802.15.5™

IEEE Recommended Practice for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements

Part 15.5: Mesh Topology Capability in Wireless Personal Area Networks (WPANs)

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

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Abstract: This IEEE recommended practice defines the architectural framework that enables WPAN devices to promote interoperable, stable, and scaleable wireless mesh topologies and, if needed, to provide the amendment text to the current WPAN standards that is required to implement this recommended practice.

Keywords: address assignment, block addressing, broadcast, carrier sense multiple access/collision avoidance, high-rate WPAN mesh, HR-WPAN mesh, multicast, low-rate WPAN mesh, LR-WPAN mesh, mesh, mesh coordinator, server routing, wakeup interval, multiple hop, multi-hop, local link state, logical tree, portable, portability, power saving, reliable broadcast, sensor network, traceroute, unicast, wireless PAN, WPAN

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Introduction

This introduction is not part of IEEE Std 802.15.5-2009, IEEE Recommended Practice for Information technology—Telecommunications and information exchange between systems— Local and metropolitan area networks— Specific requirements.

This recommended practice provides the architectural framework enabling WPAN devices to promote interoperable, stable, and scalable wireless mesh topologies. This recommended practice is composed of two parts: low-rate WPAN mesh and high-rate WPAN mesh networks. The low-rate mesh is built on IEEE 802.15.4 MAC, while high rate mesh utilizes IEEE 802.15.3/3b MAC. Common features of both meshes include network initialization, addressing, and multihop unicasting. In addition, low-rate mesh supports multicasting, reliable broadcasting, portability support, trace route and energy saving function, and high-rate mesh supports multihop time-guaranteed service.

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Part 15.5: Mesh Topology Capability in Wireless Personal Area Networks (WPANs)

1. Overview

A Wireless Personal Area Network (WPAN) mesh is a network of WPANs with mesh topology. This document defines a recommended practice for WPAN meshes.

1.1 Scope

The scope of this standard is to provide a recommended practice to provide the architectural framework enabling WPAN devices to promote interoperable, stable, and scaleable wireless mesh topologies and, if needed, to provide the amendment text to the current WPAN standards that is required to implement this recommended practice.

1.2 Purpose

The purpose of this project is to facilitate wireless mesh topologies optimized for IEEE 802.15 WPANs.

Mesh Topology provides the following features to WPANs:

— Extension of network coverage without increasing the transmit power or the receiver sensitivity

— Enhanced reliability via route redundancy

— Easier network configuration

— Better device battery life

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 802.15.3™-2003, IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements Part 15.3: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for High Rate Wireless Personal Area Networks (WPANs). [1, 2]

IEEE Std 802.15.3b™-2005, IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements Part 15.3: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for High Rate Wireless Personal Area Networks (WPANs) Amendment 1: MAC Sublayer.

IEEE Std 802.15.4™-2006, IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low Rate Wireless Personal Area Networks (WPANs).

3. Definitions

For the purposes of this draft recommended practice, the following terms and definitions apply. *The Authoritative Dictionary of IEEE Standards Terms* should be referenced for terms not defined in this clause.

3.1 active duration: A time period defined in both synchronous and asynchronous energy saving modes in the mesh sublayer during which a mesh device accesses the common channel using carrier sense multiple access with collision avoidance mechanism.

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