

Example Network Sizes

Does one size fit all?



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Motivation

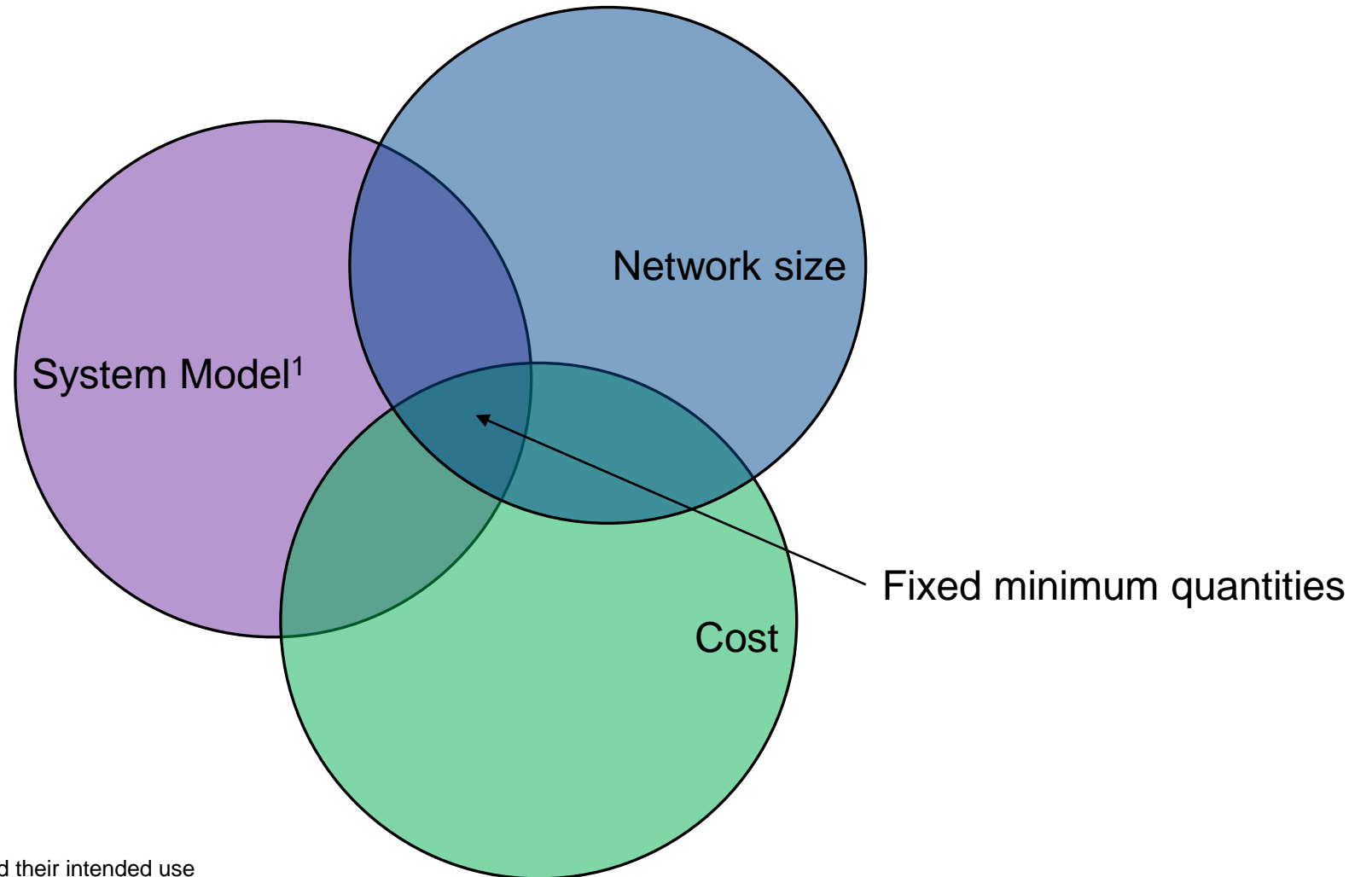
- There are ongoing discussion in IEC/IECC 60802 on parameters that need to be reported by devices as well as the question if quantities for these parameters need to be mandated for interoperability
- This presentation tries to do the following¹
 - Suggest a first (incomplete) set of parameters that need to be reported by bridges as baseline for discussion
 - Suggest a subset of these parameters for which quantities are not related to network sizes or system models, and that might be normatively required
 - Provide some sample networks of different sizes and start the discussion on quantities for the variable parameters that can be included informatively in IEC/IEEE 60802 to provide guidance to manufacturers of network devices, based on the targeted network size

¹ the views given in this presentation are the personal opinion of the presenter and do not represent any consensus within IEC/IEEE 60802

Parameters to be reported

- In order to allow for the planning of Networks as well as for their operation with TSN traffic, it is a requirement to know related system capabilities
 - For offline planning, the parameters need to be provided in some form of electronic datasheet
 - For online operation, the parameters need to be readable from the devices
- The set of parameters that is required needs to be discussed and agreed upon in the IEC/IEEE 60802 group
 - <https://www.ieee802.org/1/files/public/docs2021/60802-Steindl-et-al-ExampleSelectionTables-0221-v33.xlsx> provides a good overview over parameters that are relevant
- The quantities required for a given parameter by a device, in the opinion of this presenter, are generic in nature for some parameters and specific to the environment the device is used for others

Factors that determine Scaling



¹ Selected Ethernet features and their intended use

Parameters to be reported

- The following list provides some parameters that need to be reported in the opinion of the presenter
- The list is incomplete^{1,2} and intended as a starting point for discussion, only.
 - Link speed
 - Queues (per port)
 - VLAN ID
 - Number of streams supported
 - Number of FDB entries (for streams and non stream traffic)
 - Gate control list entries
 - Tick granularity (for gate control list)
 - Number of stream filters
 - Number of stream gates
 - Number of flow meters
 - Forwarding resources

¹ Parameters in the list are a selection taken from <https://www.ieee802.org/1/files/public/docs2021/60802-Steindl-et-al-ExampleSelectionTables-0221-v33.xlsx> - see that contribution for a more comprehensive list of parameters

² One of the parameter sets currently missing from this list are parameters around the topic of clock synchronization

Does one size fit all?

- One question being discussed in IEC/IEEE 60802 regarding parameters is:
 - Do all of the required parameters need to have a mandatory fixed quantity?
- To answer this question, it is necessary to look at the level of interoperability that IEC/IEEE 60802 wants to achieve.
- For an interoperability at the network level, in the opinion of the presenter, the answer to this question is: no.
 - Some of the parameters are related to base functionality and are not related to the size of the network
 - For these parameters fixed quantities might be mandated
 - One example for this is the number of queues per port
 - Some of these parameters are strongly influenced by the size of the network and/or the size of the bridge
 - For these parameters reported quantities seem to be preferable in the opinion of the presenter
 - Examples for this are the forwarding resources in a bridge or the number of streams supported

Parameters with fixed quantities

- Queues (per port)
- VLAN ID
- Tick granularity (for gate control list)
- Number of stream filters¹
- Number of stream gates¹
- Number of flow meters¹

¹ For these parameters there seems to be agreement that a fixed minimum quantity is required to make meaningful use of the feature

Parameters with variable quantities

- Link speed
- Number of streams supported
- Number of FDB entries (for streams and non stream traffic)
- Gate control list entries
- Forwarding resources

What is required to move forward?

- Looking at previous discussions in IEC/IEEE 60802 it is the strong opinion of the presenter, that in order to provide a profile that is meaningful to the industry the following is needed
 - Defined list of parameters that a device needs to provide
 - Mandated quantities for some of these parameters to provide consistent behavior at the network level
 - Reported quantities for the other parameters
 - This allows flexibility in device implementation to ensure good cost/benefit ratio for the user
 - One size does not fit all!
 - Conformance tests against the reported quantities of all the parameters defined in IEC/IEEE 60802
 - All parameters need to be reported online by the device and also provided offline (e.g., as electronic datasheet) for conformance testing and offline planning

Example Network sizes

- Example for a large network^{1, 2}:
 - 512 Talkers
 - 512 Listeners
 - 1000 Devices
 - >9k Streams
- Examples for medium and small networks:
 - Need to be determined. Contributions are welcome
- Quantities typically required in the different network sizes, in order to provide guidance to device vendors and users
 - Need to be determined. Contributions are welcome
- In order to assist vendors of devices and components to select the correct quantities for their products, it would be helpful to add information on network sizes and required (variable) quantities to an informative annex of IEC/IEEE 60802

¹ Numbers taken from <https://www.ieee802.org/1/files/public/docs2021/dj-Coelho-CNC-Requirements-0721-v02.pdf>, but also matches values from previous discussions

² Further discussion and validation is required in IEC/IEEE 60802 to ensure the numbers do correctly represent a network of the indicated size

Thank you

Thank you!