

IEEE 802.1 DRAFT PAR and 5C for multi-path and redundancy for 802.1 AVB

Version 1,
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2.1 Project Title

IEEE Standard for Local and Metropolitan Area Networks – Media Access Control (MAC) Bridging and Virtual Bridged Local Area Networks, Amendment: Multiple Paths and Redundancy.

Other PAR Fields (1)

4.1 Type of Ballot: Individual

4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: <30 Nov 2015>?

4.3 Projected Completion Date for Submittal to RevCom: <30 Nov 2016>?

5.1 Approximate number of people expected to be actively involved in the development of this project: <25>?

5.3 Is the completion of this standard dependent upon the completion of another standard: <No / Yes<which one(s)>?

5.6 Stakeholders for the Standard: Developers, providers, and users of networking services and equipment for Industrial Automation, In-vehicle networking, Pro Audio/Video and Residential systems requiring optimized bandwidth usage and/or redundancy, including networking IC developers, bridge and NIC vendors, and users.

5.2 Scope

This amendment specifies protocol extensions that:

- Provide for discovery and selection of multiple paths between talkers and listeners on engineered and non-engineered networks to
 - maximize the usage of the whole topology beyond the limitation of spanning trees.
 - support multiple types of redundancy & fault-tolerance in function of the service requirements:
 - static / dynamic
 - with /without single point of failure
 - with / without failover lag time

5.4 Purpose

- The purpose of this amendment is to provide a protocol for path selection and management between talkers and listeners of time-aware and time-critical services in a bridged LAN, that both improves the usage of the whole network topology and supports the redundancy and fault-tolerance of these services

5.5 Need for the Standard

- The limited bandwidth capacity and quality of power line & wireless links within a home network requires to maximize the usage of the whole network topology
- The need for fault-tolerance and redundancy for time-aware and time-critical services requires to select and managed paths beyond the limitation of spanning trees on bridged LANs.

Other PAR Fields (2)

6.1 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?: No

7.1 Are there other standards or projects with a similar scope?: No

7.2 Is there potential for this standard (in part or in whole) to be adopted by another national, regional, or international organization? : No

7.3 Will this project result in any health, safety, security, or environmental guidance that affects or applies to human health or safety? No

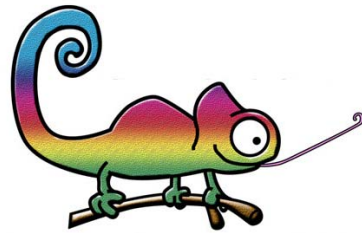
7.4 Additional Explanatory Notes:

8.1 Sponsor Information:

The 5 Critters



Broad
Market
Potential



Compatibility



Distinct
Identity



Technical
Feasibility



Economic
Feasibility

Broad Market Potential <TO BE EDITED>

- a) **Broad sets of applicability**
- b) **Multiple vendors and numerous users**
- c) **Balanced costs (LAN versus attached stations)***

- a) Specific to automotive in-vehicle environment.
Streaming, Data, Control, over single wire that supports, infotainment, driver assist and diagnostics within various functional LAN segments within a vehicular network. **Control system requires fully redundant bridged network for this convergence.**

Specific to Industrial network environment.

Low Latency Sampling Data, (Closed Loop) Control, Data Streaming (e.g. image processing) and supervision data traffic.

Sampling Data and Closed Loop Control traffic have **mandatory redundancy** requirements,

Data streaming (e.g. image processing) is less demanding than control, but higher than best effort. Supervision Data traffic is not time-critical, but provides a constant source for interference traffic.

- b) 60 million in 2010 (56~70 million per annum from 1960's till now) cars and light-trucks/SUVs sold per year. In-vehicle networking is expected to reach >15% in 2011 and grow. With a assumption of @ 5 Ethernet nodes/vehicle, Assuming 60 million vehicles/year, potential vehicle market served at 15% adoption would yield 45+ million nodes (plus 45+ million Switch ports). The number of Ethernet Switch ports is ~400 million/yr, split 35%:60%:5% FE/GE/10+GE in 2011. Thus potential for 15% Ethernet market expansion as adoption occurs in automotive.

Industrial Automation – The number of industrial Ethernet ports sold worldwide is 24 million per year in 2010. This is expected to grow to 40 million per year in 2014.] Additional market served with this standards are medical control systems (e.g. MRI), and Energy (e.g. Power substation power controllers), and Avionics.

- c) This project does not materially alter the existing cost structure of bridged networks.

Compatibility

- a) **IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management and Inter-working documents 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.Conformance with 802.1D, 802.1Q, 802.1f**
- b) **Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.**

a) The standard will conform to the above architectures, and specifically 802.1Q bridge framework for forwarding and receiving compatibility at the ISS . This guarantees that 802.1Q bridges can be added to a network of bridges and end stations that implements this standard to increment the network functionality.

b) Such a definition will be included.

Distinct Identity

- a) Substantially different from other IEEE 802 standards
- b) One unique solution per problem (not two solutions to a problem)
- c) Easy for the document reader to select the relevant specification

- a) There is no existing 802 standard or approved project that **fully supports both multi-paths and fault-tolerant redundancy for time-aware and mission-critical applications.**
- b) There is no IEEE 802 based solution **< TO BE COMPLETED >**
- c) This standard enhances QoS relevant sections of 802.1Q.

Technical Feasibility

- a) **Demonstrated system feasibility**
- b) **Proven technology, reasonable testing**
- c) **Confidence in reliability**
- d) **Coexistence of 802 wireless standards specifying devices for unlicensed operation.**

- a) **Path selection protocols and redundancy protocols** has been used in other networking systems.
- b) This standard is based on mature virtual LAN bridging protocols.
- c) The technology re-use, and other augmented methods are deemed proven for their reliability.
- d) Not Applicable

Economic Feasibility

- a) **Known cost factors, reliable data**
- b) **Reasonable cost for performance**
- c) **Consideration of installation costs**

- a) The standard will not increase the cost beyond the addition of a new protocol stack
- b) Reasonable cost for fault-tolerance and redundancy , widely accepted today in IT segment, will be consistent in this standard.
- c) Installation cost is expected to be reduced by an optimized usage of the network topology of bridged LANs.