



Smart Grid Standards Information

Version 1.7

Tuesday, May 11, 2010

Section I: Use and Application of the Standard

A. Identification and Affiliation

1.	Number of the standard	ANSI/CEA-709.1-B
2.	Title of the standard	Control Network Protocol Specification
3.	Name of owner organization	ANSI/CEA
4.	Latest versions, stages, dates	September 2002 (709.1-C approved in CEA March 2010, on the way to ANSI)
5.	URL(s) for the standard	http://www.ce.org/Standards/browseByCommittee_2543.asp
6.	Working group / committee	R7.1 HCS1 Subcommittee
7.	Original source of the content (if applicable)	Adept Systems Corporation, Echelon Corporation
8.	Brief description of scope	<p>This specification applies to a communication protocol for networked control systems. The protocol provides peer-to-peer communication for networked control and is suitable for implementing both peer-to-peer and master-slave control strategies. This specification describes services in layers 2-7. In the layer 2 (data link layer) specification, it also describes the MAC sub-layer interface to the physical layer. The physical layer provides a choice of transmission media. The interface described in this specification supports multiple transmission media at the physical layer. In the layer 7 specification, it includes a description of the types of messages used by applications to exchange application and network management data. The data types and industry-contextual uses are described in complementary standards: EN 14908-5 and EN 14908-6.</p> <p>Note: This standard represents the SDO standardization of the protocol for the LONWORKS controls-networking platform.</p>

B. Level of Standardization

Section I: Use and Application of the Standard

9.	Names of standards development organizations that recognize this standard and/or accredit the owner organization	American National Standards Institute (ANSI); Association of American Railroads (AAR); British Standards Institute (BS); Consumer Electronics Association (CEA); Electronics Industries Alliance (EIA), formerly before CEA; European Committee for Standardization (CEN); European Committee of Domestic Equipment Manufacturers (CECED); Institute of Electrical and Electronics Engineers (IEEE); International Electrotechnical Commission (IEC); International Forecourt Standards Forum (IFSF); International Organization for Standardization (ISO); Semiconductor Equipment and Materials International (SEMI); Standardization Administration of China (SAC)
10.	Has this standard been adopted in regulation or legislation, or is it under consideration for adoption?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
11.	Has it been endorsed or recommended by any level of government? If "Yes", please describe	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No US Department of Defense: UFC 3-410-02 and UFGS-23 09 23 (Direct Digital Control for HVAC and Other Local Building Systems). UFC 3-401-01 and UFGS 25 10 10 (Utility Monitoring and Control System) for use on all United States Army Corps of Engineers & Air Force Civil Engineer Support Agency projects.
12.	Level of Standard (check all that apply)	<input checked="" type="checkbox"/> International <input checked="" type="checkbox"/> National <input checked="" type="checkbox"/> Industry <input checked="" type="checkbox"/> de Facto <input type="checkbox"/> Single Company
13.	Type of document	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Report <input type="checkbox"/> Guide <input type="checkbox"/> Technical Specification
14.	Level of Release	<input checked="" type="checkbox"/> Released <input type="checkbox"/> In Development <input type="checkbox"/> Proposed

C. Areas of Use

1.	Currently used in which domains? (check all that apply)	<input type="checkbox"/> Markets <input checked="" type="checkbox"/> Operations <input checked="" type="checkbox"/> Service Providers <input checked="" type="checkbox"/> Generation <input checked="" type="checkbox"/> Transmission <input checked="" type="checkbox"/> Distribution <input checked="" type="checkbox"/> Customer
2.	Planned for use in which domains? (check all that apply)	<input checked="" type="checkbox"/> Markets <input checked="" type="checkbox"/> Operations <input checked="" type="checkbox"/> Service Providers <input checked="" type="checkbox"/> Generation <input checked="" type="checkbox"/> Transmission <input checked="" type="checkbox"/> Distribution <input checked="" type="checkbox"/> Customer
3.	Please describe the Smart Grid systems and equipment to which this standard is applied	Is used in thermostats, appliances, controllers, lighting, and other small devices within the home or commercial facilities. Used in substation monitoring and automation, and electricity metering. Used in transportation (locomotive, light rail, subway, bus, automotive) for controls and monitoring. Used for commercial demand response, and building automation. Used in PV and Wind farms for monitoring and gen-set interfacing. Used in backup generator monitoring and control. Used for medium-voltage monitoring and distribution-transformer monitoring.

Section I: Use and Application of the Standard

D. Relationship to Other Standards or Specifications

1.	Which standards or specifications are referenced by this standard?	ANSI/CEA-852.1
2.	Which standards or specifications are related to this standard?	AAR S-200 ANSI/CEA 709.1 through .4 ANSI/CEA-860 ANSI/CEA-852 ANSI/CEA-852.1 CECED CHAIN EN 14908-1 through -6 GB/Z 20177.1 through .4 GB/T 20299.4 IEEE 1473-L ISO/IEC 14908-1 through -4 SEMI E54.16
3.	Which standards or specifications cover similar areas (may overlap)?	SEP 2 ANSI/CEA-600 (CEBus) ASHRAE/ANSI 135 (BACnet)
4.	What activities are building on this work?	Specifications by the AAR, Chinese Ministry of Construction, IEEE, SEMI, and USACE. Smart Grid considerations include Appliances, DR Signaling, Generation, Metering, and PEVs.

E. Dept of Energy Smart Grid Characteristics

Please describe how this standard may encourage each of the following:

1.	Enables informed participation by customers	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Specification stops at application syntax layer
2.	Accommodates all generation and storage options	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No EN 14908-5, EN 14908-6
3.	Enables new products, services and markets	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
4.	Provides the power quality for a range of needs	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Specification stops at application syntax layer
5.	Optimizes asset utilization and operating efficiency	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Specification stops at application syntax layer
6.	Operates resiliently to disturbances, attacks, and natural disasters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Local networking technology—uses IP -based networks for Wide Area Operations. Does contain authentication algorithm for attacks

F. Priority Areas Previously Mentioned by FERC and NIST

Please describe if and how this standard may be applied in each of the following areas. Note that there is space in section J to discuss any other significant areas where the standard may be applied.

1.	Cybersecurity and physical security	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Does contain authentication algorithm for attacks
2.	Communicating and coordinating across inter-system interfaces	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Specification stops at application syntax layer
3.	Wide area situational awareness	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Specification stops at application syntax layer
4.	Smart grid-enabled response for energy demand	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Specification stops at application syntax layer
5.	Electric storage	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Specification stops at application syntax layer
6.	Electric vehicle transportation	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Subways, light-rail, & buses controlled and monitored today
7.	Advanced metering infrastructure	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Deployed in 30M+ meters and AMI infrastructure
8.	Distribution grid management	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No In use by aggregation companies for AMR and DR

G. Openness		
1.	Amount of fee (if any) for the documentation	\$373.00 USD (normal purchase); \$279.95 USD (CEA Members)
2.	Amount of fee (if any) for implementing the standard	None
3.	Amount of fee (if any) to participate in updating the standard	None
4.	Is the standard documentation available online?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No URL: http://global.ihs.com/doc_detail.cfm?document_name=CEA-709.1 for fee.
5.	Are there open-source or reference implementations?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
6.	Are there open-source test tools?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
7.	Would open-source implementations be permitted?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
8.	Approximately how many implementers are there?	Over 50 organizations implement the standard; 1000s of organizations build products based upon the implementations
9.	Approximately how many users are there?	Unknown, over 90 Million devices have been created (based upon MAC ID consumption)
10.	Where is the standard used outside of the USA?	Nearly everywhere but Iran and North Korea; including in space
11.	Is the standard free of references to patented technology?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
12.	If patented technology is used, does the holder provide a royalty-free license to users of the standard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Patented
13.	Can an implementer use the standard without signing a license agreement?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14.	Are draft documents available to the public at no cost?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
15.	How does one join the working group or committee that controls the standard?	Through participation in either CEA or CEN working groups
16.	Is voting used to decide whether to modify the standard? If Yes, explain who is permitted to vote.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Voting members of working groups must maintain eligibility by attending meetings/calls.
17.	Is an ANSI-accredited process used to develop the standard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
18.	What countries are represented in the working group or committee that controls the standard?	US and several EU countries
H. Support, Conformance, Certification and Testing		
1.	Is there a users group or manufacturers group to support this standard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2.	What is the name of the users group or manufacturers group (if any)?	LonMark® International: http://www.lonmark.org
3.	What type of test procedures are used to test this standard? (please check all that apply)	<input checked="" type="checkbox"/> Internal to the lab <input type="checkbox"/> Published by standards organization <input checked="" type="checkbox"/> Published by users group <input type="checkbox"/> No procedures, informal testing

4.	Are there test vectors (pre-prepared data) used in testing? (please check all that apply)	<input type="checkbox"/> Internal to the lab <input type="checkbox"/> Published by standards organization <input checked="" type="checkbox"/> Published by users group <input type="checkbox"/> No procedures, informal testing
5.	What types of testing programs exist? (check all that apply)	<input checked="" type="checkbox"/> Interoperability Testing <input checked="" type="checkbox"/> Conformance Testing <input type="checkbox"/> Security Testing <input type="checkbox"/> No Testing
6.	What types of certificates are issued? (check all that apply)	<input checked="" type="checkbox"/> Interoperability Certificate <input checked="" type="checkbox"/> Conformance Certificate <input type="checkbox"/> Security Certificate (text document) <input type="checkbox"/> No Certificates
7.	Are there rules controlling how and when to use the logo?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Standard has no logo The standard has no logo but the user group has logos for devices that pass interoperability conformance testing and user-group membership.
8.	Is there a program to approve test labs?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
9.	Approximately how many test labs are approved (if any)?	Testing is in vendor labs while connected to the Internet-based testing tool.
10.	Is there a defined process for users to make technical comments on the standard or propose changes to the standard and have these issues resolved?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
11.	Is there a published conformance checklist or table?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
12.	Are there defined conformance blocks or subsets?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
13.	Approximately how many vendors provide test tools?	Approximately 5-to-10 vendors provide various test tools but only the user group's test tool qualifies a device to use the logo.
14.	Are there tools for pre-certification prior to testing?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
15.	Can vendors self-certify their implementations?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No The testing is accomplished by the vendors in a self-certification method but the user group's tools determine passing/failing by inspection of the test results.
16.	Is there application testing for specific uses?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
17.	Is there a "golden" or "reference" implementation to test against?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
18.	Who typically funds the testing? (check all that apply)	<input type="checkbox"/> User <input type="checkbox"/> Users Group <input checked="" type="checkbox"/> Vendor <input type="checkbox"/> Confidential
19.	Is there a method for users and implementers to ask questions about the standard and have them answered? (check all that apply)	<input type="checkbox"/> Yes, official interpretations <input checked="" type="checkbox"/> Yes, informal opinions <input type="checkbox"/> No
20.	Does the users' group (or some other group) fund specific tasks in the evolution of the standard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No The user group has a small staff that participates in the SDOs and maintains the testing tools.

21.	Is the users' group working on integration, harmonization or unification with other similar standards?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
22.	What other standards is this standard being integrated, harmonized, or unified with (if any)?	ANSI/CEA-852 and 852.1
23.	Are there application notes, implementation agreements, or guidelines available describing specific uses of the standard?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable

J. Notes

Please present here any additional information about the standard that might be useful:

1. LonMark International uses the LonMark Certification Tool which is a web-based interactive process that allows a manufacturer to self-test their devices in their own labs, where the results of the testing are then verified by LonMark staff for certification – <http://cert.lonmark.org/>

Section II: Functional Description of the Standard

K. GridWise Architecture: Layers

Please identify which layers this standard specifies, as described in

http://www.gridwiseac.org/pdfs/interopframework_v1_1.pdf, and the applicable section of the standard. Note the mapping to the Open Systems Interconnect (OSI) model is approximate.

1.	Layer 8: Policy	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Communications Protocol
2.	Layer 7: Business Objectives	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Communications Protocol
3.	Layer 6: Business Procedures	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Communications Protocol
4.	Layer 5: Business Context	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Communications Protocol
5.	Layer 4: Semantic Understanding (object model)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Partially
6.	Layer 3: Syntactic Interoperability (OSI layers 5-7)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Defines handling for 6-7
7.	Layer 2: Network Interoperability (OSI layers 3-4)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Defines Network Layers
8.	Layer 1: Basic Connectivity (OSI layers 1-2)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Defines interaction with 1-2

L. GridWise Architecture: Cross-Cutting Issues

Please provide an explanation in the box beside the heading for any questions answered "Not applicable". If the question is not applicable because the function is provided in another layer or standard, please suggest any likely candidates. Note that "the standard" refers to the technology specified by the standard, not the documents themselves.

	Shared Meaning of Content	
1.	Do all implementations share a common information model?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable via EN 14908-5 and -6
2.	Can data be arranged and accessed in groups or structures?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable via EN 14908-5 and -6
3.	Can implementers extend the information model?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable Both formally via SDO/user-group and via proprietary extensions
4.	Can implementers use a subset of the information model?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
	Resource Identification	
5.	Can data be located using human-readable names?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
6.	Can names and addresses be centrally managed without human intervention?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
	Time Synchronization and Sequencing	
7.	Can the standard remotely synchronize time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable via EN 14908-5 and -6
8.	Can the standard indicate the quality of timestamps?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable via EN 14908-5 and -6
	Security and Privacy	

Section II: Functional Description of the Standard

9.	Where is security provided for this standard?	<input checked="" type="checkbox"/> Within this standard <input checked="" type="checkbox"/> By other standards
10.	Does the standard provide authentication?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
11.	Does the standard permit role-based access control?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Not inherently
12.	Does the standard provide encryption?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Only for the Authentication
13.	Does the standard detect intrusions or attacks?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No via Authentication
14.	Does the standard facilitate logging and auditing of security events?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Data are tagged and events are stored
15.	Can the security credentials be upgraded remotely?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No Credentials
16.	Can the security credentials be managed centrally?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No Credentials
17.	Please list any security algorithms and standards used	Built-in to ANSI/CEA-709.1 protocol
18.	Please provide additional information on how the standard addresses any "Yes" answers above	Standard handles shared-key authentication as a part of all implementations and can be turned-on in the field.
19.	Please provide additional information about why any of the questions listed above do not apply to this standard	Data can be shared between multiple authenticated and non-authenticated devices; therefore, data encryption is left to the application -- except for encryption used to authenticate.
Logging and Auditing		
20.	Does the standard facilitate logging and auditing of critical operations and events?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
21.	Can the standard gather statistics on its operation?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
22.	Can the standard report alerts and warnings?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
Transaction State Management		
23.	Can the standard remotely enable or disable devices or functions?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
System Preservation		
24.	Can the standard automatically recover from failed devices or links?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable <input type="checkbox"/> Provided in another layer
25.	Can the standard automatically re-route messages?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable <input checked="" type="checkbox"/> Provided in another layer
26.	Can the standard remotely determine the health (as opposed to just connectivity) of devices or software?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
Other Management Capabilities		
27.	Please describe any other system or network management capabilities the standard provides.	Standard allows for downloading/uploading of data files and invocation of diagnostic sequences. Standard defines firmware update process for field devices.
Quality of Service		
28.	Is data transfer bi-directional?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
29.	Can data be prioritized?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable

Section II: Functional Description of the Standard

30.	What types of reliability are provided?	<input type="checkbox"/> Reliable <input type="checkbox"/> Non-guaranteed <input checked="" type="checkbox"/> Both <input type="checkbox"/> Either <input type="checkbox"/> Provided in another layer
31.	Can information be broadcast to many locations with a single transmission?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
32.	Please describe any other methods the standard uses to manage quality of service.	ACK service, repeated service, request/response service, priority messaging, application-layer notification of message delivery/failure
Discovery and Configuration		
33.	Can the software or firmware be upgraded remotely?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
34.	Can configuration or settings be upgraded remotely?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
35.	Can implementations announce when they have joined the system?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
36.	Can implementations electronically describe the data they provide?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable Data are typed and carry an index to reference the type (e.g., 105 is a temperature type of a specific data size and to a specific resolution/scaling)
System Evolution and Scalability		
37.	What factors could limit the number of places the standard could be applied?	High-speed manufacturing with time-division precision is not supported. Messaging is asynchronous.
38.	What steps are required to increase the size of a system deploying this standard?	Logical division of hierarchy must be maintained to optimize the logical addressing; unless MAC ID addressing is used for messaging. The latter is limited to 2 ⁴⁸ .
39.	Is the information model separate from the transport method?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
40.	Does the standard support alternate choices in the layers(s) below it?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No layers below
41.	List the most common technology choices for layers implemented below this standard	Internet protocols (TCP & UDP); Twisted-pair wire cabling; Power-line signaling; Radio-frequency modulation; Fiber-optic cabling; Coaxial cabling; Infrared signaling
42.	Does the standard support multiple technology choices in the layers above it?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No layers above
43.	List the technologies or entities that would most commonly use this standard in the layer above	ASHRAE STD 135 (BACnet)

Section II: Functional Description of the Standard

44.	Please describe any mechanism or plan to ensure the standard is as backward-compatible as possible with previous versions	The standard is now on its third backward-compatible revision. It is the goal of the participants to ensure such but there is no formal decree.
45.	Please describe how the design of this standard permits it to be used together with older or legacy technologies	Data types are available in different sizes and adhere to ANSI/IEEE 754 for floating-point values. Data typing is not a requirement for implementation of the standard; therefore, older/legacy technology's types can be carried.
46.	Please describe how the design of this standard permits it to co-exist on the same network or in the same geographic area with similar technologies, and give examples	Some buildings contain both ASHRAE STD 135 and ANSI/CEA-709.1 integrated. Some trains contain both IEC 61375-1 and ANSI/CEA-709.1 integrated.
47.	Electromechanical	

M. Architectural Principles

Please describe how this standard may apply any of these principles:

1.	Symmetry – facilitates bi-directional flow of energy and information	Can carry information, requests, and responses bi-directionally
2.	Transparency – supports a transparent and auditable chain of transactions	Transactions are tagged numerically for order and repeats.
3.	Composition – facilitates the building of complex interfaces from simpler ones	A device can transmit simple scalar data or complex structures and/or unions based on simpler data types. Collections of data points are represented as “functional profiles” of application-specific purposes.
4.	Loose coupling – can support bilateral and multilateral transactions without elaborate pre-arrangement	The standard supports several information-transfer methods, including unicast, broadcast, and multicast. Likewise, a device can receive from multiple senders on the same or other data-point inputs. Device transactions can be pre-arranged or not.
5.	Shallow integration – does not require detailed mutual information to interact with other components	The protocol allows for shallow integration due to a heavily typed data exchange, where only the data and an index need be sent. Addressing is not part of the data but instead is carried in the data package. At the application layer, supported interfaces can be queried over the network at runtime.
6.	Please list any other architectural models, reference architectures or frameworks this standard was designed to be compliant with, e.g. W3C, IEC TC57, OSI and how it fits those models	The standard is designed to the ISO OSI Reference Model to consider all 7 layers for a complete solution. It is not specific to a single industry; it is designed to be a transport protocol that uses Système International (SI) units and other widely used data types of various industries.