Quantity Figures

Excerpt from IEC/IEEE 60802 use case document

http://www.ieee802.org/1/files/public/docs2018/60802-industrial-use-cases-0918-v13.pdf

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Why do we need to identify and to define to be supported quantities?

- to support interoperability
  - A customer need to add another device for a new version of his machine. Its best placed somewhere in between the already existing network
  - After installing, it shall not disturb the network by having to less of one of the defined quantities
  - Thus, the costumer can focus on the function of the machine and doesn’t need to be a network expert
- to support silicon vendors
  - What are the needed quantities?
  - Its assumed, that there is no better place than the IEC/IEEE 60802 to define this values

Example from the use case document

Representative example for data flow requirements 1/3

TSN domains in an industrial automation network for cyclic real-time traffic can span multiple Cyber-physical systems, which are connected by bridges. The following maximum quantities apply:

- Stations: 1024
- Network diameter: 64
- per PLC for Controller-to-Device (C2D) – one to one or one to many – communication:
  - 512 producer and 512 consumer data flows; 1024 producer and 1024 consumer data flows in case of seamless redundancy.
  - 64 kByte Output und 64 kByte Input data
- per Device for Device-to-Device (D2D) – one to one or one to many – communication:
  - 2 producer and 2 consumer data flows; 4 producer and 4 consumer data flows in case of seamless redundancy.
  - 1400 Byte per data flow

Representative example for data flow requirements 2/3

- per PLC for Controller-to-Controller (C2C) – one to one or one to many – communication:
  - 64 producer and 64 consumer data flows; 128 producer and 128 consumer data flows in case of seamless redundancy.
  - 1400 Byte per data flow
- Example calculation for eight PLCs
  - 8 x 512 x 2 = 8192 data flows for C2D communication
  - 8 x 64 x 2 = 1024 data flows for C2C communication
  - 8 x 64 kByte x 2 = 1024 kByte data for C2D communication
  - 8 x 64 x 1400 Byte x 2 = 1400 kByte data for C2C communication
- All above shown data flows may optionally be redundant for seamless switchover due to the need for High Availability.

Representative example for data flow requirements 3/3

- Application cycle times for the 512 producer and 512 consumer data flows differ and follow the application process requirements.
- E.g. 125 µs for those used for control loops and 500 µs to 512 ms for other application processes. All may be used concurrently and may have frames sizes between 1 and 1440 bytes.

Selection of possible quantities and example values

Quantity figures 1/2

# of supported VLANs (TCI.VID)	5 or more
# of supported Queues (TCI.PCP)	8 (and optional 6)
# of FDB entries for streams	8192
# of FDB entries for non-streams	2048
Neighborhood for hashed FDBs	4 or more
# of stream MAC addresses (per VLAN)	2048
# of gate events	3 or more
# of gPTP domains	4 or more

Quantity figures 2/2

Stream resources for inclass interference (# of port dependent)

10Mbit/s and 100Mbit/s (50% @ 1ms)	6,25kB per port
1Gbit/s (20% @ 1ms)	25kB per port
2,5Gbit/s (10% @ 1ms)	31,25kB per port
10Gbit/s (5% @ 1ms)	62,5kB per port

Resources to protect non-stream traffic (# of port dependent)

10Mbit/s and 100Mbit/s	6,25kB per port
1Gbit/s	25kB per port
2,5Gbit/s	31,25kB per port
10Gbit/s	62,5kB per port

The author of this presentation suggests to agree on quantities for the to be defined device classes in the profile.

Questions?