End Station Configuration
for Aerospace Profile

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Objective

- ***Discuss configuration of End Stations***

- ***Propose options for Talker/Listener configuration***

References:

- **P802.1DP Configuration - Open Issues**
  https://www.ieee802.org/1/files/public/docs2022/dp-jabbar-configuration-open-topics-0522-v01.pdf

- **IEEE Std 802.1Q-2018, IEEE Standard for Local and Metropolitan Area Networks — Bridges and Bridged Networks**

- **July Plenary 2022, https://www.ieee802.org/1/files/public/docs2022/new-jabbar-YANG-for-CBS-0722-v01.pdf**

- **IEEE Std 802.1Qdj, ieee802-dot1q-tsn-config-uni.yang**

Aerospace Configuration Model

1. Fully centralized configuration model

2. Engineered network with static topology

3. No direct comms between ES/Bridges and CUC/CNC

4. Design/Engineering tool generates all inputs (ES/Stream requirements, Device Data Sheets, Topology definitions) to CUC/CNC

5. File based configuration for all end stations and bridges

6. Integration, interoperability, and configuration across multiple TSN device vendors for an aerospace vehicle would be driven by YANG modeled configuration data...

7. This is a system integrator perspective
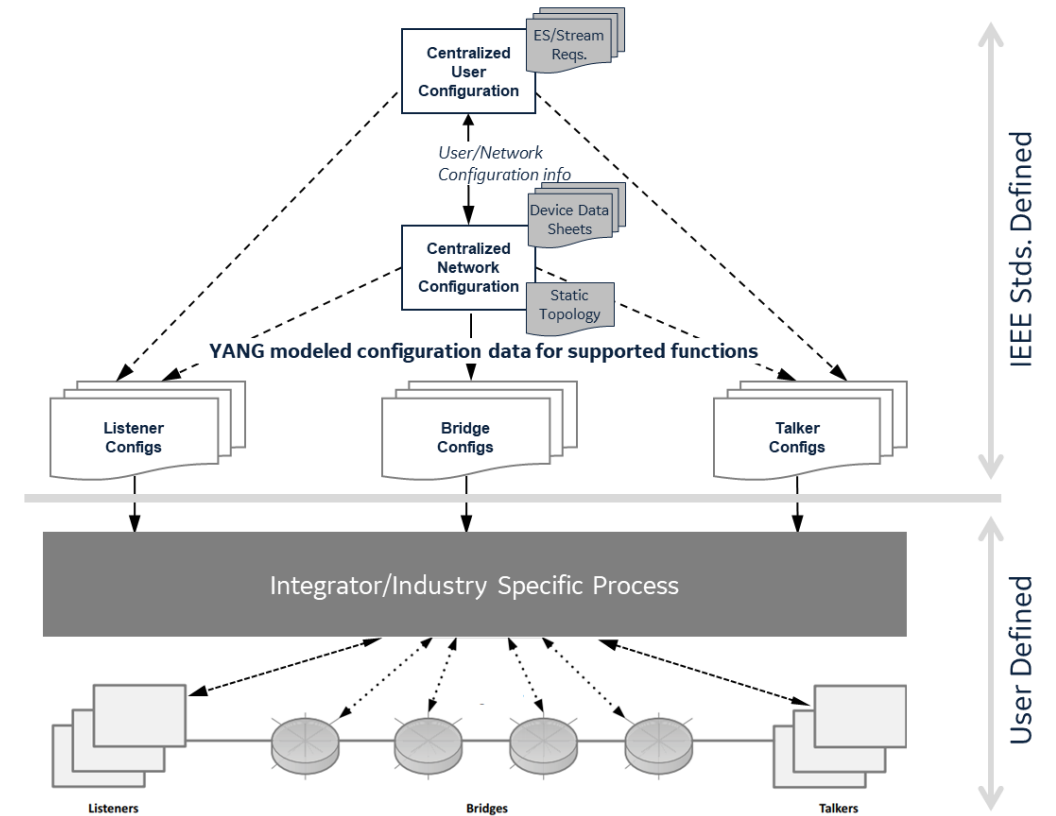
Offline configuration model for aerospace

Talker/Listener Configuration

- Typically left out of IEEE standards for configuration.
  Caveat: end station interfaces may be configurable with the standard models that target interfaces. E.g., Time Aware Shaper (Qbv)

- However, for offline configuration scenarios (like aerospace), we need to agree on the config model.

- What needs to be configured (beyond the interface)? Stream centric view

  - Stream Identification/Tagging

  - Stream Shaping (Qbv, Qav)

  - Stream Redundancy (FRER)

  - Stream Queueing/forwarding

  - Stream Policing (?)

- What elements of an end station are involved?

  - Applications

  - OSI/Network Stack

  - Interface drivers

- Proposal: Rather than focus on how the configuration is instantiated or by whom, focus on what needs to be conveyed to the end station from the config utilities
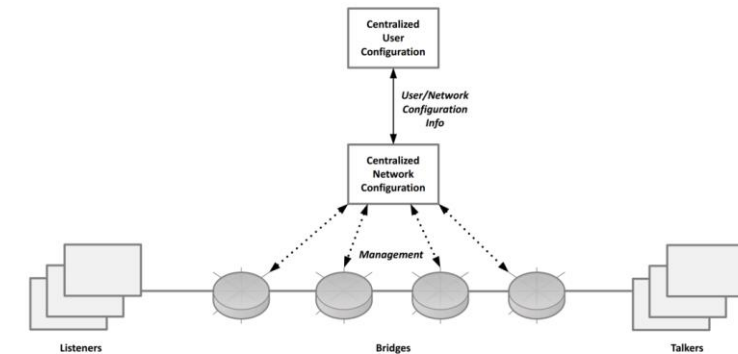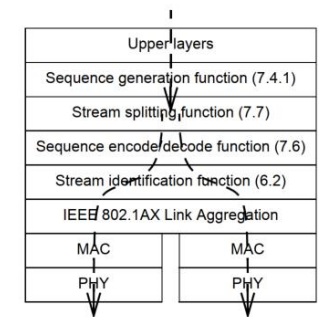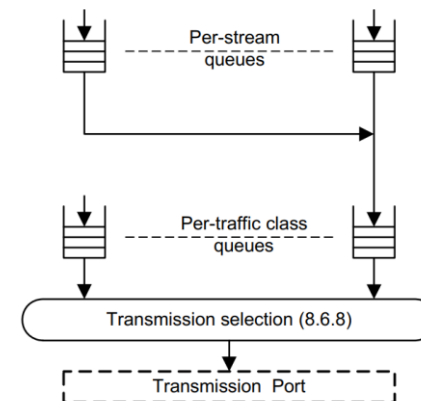

Figure 46-3—Fully centralized model

Figure C-2—Protocol stack for End System B in Figure C-1

Synchronous Applications

Talker/Listener Configuration - Approaches

1. TSN UNI as the talker/listener configuration model

2. Purpose built to expose just the right information in the right format

   - Precedent is set with fully distributed and Centralized network/distributed user models, which define UNI between talker/listeners and network
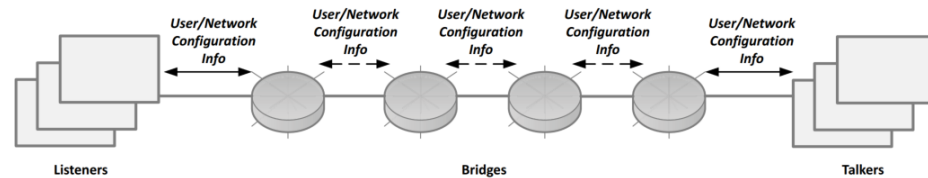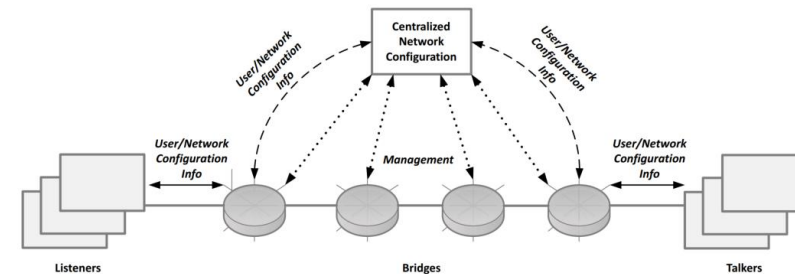

Figure 46-1—Fully distributed model

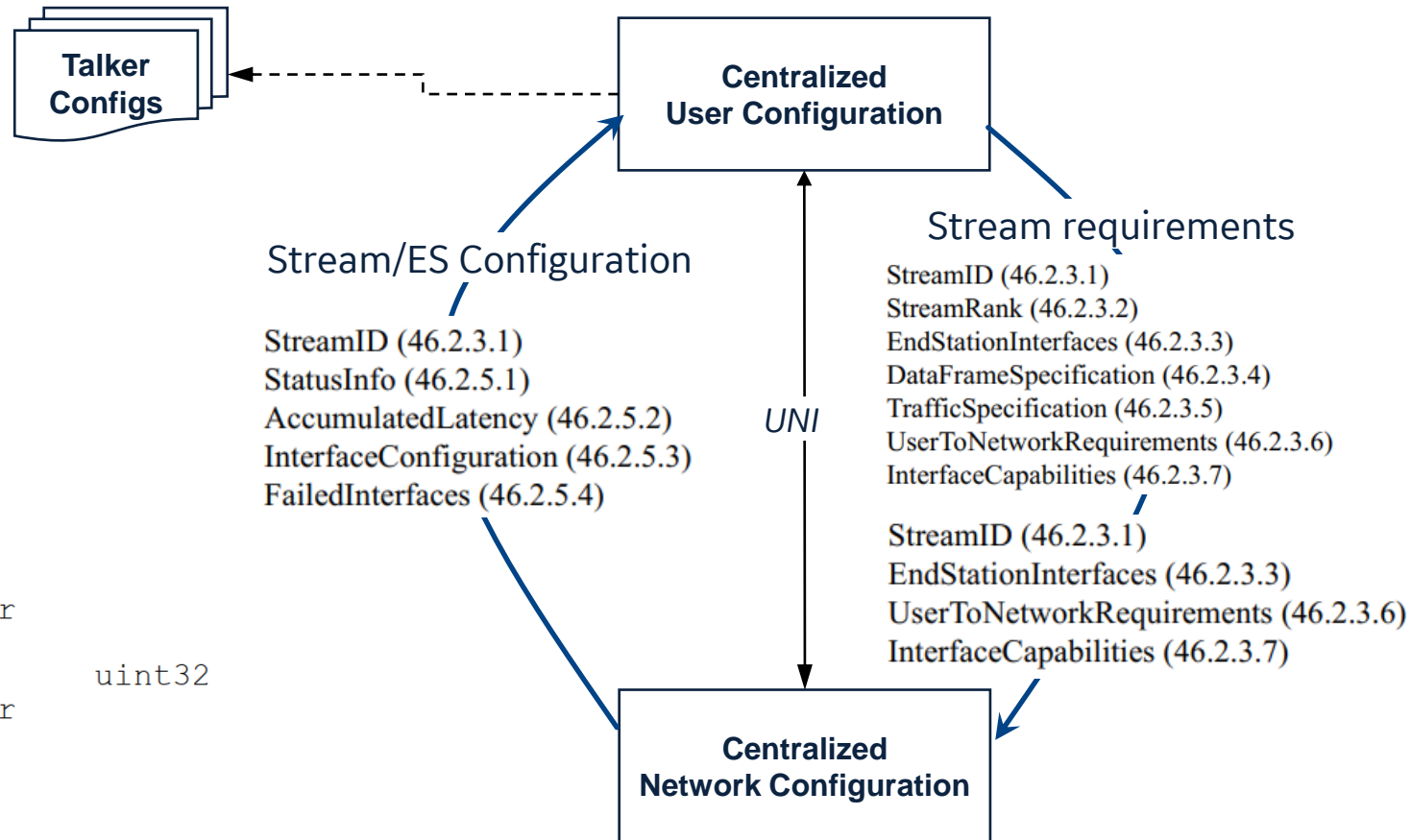Figure 46-2—Centralized network/distributed user model

TSN UNI as Talker/Listener Config Model?

Compact View of UNI Yang model

```
module: ieee802-dot1q-tsn-config-uni
  +--rw tsn-uni
    +--rw stream-list* [stream-id]
      +--rw stream-id        tsn:stream-id-type
      +--rw request
      |   +--rw talker
      |   |   +---u tsn:group-talker
      |   +--rw listener-list* [index]
      |       +--rw index                uint32
      |       +---u tsn:group-listener
    +--ro configuration!
      +---u tsn:group-status-stream
      +--ro talker
      |   +---u tsn:group-status-talker-listener
      +--ro listener-list* [index]
        +--ro index                   uint32
        +---u tsn:group-status-talker-listener
```

Talker Configs

Centralized User Configuration

Stream/ES Configuration

StreamID (46.2.3.1)
StatusInfo (46.2.5.1)
AccumulatedLatency (46.2.5.2)
InterfaceConfiguration (46.2.5.3)
FailedInterfaces (46.2.5.4)

Stream requirements

StreamID (46.2.3.1)
StreamRank (46.2.3.2)
EndStationInterfaces (46.2.3.3)
DataFrameSpecification (46.2.3.4)
TrafficSpecification (46.2.3.5)
UserToNetworkRequirements (46.2.3.6)
InterfaceCapabilities (46.2.3.7)

StreamID (46.2.3.1)
EndStationInterfaces (46.2.3.3)
UserToNetworkRequirements (46.2.3.6)
InterfaceCapabilities (46.2.3.7)

UNI

Centralized Network Configuration

References: 801.Qcc and P801.Qdj

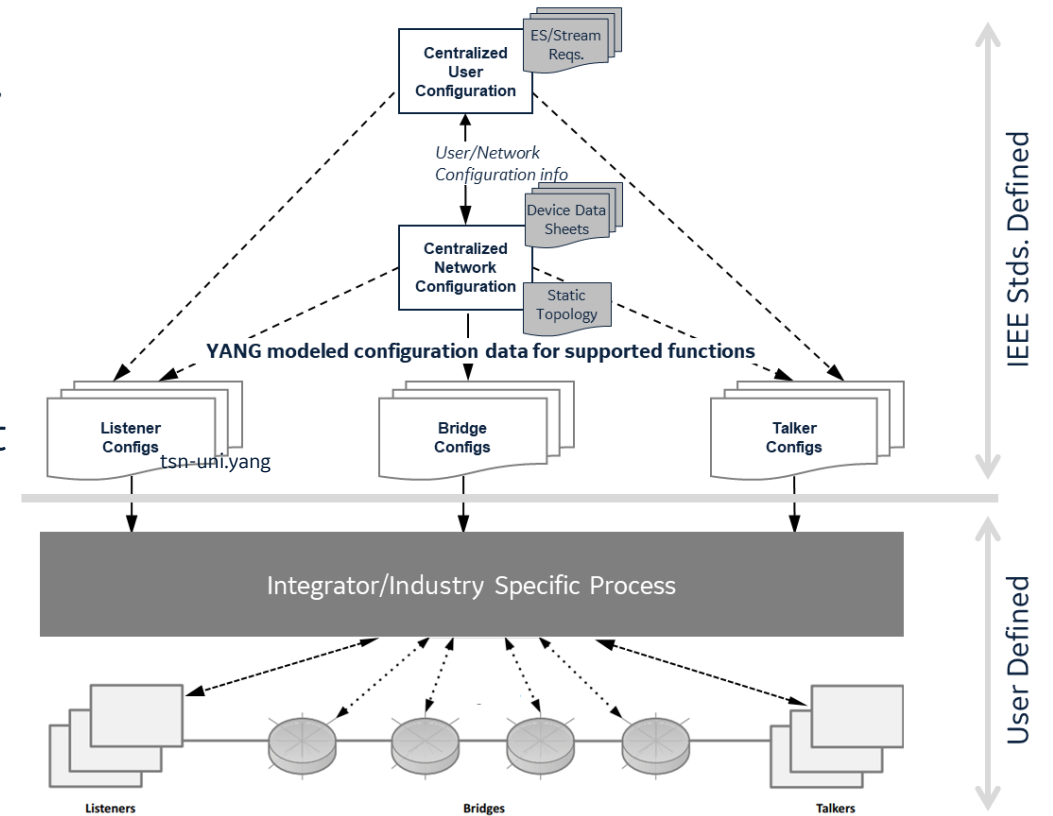# Purposed Talker/Listener Config Model for DP Option A

- Use TSN-UNI model as is for the end station offline configuration. Instance data under for Talker, Listener, and Status groups may be needed to configure the end station

- Configure the following features on Talkers/listeners with TSN-UNI

  - Synchronous applications transmission offset, period, duration

  - Asynchronous applications per-stream queue shaping with CBS

  - Stream identification/transformation (tagging)

- DP can mandate that conformant end stations shall be configurable with this model

- No new YANG work needed
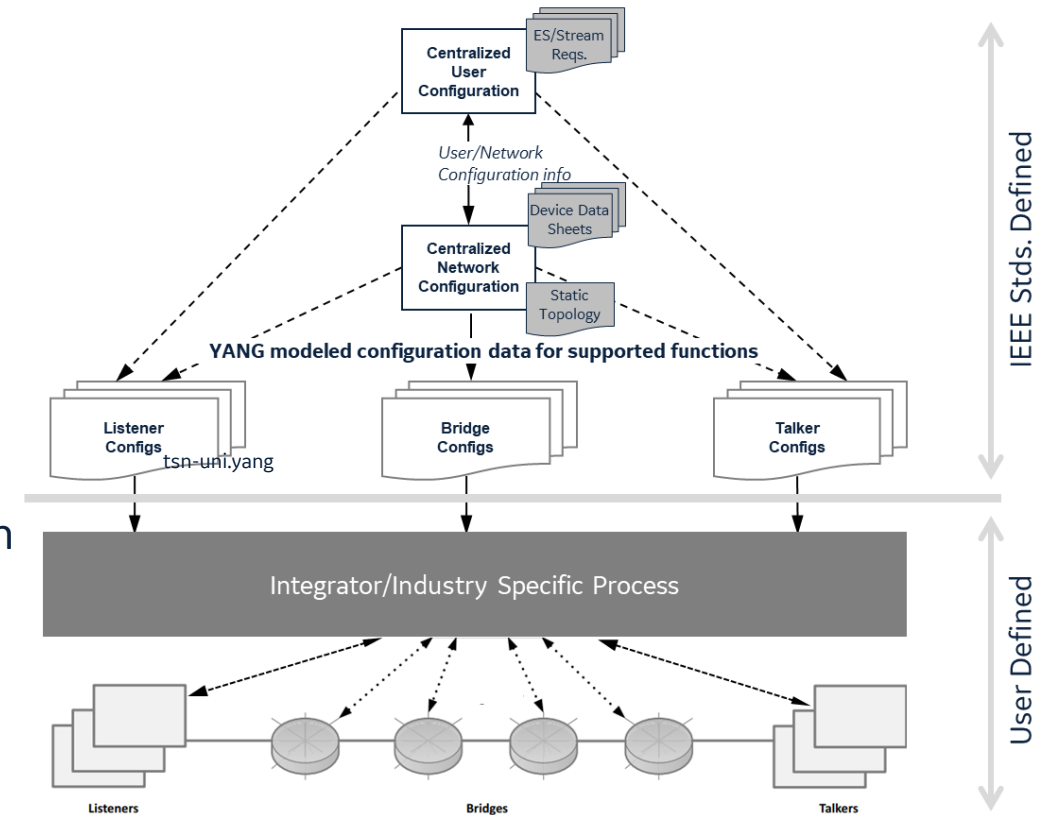
Purposed Talker/Listener Config Model for DP
Option B – Purpose Built model

- Create a new ES-Config model end station offline configuration.

- Better groupings and cleaner

- Requires new YANG work and IEEE standardization

- DP can mandate that conformant end stations shall be configurable with this model

- DP release will be dependent on completion of that new project

Building a world that works