**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | TG4t Coexistence Assurance Document |
| Date Submitted | 19 May 2016 |
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| Re: | IEEE 802.15.4t Draft Amendment |
| Abstract | Analysis on coexistence of IEEE 802.15.4t with other IEEE 802 systems within the same frequency band |
| Purpose | To address the coexistence capability of IEEE 802.15.4t to satisfy requirements of the IEEE 802.19 Work Group and IEEE 802 Executive Committee to determine if a proposed IEEE 802 standard has made a reasonable effort to be able to coexist with devices compliant to other IEEE 802 standards in their operating band. |
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# Scope

The IEEE 802.19 Work Group has mandated that new wireless standards developed under IEEE 802 be accompanied by a *Coexistence Assurance* document. In [2], guidelines are provided for how coexistence can be quantified based on predicted packet error rates among IEEE 802 wireless devices. Hence, this coexistence assurance document is provided by the IEEE 802.15.4t Task Group to satisfy the requirements of the IEEE 802.19 Work Group and IEEE 802 Executive Committee.

The IEEE 802.15.4t (Higher Rate) PHY provides a 2000 kb/s option when operating in the global 2450 MHz band.

This document addresses the coexistence of the IEEE 802.15.4t (Higher Rate) PHY with other IEEE 802 standards operating in the same frequency bands.

# References

1. S. Shellhammer, “Writing a Coexistence Assurance Document,” IEEE 802.19-09/0001r0, 2009.
2. IEEE Std 802.15.4TM-2015.

# IEEE 802.15.4t amendment overview

Amendment 802.15.4t uses the same modulation, with the exception of a higher data rate, than other PHYs already defined in the IEEE Std 802.15.4-2015. This amendment also uses the same channel plan as already defined by other PHYs in the IEEE Std 802.15.4-2015.

## Operating frequency bands

The allocated frequency band for the IEEE 802.15.4t amendment is:

|  |  |
| --- | --- |
| Band Identifier (MHz) | Frequency band (MHz) |
|
| 2450 | 2405-2480 |

Table – IEEE 802.15.4t Frequency bands

## Modulation parameters

This amendment increases the data of an existing PHY in the IEEE Std 802.15.4-2015 from 250 kb/s to 2000 kb/s.

## Coexistence mechanisms

This amendment makes no changes to the available coexistence mechanisms in the IEEE Std 802.15.4-2015.

# Other IEEE 802 standards occupying the same frequency bands

## Interference to other systems

The channel plan for the IEEE 802.15.4t amendment is identical to the 250 kb/s O-QPSK PHY already defined in the IEEE Std 802.15.4-2015. The spectral emissions of the 802.15.4t amendment are better than those of the 250 kb/s O-QPSK PHY already defined in the IEEE Std 802.15.4-2015. Therefore the spectral interference caused by the 802.15.4t amendment to other systems in the 2450 MHz band will be better than that of the existing 250 kb/s O-QPSK PHY.

The modulation defined in the IEEE 802.15.4t amendment uses a higher data than the existing 250 kb/s O-QPSK PHY. Therefore the IEEE 802.15.4t amendment will spend less time on the channel, thereby reducing the probability of interference to other systems.

The net combination of the spectral and temporal impacts will result in reduced interference to other systems compared to that of the existing 250 kb/s O-QPSK PHY.

## Interference from other systems

The modulation defined in the IEEE 802.15.4t amendment uses a higher data than the existing 250 kb/s O-QPSK PHY. Due to the higher data in the IEEE 802.15.4t amendment there will be an increase in the sensitivity to noise and interference in the band. However, the higher data rate defined in the IEEE 802.15.4t amendment will also result in spending less time on the channel, thereby reducing the probability of interference from other systems.

The net combination of the spectral and temporal impacts will result in the IEEE 802.15.4t amendment having an acceptable reduced level of performance, compared to that of the existing 250 kb/s O-QPSK PHY, when in the presence of interference in the band.