SGIP Catalog of Standards Standards Information Form (SIF)

	Name of the Standard: Date Standards information below was last edited:		
ID	**Attribute**	**Standards Information**	**Additional Comments**
	These are the attributes of the SIF that are to be addressed in the Standard Information column. Information in the form is intended to be accurate as of the date of submission.	Enter information in this column that answers the question/request for information posed. In many cases, as check box or drop down list is available to facilitate consistency. However, if you believe a different answer is appropriate, enter it in the box.	Provide any additional comments you feel aid in the understanding of the answer in the adjacent cell.
	Section I: Use and Application of the Standard		
A	Identification and Affiliation		
1	Identifier of the standard	IEEE Std 802.3-2012	
2	Title of the standard	IEEE Standard for Ethernet	
3	Name of owner organization	IEEE Standards Association	
4	Latest versions, stages, dates	2012 revision	Document is regularly maintained and has frequent additions of capability to address new market needs. Though initially separately published, amendments and corrigenda become part of the latest revision upon approval (e.g., for purposes of reference). Amendments and corrigenda are merged and superseeded at the next revision.
5	URL(s) for the standard	http://www.techstreet.com/cgi-bin/browse?publisher_id=95&subgroup_id=36721	Documents are available for free download 6 months after publication via the Get IEEE 802 program (https://standards.ieee.org/about/get).
6	SSO Working Group / Committee responsible for the standard	IEEE 802.3 Ethernet Working Group	
7	Original source of the content (if applicable)		
8	Brief description of scope	This standard defines Ethernet local area, access and metropolitan area networks. Ethernet is specified at selected speeds of operation; and uses a common media access control (MAC) specification and management information base (MIB). The Carrier Sense Multiple Access with Collision Detection (CSMA/CD) MAC protocol specifies shared medium (half duplex) operation, as well as full duplex operation. Speed specific Media Independent Interfaces (MIIs) provide an architectural and optional implementation interface to selected Physical Layer entities (PHY). The Physical Layer encodes frames for transmission and decodes received frames with the modulation specified for the speed of operation, transmission medium and supported link length. Other specified capabilities include: control and management protocols, and the provision of power over selected twisted pair PHY types.	
9	Priority Action Plan (PAP) working with this standard (if established by SGIP)		
B	Level of Standardization		
1	Names of standards development organizations that recognize this standard and/or accredit the owner organization	IEEE (ANSI accreditation).	ITU-T, ISO/IEC, broadly reference IEEE 802.3. Many data communications standards specify adaptation to Ethernet.
2	Has this standard been adopted in regulation or legislation, or is it under consideration for adoption?	Yes	For example Energy Efficient capability is referenced by Energy Star.
3	Has it been endorsed or recommended by any level of government? If "Yes", please describe	No	
4	Level of Standard (check all that apply)	☐ International ☐ National ☐ Regional ☐ ANSI ☐ deFacto ☐ Single Company	International version is ISO/IEC 8802-3 (if 2012 revision adopted, it will be ISO/IEC/IEEE 8802-3), IEEE 802.3 is also an ANSI standard
5	Type of document	Standard	

6	Level of Release	Released	IEEE Std 802.3 is almost constantly under development to add capabilities. For example, its initial 10 Mb/s operational speed has increased to the most recently added 100 Gb/s data rate with even higher speed currently under consideration.
C	Conceptual Model Areas of Use		
1	Currently applies to which domains? (check all that apply)	☐ Market ☐ Operations ☐ Service Provider ☐ Generation ☐ Transmission ☐ Distribution ☐ Customer	Different versions of Ethernet are applicable to all domains.
2	Planned for use in which domains? (check all that apply)	☐ Market ☐ Operations ☐ Service Provider ☐ Generation ☐ Transmission ☐ Distribution ☐ Customer	Different versions of Ethernet are applicable to all domains.
3	Please describe the Smart Grid systems and equipment to which this standard is applied	Data communication and control	Ethernet is widely used in the current grid. Ethernet is used in enterprise and home networks for computer, equipment and server connection. It is used in industiral control, manufacturing and other special applications. It is pervasive in data centers, widely deployed in metropolitian area networks, and with adaptations in wide area networks. It is the most common back haul technology for radio-based communications alternatives. It has similar applications in Smart Grid.
D	Relationship to Other Standards or Specifications		
1	Which standards or specifications are referenced by this standard?	Too numerous to list	Seven pages of normative references ranging from connector and cable specifications, cabling systems, test procedures, relevant safety standards, communications protocols including IETF and IEEE 802.1 that typically run over Ethernet, management, etc.
2	Which standards or specifications are related to this standard?	IEEE Std 802.3.1, many others	Ethernet management information bases previously specified by IETF are now specified within 802.3.1.
3	Which standards or specifications cover similar areas (may overlap)?		Other link layer communications capabilities may be substitu
4	What activities are building on this work?	For example, ITU-T standards specify mapping of Ethernet at various speeds to ITU-T specified carrier links. IEEE 802.1 Data Center Bridging and Time Sensitive Networking activities build on basic Ethernet capabilities.	
E	Dept of Energy Smart Grid Characteristics		
	Please describe how this standard may encourage each of the following:		
1	Enables informed participation by customers	A common HAN technology	Ethernet 10BASE-T, 100BASE-TX and 1000BASE-T are plug and play in customer home networks
2	Accommodates all generation and storage options	Where data communication is required	Ethernet has both conductive and non-conductive media which allows selected types to be used in a broad range of environments.
3	Enables new products, services and markets	Yes	30 years of enhancement and expansion into new markets shows no signs of slowing.
4	Provides the power quality for a range of needs	Not applicable	
5	Optimizes asset utilization and operating efficiency	Ethernet frequently provides the most economical transport of data, and for high bandwidth, may be the only viable option.	
6	Operates resiliently to disturbances, attacks, and natural disasters	With capabilities sometimes specified in other standards.	Resiliency is enhanced via redundancy as frequently applied in carrier and data center applications of Ethernet.
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	Yes	Fiber optic media enhance cybersecurity, compatible with 802.1 MAC Sec and other security protocols
2	Communicating and coordinating across inter-system interfaces	Yes	Media and speed options allow for optimal selection of communication capability
3	Wide area situational awareness	Yes	Selected port types are targeted for metro and wide area communication
4	Smart grid-enabled response for energy demand	Partial	Provides the neessary data communication
5	Electric storage	No	
6	Electric vehicle transportation	Partial	Reduced pair is under development at the request of the automotive industry
7	Advanced metering infrastructure	Yes	Primarily for backhaul and control center
8	Distribution grid management	Yes	Provides necessary data communication
G	Standards Development Process		
1	Amount of fee (if any) for the documentation	Free download (http://standards.ieee.org/getieee802), 6 months after publication, before that, http://standards.ieee.org/	
2	Amount of fee (if any) for implementing the standard	Typically RAND for applicable IP licenses	
3	Amount of fee (if any) to participate in updating the standard	802 meeting fees vary from meeting to meeting, participation in Sponsor ballot requires IEEE-SA membership (~$200) or equivilant ballot fee	
4	Is the standard documentation available online?	Yes	
5	Are there open-source or reference implementations?	Yes	Silicon vendors typically have reference designs, ASIC libraries include various speed/media options for inclusion in custom chips
6	Are there open-source test tools?	Yes	Test suites are published for various speeds/media
7	Would open-source implementations be permitted?	No	Need for IP licenses has been asserted for most popular speed/media options
8	Approximately how many implementers are there?	Thousands of equipment and component implementers	
9	Approximately how many users are there?	Billions	Virtually all Internet traffic crosses an Ethernet someplace
10	Where is the standard used outside of the USA?	Worldwide	
11	Is the standard free of references to patented technology?	No	IEEE-SA does not determine validity of essential patent assertions.
12	If patented technology is used, does the holder provide a royalty-free license to users of the standard?	No	Some asserted IP is royalty free
13	Can an implementer use the standard without signing a license agreement?	Yes	Licensing is typically covered by component or equipment implementers, so a network implementer needs no licenses.
14	Are draft documents available to the public at no cost?	No	May be purchased from IEEE store before approval
15	How does one join the working group or committee that controls the standard?	Attendance at working group meetings is open to all interested parties.	Working group voting membership is gained and maintained via attendance at working group meetings
16	Is voting used to decide whether to modify the standard? If Yes, explain who is permitted to vote.	Yes	Changes are initiated within the IEEE 802.3 working group, by member vote. During draft development, anyone in the room is typically allowed to vote. In formal ballots, anyone may comment. IEEE 802.3 approval is required at various progress points by 802.3 members (initiation of a new project, WG ballot, Sponsor ballot, submittal for approval by Standards Board). Any IEEE-SA member (or anyone paying an equilivent ballot fee) may vote at Sponsor ballot.

17	What type of process is used (check all that apply)?	☐ ANSI Accredited ☐ International SDO ☐ Industry Consortium ☐ Users Group ☐ Mult iCompany Agreement ☐ Open source <open source license>	ANSI
18	What countries are represented in the working group or committee that controls the standard?	802.3 membership is by individual, though members/participants come from many different countries	
19	Is there openness	Yes	
20	Does the standard ballot process ensure balance of interests	Yes	Not required for working group, required for Sponsor ballot
21	Is there due process?	Yes	
22	Is there an appeals process?	Yes	
23	Does the process seek to achieve consensus?	Yes	
24	The SSO's IPR Policy documents (including policies, bylaws, process documents, lists of defined terms and guidance documents published by the SSO) applicable to the Standard, as provided by the SSO. Insert hyperlink here or otherwise provide the SGIP with such documentation in electronic form.	http://standards.ieee.org/develop/policies/, http://www.ieee802.org/devdocs.shtml, http://www.ieee802.org/3/rules/index.html	
25	The SSO's Information, if any, regarding IPR-related Disclosures and Licensing applicable to the Standard (to the extent this information is publicly available), as provided by the SSO. Insert hyperlink here or otherwise provide the SGIP with such documentation in electronic form.	http://standards.ieee.org/about/sasb/patcom/patents.html	
26	With regard to the Standard, did any entity notify the SSO in writing that it holds a Necessary Patent and it is not willing to provide licenses in accordance with the SSO's IPR Policy? If yes, please insert hyperlink here or otherwise provide the SGIP with such documentation in electronic form.	Unknown	
27	Does the SSO have any information in writing regarding any published licensing program(s) (such as published licensing terms or a patent pool) where Necessary Patents with regard to the Standard are included? If yes, please insert hyperlink here or otherwise provide the SGIP with such documentation in electronic form.	Submitted patent letters of assurance may optionally include license terms. http://standards.ieee.org/about/sasb/patcom/patents.html	
28	With regard to the Standard, did the SSO receive any notification in writing that any Necessary Patents were developed with government funding? If yes, please insert hyperlink here or otherwise provide the SGIP with such documentation in electronic form.	No	
H	Support, Conformance, Certification and Testing		
1	Is there a testing and certification authority operating a program in support of this standard? If yes, provide program name in the comments column.	No	
2	Is there a testing and certification authority in development to support this standard? If yes, provide program name in the comments column.	No	
3	Are test programs supporting this standard focused on conformance, interoperability (or both)?	☐ Conformance testing ☐ Interoperability testing	Both
4	Are there test laboratories offering conformance and/or interoperability testing services based on this standard? If yes, provide examples of labs providing these services.	Yes	University of New Hampshire Interoperability Lab, various commercial labs
5	Does the testing and certification authority implement the SGTCC Interoperability Process Reference Manual (IPRM) recommendations. Select Not Applicable if there is no existing testing and certification authority.	Not Applicable	
6	Are there products certified (by an ISO 65 accredited organization) against this standard commercially available?	Unknown	
J	Notes		
1	Please present here any additional information about the standard that might be useful:		
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: Economic/Regulatory Policy	No	
2	Layer 7: Business Objectives	No	
3	Layer 6: Business Procedures	No	
4	Layer 5: Business Context	No	
5	Layer 4: Semantic Understanding information model)	No	
6	Layer 3: Syntactic Interoperability (OSI layers 5-7)	No	
7	Layer 2: Network Interoperability (OSI layers 3-4)	No	
8	Layer 1: Basic Connectivity (OSI layers 1-2)	Yes	
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?	Yes	A common frame format is used for data, management data uses a consistent model.
2	Can data be arranged and accessed in groups or structures?	Not Applicable	MIB structure for SNMP specified in IEEE Std 802.3.1 which includes packages of attributes.
3	Can implementers interoperably extend the information model?	Yes	Vendor specific management is supported in an interoperabile manner.
4	Can implementers interoperably use a subset of the information model?	Yes	Not all Ethernet implementations include all capabilities, e.g., Energy-efficient Ethernet capabilities, Power over Ethernet. Certain information is only specified for such options (e.g., Link Layer Discovery Protocol (LLDP) data for power over Ethernet).
	Resource Identification		
5	Can data be located using human-readable names?	Yes	Typically via higher layer management protocol
6	Can names and addresses be centrally managed without human intervention?	Yes	Typically via higher layer management protocol
	Time Synchronization and Sequencing		
7	Can the standard remotely synchronize time?	Yes	Capabilities have been specified in IEEE Std 802.3 to support time synchronization protocols, e.g., IEEE Std 1588 Precision Time Protocol, and IEEE Std 802.1AS Timing and Synchronization for Time-Sensitive Applications.
8	Can the standard indicate the quality of timestamps?	No	IEEE 802.3 provides OSI layer 1 ingress and egress indicators for use by higher layer timing protocols
	Security and Privacy		
9	Does the standard address cybersecurity?	By other standards	Network access via IEEE Std 802.1X Port Based Network Access Control, data encryption by IEEE Std 802.1AE Media Access Control (MAC) Security, or by other higher layer encryption.
10	If not, why is cybersecurity not addressed?	Yes	Proper layering of functionality.
11	What aspects of cybersecurity does the standard not address? Which of these aspects should it address? Which should be handled by other means?	Yes	Should be addressed by other standards. Physical security of media can enhance cybersecurity, selection of media affects cybersecurity (copper cables have electronic emmissions, fiber optic cables do not).
12	What work, if any, is being done currently or is planned to address the gaps identified above?	Unknown	Not known what higher layer cybersecurity measures are underway, but there are not any indentified gaps.
	Logging and Auditing		

15	Does the standard address logging and auditing of critical operations and events?	Partial	Management data is specified, IEEE Std 802.3.1 Management Information Base (MIB) Definitions for Ethernet specifies use of such data for SNMP management.
16	Can the standard gather statistics on its operation?	Yes	Typically accessed via SNMP.
17	Can the standard address reporting of alerts, events, and warnings?	Yes	IEEE Std 802.3 is management protocol agnostic, though the industry primarily uses SNMP. Ethernet PONS include notifications via OAM protocol.
	Transaction State Management		
18	Can the standard remotely enable or disable devices or functions?	Yes	Point-to-point communication links can be disabled by either partner at the physical layer.
	System Preservation		
19	Can the standard automatically recover from failed devices or links?	Provided in another layer	Other than Ethernet PONS, shared media is rarely used today placing these functions in IEEE 802.1 standards.
20	Can the standard automatically re-route messages?	Provided in another layer	Primarily by IEEE 802.1 and IETF protocols
21	Can the standard remotely determine the health (as opposed to just connectivity) of devices or software?	Yes	Specified data includes error ratio information accessable via a management protocol
22	Does the standard enhance Dependability	Yes	Fiber optic port types have lower error rates than copper types
23	Does the standard enhance Availability	Not Applicable	
	Other Management Capabilities		
24	Please describe any other system or network management capabilities the standard provides.		
	Quality of Service		
25	Is data transfer bi-directional?	Yes	
26	Does the standard enable prioritization for executing communications Quality of Service?	Yes	Enabled though prioritization is provided by the higher layers
27	What types of reliability are provided?	Provided in another layer	All port types are designed for low undetected error rate. Data integrity is enhanced by higher layer protocols. Connectivity reliability is provided by 802.1 link aggregation, or management of redundant links via 802.1 protocols, and alternate route via higher layer protocols like IP.
28	Does the standard enable multicast or broadcast functions?	Yes	Both multicast and broadcast addresses supported
29	Please describe any other methods the standard uses to manage quality of service.		
	Discovery and Configuration		
30	Can the software or firmware be upgraded remotely?	Yes	Via higher layer protocols
31	Can configuration or settings be upgraded remotely?	Yes	Via higher layer management protocols
32	Can implementations announce when they have joined the system?	Yes	Via higher layer management protocols
33	Can implementations electronically describe the data they provide?	Yes	Via higher layer management protocols
	System Evolution and Scalability		
34	What factors could limit the number of remote devices or number of networks supported?	There is no practical limit on the number of devices or networks that can be connected via Ethernet. An end device typically connects to an 802.1 specified bridge (e.g., Ethernet switch), with bridges interconnected via higher speed links to provide an OSI layer 2 network. The aggregated bandwidth at higher levels in the hierarchy may limit network size. Ethernet continues to evolve to support higher data rates for aggregation as well as for end devices.	
35	What steps are required to increase the size of a system deploying this standard?	An increase in devices is typically accomplished via increased switching capability (either more ports on switches or more switches. Multiple levels of switches allow for use aggragation of bandwidth supported by high speed links.	
36	Is the information model separate from the transport method?	Yes	

37	Does the standard support alternate choices in the OSI layers(s) below it?	Not Applicable	Port types with different media (optic or copper) and speed (1 Mb/s to 100 Gb/s) are specified within the standard
38	List the most common technology choices for layers implemented below this standard	Not Applicable	
39	Does the standard support multiple technology choices in the layers above it?	Yes	
40	List the technologies or entities that would most commonly use this standard in the layer above	IEEE 802.3 is specified independent of its MAC client. Typical implementations use EtherType identified data via an 802.1 MAC client, and TCP/IP for OSI layers 3 and 4.	
41	Please describe any mechanism or plan to ensure the standard is as backward-compatible as possible with previous versions	Interoperability with legacy equipment is evaluated with all enhancements. Some proposals are rejected by the working group to avoid such incompatibility. IEEE 802.1 bridges (switches) allow evolution rather than forklift upgrade of equipment (e.g., with 10 Mb/s through 1000 Mb/s twisted pair port types, an end station may be upgraded independent of the switch)	
42	Please describe how the design of this standard permits it to be used together with older or legacy technologies. Were there any changes that limit the integration of previous versions (e.g. addressing changes, information model changes, ontology changes,…)	The Ethernet frame format has remained consistent for decades. Maximum frame size has increased slightly to support the addition of headers and trailers of higher layer protocols. A circa 1985 10BASE5 connected station can be switched onto a 100GBASE- link via 802.1 bridging. Autonegotiation has allowed plug and play between the most common Ethernet port types (10BASE-T, 100BASE-TX and 1000BASE-T).	
43	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	Ethernet currently defines three frame sizes, the basic 1500 byte information field, slightly larger to allow IEEE Std 802.1Q Virtual LAN (VLAN) tagging, and 2000 bytes to allow other enveloping protocols e.g., (IEEE Std 802.1AE MAC Security). While legacy equipment may not be able to be upgraded to use VLAN or MACSec, it can still interoperate because the basic information size remains 1500 bytes. Because of Ethernet's pervasive use, newer LAN types have been designed to be compatible with Ethernet (Wi-Fi, PLC, etc.) For example IEEE Std 802.11 was specified recognizing Ethernet would be used to interconnect access points. This Ethernet like behavior allows a new LAN type to quickly merge into IEEE Std 802.1 bridged networks. The independence of higher layer protocols like TCP/IP similarily allows interoperability with different network types.	
	Electromechanical		
44	Does the standard deal with Electromagnetic Compatibility (EMC)	Yes	IEEE Std 802.3 includes specification related to EMC.
45	Does the standard deal with Electromagnetic Field (EMF)	No	
46	Does the standard deal with Safety	Yes	Specification for isolation, grounding and power over Ethernet include safety concerns.
47	Does the standard define physical characteristics	Yes	There are limited specifications but most physical characteristics, e.g., cables and connectors are in referenced specifications.
M	Architectural Attributes		
	Please describe how this standard may apply any of these attributes:		
1	Does the standard enable the exchange of meta data?	Not specifically, higher layer data is just data.	
2	Does the standard enable the integration of non-functional requirements?	Yes	
3	Does the standard have an integration pathway or migration across domains?	IEEE Std 802.3 Ethernet port types are well suited for communication between domains.	
4	Is the standard part of a harmonization development with other key standards?	IEEE 802 also works to maintain compatibility with other 802 and 802-like technologies. IEEE Std 802.3 works with ITU to maintain compatibility with carrier links (e.g., mapping of various Ethernet speeds onto ITU specified links).	
5	Is the standard part of a development effort under an architectural framework? Frameworks include but are not limited to IEC TC 57 Architecture, IEEE P2030, TOGAF, RM-ODP, Service Oriented Architecture, Zachman, or other.	IEEE Std 802.3 is included in IEEE Std 2030 as an applicable data communication technology in multiple domains and between domains.	