IEEE 802.1 Qcb DRAFT 5C's for Frame Replication and Elimination for Reliability

Version 5

The 5 Critters

Broad Market Potential

Compatibility

Distinct Identity

Technical Feasibility

Economic Feasibility

Broad Market Potential

a. Broad sets of applicability

b. Multiple vendors and numerous users

a. Redundant topologies are common in many industrial networks such as Industrial Automation, Energy Automation, Rail Systems. Growth rate of redundant systems is much higher than the growth of communication in general. Redundant topologies are also used in automotive in-vehicle networks for safety critical control applications and ring topologies are proposed for automotive backbone applications. These applications would significantly benefit from frame replication and duplicate frame elimination in order to support seamless availability with network segment protection.
Professional AV requires error protection as well. This is accomplished today by duplicating the complete network infrastructure which is costly and sometimes not as robust as required. Additionally every AV application which needs audio/video transmissions with seamless availability benefits from the proposed amendment.

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 an 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 existing Ethernet Switch ports is ~400 million/yr, split 35%:60%:5% FE/GE/10+GE in 2011.
Thus, a potential for 15% Ethernet market expansion as adoption occurs in automotive.

Industrial Automation – The number of industrial communication 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 Energy (e.g. Power substation power controllers) and Avionics.

Compatibility

IEEE 802 LMSC defines a family of standards. All standards should be in conformance : IEEE Std 802, IEEE 802.1D, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 Working Group. In order to demonstrate compatibility with this criterion, the Five Criteria statement must answer the following questions.

a. Does the PAR mandate that the standard shall comply with IEEE Std 802, IEEE Std 802.1D and IEEE Std 802.1Q?
b. If not, how will the Working Group ensure that the resulting draft standard is compliant, or if not, receives appropriate review from the IEEE 802.1 Working Group?

a. This standard will be defined in 802.1, which defines bridging, and will be consistent with the bridging standards.

b. Not applicable.

Distinct Identity

a. Substantially different from other IEEE 802 LMSC 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 provides link or intermediate node failure tolerance without failover.

b. There is no IEEE 802 based solution that allows for link or intermediate node failure tolerance without failover via frame replication and elimination.

c. The proposed project will be formatted as a stand-alone standard. The title of the standard makes it clear what the standard specifies and therefore makes it easy to select.

Technical Feasibility

a. Demonstrated system feasibility
b. Proven technology, reasonable testing
c. Confidence in reliability

a. The function is similar in complexity to existing functions in IEEE 802.1Q which have been successfully implemented. Non-IEEE 802 networks that require high availability use similar concepts (e.g. IEC 62439-3).
b. This standard is based on mature virtual LAN bridging.
c. The technology re-use, and other augmented methods are deemed proven for their reliability.

Economic Feasibility

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

a. The standard would add small and contained incremental cost to bridge and end station implementations.

b. Reasonable cost for performance, widely accepted today in IT segment, will be consistent in this standard. In addition, this standard would help to use time sensitive traffic in applications which require high availability, thereby helping to replace a) parallel networks, b) multiple dedicated point-to-point wires. The extra performance gain of this enhancement adds new markets that otherwise could not be addressed.

c. The installation cost of enhanced VLAN bridges and end stations is expected to be similar to existing implementations