IEEE1888-2011
Ubiquitous Green Community Control Network

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Contents of C&AR

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• Relevancy
  – reliability, security and efficiency of the Smart Grid
  – grid operations and resources
  – distributed resources and generation
  – demand response, demand-side resources
  – “smart” technologies
  – “smart” appliances and consumer devices
  – ...
• Community Acceptance
• Deployment Suitability
• Interface Characterization
• Document Maintenance
1.1. Overview of the standard

- HTTP/XML communication protocol for
  - facility monitoring / remote control
  - data analysis
  - integration with databases and IT systems
- Interoperable with
  - BACnet, Lonworks, Modbus, ZigBee
  - proprietary systems
- Mainly used for
  - remote energy management
  - remote facility management
- Allow “inter-cloud operation” – data exchange among databases and IT systems (not only facilities)
2.1. Relevancy (Summary)

• Gateway-based efficient integration
  – Integration of any data types (BACnet, Lonworks, …)
• The standard is for customer-side
  – Implementation of DR, dynamic-pricing
  – Scheduling and optimization of electric storage charge control and thermal storage
• Transport-layer security (TLS) (for cyber-security)
  – Detection and disconnection of unauthorized access
  – Access control
• Integration to Cloud (consumer) services
  – Visualization (Web), Alert (E-mail and Twitter)
  – Distributed data management and higher-availability
  – Integration of facilities, databases and IT systems over multiple organizations
2.2. Community Acceptance

- Open source projects of IEEE1888 protocol stack
- Vendor implementations
- Commercial products
- Conformance test tools
- Interoperability testing laboratory
- Education and training programs
2.3. Deployment Suitability

- For Commercial and Industrial (C&I) facilities.
- BEMS aggregator (on going)
  - Integration of thousands of small C&I buildings.
  - 50,000kW demand in total (50kW – 500kW each)
- University campus with PV (new)
  - See “IEEE1888: Application (2/2)”
2.4. Interface Characterization

- HTTP/XML-based protocol (over the Internet)
  - Integration with IT systems (e.g., Database, Web)
- Allow Data Portability among IT systems (with globally unique identifier)
  
  E.g., Data Storage 1 --(IEEE1888)-- > Web Application 1
  Data Storage 1 --(IEEE1888)-- > Data Storage 2
- Allow Any Data Types
  - BACnet Data Types, Lontalk Data Types, Modbus Data Types, ZigBee, Z-Wave, ...
- Allow Bi-Directional Communication
  - Facility <--(IEEE1888)-- Center (Data Storage)
  - Facility --(IEEE1888)-- > Center (Data Storage)
Appendix
IEEE1888: Application (1/2)
Energy Management in University of Tokyo Campuses

http://ep-monitor.adm.u-tokyo.ac.jp/portal/denryoku

More than 50,000kW is under management
IEEE1888 Application (2/2)

Facility and Energy Management: Tokyo Institute of Technology

It integrates Modbus, BACnet/IP and proprietary systems with IEEE1888.

Cite: http://www.nttdatacs.co.jp/news/20121204.html
IEEE1888 Devices

IEEE1888 Digital Analog Input Device

IEEE1888 GW for BACnet/IP

IEEE1888 Demand Alarm

IEEE1888 Learning Kit


IEEE1888 Open SDK, Stack, Tester

SDK: Software Development Kit

IEEE1888 Stack for Embedded Systems

Conformance Tester