P1703

Submitter Email: l.j.kotewa@ieee.org
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PAR Approval Date:
PAR Expiration Date:
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Root PAR: P1703 **Approved on:** 07-Dec-2005
Project Record: 1703

1.1 Project Number: P1703
1.2 Type of Document: Standard
1.3 Life Cycle: Full Use

2.1 Title: Standard for Local Area Network/Wide Area Network (LAN/WAN) Node Communication Protocol to complement the Utility Industry End Device Data Tables

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3.1 Working Group: End Device/Telemetry Interface Unit Subcommittee (SASB/SCC31/EndDevic)
Contact Information for Working Group Chair
Name: Richard Tucker
Email Address: richardaet@aol.com
Phone: 281-827-2961
Contact Information for Working Group Vice-Chair
None

3.2 Sponsoring Society and Committee: IEEE-SASB Coordinating Committees/SCC31 - Automatic Meter Reading and Energy Management (SASB/SCC31)
Contact Information for Sponsor Chair
Name: Lawrence Kotewa
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Contact Information for Standards Representative
None

4.1 Type of Ballot: Individual
4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: 11/2009
4.3 Projected Completion Date for Submittal to RevCom: 03/2010

5.1 Approximate number of people expected to be actively involved in the development of this project: 15

5.2 Scope: Initially, communications with electronic devices consisted of transporting memory data via proprietary protocols that were unique to each manufacturer. The desire for interoperability and support for multiple manufacturers by reading and programming systems created a need for standardization of data formats and transport protocols.

The first step was to standardize data formats. Internal data was abstracted as a set of Tables. A set of standard Table contents and formats were defined in ANSI C12.19-2008 / MC1219-2009 / IEEE 1377-2009, Utility Industry End Device Data Tables.

In the Protocol Specification for ANSI Type 2 Optical Port Standard (ANSI C12.18-2006 / MC1218-2009 / IEEE 1701-2009), a point-to-point protocol was developed to transport table data over an optical connection. The ANSI C12.18-2008 / MC1218-2009 / IEEE 1701-2009 protocol include an application language called Protocol Specification for Electric Metering

Old Scope: This document defines interfaces between IEEE P1377 devices and network protocols (IEEE P1377, MC12.19, and ANSI C12.19 standards are congruent). This standard shall provide the Local Area Network/Wide Area Network (LAN/WAN) lower layers communication protocol for the Utility metering Industry including specifically Water, Gas, and Electric. This work is complementary with the proposed Utility Industry End Device Data Tables, IEEE P1377, MC12.19 and ANSI C12.19.

Specific goals identified by this committee were:

1. Defining a Datagram that may convey IEEE P1377 or MC12.19 or ANSI C12.19 data Tables through any network.

This is accomplished by:

Assuming that the data source is IEEE P1377 or MC12.19 or

(PSEM) that allows applications to read and write Tables. The Protocol Specification for Telephone Modem Communication (ANSI C12.21-2006 / MC1218-2009 / IEEE 1702-2009) was then developed to allow devices to use PSEM to transport Tables over telephone modems.

This Standard extends on the concepts of ANSI C12.18-2006 / MC1218-2009 / IEEE 1701-2009, ANSI C12.21-2006 / MC1218-2009 / IEEE 1702-2009, and ANSI C12.19-2008 / MC1219-2009 / IEEE 1377-2009 standards to allow transport of Table data over any reliable networking communications system. Note that in this use of the word, reliable means that for every message sent, the sender receives a response at its option: either a positive acknowledgement or an error message. That is, messages cannot fail silently in a reliable network (see discussion of Reliable Stream Transport Service in [IPPA : 1995]).

In addition, this Standard describes an optionally exposed point-to-point interface between a C12.22 Device and a C12.22 Communications Module designed to attach to any network. The terms C12.22 XXXX (e.g. C12.22 Device) were introduced by the ANSI C12.22-2008 Standard. These terms can be interchangeably replaced with the terms IEEE 1703 XXXX. i.e. IEEE 1703 Device is the same as ANSI C12.22 Device and IEEE 1703 Communication Module is the same as a C12.22 Communication Module. However, since this standard was originally developed under the auspice of ANSI C12 SC17 WG1, the document terminology is based on C12.22 terms.

Furthermore, this Standard defines a methodology to capture, translate and transmit one way device messages (blurts).

This Standard defines interfaces between IEEE 1377 Devices (ANSI C12.19 Devices) and network protocols.

Specific goals identified by the committee in the creation of this Standard were:

1. Defining a Datagram that may convey ANSI C12.19 data Tables through any network

This was accomplished by:
Assuming that the data source is ANSI C12.19 data Tables
Defining the Application Layer services (language)

2. Providing a full stack [ISO/IEC 7498-1] definition for interfacing a C12.22 Device to a C12.22 Communication Module

This was accomplished by:
Defining the physical interface requirements between the C12.22 Device and the C12.22 Communication Module
Defining the interface lower layers [ISO/IEC 7498-1]; 4 (transport), 3 (network), 2 (data link) and 1 (physical)

3. Providing a full stack definition for point-to-point communication to be used over local ports such as optical ports, or modems

This was accomplished by defining a Layer 4 (transport) and ANSI C12.19 data Tables.

Defining the Application Layer services (language).

Defining the interface lower layers; layers; 4 (Transport), 3 (Network), 2 (Data Link) and 1 (Physical).

2. Providing a full stack definition for interfacing an end device to a Network Communication Module .

This is accomplished by:

Defining the physical interface requirements between the end device and the Network Communication Module .

Defining the interface lower layers; 4 (network), 3 (transport), 2 (data link) and 1 (physical).

3. Providing a full stack definition for point-to-point communication to
be used over local ports such as optical ports, or modems.

This is accomplished by defining a Layer 4 (Transport Layer) and Layer 2 (Data Link Layer).

4. Providing support for efficient one-way messaging (blurts) (IEEE P1703, MC.22, and ANSI C12.22 standards are congruent)

This is accomplished by:

Defining a compact message format that can be easily transformed to a standard IEEE P1703 or MC12.22 or ANSI C12.22 Datagram.

Assuring that all needed layers defined in this Standard can support one-way messaging

5. Providing network architecture compatible with this protocol. (IEEE P1703, MC12.22, and ANSI C12.22 are congruent)

This is accomplished by:

Defining different type of nodes such as IEEE P1703 Relay, IEEE P1703 Master Relay, IEEE P1703 Host, IEEE P1703 Authentication Host, IEEE P1703 Notification Host, IEEE P1703 Gateway.

Defining the role and responsibilities of each of these IEEE P1703 Nodes.

6. Providing data structure definitions in support of this protocol. (IEEE P1377, MC12.19, and ANSI C12.19 standards are congruent)

This is accomplished by:

Defining an IEEE P1377 Decade to be used by IEEE P1703 Nodes.

Layer 2 (data link)

4. Providing support for efficient one-way messaging (blurts)

This was accomplished by:
Defining a compact message format that can be easily transformed to a standard ANSI C12.22 Datagram
Assuring that all needed layers defined in this Standard can support one-way messaging

5. Providing network architecture compatible with this protocol (Some architectural concepts were derived from [HCCS 1: 1987, HCCS 2: 1987, HCCS 3: 1988, DND : 1993, IPPA : 1995, TCPCE : 1997])

This was accomplished by:
Defining different type of nodes such as C12.22 Relay, C12.22 Master Relay, C12.22 Host, C12.22 Authentication Host, C12.22 Notification Host, and C12.22 Gateway
Defining the role and responsibilities of each of these C12.22 Nodes

6. Providing data structure definitions in support of this protocol

This was accomplished by:
Defining an ANSI C12.19 Decade to be used by C12.22 Nodes
Defining an ANSI C12.19 Decade to be used by C12.22 Relays
Defining new procedures in support of this protocol
Defining a new Table for enhanced security

Defining an IEEE P1377 Decade to be used by IEEE P1703 Relays.

Defining new procedures in support of this protocol.

Defining a new table for enhanced security.

5.3 Is the completion of this standard dependent upon the completion of another standard: No

5.4 Purpose: The Utility Industry has need for a standard that provides an operable "plug and play" environment for field devices (e.g. meters, communication modules and Utility systems). The purpose of this standard is to define the network framework and means to transport the Utility End Device Data Tables via any Local-area / Wide-area network for use by enterprise systems in a multi-source environment.

This standard is intended to accommodate the concept of an advanced metering infrastructure such as that identified by the Office of Electricity Delivery and Energy Reliability of the US Department of Energy; the Smart Metering Initiative of the Ontario Ministry of Energy (Canada) and the stated requirements of Measurement Canada for the approval of a metering device for use in Canada.

This standard is to provide a uniform, managed, adaptive and secured network data and message delivery system for Utility End Devices and ancillary devices (e.g. home appliances and communication technology) that can operate in a plug and play and end-to-end multi-source enterprise AMI environment, in a manner that allows independence from the underlying network implementation (i.e. an End Device can implement this standard by utilizing a transceiver that is independent of the meter s metrology logic and for the meter not to depend on the design of the network that is serviced by that transceiver). The independence from the underlying native network protects the End Device from premature obsolescence that may occur as networks may come and go.

Old Purpose: The Utility Industry has need for a standard that provides an operable "plug and play" environment for field metering devices. The purpose of this standard is to define the means to transport the Utility End Device Data Tables via a local Area/Wide Area network interface such that a multi-source environment and end device interchangeability is possible.

This standard extends the definitions provided by IEEE 1377-2009 standard to include provisions for enterprise level asset management, data management, and uniform data exchange interfaces, through the use of network and relay tables and services In addition it is to provide all the necessary support services needed to deploy, commission, notify, manage and access End Devices in a manner that preserves privacy, security and the integrity of the network.

5.5 Need for the Project: This work shall provide multi-source and "plug and play" environment for the millions of metering devices in the field now and the future. It will solve the problems associated with single source systems and with multi-source systems based upon proprietary communications protocols. Electric, Water, and Gas Utilities and corresponding vendors shall realize cost savings which ultimately is passed on to the Utilities client consumers.

5.6 Stakeholders for the Standard: energy stakeholders

Intellectual Property

6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?: No

6.1.b. Is the Sponsor aware of possible registration activity related to this project?: No

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7.1 Are there other standards or projects with a similar scope?: No

7.2 International Activities

a. Adoption

Is there potential for this standard (in part or in whole) to be adopted by another national, regional or international organization?: Do Not Know

Organization:
Technical Committee Name:
Technical Committee Number:
Contact Name:
Phone:
Email:

b. Joint Development

Is it the intent to develop this document jointly with another organization?: Yes

Organization: Measurement Canada and ANSI (MOU signed)
Technical Committee Name: Measurement Canada and ANSI C12
Technical Committee Number:
Contact Name: Vuong Hguyen and Tom Nelson
Phone:
Email:

c. Harmonization

Are you aware of another organization that may be interested in portions of this document in their standardization development efforts?: Do Not Know

Organization:
Technical Committee Name:
Technical Committee Number:
Contact Name:
Phone:
Email:

8.1 Additional Explanatory Notes (Item Number and Explanation): They were clarified to reflect details of the standard.