**IEEE P802.15**

**Wireless Specialty Networks (WSN)**

|  |  |
| --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Specialty Networks (WSN) |
| Title | **Next Generation SUN PHY Technical Guidance Document**  |
| Date Submitted | 14 March 2024 |
| Source | Joerg ROBERTTU Ilmenau / Fraunhofer IISHelmholtzplatz 2, 98693 Ilmenau, Germany | Voice: Fax: E-mail: joerg.robert@tu-ilmenau.de  |
| Re: | SG NG OFDM PHY Technical Guidance for Proposals |
| Abstract |  |
| Purpose | To capture essential PHY requirements, 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. |
| Notice | This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. |

### Contents:

[Contents: 2](#_Toc156321109)

[DRAFT 802.15.4 Next Generation SUN PHY Technical Guidance Document 3](#_Toc156321110)

[Document is based on IEEE 802.15.4w. Yellow parts are for IEEE 802.15.4w and have to be updated! 3](#_Toc156321111)

[Introduction 3](#_Toc156321112)

[802.15.4 Purpose 3](#_Toc156321113)

[802.15 Need 3](#_Toc156321114)

[802.15 Scope 3](#_Toc156321115)

[Methodology 3](#_Toc156321116)

[Proposal Criteria 4](#_Toc156321117)

DRAFT 802.15.4 Next Generation SUN PHY Technical Guidance Document

# Document is based on IEEE 802.15.4w. Yellow parts are for IEEE 802.15.4w and have to be updated!

# Introduction

## 802.15.4 Purpose

Copy form PAR/CSD

## 802.15 Need

Copy from PAR/CSD

## 802.15 Scope

Copy form PAR/CSD

## 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.

The parameters discussed in this document are essential parameters for the design of physical layer and also satisfy the PAR. The proposal shall reference the relevant regulations. Devices implementing shall abide by regulations in the region it is operating.

### Proposal Criteria

Proposers are welcome to propose a complete system proposal. However, proposers are also welcome to propose specific technology elements only.

The following should be included in the proposal:

**Complexity**

The complexity should not be significantly higher compared to existing SUN PHYs.

Receiver Sensitivity

* One mode with a sensitivity of at least -120dBm with an occupied channel bandwidth of at least 500 kHz

Data Rate

* One mode with an effective payload data rate higher than of 2.4 Mbps
* Proposers are encouraged to propose modes with higher data rates

Channel Bandwidth

* Proposers should support a minimum channel spacing of 200kHz for the OFDM modes to meet the regulation in specific regions
* Proposers should support at least one mode with an occupied channel bandwidth of at least 500kHz

Performance Evaluation

* The proposer are encouraged to show simulation results for the applicable application scenarios
* “Applicable Application Scenarios” will be defined later

**Mandatory and Optional Features**

Proposals shall clearly stipulate the mandatory and optional behaviors/features.

**Forward Error Correction**

The use of a least an optional FEC should be possible in all modes.

**Modulation**

The proposers should consider the use of 4-FSK and 64-QAM.

**Symmetrical Links**

It should be possible to use the same class of devices for transmit and receive.

**PHY Frame Structure**

The PHY should be based on the existing SUN PHY specifications.

**Crystal Tolerance**

The PHY should support oscillator tolerances comparable to the existing SUN PHYs.

**Coexistence Features**

The proposal shall at a minimum include discussion of the coexistence impacts wrt. other IEEE 802 networks.

It is recommended that the proposer addresses other networks in the same and/or adjacent bands.

In addition, it is highly recommended that the proposer explains how interference to existing IEEE 802.15.4 networks can be avoided.

**Operational Bands**

At least one of the operational bands relevant to the scope of the project shall be supported.

**Multipath Robustness**

The proposer shall describe the immunity to multi-path reception. Simulation results using the channel model defined in section 5.2 of the IG report (DCN 15-17-0528-01) (outdoor urban, hBS=140m, 3Hz Doppler) showing the impact of multi-path on the PER are recommended.

**Interference Robustness**

The proposer shall describe the immunity to interference. Simulation results using the interference model defined in section 4.3 of the IG report (DCN 15-17-0528-01) (Parameters: Channel model outdoor urban, hBS=140m) showing the impact on the PER are recommended.