IEC/IEEE 60802

Quantities

Requirements and assigned features

(Have additional a look at 60802-Steindl-EndStationModel-0321-v07.pdf)

Version V02 – October 2021

Günter Steindl (Siemens AG)

TSN-IA profile

End Stations

a) End station component for a device

b) End station component for a controller

Bridge

c) Bridge component for a 3port (linear topology; bridge component of a bridged end station)

d) Bridge component for a >3port (any topology)

TSN Domain

e) 64 stations

f) 300 stations

g) 1000 stations

TSN-IA profile
End station as a device

What does a) at least need to support?

- SILICON* for end station component of a device shall support 1-16 Streams as Talker and 1-16 Streams as Listener. These Talkers/Listeners shall be able to handle 1-5KByte input and 1-5kByte output data. End station FRER for up to streams/2. Able to transmit and receive back to back.

- Eight Queues, 5 VLANs, per queue and per frame time triggered transmit (Time-aware offset control)

- Eight Qbv Gates

- Five MEF10.3 based egress rate limiter
  Streams and NetworkControl do not need Egress rate limiter; Eight if all queues should support it

- Preemption

- Hot standby for WC and GT

- Two targetClocks fully couple/decouple able

- Receive filtering for receive ressource protection
  „simplified FDB concept"

- Security offloading (depending on the middleware)
  For all streams with support of bumpless rekeying

- …

*Compute is another selector; it is assumed that silicon with the same communication features is available together with different classes of compute

TSN-IA profile
End station as Controller

What does b) at least need to support?

- SILICON* for end station component of a controller shall support 64-512 Streams as Talker and 64-512 Streams as Listener. These Talkers/Listeners shall be able to handle 16-128KByte input and 16-128kByte output data. End station FRER, for up to streams/2. Able to transmit and receive back to back.

- Eight Queues, 8 VLANs, per queue and per frame time triggered transmit (Time-aware offset control)

- Eight Qbv Gates

- Five MEF10.3 based egress rate limiter (one per queue)
  Streams and NetworkControl do not need Egress rate limiter; Eight if all queues should support it

- Preemption

- Hot standby for WC and GT

- Two targetClocks fully couple/decouple able

- Grandmaster capable

- Receive filtering (and dropping) for receive ressource protection
  „simplified FDB concept"

- Security offloading (depending on the middleware)
  For all streams with support of bumpless rekeying

- …

*Compute is another selector; it is assumed that silicon with the same communication features is available together with different classes of compute

TSN-IA profile
Bridge (3 port)

What does c) at least need to support?

- Congestion loss protection at the boundary port for a defined time *, e.g. for the time this device is cyclicly blocking the forwarding of frames due to Qbv usage or stream injection.
  - If the egress port is blocked cyclicly, then the bridge shall not throw away frames it receives during this time.
- Assumption: Network setup ensures that the traffic would -without this blocking- not dropped.
- Number of stream entries for the FDB**:
- 2k without FRER support, 4k with FRER support
  -> no rules for combining nodes

- Some other number, e.g. 256 without FRER support, 512 with FRER support
  -> rules for combining nodes; detailed ressource control implemented into CNC

…

* Assumption: In addition a pulse / pause model is used which allows to empty the used buffers in a short time

**FDB size is TSN Domain size dependent

TSN-IA profile
Bridge (>3 ports)

What does d) at least need to support?

- Congestion loss protection at the boundary port for a defined time, e.g. for the time this device is cyclicly blocking the forwarding of frames due to Qbv usage or stream injection.
  - If the egress port is blocked cyclicly, then the bridge shall not throw away frames it receives during this time.

➔ Fixed numbers (per egress port):
  2ms at 10Mbit/s *
  500µs at 100Mbit/s *
  200µs at 1Gbit/s *
  20µs at 10Gbit/s *

- Assumption: Network setup ensures that the traffic would -without this blocking- not dropped.

- Number of stream entries for the FDB**:

- 2k without FRER support, 4k with FRER support
  -> no rules for combining nodes

…

* Assumption: In addition a pulse / pause model is used which allows to empty the used buffers in a short time

**FDB size is TSN Domain size dependent

TSN-IA profile
TSN Domain (CNC)

What does e) at least need to support?

- 64 stations*

- CNC needs to support this number

…

*TSN Domain size dependent

TSN-IA profile
TSN Domain (CNC)

What does f) at least need to support?

- 300 stations*

- CNC needs to support this number

…

*TSN Domain size dependent

TSN-IA profile
TSN Domain (CNC)

What does g) at least need to support?

- 1000 stations*

- CNC needs to support this number

…

*TSN Domain size dependent

Conclusion

End stations seems to be able to be connected to any size of TSN Domain.

Whether a bridge is feasible to be used in a TSN Domain of a given size depends on the supported quantities (and the applied constraints for the network topology).

Aligning the quantities for 1000 stations TSN Domains (at least at the FDB sizes) makes the life of the customer easier.

Questions ?