Capability Models for Nodes and Dynamic Behavior of CNCs & CUCs

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Agenda

1. Need for end station and bridges capabilities model
2. Behavior of CNCs and CUCs (Dynamics)

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Need for End Station and Bridges Capabilities Model

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Motivation

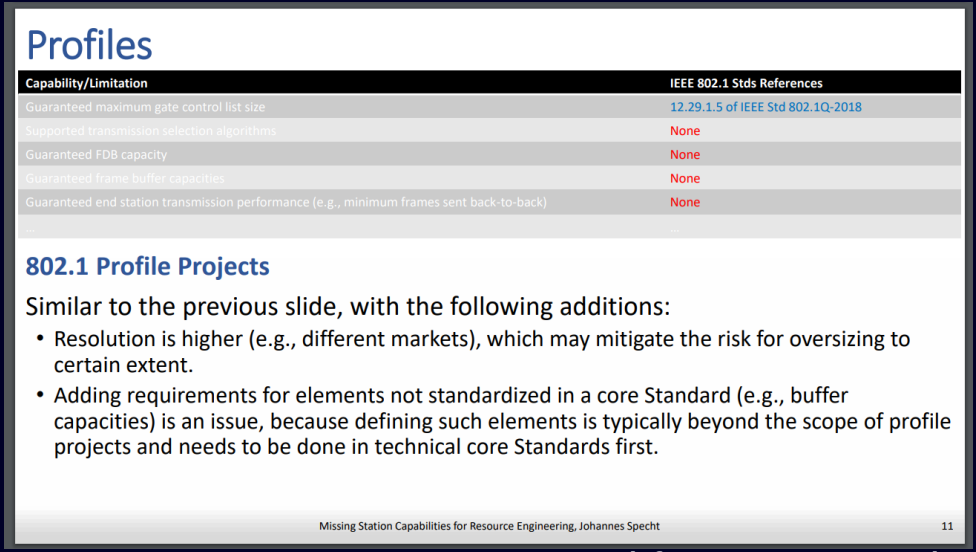
- Nodes need not to support the same capabilities, e.g. some may not support: arbitrary time aware offset, constant IPG
- Information needed to configure the network: both off-line (engineering tool) and on-line (CNC)
- Knowing the capabilities of the end stations and bridge is a pre-requirement for consistent configuration of the domain
  - How can CNC plan streams if it doesn’t know what capabilities are supported/ configured for each node in the stream path?
- Available in a machine readable format

Motivation

Need

- Means to describe supported/ configured relevant capabilities of each node in the domain to allow for the CNC to correctly plan streams

Also previously addressed in https://www.ieee802.org/1/files/public/docs2021/new-specht-dev-caps-and-limits-1121-v01.pdf



Profiles

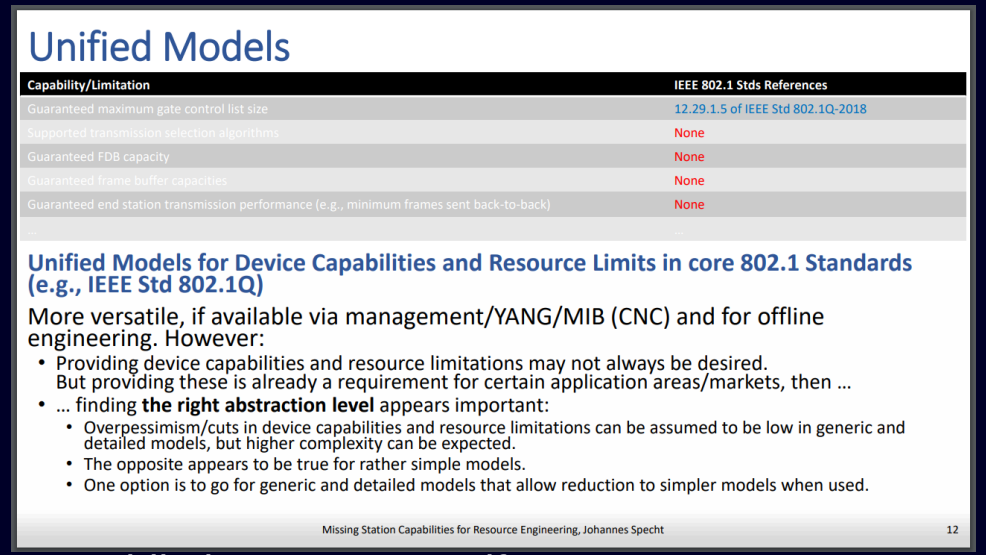
Capability/Limitation	IEEE 802.1 Stds References
Guaranteed maximum gate control list size	12.29.1.5 of IEEE Std 802.1Q-2018
Supported transmission selection algorithms	None
Guaranteed FDB capacity	None
Guaranteed frame buffer capacities	None
Guaranteed end station transmission performance (e.g., minimum frames sent back-to-back)	None

802.1 Profile Projects

Similar to the previous slide, with the following additions:

- Resolution is higher (e.g., different markets), which may mitigate the risk for oversizing to certain extent.
- Adding requirements for elements not standardized in a core Standard (e.g., buffer capacities) is an issue, because defining such elements is typically beyond the scope of profile projects and needs to be done in technical core Standards first.

Missing Station Capabilities for Resource Engineering, Johannes Specht 11



Unified Models

Capability/Limitation	IEEE 802.1 Stds References
Guaranteed maximum gate control list size	12.29.1.5 of IEEE Std 802.1Q-2018
Supported transmission selection algorithms	None
Guaranteed FDB capacity	None
Guaranteed frame buffer capacities	None
Guaranteed end station transmission performance (e.g., minimum frames sent back-to-back)	None

Unified Models for Device Capabilities and Resource Limits in core 802.1 Standards (e.g., IEEE Std 802.1Q)

More versatile, if available via management/YANG/MIB (CNC) and for offline engineering. However:

- Providing device capabilities and resource limitations may not always be desired.
  But providing these is already a requirement for certain application areas/markets, then …
- … finding **the right abstraction level** appears important:
  - Overpessimism/cuts in device capabilities and resource limitations can be assumed to be low in generic and detailed models, but higher complexity can be expected.
  - The opposite appears to be true for rather simple models.
  - One option is to go for generic and detailed models that allow reduction to simpler models when used.

Missing Station Capabilities for Resource Engineering, Johannes Specht 12

Extracted from new-specht-dev-caps-and-limits-1121-v01.pdf

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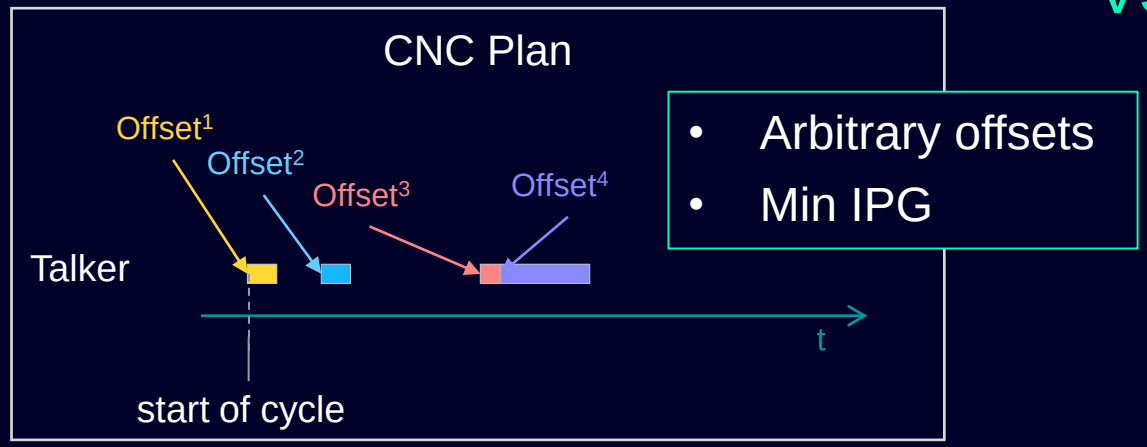
Motivation

Need

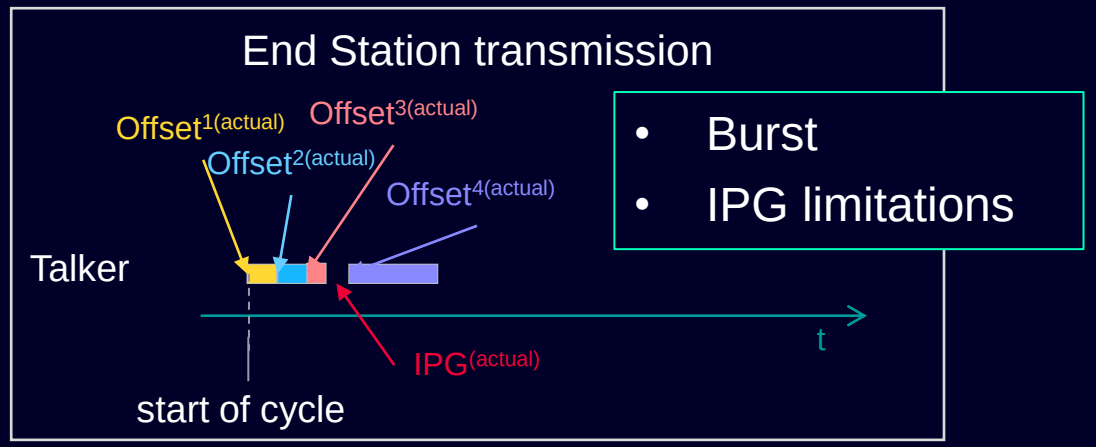
- Means to describe supported/ configured relevant capabilities of each node in the domain to allow for the CNC to correctly plan streams

CNC Assumptions



VS.

End Station Capabilities



Actual stream behavior completely different from planned

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Issue to be addressed

Required: Capability model for nodes

Where should they be addressed

- Qdj ?
- 60802 ?
- …?

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Behavior of CNCs and CUCs (Dynamics)
E.g. CUC Removal

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Motivation

Need for standardized behavior to ensure

- Multivendor
- Plug & Produce
- Converged network

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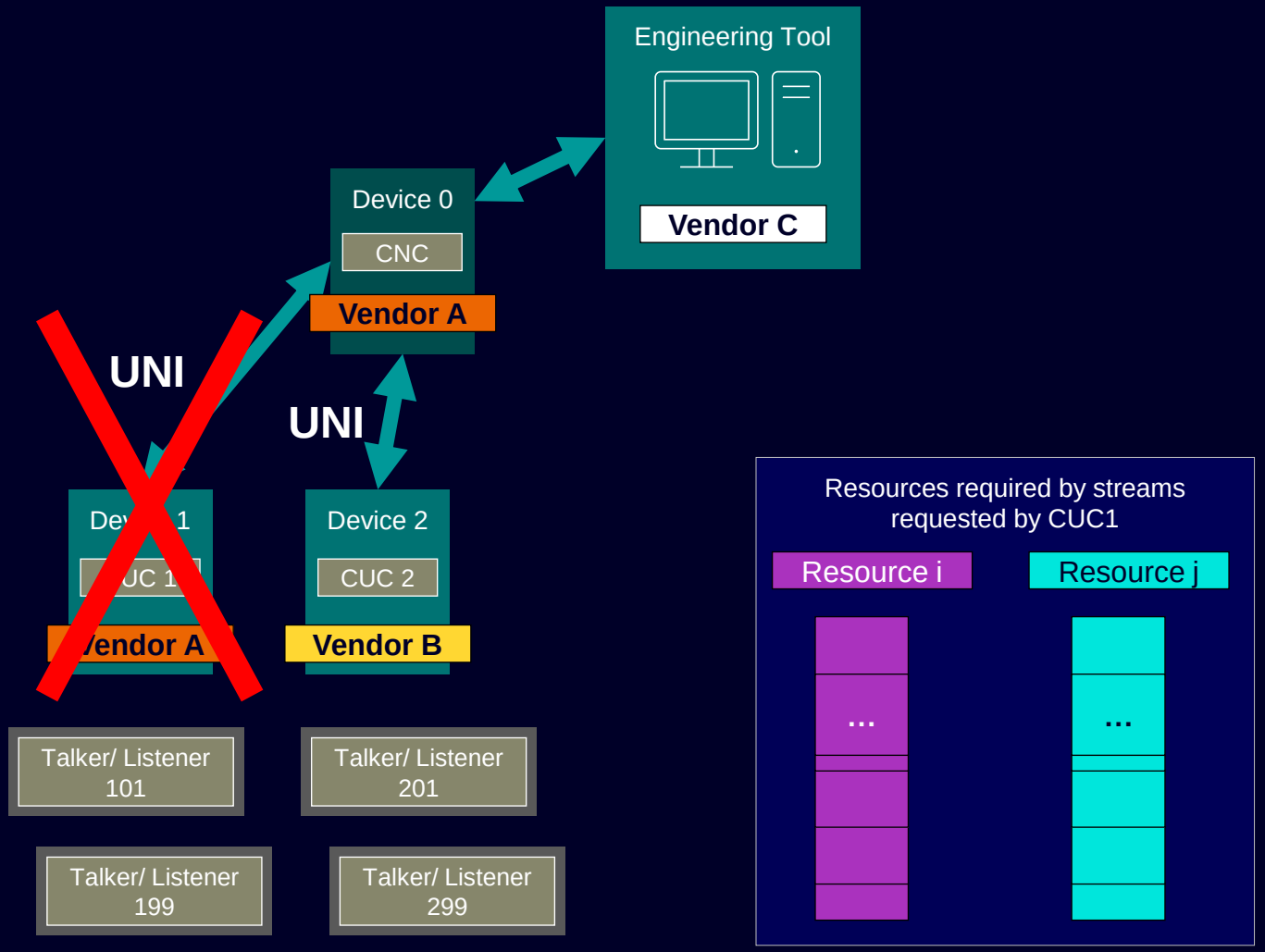
Current Qdj: Not addressed



Example 1: CNC-unaware removal of machine controlled by CUC 1

- No signaling from CUC 1
- CNC cannot auto-detect CUC 1 removal

Consequently

- CNC does not free resources of requested streams
- Zombie streams: reservations exist, stream communication (probably) does not

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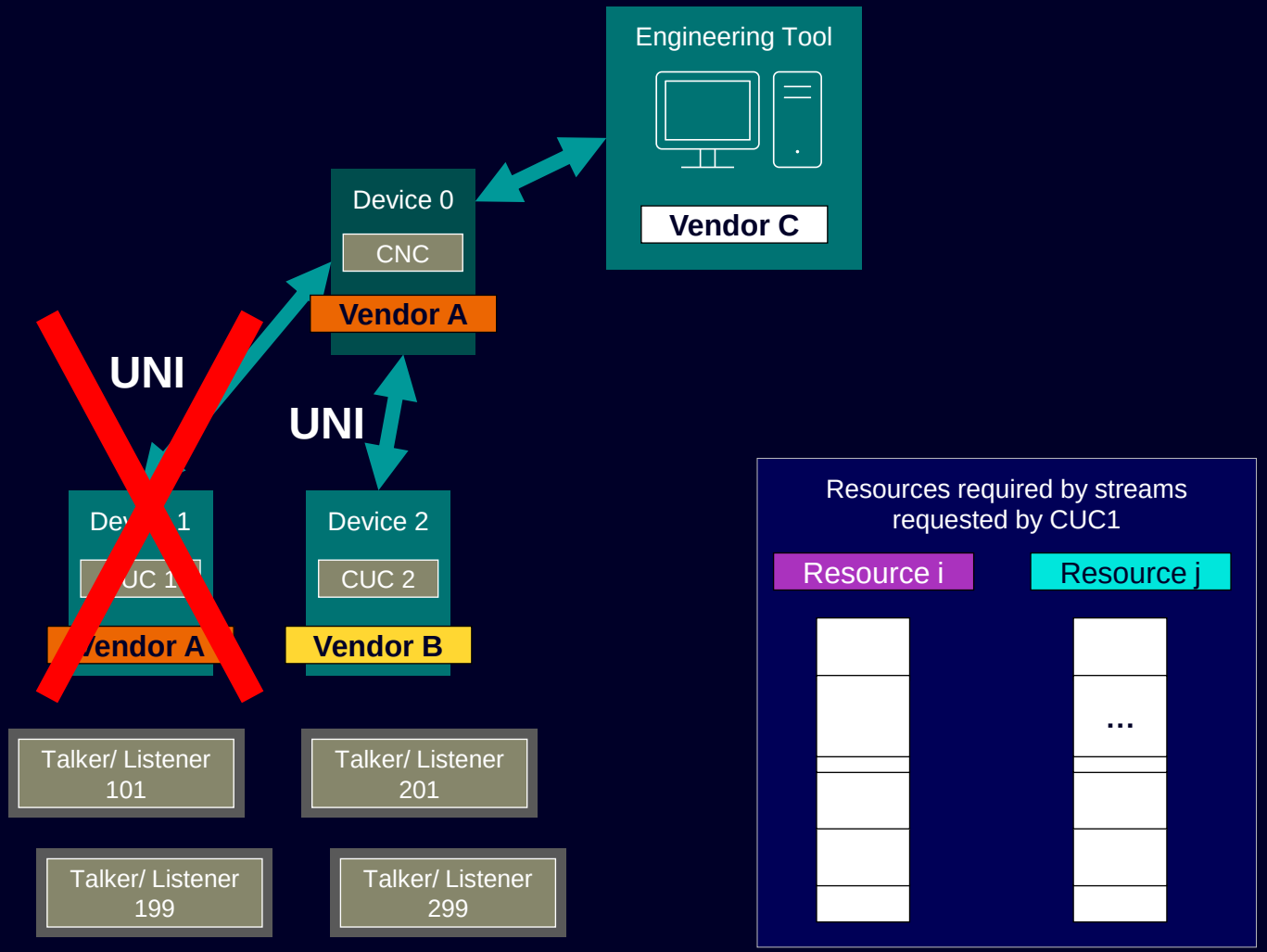
Current Qdj: Not addressed



Example 2 : CNC-aware removal of machine controlled by CUC 1

- CUC 1 requests CNC to free required resources, or
- CNC auto-detects CUC 1 removal

Consequently

- If so configured, CNC frees resources
  - Streams not available anymore
- If so configured, CNC keeps resources
  - Machine can be quickly re-inserted

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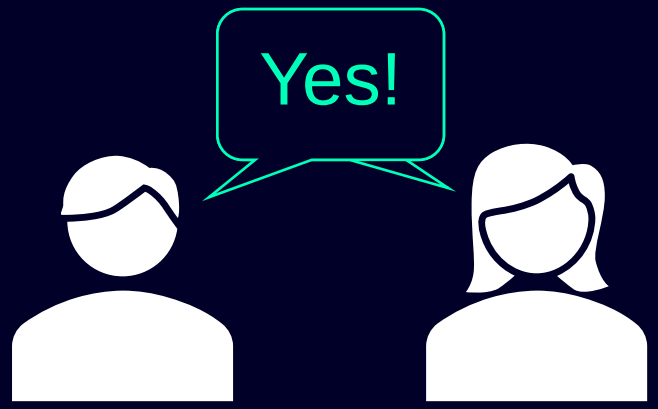
Issue to be addressed

Is CNC-aware removal a requirement for a consistent stream management in a multivendor domain?



Mr. Plug&Produce

Mrs. Converged Network

Required:

Definition for CNC behavior

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Further open issues

Currently not described in Qdj (or other Q standards)

- Power-on behavior of CNC
- On-boarding procedure
- Behavior in error detection
  - too many CUCs, CNCs, stream requests …
- Overall dynamic behavior

Where should they be addressed

- Qdj ?
- 60802 ?
- …?

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Further questions?

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