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IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications

Amendment 1: Enhancement for Internet of Things Applications

IEEE Communications Society

Sponsored by the
Power Line Communications Standards Committee

IEEE
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USA

IEEE Std 1901a™-2019
(Amendment to
IEEE Std 1901-2010)

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Abstract: Physical (PHY) and media access control (MAC) layers of a broadband powerline communication technology called flexible channel wavelet PHY/MAC (FCW) for Internet of Things applications (IoTPLC) based on wavelet orthogonal frequency division multiplexing (wavelet OFDM) are specified in this amendment. Modes for operations in different channels (frequency bands) with different values of carrier spacing are defined.

Keywords: extended ISP (E-ISP), flexible channel wavelet (FCW) PHY/MAC, IEEE 1901a, Internet of Things (IoT), medium access control (MAC), physical layer (PHY), power line communication (PLC), wavelet orthogonal frequency division multiplexing (wavelet OFDM)

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This entity-based standard was created under the leadership of the following individuals:

Jean-Philippe Faure, *Chair*
Markus Rindchen, *Vice Chair*

At the time this IEEE standard was completed, the Standard for Internet of Things Powerline Communication Working Group had the following membership:

ACN Advanced Communications Networks SA
HD-PLC Alliance
Panasonic
Power Plus Communications AG

The Working Group gratefully acknowledges the contributions of the following entities and participants. Without their assistance and dedication, this standard would not have been completed.

ACN Advanced Communications Networks SA……Stephan Horvath
David Naughton

HD-PLC Alliance…… Michimasa Aramaki
Hisao Koga
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Panasonic.....…….Jean-Philippe Faure
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Power Plus Communications AG……..Markus Rindchen
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The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Ericsson AB
HD-PLC Alliance
IoTecha Corp
National Taiwan University
Panasonic Corporation of North America
Power Plus Communications AG
Qingdao Eastsoft Communication Technology Co., Ltd.
Renesas Electronics Corporation
Siemens Corporation
STMicroelectronics
Wi-SUN Alliance

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Introduction

This introduction is not part of IEEE Std 1901a-2019, IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications—Amendment: Enhancement for Internet of Things Applications.

This amendment specifies physical (PHY) and media access control (MAC) layers of a broadband powerline communication technology called flexible channel wavelet (FCW) for Internet of Things applications (IoTPLC) based on wavelet orthogonal frequency division multiplexing (wavelet OFDM). This amendment defines modes for operations in different channels (frequency bands) with different values of carrier spacing. FCW PHY/MAC can be used for wired communications via physical media such as, but not limited to, electric power lines and coaxial cables.

With the growth of IoT applications, the requirements for communications are increasingly diverse. Some IoT applications, such as 8k/4k video applications for entertainment or security, need to communicate data at very high speed. Other IoT applications, such as IoT for smart cities, energy management, building control, and light control, need long distance communication instead of very high speed communication. The different modes specified in IEEE Std 1901a intend to address this diversity of requirements.

Contents

IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications—Amendment 1: Enhancement for Internet of Things Applications

NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.[1]

The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strikethrough~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.

1. Overview

1.1 Scope

Change 1.1 as follows:

The project defines a standard for high-speed (>100 Mbps at the physical layer) communication devices via electric power lines, so-called broadband over power line (BPL) devices. This standard uses transmission frequencies below 100 MHz. It is usable by all classes of BPL devices, including BPL devices used for the first-mile/last-mile connection (<1500 m to the premise) to broadband services as well as BPL devices used in buildings for local area networks (LANs), smart energy applications, transportation platform (vehicle) applications, Internet of Things applications, and other data distribution (<100 m between devices). This standard focuses on the balanced and efficient use of the power line communications channel by all classes of BPL devices, defining detailed mechanisms for coexistence and interoperability between different BPL

[1] Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.