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IEEE Standard for Ubiquitous Green Community Control Network Protocol

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13 April 2011

IEEE Std 1888™-2011

IEEE Standard for Ubiquitous Green Community Control Network Protocol

Sponsor

Corporate Advisory Group
of the
IEEE-SA Board of Governors

Approved 2 February 2011

IEEE-SA Standards Board

Approved 28 June 2011

American National Standards Institute

Abstract: The standard describes remote control architecture of digital community, intelligent building groups, and digital metropolitan networks; specifies interactive data format between devices and systems; and gives a standardized generalization of equipment, data communication interface, and interactive message in this digital community network. The digital community remote control network opens interfaces for public administration, public service, property management service, and individual service, which enables intelligent interconnection, collaboration service, remote surveillance, and central management to be feasible.
Keywords: access interface, actuator, application (APP), communication protocol, component, data structure, energy management, energy saving, facility networking, gateway (GW), IEEE 1888, point, registry, remote control, sensor, SOAP, storage

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PDF: ISBN 978-0-7381-6553-0 STD97078
Print: ISBN 978-0-7381-6554-7 STDPD97078

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Introduction

This introduction is not part of IEEE Std 1888-2011, IEEE Standard for Ubiquitous Green Community Control Network Protocol.

This standard describes a remote control architecture of digital community, intelligent building groups, and digital metropolitan networks; specifies interactive data format between devices and systems; and gives a standardized generalization of equipment, data communication interface, and interactive message in this digital community network. The digital community remote control network opens interfaces for public administration, public service, property management service, and individual service, which enables intelligent interconnection, collaboration service, remote surveillance, and central management to be feasible.

Facility networking in buildings, houses, and factories is now considered to be a promising tool for energy-management or energy-saving, and networking of facilities with TCP/IP protocols has certainly enabled building-scale or city-wide energy management. However, most of the systems are proprietarily and independently developed, deployed, and operated, which made the installation and running costs quite high.

Traditionally, in order to extend access reachability to sensors and actuators at field-bus level via the Internet, gateway design has been introduced. However, recent applications of facility networking for such scales are required beyond just a simple access to devices. In most of the practical implementation, they have (1) a large storage to archive the history of sensor readings, (2) user interface for interactive operation, (3) reporting systems, and (4) data analyzer.

Collaboration of these system components is mandatory, especially in energy-aware facility networking. However, they cannot simply collaborate or interoperate with each other without unpreferred analysis, integration, and operation of systems, because these system components have been independently developed and proprietarily integrated.

Interoperability of these system components by a common communication protocol certainly increases the efficiency of facility networking deployment. It reduces the cost of system integration and interoperability management, allowing installation of them in small- and medium-sized buildings and even houses. For vendors, their developed components can be sold worldwide without any customized implementation, sometimes resulting in mass production with reasonable cost.

Targeting at building-scale and city-wide energy management, the IEEE P1888 working group initiates the project named Ubiquitous Green Community Control Network (UGCCNet), which specifies remote control architecture of facility networking. The scope and purpose of this project is to establish facility networking infrastructure over the Internet by specifying an interoperable communication protocol among the common (building-scale) facility networking components (i.e., device access gateways, data storages, and application units). This standard specifies UGCCNet in order to allow interoperability and open development of those facility networking components. First, the standard generalizes all the facility networking components by a simple component model. Then, the standard defines communication protocol among them. The standard also introduces registry mechanism to support autonomous collaboration of these components.

It is a communication infrastructure that aims to construct a new network for the renewal of the facilities, next generation's facility management, and the energy conservation including small- and medium-sized facilities. The aspect is expanded from a past facility management to the operation management that targets energy conservation and the integration of the management platform, monitoring and controlling by using an open and common protocol. This infrastructure will be used for some system-level collaborations in addition to the energy conservation.

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Beijing Jiaotong University
Beijing University of Posts and Telecommunications
BII Group Holdings Ltd.
China Telecommunications Corporation
Intel Corporation
Tsinghua University
The University of Tokyo

The P1888 Working Group gratefully acknowledges the contributions of the following participants. Without their assistance and dedication, this standard would not have been completed.

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IEEE Standard for Ubiquitous Green Community Control Network Protocol

1. Overview

1.1 Scope

The standard describes a remote control architecture of digital community, intelligent building groups, and digital metropolitan networks; specifies interactive data formats between devices and systems; and gives a standardized definition of equipment, service services, signals, and interactive messages in this digital community network.

The digital community remote control network opens application interfaces for public administration, public services, property management services, and individual service services, which enables intelligent interconnection, collaboration service, remote surveillance, and central management to be feasible. Surveillance networks, consumer electronics, remote service systems, public administration systems, security linkage systems, and emergency reaction systems will be integrated into the community network seamlessly.

Based on TCP/IP open systems, the network architecture adopts active and emerging technologies, supporting diverse access technologies in the physical layer, supporting IPv4/v6 in the network layer, and integrating well with the next generation converged networks.