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American National Standard

**Protocol Specification
For
Interfacing to Data Communication Networks**

Secretariat:

National Electrical Manufacturers Association

Approved January 9, 2009

American National Standards Institute, Inc.

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Contents

	Page
1 SCOPE.....	1
2 REFERENCES	2
2.1 NORMATIVE	2
2.2 OTHERS	4
3 DEFINITIONS AND SYNTAX.....	4
3.1 DEFINITIONS.....	4
3.1.1 <i>Absolute UID</i>	4
3.1.2 <i>ACSE</i>	4
3.1.3 <i>APDU Segment</i>	5
3.1.4 <i>Application Association</i>	5
3.1.5 <i>Application Context</i>	5
3.1.6 <i>Application Entity</i>	5
3.1.7 <i>Application Process</i>	5
3.1.8 <i>Application Protocol Data Unit (APDU)</i>	5
3.1.9 <i>ApTitle</i>	5
3.1.10 <i>Association</i>	5
3.1.11 <i>BER</i>	5
3.1.12 <i>Bit</i>	5
3.1.13 <i>Byte</i>	6
3.1.14 <i>C12.19 Device</i>	6
3.1.15 <i>C12.19 Device Class</i>	6
3.1.16 <i>C12.22 Application</i>	6
3.1.17 <i>C12.22 Authentication Host</i>	6
3.1.18 <i>C12.22 Client</i>	6
3.1.19 <i>C12.22 Communication Module</i>	6
3.1.20 <i>C12.22 Datagram Segmentation and Reassembly</i>	6
3.1.21 <i>C12.22 Device</i>	6
3.1.22 <i>C12.22 Gateway</i>	6
3.1.23 <i>C12.22 Host</i>	7
3.1.24 <i>C12.22 Master Relay</i>	7
3.1.25 <i>C12.22 Message</i>	7
3.1.26 <i>C12.22 Network</i>	7
3.1.27 <i>C12.22 Network Segment</i>	7
3.1.28 <i>C12.22 Node</i>	7
3.1.29 <i>C12.22 Notification Host</i>	7
3.1.30 <i>C12.22 Relay</i>	7
3.1.31 <i>C12.22 Server</i>	7
3.1.32 <i>Called ApTitle</i>	7
3.1.33 <i>Calling ApTitle</i>	7
3.1.34 <i>Channel</i>	7
3.1.35 <i>Cipher</i>	8
3.1.36 <i>Cipher, Inverse</i>	8
3.1.37 <i>Ciphertext</i>	8
3.1.38 <i>Cleartext</i>	8
3.1.39 <i>Connection</i>	8
3.1.40 <i>Datagram</i>	8
3.1.41 <i>EPSEM</i>	8
3.1.42 <i>Fragment</i>	8

3.1.43	<i>Interface</i>	8
3.1.44	<i>Local Port</i>	8
3.1.45	<i>Octet</i>	8
3.1.46	<i>Other Device</i>	8
3.1.47	<i>Plaintext</i>	8
3.1.48	<i>PSEM</i>	8
3.1.49	<i>Relative UID</i>	9
3.1.50	<i>Segment</i>	9
3.1.51	<i>Segmentation</i>	9
3.1.52	<i>Session</i>	9
3.1.53	<i>Transaction</i>	9
3.1.54	<i>UID</i>	9
3.2	DOCUMENT SYNTAX.....	9
3.3	TABLE SYNTAX.....	10
4	REFERENCE TOPOLOGY	10
5	C12.22 NODE TO C12.22 NETWORK SEGMENT DETAILS	12
5.1	C12.22 NODE TO C12.22 NETWORK SEGMENT REFERENCE.....	12
5.2	DATA ENCODING RULES.....	12
5.2.1	<i>Data order</i>	12
5.2.2	<i>Length Fields Encoding</i>	13
5.2.3	<i>Universal Identifiers Encoding</i>	13
5.2.4	<i>Universal Identifiers Canonical Encoding</i>	15
5.3	LAYER 7—APPLICATION LAYER.....	15
5.3.1	<i>Data Structure—Utility Industry Data Tables</i>	15
5.3.2	<i>EPSEM</i>	15
5.3.2.1	Request Codes.....	16
5.3.2.2	Response Codes.....	16
5.3.2.3	Time-out.....	19
5.3.2.3.1	Session Time-out.....	19
5.3.2.3.2	Application Layer Response Time-out.....	20
5.3.2.4	Services.....	20
5.3.2.4.1	Identification Service.....	20
5.3.2.4.2	Read Service.....	23
5.3.2.4.3	Write Service.....	25
5.3.2.4.4	Logon Service.....	26
5.3.2.4.5	Security Service.....	27
5.3.2.4.6	Logoff Service.....	28
5.3.2.4.7	Terminate Service.....	28
5.3.2.4.8	Disconnect Service.....	29
5.3.2.4.9	Wait Service.....	30
5.3.2.4.10	Registration Service.....	30
5.3.2.4.11	Deregistration Service.....	37
5.3.2.4.12	Resolve Service.....	37
5.3.2.4.13	Trace Service.....	38
5.3.2.5	Service sequence state control.....	39
5.3.2.6	Partial Table access using index/element-count Method.....	41
5.3.2.7	Partial Table access using offset/octet-count method.....	43
5.3.3	<i>EPSEM Envelope Structure</i>	44
5.3.4	<i>Association Control—Association Control Service Element (ACSE)</i>	45
5.3.4.1	Application Context Element (A1 _H).....	46
5.3.4.2	Called AP Title Element (A2 _H).....	47
5.3.4.3	Calling AP Title Element (A6 _H).....	47
5.3.4.4	Universal Identifier of Called and Calling AP Title Element (06 _H).....	47
5.3.4.5	Relative Universal Identifier of Called and Calling AP Title Element (80 _H).....	48
5.3.4.6	Calling Application Entity Qualifier Element (A7 _H).....	48
5.3.4.7	Mechanism Name Element (8B _H).....	49

5.3.4.8	Calling Authentication Value Element (AC _H)	49
5.3.4.8.1	C12.22 Security Mechanism (<application-context-oid>.2.1)	51
5.3.4.8.2	C12.21 Security Mechanism (<application-context-oid>.2.0)	53
5.3.4.8.3	C12.22 Other Security Mechanisms	55
5.3.4.9	Called AP Invocation ID Element (A4 _H)	56
5.3.4.10	Calling AP Invocation ID Element (A8 _H)	56
5.3.4.11	User Information Element (BE _H)	58
5.3.4.12	Use of Subbranches of a Registered ApTitle	59
5.3.4.13	C12.22 Security Mechanism	63
5.3.4.13.1	C12.22 Security Mechanism (<application-context-oid>.2.1)	64
5.3.5	<i>Application Segmentation Sub-layer</i>	70
5.3.5.1	APDU Segmentation	71
5.3.5.2	APDU Segment	71
5.3.5.2.1	Called AE Qualifier Element (A3 _H)	71
5.3.5.2.2	Segment User Information Element (BE _H)	72
5.3.5.2.2.1	Segment Association Information Element	72
5.3.5.2.2.2	Segment Data Elements	72
5.3.5.3	The Segmentation and Reassembly	73
5.3.5.3.1	The Segmentation Algorithm	73
5.3.5.3.2	The Reassembly Algorithm	74
5.4	LAYER 6—PRESENTATION LAYER	75
5.5	LAYER 5—SESSION LAYER	75
5.6	LAYER 4—TRANSPORT LAYER	76
5.7	LAYER 3—NETWORK LAYER	76
5.8	LAYER 2—DATA LINK LAYER	76
5.9	LAYER 1—PHYSICAL LAYER	76
6	PROTOCOL DETAILS: C12.22 DEVICE TO C12.22 COMMUNICATION MODULE INTERFACE 77	
6.1	INTERFACE ARCHITECTURE	77
6.2	INTERFACE DIAGRAM	77
6.3	IMPLEMENTATION GUIDELINES	78
6.3.1	<i>C12.22 Communication Module</i>	78
6.3.2	<i>C12.22 Device</i>	79
6.4	LAYER 7—APPLICATION LAYER	79
6.5	LAYER 6—PRESENTATION LAYER	80
6.6	LAYER 5—SESSION LAYER	80
6.7	LAYER 4—TRANSPORT LAYER	80
6.7.1	<i>Negotiate Service</i>	80
6.7.2	<i>Get Configuration Service</i>	82
6.7.3	<i>Link Control Service</i>	85
6.7.4	<i>Send Message Service</i>	87
6.7.5	<i>Get Status Service</i>	88
6.7.6	<i>Get Registration Status Service</i>	89
6.7.7	<i>Service Time Sequence Diagrams</i>	91
6.7.8	<i>Service Sequence States</i>	94
6.8	LAYER 3—NETWORK LAYER	96
6.9	LAYER 2—DATA LINK LAYER	96
6.9.1	<i>Basic Data Information</i>	97
6.9.1.1	Fixed Settings	97
6.9.1.2	Variable Settings	97
6.9.2	<i>Packet Definition</i>	97
6.9.3	<i>CRC Selection</i>	99
6.9.4	<i>Acknowledgment</i>	99
6.9.5	<i>Retry Attempts</i>	100
6.9.6	<i>Timeouts</i>	100
6.9.6.1	Traffic Time-out	100
6.9.6.2	Inter-character Time-out	100

6.9.6.3	Response Time-out	100
6.9.7	<i>Turn Around Delay</i>	100
6.9.8	<i>Collision</i>	100
6.9.9	<i>Duplicate Packets</i>	101
6.9.10	<i>Transparency</i>	101
6.9.11	<i>Supervision of the Communications Link</i>	101
6.9.12	<i>Local Routing</i>	101
6.9.13	<i>Service Sequence States</i>	103
6.10	LAYER 1—PHYSICAL LAYER	104
6.10.1	<i>Signal Definition</i>	104
6.10.2	<i>Electrical Properties of Connection</i>	104
6.10.3	<i>Mechanical and Environmental Properties</i>	105
6.10.4	<i>Supervision of the Communications Link</i>	106
7	LOCAL PORT COMMUNICATION PROTOCOL DETAILS.....	107
7.1	PROTOCOL DEFINITION.....	107
7.1.1	<i>Layer 7—Application Layer</i>	107
7.1.2	<i>Layer 6—Presentation Layer</i>	107
7.1.3	<i>Layer 5—Session Layer</i>	107
7.1.4	<i>Layer 4—Transport Layer</i>	107
7.1.5	<i>Layer 3—Network Layer</i>	108
7.1.6	<i>Layer 2—Data Link Layer</i>	108
7.1.7	<i>Layer 1—Physical Layer</i>	108
7.2	C12.22 LOCAL PORT COMMUNICATION USING A C12.18 OPTICAL PORT.....	108
7.2.1	<i>Establishment of ANSI C12.18 Protocol Compatibility Mode</i>	109
7.2.2	<i>Establishment of ANSI C12.22 Protocol Compatibility Mode</i>	109
8	BACKWARD COMPATIBILITY.....	110
9	COMPLIANCE	111
ANNEX A—RELAYS.....		112
A.1	HIERARCHICAL TOPOLOGY.....	112
A.2	C12.22 MASTER RELAYS	112
A.3	REGISTRATION NOTIFICATION.....	113
A.4	REGISTRATION ALGORITHM DETAILS.....	113
A.5	C12.22 NODE AP TITLE AUTO-ASSIGNMENT.....	113
A.6	C12.22 MASTER RELAY AP TITLE AUTO-ASSIGNMENT.....	114
A.7	OBSOLETE ROUTES.....	114
A.8	MULTIPLE ROUTES	114
A.9	APPLICATION LAYER SUPERVISION	114
A.10	ROUTING	115
ANNEX B—ROUTING EXAMPLES.....		116
B.1	C12.22 RELAYS WITH A SINGLE SERVICE PROVIDER	116
B.2	C12.22 RELAYS SHARED BY MULTIPLE SERVICE PROVIDERS	116
ANNEX C—MODIFICATIONS AND EXTENSIONS TO C12.19-1997		118
C.1	DECADE 12: NODE NETWORK CONTROL TABLES.....	119
TABLE 120	<i>Dimension Network Table</i>	119
TABLE 121	<i>Actual Network Table</i>	123
TABLE 122	<i>Interface Control Table</i>	126
TABLE 123	<i>Exception Report Configuration Table</i>	129
TABLE 124	<i>Filtering Rules Table</i>	131
TABLE 125	<i>Interface Status Table</i>	133

TABLE 126 Registration Status Table.....	138
TABLE 128 Network Statistics Table	141
C.2 DECADE 130—RELAY CONTROL TABLES	143
TABLE 130 Dimension Relay Table.....	143
TABLE 131 Actual Relay Table.....	145
TABLE 132 Registration List Table.....	146
TABLE 133 Static Routing Table.....	149
TABLE 134 Host Notification Table.....	151
TABLE 135 Master Relay Assignment Table.....	154
TABLE 136 Dynamic Routing Report Table	155
C.3 UNIVERSAL ID PATTERN DESCRIPTION OF AP TITLES	156
C.4 ADDITIONS TO TABLE 07—PROCEDURE INITIATE TABLE.....	157
PROCEDURE 23 Register	157
PROCEDURE 24 Deregister.....	157
PROCEDURE 25 Network Interface Control	157
PROCEDURE 26 Exception Report.....	158
C.5 TABLE 46: EXTENDED KEY TABLE.....	160
C.6 TABLE 47 HOST ACCESS SECURITY TABLE	162
ANNEX D—UNIVERSAL IDENTIFIER.....	166
ANNEX E—ONE-WAY DEVICES.....	168
ANNEX F—APDU RESPONSE TIMEOUT ALGORITHM	170
ANNEX G—COMMUNICATION EXAMPLE	172
EXAMPLE #1: UNSECURED SESSION.....	172
EXAMPLE #2: UNSECURED SESSIONLESS	173
EXAMPLE #3: UNSECURED NOTIFICATION	174
EXAMPLE #4: AUTHENTICATED SESSION	174
EXAMPLE #5: AUTHENTICATED SESSIONLESS.....	176
EXAMPLE #6: AUTHENTICATED NOTIFICATION.....	178
EXAMPLE #7: ENCRYPTED SESSION	178
EXAMPLE #8: ENCRYPTED SESSIONLESS.....	182
EXAMPLE #9: ENCRYPTED NOTIFICATION.....	183
ANNEX H—CRC EXAMPLES.....	185
H.1 TRACE	185
H.2 CRC CODE EXAMPLE	186
ANNEX I—THE EAX' CRYPTOGRAPHIC MODE	187
I.1 EAX' DESCRIPTION	187
I.2 JUSTIFICATIONS FOR SELECTION OF EAX RATHER THAN CCM (INFORMATIVE)	191
I.3 JUSTIFICATIONS FOR THE EAX' OPTIMIZATIONS.....	192
I.4 EAX' C CODE EXAMPLE (INFORMATIVE)	195
I.5 AES C CODE EXAMPLE (INFORMATIVE)	199
ANNEX J – CONNECTIONLESS-ACSE-1 EQUIVALENT REDUCED SYNTAX FOR C12.22 MESSAGE TRANSMISSION	204

Foreword (This Foreword is not part of American National Standard C12.22-2008.)

This Standard is another in the series of communications protocols that describe how to transport Tables (defined in ANSI C12.19, "Utility Industry End Device Data Tables"). Because this Standard describes a protocol that operates over networks, it is necessarily more complex than the simple point-to-point protocols defined in ANSI C12.18 and ANSI C12.21, but the committee has done as much as practical to smooth the transition from those earlier standards.

This Standard describes three different but related uses. One is the operation of the protocol over the network that all C12.22 Nodes implement. The second is an optionally exposed point-to-point interface between a C12.22 Device, e.g., a meter, and, a C12.22 Communications Module, e.g., a network adaptor. The third is the capture, translation and transmission of one way device messages (blurts).

This division was chosen to foster interoperability among communications modules and meters. Suggestions for improvement to this Standard are welcome. They should be sent to:

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Protocol Specification For Interfacing To Data Communication Networks**1 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, "Utility Industry End Device Data Tables."

In the "Protocol Specification for ANSI Type 2 Optical Port" (ANSI C12.18) Standard, a point-to-point protocol was developed to transport table data over an optical connection. The ANSI C12.18 protocol included an application language called Protocol Specification for Electric Metering (PSEM) that allowed applications to read and write Tables. The "Protocol Specification for Telephone Modem Communication" (ANSI C12.21) was then developed to allow devices to use PSEM to transport Tables over telephone modems.

This Standard extends on the concepts of the ANSI C12.18, ANSI C12.19 and the ANSI C12.21 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.

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

This Standard defines interfaces between 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 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; 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 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

2 References

2.1 Normative

ANSI C12.18-1996	Protocol Specification for ANSI Type 2 Optical Port
ANSI C12.19-1997	Utility Industry End Device Data Tables
ANSI C12.21-1999	Protocol Specification for Telephone Modem Communication
IEEE C37.90.1-2002	IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
IEEE C62.41-2002	IEEE Recommended Practice on Surge Voltages in Low-voltage AC Power Circuits
ISO/IEC 7498-1	Information Technology—Open Systems Interconnection—Basic Reference Model: The Basic Model
ISO/IEC 13239:2002	Information Technology—Telecommunications and Information Exchange between Systems—High-level Data Link Control (HDLC) Procedures—Frame Structure, Annex A, Explanatory Notes On Implementation of the Frame Checking Sequence