



# P802.1AX-REV PAR

## **Revision of IEEE Std 802.1AX Link Aggregation**

Rev. 1

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# P802.1AX-REV PAR

PAR for a Revision to an existing IEEE Standard

1.1 Assigned Project Number: **P802.1AX-REV**

1.2 Type of Document: **Standard**

1.3 Life Cycle: **Full Use**

2.1 Project Title: **Standard for Local and metropolitan area networks--Link Aggregation**

3.1 Working Group: **Higher Layer LAN Protocols Working Group (C/LM/WG802.1)**

3.2 Sponsoring Society and Committee: **IEEE Computer Society/LAN/MAN Standards Committee (C/LM)**

3.3 Joint Sponsor: **none**

# P802.1AX-REV PAR

4.1 Sponsor Balloting Information: **Individual**

4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: **Nov. 2014**

4.3 Projected Completion Date for Submittal to RevCom: **Oct. 2015**

5.1 Approximate number of people expected to be actively involved in the development of this project: **45**

**This includes Working Group members, additional non-voting participants, etc.**

# Scope of P802.1AXbq

This standard enhances Link Aggregation, its protocols, procedures and managed objects, to provide a resilient interconnect using multiple links among one or more nodes in a network and one or more nodes in another, separately administered, network. The DRNI preserves the Link Aggregation model of establishing a single logical link consisting of multiple links, and will be backward compatible with existing conformant implementations of Link Aggregation. The DRNI will specify a means to ensure that frames belonging to any given service will use the same physical path in both directions between the two networks.

# Scope of IEEE Std 802.1AX-2008

Link Aggregation allows one or more links to be aggregated together to form a Link Aggregation Group, such that a MAC Client can treat the Link Aggregation Group as if it were a single link. To this end, it specifies the establishment of data terminal equipment (DTE) to DTE logical links, consisting of N parallel instances of full duplex point-to-point links operating at the same data rate. This standard defines the MAC independent Link Aggregation capability, and general information relevant to specific MAC types that support Link Aggregation.

## 5.2 Scope of Proposed Standard

**NOTE:** The Scope in the draft standard as submitted to RevCom must match the Scope of the PAR.

**Link Aggregation provides protocols, procedures, and managed objects that allow:**

- 1. One or more parallel instances of full duplex point-to-point links, operating at the same data rate, to be aggregated together to form a Link Aggregation Group, such that a MAC Client can treat the Link Aggregation Group as if it were a single link; and**
- 2. A resilient interconnect using multiple links among one or more nodes in a network and one or more nodes in another, separately administered, network, along with a means to ensure that frames belonging to any given service will use the same physical path in both directions between the two networks.**

**This standard defines the MAC independent Link Aggregation capability, and general information relevant to specific MAC types that support Link Aggregation. The two types of Link Aggregation are compatible with each other and with previous versions of this standard.**

# Another standard

5.3 Is the completion of this standard contingent upon the completion of another standard?: **No**

# Purpose

**NOTE: The Purpose in the draft standard as submitted to RevCom must match the Purpose set forth in the PAR.**

5.4 Will this document contain a Purpose clause?: **No**

Purpose clause in 802.1AX PAR:

Link Aggregation allows the establishment of full duplex point-to-point links that have a higher aggregate bandwidth than the individual links that form the aggregation. This allows improved utilization of available

**<< I suggest that we have no purpose. clause. >>**



## 5.5 Need for the Project

Highlighted text is new from 802.1AX-2008

There is no current standard that permits networks with independent control protocols to exchange IEEE 802 data through redundant nodes (**item 2 of the Scope**). At the present time, either changes to the active topology of one network, caused by component faults, fault recovery, or administrative changes can trigger consequent alterations in a neighboring network, or else the connection between the networks is subject to being severed by a single failure. **Furthermore, IEEE Std 802.1AX requires revision to utilize logical and physical media besides IEEE 802.3 media, and to correct errors.**

## 5.6 Stakeholders for the Standard:

(Same as 802.1AX-2008, with AX-2008 substituted for 802.3-2005.)

The stakeholders for this standard are the semiconductor manufacturers, system product manufacturers (e.g., switch and NIC), network providers (e.g. installers, support, enterprises), bandwidth providers (e.g., carriers), and users of Ethernet link aggregation as currently defined in IEEE Std **802.1AX-2008**.

# The nose knows noes

## 6.1 Intellectual Property

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

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

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**

# The nose knows noes

## 6.1 International Standards Activities

- A. Adoptions - Is there potential for this standard to be adopted by another organization?: **No**
- B. Harmonization - Are you aware of another organization that may be interested in portions of this document in their standardization development efforts?: **No**

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**

# The nose knows noes

7.4 Does the sponsor foresee a longer term need for testing and/or certification services to assure conformity to the standard? **No**

Additionally, is it anticipated that testing methodologies will be specified in the standard to assure consistency in evaluating conformance to the criteria specified in the standard? **No**

# Five criteria

- The five criteria from P802.1AXbq are listed here for reference. Suggested changes are **highlighted**.

# 1. Broad Market Potential

A standards project authorized by IEEE 802 shall have a broad market potential. Specifically, it shall have the potential for:

- a) Broad sets of applicability.  
Redundant connections between two networks, or a network and an end station, with both sides under separate administration, are increasingly common, especially in the Ethernet service provider market.
- b) Multiple vendors and numerous users  
Several vendors offer non-interoperable implementations of Link Aggregation with resilient external network interconnect capabilities, **not tied specifically to 802.3 media**, and they are widely deployed.
- c) Balanced costs (LAN versus attached stations)  
The changes to Link Aggregation have no effect on the balance of costs with respect to existing technology other than the well-known trade-offs between enhanced capabilities and enhanced software complexity.

## 2. Compatibility

- IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management and Interworking standards as follows: 802 Overview and Architecture, 802.1D, 802.1Q and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802.

A device implementing the new version of LACP will interoperate with devices implementing previous versions of LACP.

- Each standard in the IEEE 802 family of standards shall include a definition of managed objects which are compatible with systems management standards.

Such a definition will be included.



# 3. Distinct Identity

Each IEEE 802 standard shall have a distinct identity. To achieve this, each authorized project shall be:

- a) Substantially different from other IEEE 802 standards.  
There is only one link aggregation standard in IEEE 802.  
There are none for resilient multi-node interconnects.
- b) One unique solution per problem (not two solutions to a problem).  
As this project enhances the only existing IEEE 802 standard for link aggregation, it does not create a second solution.
- c) Easy for the document reader to select the relevant specification.  
IEEE Std 802.1AX is the only current IEEE 802 standard for link aggregation, and there are none for resilient multi-node interconnects.

# 4. Technical Feasibility

For a project to be authorized, it shall be able to show its technical feasibility. At a minimum, the proposed project shall show:

- a) Demonstrated system feasibility.  
Similar techniques have been deployed as proprietary enhancements to IEEE 802 link aggregation. The redundancy and isolation techniques of DRNI are straightforward applications of existing bridge components as described in IEEE 802.1Q and its amendments.
- b) Proven technology, reasonable testing.  
Link aggregation and bridge component definitions are proven technologies, and test methodologies are well understood.
- c) Confidence in reliability.  
Link Aggregation is often deployed to enhance the reliability of data communication networks. The intended changes improve this aspect of the Link Aggregation capability. By isolating the fault recovery and load sharing capabilities of different networks that are interconnected by this new standard, the reliability of the combined network is enhanced.
- d) Coexistence of 802 wireless standards specifying devices for unlicensed operation.  
Not applicable.

# 5. Economic Feasibility

For a project to be authorized, it shall be able to show economic feasibility (so far as can reasonably be estimated), for its intended applications. At a minimum, the proposed project shall show:

- a) Known cost factors, reliable data.  
Existing implementations have demonstrated that the impact of the proposed changes are commensurate with the benefits obtained.
- b) Reasonable cost for performance.  
The proposed changes have negligible impact on the cost factors applicable to Link Aggregation or bridging.
- c) Consideration of installation costs.  
The proposed standard specifies the negotiation required between network administrations to interconnect their networks. This is consequent to and commensurate to the new capabilities offered, and eliminates a large amount of effort currently expended in the absence of a standard.