Common bridge requirements

Taro Harima

Contributors

- Yoshifumi Hotta
- Daisuke Osagawa
- Isao Tarui
- Taro Harima

Foreword

- This contribution demonstrates the point of the common bridge requirements, referring to IEEE standard 802.1CM.

Bridge requirements

- Common bridge requirements
  - Requirements of 802.1Q bridge
  - Requirements for time synchronization
  - Requirements for low latency
- Bridge options

Common bridge requirements

- A minimum set of features specified in IEEE standard 802.1Q are required for a bridge to support this Profile.

- That is, the bridge shall be a VLAN Bridge supporting the minimum set of features identified in this profile.

- The requirements of this profile do not imply that a VLAN Bridge implementation that conforms to the provisions of this standard has to support options specified in IEEE standard 802.1Q-2018 other than those identified in this profile.

Requirements of 802.1Q bridge (1/5)

A bridge implementation that conforms to the provisions of this standard shall:

a. Conform to the relevant standard for the MAC technology implemented at each port in support of the MAC Internal Sublayer Service (ISS), as specified in IEEE Std. 802.1AC;

b. Implement full duplex IEEE Std. 802.3 MAC with data rate of 10 Mbps or greater on each port;

c. Support the capability of 2000 octets maximum size MAC Protocol Data Unit (PDU) on each port;

Requirements of 802.1Q bridge (2/5)

d. Support the capability to disable MAC control PAUSE if it is implemented;

e. Support the capability not to assert Low Power Idle (LPI) on each port that supports Energy Efficient Ethernet (IEEE, specified in IEEE Std. 802.3);

f. Meet the VLAN Bridge requirements stated in items a) through f) in 5.4 of IEEE Std. 802.1Q-2018;

g. Support an active topology enforcement mechanism;

Requirements of 802.1Q bridge (3/5)

h. Meet the VLAN Bridge requirements stated in items g) and h) in 5.4 of IEEE Std. 802.1Q-2018 if the supported active topology enforcement mechanism is the Rapid Spanning Tree Protocol (RSTP);

i. Meet the VLAN Bridge requirements stated in items i) through n) in 5.4 of IEEE Std. 802.1Q-2018;

j. Support at least the Acceptable Frame Types parameter value of Admit All frames on each port [see item l) in 5.4 of IEEE Std. 802.1Q-2018];implemented (Clause 36 of IEEE Std. 802.1Q-2018).

k. Support the use of at least one VLAN Identifier (VID);

Requirements of 802.1Q bridge (4/5)

l. Meet the VLAN Bridge requirements stated in items p) through r) in 5.4 of IEEE Std. 802.1Q-2018;

m. Support the ability to allocate the Port VID (PVID) and all other VIDs to the single Filtering Identifier (FID) if only a single FID is supported [item q) in 5.4 of IEEE Std. 802.1Q-2018], i.e., support shared VLAN learning (8.8.8 of IEEE Std. 802.1Q-2018);

n. Support a minimum of three traffic classes (3.268 of IEEE Std. 802.1Q-2018) on all ports;

Requirements of 802.1Q bridge (5/5)

o. Support the strict priority algorithm for transmission selection (8.6.8.1 of IEEE Std. 802.1Q-2018) on each port for each traffic class;

p. Support the capability to disable Priority-based flow control if it is implemented (Clause 36 of IEEE Std. 802.1Q-2018).

q. Support the capability to schedule traffics (IEEE Std. 802.1Qbv-2015)

Common Bridge requirements for time synchronization

Bridge requirements for synchronization A bridge implementation for which a claim of conformance to support synchronization in the bridged network is made, shall:

a. Support untagged frames on all ports;

b. Support the IEEE Std. 802.1AS-2018 profile and one (single gPTP Domain) or more (multiple gPTP Domain) of the related clocks.

Traffic type support

Item	Feature	Status	Support
ICR	Is isochronous cyclic real-time traffic type supported on at least one Port?	O. 1	Yes[ ] / No[ ]
CRT	Is cyclic real-time traffic type supported on at least one Port?	O. 1	Yes[ ] / No[ ]
NCL	Is network control traffic type supported on at least one Port?	M	Yes[ ] / No[ ]
AVD	Is audio/video traffic type supported on at least one Port?	O	Yes[ ] / No[ ]
BRW	Is Brownfield traffic type supported on at least one Port?	O	Yes[ ] / No[ ]
ALM	Is arms/ events traffic type supported on at least one Port?	O	Yes[ ] / No[ ]
CFG	Is configuration/ diagnostics traffic type supported on at least one Port?	M	Yes[ ] / No[ ]
BST	Is best effort traffic type supported on at least one Port?	M	Yes[ ] / No[ ]

Note: O.1 shows that at least one of ICR and CRT is mandatory.

Traffic types

- Mandatory stream classes inside TSN boundary
  - Isochronous cyclic real time
    - e.g. Machin control (Motion, I/O and etc.), Reactor control, etc.
  - Network control
    - e.g. Time synchronization
  - Configuration / diagnostics
    - e.g. SNMP + LLDP and/or Application Specific Protocol etc.
  - Best effort
    - Other IP communication

Traffic types (continue)

- Isochronous cyclic real time
  - e.g. Machin control (Motion, I/O and etc.), Reactor control, etc.
  - This contribution does not cover this stream, since it depends on the application.

Traffic types (continue)

- Network control
  - e.g. Time synchronization

Traffic types (continue)

- Configuration / diagnostics
  - e.g. SNMP + LLDP and/or Application Specific Protocol etc.
  - This contribution does not cover diagnostics, since it depends on the application.

Traffic types (continue)

- Best effort
  - Other IP communication
  - This contribution does not cover this stream, since it depends on the application.