LLDPv2 PAR and CSD Discussion Material

IEEE 802.1 Interim
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Paul Congdon (Huawei/Tallac)
Paul Bottorff (Aruba)
Paul Unbehagen (Big Switch Networks)
Mark Hantel (Rockwell Automation)
Scott Fincher (Extreme)

Proposed PAR Scope

- This amendment specifies protocols, procedures and managed objects that support the transmission and reception of a set of LLDP TLVs that exceed the space available in a single frame. The current LLDP supports the transmission and reception of a single frame by an LLDP agent. This amendment will define transmission of multiple frames and additional TLVs and procedures needed to support the transmission of multiple frames by updated implementations. Existing LLDP implementations will be able to maintain existing functionality while communicating with updated implementations. Updated implementations will be able to further restrict the size of the LLDPDU and extensions in order to meet timing constraints in the network. This amendment also addresses errors and omissions in the description of existing functionality.

Proposed PAR Need

- The set of TLVs that an LLDP agent exchanges with a peer must fit into a single LLDPDU. The size of the LLDPDU is restricted by the maximum size of the information field for the particular link technology. In some cases, the size of the LLDPDU is required to be further reduced to meet timing constraints on the network. Std IEEE 802.1AB is widely supported and used in several different environments. Many of these environments have the need to transmit and receive more TLVs than can fit into a single frame. In addition, the number of unique TLVs in use continues to grow. Standards organizations and vendors can define their own sets of TLVs. Environments that need to advertise more information than can fit into a single LLDPDU currently have no solution other than inventing a new protocol and incompatible protocol. Given the popularity and wide deployment of LLDP there is a need to allow a migration to a version of the LLDP protocol that supports the transmission and reception of sets of TLVs that exceed the space provided by a single frame.

P802.1ABdh

Submitter Email: paul.congdon@tallac.com
Type of Project: Amendment to IEEE Standard 802.1AB-2016
PAR Request Date: 24-Apr-2019
PAR Approval Date:
PAR Expiration Date:
Status: Unapproved PAR, PAR for an Amendment to an existing IEEE Standard

1.1 Project Number: P802.1ABdh
1.2 Type of Document: Standard
1.3 Life Cycle: Full Use

2.1 Title: Standard for Local and metropolitan area networks - Station and Media Access Control Connectivity Discovery
Amendment: Support for Extension LLDPDUs

3.1 Working Group: Higher Layer LAN Protocols Working Group (C/LM/WG802.1)
Contact Information for Working Group Chair
Name: John Messenger
Email Address: j.l.messenger@ieee.org
Phone: +441904699309
Contact Information for Working Group Vice-Chair
Name: Jessy Rouyer
Email Address: jessy.rouyer@nokia.com
Phone: +1 469 661 2093

3.2 Sponsoring Society and Committee: IEEE Computer Society/LAN/MAN Standards Committee (C/LM)
Contact Information for Sponsor Chair
Name: Paul Nikolich
Email Address: p.nikolich@ieee.org
Phone: 8572050050
Contact Information for Standards Representative
Name: James Gilb
Email Address: gilb@ieee.org
Phone: 858-229-4822

4.1 Type of Ballot: Individual
4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: 07/2022
4.3 Projected Completion Date for Submittal to RevCom
Note: Usual minimum time between initial sponsor ballot and submission to Revcom is 6 months.: 10/2023

5.1 Approximate number of people expected to be actively involved in the development of this project: 30
5.2.a. Scope of the complete standard: The scope of this standard is to define a protocol and management elements, suitable for advertising information to stations attached to the same IEEE 802 LAN, for the purpose of populating physical topology and device discovery management information databases. The protocol facilitates the identification of stations connected by IEEE 802 LANs/MANs, their points of interconnection, and access points for management protocols. This standard defines a protocol that a) Advertises connectivity and management information about the local station to adjacent stations on the same IEEE 802 LAN. b) Receives network management information from adjacent stations on the same IEEE 802 LAN. c) Operates with all IEEE 802 access protocols and network media. d) Establishes a network management information schema and object definitions that are suitable for storing connection information about adjacent stations. e) Provides compatibility with the IETF PTOPO MIB (IETF RFC 2922 [B9]).

5.2.b. Scope of the project: This amendment specifies protocols, procedures and managed objects that support the transmission and reception of a set of LLDP TLVs that exceed the space available in a single frame. The current LLDP supports the transmission and reception of a single frame by an LLDP agent. This amendment will define transmission of multiple frames and additional TLVs and procedures needed to support the transmission of multiple frames by updated implementations. Existing LLDP implementations will be able to maintain existing functionality while communicating with updated implementations. Updated implementations will be able to further restrict the size of the LLDPDU and extensions in order to meet timing constraints in the network. This amendment also addresses errors and omissions in the description of existing functionality.

5.3 Is the completion of this standard dependent upon the completion of another standard: Yes
If yes please explain: This amendment will specify a new Link Layer Discovery Protocol (LLDP) Type-Length-Value (TLV) and its associated Management Information Base (MIB) and YANG model. IEEE P802.1ABcu is currently specifying the YANG model for IEEE Std 802.1AB which must be completed in order for this amendment to specify its extension.

5.4 Purpose: An IETF MIB (IETF RFC 2922 [B9]) and a number of vendor specific MIBs have been created to describe a network's physical topology and associated systems within that topology. This standard specifies the necessary protocol and management elements to a) Facilitate multi-vendor inter-operability and the use of standard management tools to discover and make available physical topology information for network management.
b) Make it possible for network management to discover certain configuration inconsistencies or malfunctions that can result in impaired communication at higher layers. c) Provide information to assist network management in making resource changes and/or re-configurations that correct configuration inconsistencies or malfunctions identified in b) above.

5.5 Need for the Project: The set of TLVs that an LLDP agent exchanges with a peer must fit into a single LLDPDU. The size of the LLDPDU is restricted by the maximum size of the information field for the particular link technology. In some cases, the size of the LLDPDU is required to be further reduced to meet timing constraints on the network. Std IEEE 802.1AB is widely supported and used in several different environments. Many of these environments have the need to transmit and receive more TLVs than can fit into a single frame. In addition, the number of unique TLVs in use continues to grow. Standards organizations and vendors can define their own sets of TLVs. Environments that need to advertise more information than can fit into a single LLDPDU currently have no solution other than inventing a new protocol and incompatible protocol. Given the popularity and wide deployment of LLDP there is a need to allow a migration to a version of the LLDP protocol that supports the transmission and reception of sets of TLVs that exceed the space provided by a single frame.

5.6 Stakeholders for the Standard: Developers and users of networking environments including integrated circuit developers, operating system software developers, bridge and end-node adaptor vendors, network operators and users.

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?: Yes
If yes please explain: The project may require a new Ethertype value. The project will extend the YANG data model specified in IEEE P802.1ABcu identify by a Uniform Resource Name (URN) based on the Registration Authority (RA) URN tutorial and IEEE Std 802d. The project will also extend the Simple Network Management Protocol (SNMP) MIB module specified in 802.1AB identified by an Object Identifier (OID).

7.1 Are there other standards or projects with a similar scope?: No
7.2 Joint Development
Is it the intent to develop this document jointly with another organization?: No

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8.1 Additional Explanatory Notes: #5.3: While 'YANG' (developed by the Internet Engineering Task Force) appears to be an acronym its expansion 'Yet Another Next Generation' is not meaningful.
IEEE 802.1AB - IEEE Standard for Local and metropolitan area networks - Station and Media Access Control Connectivity Discovery
IEEE P802.1AB - Draft Standard for Local and Metropolitan Area Networks - Station and Media Access Control Connectivity Discovery Amendment: YANG Data Model
#6.1.b IEEE Std 802 IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture
IEEE Std 802d IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture Amendment 1: Allocation of Uniform Resource Name (URN) Values in IEEE 802 Standards
RA URN tutorial: http://standards.ieee.org/develop/regauth/tut/ieeeurn.pdf

IEEE 802 LAN/MAN STANDARDS COMMITTEE (LMSC)

CRITERIA FOR STANDARDS DEVELOPMENT (CSD)

P802.1ABbh Standard for Local and metropolitan area networks - Station and Media Access Control Connectivity Discovery - Amendment: Support for extension LLDPDUs

1. IEEE 802 criteria for standards development (CSD)

The CSD documents an agreement between the WG and the Sponsor that provides a description of the project and the Sponsor's requirements more detailed than required in the PAR. The CSD consists of the project process requirements, 1.1, and the 5C requirements, 1.2.

1.1 Project process requirements

1.1.1 Managed objects

Describe the plan for developing a definition of managed objects. The plan shall specify one of the following:

a) The definitions will be part of this project.
b) The definitions will be part of a different project and provide the plan for that project or anticipated future project.
c) The definitions will not be developed and explain why such definitions are not needed.

Item a) is applicable. New managed objects will be defined for the extensions

1.1.2 Coexistence

A WG proposing a wireless project shall demonstrate coexistence through the preparation of a Coexistence Assurance (CA) document unless it is not applicable.

a) Will the WG create a CA document as part of the WG balloting process as described in Clause 13? (yes/no)
b) If not, explain why the CA document is not applicable.

Item b) is applicable. This project is not a wireless project; therefore, the CA document is not applicable.

1.2 5C requirements

1.2.1 Broad market potential

Each proposed IEEE 802 LMSC standard shall have broad market potential. At a minimum, address the following areas:

a) Broad sets of applicability.

b) Multiple vendors and numerous users.

a) Std IEEE 802.1AB defines LLDP, a highly successful and widely deployed protocol in the industry. It is used in numerous applications ranging from wireless environments, to enterprise LAN, to data centers and anything that involves an 802 station or network link. It is supported by most industry vendors and included in widely available open source implementations.
b) LLDP is available in nearly all vendor network infrastructure implementations and end-station implementations.

1.2.2 Compatibility

Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802, IEEE 802.1AC, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 WG prior to submitting a PAR to the Sponsor.

a) Will the proposed standard comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q?
b) If the answer to a) is no, supply the response from the IEEE 802.1 WG.

a) Yes, the proposed project is an amendment to IEEE 802.1AB which already complies with the referenced standards. The project will not change any conformance requirements to those standards.
b) Not applicable.

The review and response is not required if the proposed standard is an amendment or revision to an existing standard for which it has been previously determined that compliance with the above IEEE 802 standards is not possible. In this case, the CSD statement shall state that this is the case.

1.2.3 Distinct Identity

Each proposed IEEE 802 LMSC standard shall provide evidence of a distinct identity. Identify standards and standards projects with similar scopes and for each one describe why the proposed project is substantially different.

There is no other IEEE 802 standard or project that defines extensions to IEEE 802.1AB allowing more than one frame worth of TLVs to be sent and received.

1.2.4 Technical Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence that the project is technically feasible within the time frame of the project. At a minimum, address the following items to demonstrate technical feasibility:

a) Demonstrated system feasibility.
b) Proven similar technology via testing, modeling, simulation, etc.

a) LLDP is a protocol with slow periodic transmissions that lends itself to a software implementation in environments with limited resources. It has been implemented on a variety of devices and the proposed amendment does not significantly change the resources required to implement the new extensions.
b) Existing layer 3 routing protocols have similar transmission and reception characteristics and have been implemented and supported for many years on similar devices.

1.2.5 Economic Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:

a) Balanced costs (infrastructure versus attached stations).
b) Known cost factors.
c) Consideration of installation costs.
d) Consideration of operational costs (e.g., energy consumption).

a) The well-established cost balance between infrastructure and attached stations will not be changed by the proposed standard.
b) The cost factors are known for Std IEEE 802.1AB and supporting protocols and will not be changed by the proposed standard
c) There are no incremental installation costs relative to Std IEEE 802.1AB that will be used by the proposed standard.
d) There are no incremental operational costs relative to the existing costs associated with Std IEEE 802.1AB that will be used by the proposed standard.