this document- to develop the standard in a timely fashion.

## 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.

Category I (w/ metric mandated by this doc.)

Range, data rate

Category II (w/o metric mandated by this doc)

Symbol/chip rate, Synchronization and Timing, modulation/coding, PHY frame structure, Transmit Power, PSD,

In preparing proposals, this can be used as a framework to produce a concise summary of the characteristics of each given proposal, and will allow the group to see the similarities and differences in submitted proposals.

**Range**:

The Range of atleast 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 3 dBm EIRP including all the antennas, if multiple antennas are used.

**Bit Rate:**

The Link data rates from node to node should be atleast 250 kbps

The maximum data rate may be equal to or greater than 1 Mbps.

The lowest data rate proposed should be the mandatory data rate and shall be used for all control packets like beacon, management slots etc.

**PER requirements:**

At the transmission range of 30 m in free space environment, the packet error rate (PER) shall be less than or equal to 1% for a 20 octet payload.

The PER measurement shall include complete recovery of packet including demodulation and detection, synchronization, SFD detection, Error control coding.

Proposals should present the performance of the physical layer in the channel models proposed in the channel model document. Packet Error rate of 1 % at 20 bytes should be demonstrated with the channel models with a link success probability of 95% over the channel conditions as specified in the channel model document. A link success probability of 95% is defined as the PER averaged over the channels that result in the 95% best performance at a given Eb/N0.

**Low Power Consumption:**

The Peak Power consumption of the physical layer should be less than 15 mW. The Power consumption at the transmitter should be measured at 3 dBm EIRP. The Power consumption at the receiver should be measured at 3 dB above the receiver sensitivity, where the PER requirements are sufficiently met.

**Co-existence:**

Co-existence of atleast *TBD* networks shall be supported to enable the co-existence of multiple networks. The proposed physical layer shall allow co-existence with atleast *TBD* other networks compliance to IEEE 802.15.4q.

The Physical layer amendement shall also support the co-existence of the networks with other networks employing protocols lie IEEE 802.11, Blue Tooth, IEEE 802.15.6 systems co-existing in the same spectrum.

**Bands Supported:**

* 2.4 GHz ISM Band
* 900 MHz ISM Band

# References