Draft CSD Proposal for an IEEE 802.1 standard on Cut-Through Forwarding (CTF)

Author: Johannes Specht (Self; Analog Devices, Inc.; Mitsubishi Electric Corporation; Phoenix Contact GmbH & Co. KG; PROFIBUS Nutzerorganisation e.V.; Siemens AG; Texas Instruments, Inc.)

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Reference: Slide 95 of https://www.ieee802.org/1/files/public/minutes/2021-11-closing-plenary-slides.pdf

IEEE 802 LAN/MAN STANDARDS COMMITTEE (LMSC)

CRITERIA FOR STANDARDS DEVELOPMENT (CSD)

Based on IEEE 802 LMSC Operations Manuals approved 4 August 2020
Last edited 31 August 2020
P802.1<<Project ID>> Standard for Local and Metropolitan Area Networks –
Cut-Through Forwarding in Bridges and Bridged Networks

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.

This project will use method a).

1.1.2 Coexistence

A WG proposing a wireless project shall prepare a Coexistence Assessment (CA) document unless it is not applicable.

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

f) Broad sets of applicability.
g) Multiple vendors and numerous users.

f) CTF is already widely used in industrial automation installations and data center networks. Standardizing CTF can be an enabling technology for a wide range of professional audio-video applications.

g) Existing products of multiple Bridge vendors support CTF, but interoperability is limited. Standardizing CTF is an opportunity for deployment of IEEE 802 technology in existing and new use cases in industrial automation systems, data centers, and professional audio-video applications such as concert venues, theatres, conference centers, corporate buildings, casinos, hotels, theme parks, cruise ships, sport venues and beyond.
Additional material: https://mentor.ieee.org/802.1/dcn/21/1-21-0037-00-ICne-ieee-802-tutorial-cut-through-forwarding-ctf-among-ethernet-networks.pdf

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.

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

h) No, there will be variances in conformance, as disclosed in https://www.ieee802.org/1/files/public/docs2021/new-specht-ctf-802-1-1121-v01.pdf for reviewing with IEEE 802.1 WG.

i) The conformances variances between the proposed new IEEE 802.1 standard for CTF and the published IEEE 802 standards in question (i.e., IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q), in terms of external visible behavior, are as follows:
(1) Frames received by a bridge can be transmitted earlier than specified by the published IEEE 802 standards in question.
(2) Frames with inconsistent frame check sequences (FCSs) may be marked by bridges in a manner that allows stations downstream to identify such frames as seen invalid.
(3) Additional managed objects (e.g., management of CTF mechanisms) become available in the proposed new IEEE 802.1 standard that are not present in the published IEEE 802 standards in question.
The aforesaid variances have been reviewed and discussed with IEEE 802.1 WG, with the following responses with regard to potential interoperability issues:
On (1): This variance limits to the timing behavior of bridges.
IEEE 802.1WG could not identify a resulting interoperability issue.
On (2): This variance depends on the marking mechanism. One (out of potentially more) suggested marking mechanism is the use of special FCSs.
Properly chosen special FCS computation algorithms can preserve the ability of stations conforming to the published IEEE 802 standards to discover such frames as invalid, and

therefore does not break interoperability.

On (3): This variance causes additional managed objects to be presented via the given management interfaces (e.g., YANG). This is affects interoperability management entities (e.g., network operators).

However, the management interfaces provided by stations conforming to the published IEEE 802 standards in question follow a modular approach, and therefore the proposed new IEEE 802.1 standard would not negatively affect this situation.

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.

No other IEEE 802 standard or project defines support for CTF in Bridges and Bridged Networks.

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:

    j) Demonstrated system feasibility.
    k) Proven similar technology via testing, modeling, simulation, etc.

    j) System feasibility is demonstrated by existing industrial automation installations and data center networks based on similar non-IEEE 802 technologies.

    k) CTF in Bridges is proven by existence of products implementing similar non-IEEE 802 technology.

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:

    l) Known cost factors.
    m) Balanced costs.
    n) Consideration of installation costs.
    o) Consideration of operational costs (e.g., energy consumption).
    p) Other areas, as appropriate.

l) The cost factors are known from existing data center network and industrial automation applications using similar non-IEEE technologies. The proposed solution can reduce the overall cost by introducing the delay performance improvements by CTF to applications relying on IEEE technologies from existing IEEE 802.1 standards without support for CTF.

m) The changes, relative to the well-known cost balance between infrastructure and end stations from existing IEEE 802.1 standards without support for CTF, are negligible.

n) There are no incremental installation costs, compared to applications based on existing IEEE 802.1 standards without support for CTF.

o) There are no incremental operational costs, compared to applications based on existing IEEE 802.1 standards without support for CTF.

p) No other areas have been identified.