Credit Based Shaper Configuration
YANG Model Proposal

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GE Research

Objective

- ***Requirement for CBS YANG model***

- ***Propose CBS YANG model***
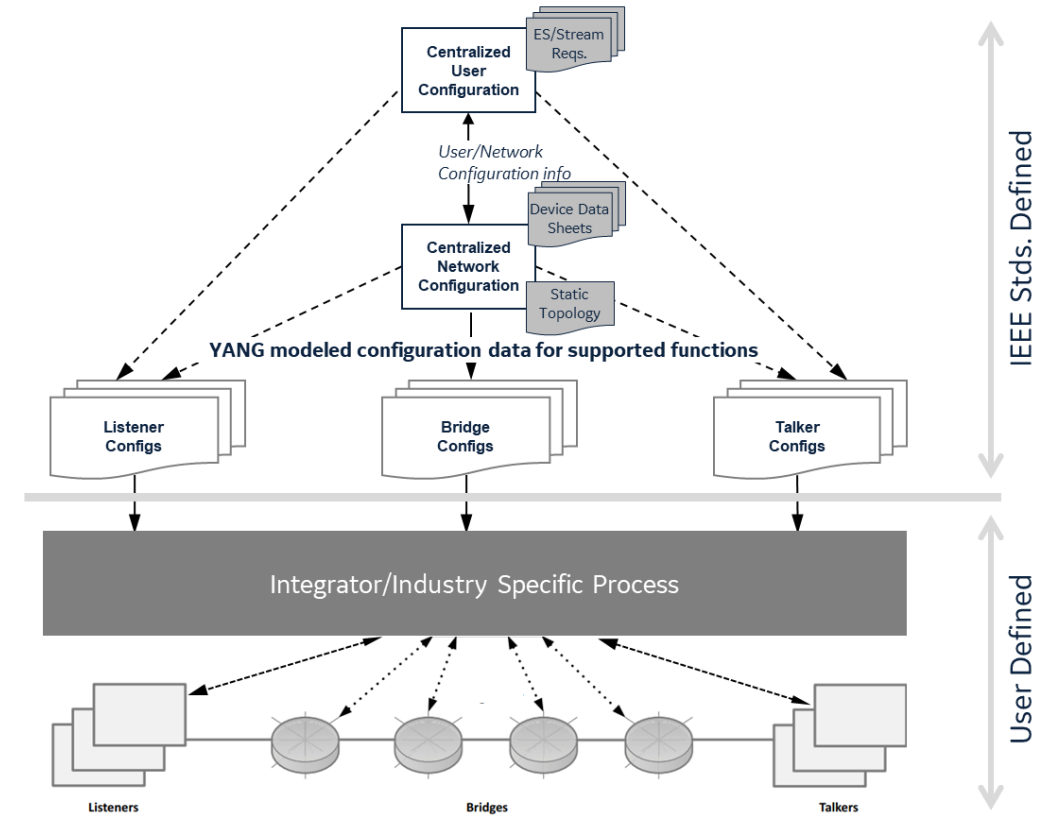
- ***Propose PAR development***

References:

- **CBS Configuration YANG Model – Sept Interim 20222**
  https://www.ieee802.org/1/files/public/docs2022/dp-markham-CBS-YANG-Model-0922-v01.pdf

- **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**

Credit Based Shaper – Configuration Requirements

1. Used by many industries (and profiles) including Pro Audio/Video, Automotive, Industrial Automation, and Aerospace

2. Enables egress shaping at the bridges

3. Enables shaping at the end stations. Includes both per-stream and per-class shaping

4. Engineered static networks in certain industries call for offline file base configuration. For example, see aerospace configuration model.

5. System integrators (of platforms, vehicles, etc) require configuration interoperability – calls for a standard IEEE YANG model.

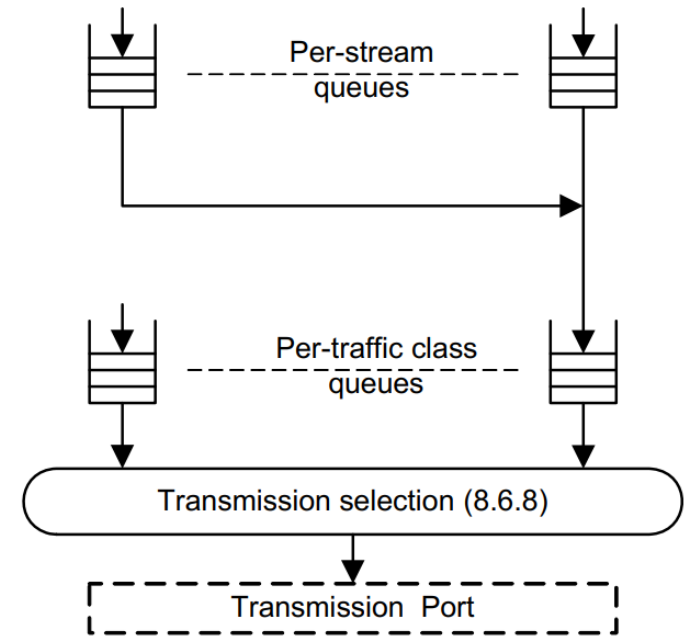6. Current projects do not have CBS YANG model in scope

Example offline configuration model for aerospace

Credit Based Shaper- YANG Model Proposal for Interface Configuration

- **Approach**:

  - Define a YANG model for the interface CBS configuration based on the FQTSS MIBs

  - Per-Stream (queue) configuration can be addressed by talker/listener configuration from CUC and can use other means to be discussed in a separate contribution.

Credit Based Shaping for End Stations, IEEE 802.1Q-2018, Clause 34.6

Credit Based Shaper- YANG Model Input

Relevant parameters for CBS configuration are defined in clause 34.3

34.3 The bandwidth availability parameters

The following bandwidth availability parameters exist for each Port, and for each traffic class, N, that is configured as an SR class (34.5):

a) **portTransmitRate** as defined in 8.6.8.2;

b) **deltaBandwidth(N)**: The bandwidth, represented as a percentage of *portTransmitRate*, that can be reserved by SRP for use by the queue associated with traffic class N. The interpretation of *deltaBandwidth(N)* is determined by the value of the associated *lockClassBandwidth(N)* as specified in 34.3.1 and 34.3.3.

c) **adminIdleSlope(N)**: The bandwidth, in bits per second, that has been requested by management to be reserved for use by the queue associated with traffic class N. If SRP is in operation for traffic class N, this parameter has no effect. If SRP is not in operation for traffic class N, then the value of *operIdleSlope(N)* is always equal to the value of *adminIdleSlope(N)*.

d) **operIdleSlope(N)**: The actual bandwidth, in bits per second, that is currently reserved for use by the queue associated with traffic class N (see 34.6.1 and 34.6.2).

e) **classMeasurementInterval(N)**: The interval of time, in seconds, over which SRP's TSpec (34.4, 35.2.2.8.4) is measured for traffic class N at the Talker.

f) **lockClassBandwidth(N)**: The Boolean parameter that determines the interpretation of *deltaBandwidth(N)*. For the value false (default), *deltaBandwidth(N)* is specified in 34.3.1. For the value true, *deltaBandwidth(N)* is specified in 34.3.3.

Based directly on 802.1Q-rev1.2's FQTSS MIB

Uses subset of MIB, and 64-bit capability

Table 17-18—IEEE8021-FQTSS-MIB structure

IEEE8021-FQTSS-MIB table/object	References
ieee8021FqtssBap subtree	
ieee8021FqtssBapTable	Bandwidth Availability Parameter Table, 12.20.1, 34.3
ieee8021FqtssBAPTrafficClass[*]	Traffic class
ieee8021FqtssDeltaBandwidth	deltaBandwidth, 12.20.1, 34.3
ieee8021FqtssOperIdleSlopeMs	operIdleSlope, 12.20.1, 34.3
ieee8021FqtssOperIdleSlopeLs	operIdleSlope, 12.20.1, 34.3
ieee8021FqtssAdminIdleSlopeMs	adminIdleSlope, 12.20.1, 34.3
ieee8021FqtssAdminIdleSlopeLs	adminIdleSlope, 12.20.1, 34.3
ieee8021FqtssMappings subtree	
ieee8021FqtssTxSelectionAlgorithmTable	Transmission Selection Algorithm Table, 12.20.2, 8.6.8
ieee8021FqtssTrafficClass[*]	Traffic class
ieee8021FqtssTxSelectionAlgorithmID	Transmission selection algorithm, 12.20.2, 8.6.8
ieee8021FqtssSrpRegenOverrideTable	SRP domain boundary port priority regeneration override table, 12.20.3, 35.1.4, 6.9.4
ieee8021FqtssSrClassPriority[*]	Received priority
ieee8021FqtssPriorityRegenOverride	Regenerated priority, 12.20.3, 6.9.4
ieee8021FqtssSrpBoundaryPort	SRPdomainBoundaryPort, 12.20.3, 35.1.4

Proposed YANG model for CBS

Propose Yang model is attached/embedded in the PDF

YANG Tree

```
module: ieee802-dot1q-fqtss

  augment /ietf-interfaces:interfaces/ietf-interfaces:interface:
    +--rw cbs-parameters {credit-based-shaper}?
      +--rw port-transmit-rate?    uint64
      +--rw class* [traffic-class]
        +--rw traffic-class                ieee802-dot1q-types:traffic-class-type
        +--rw delta-bandwidth?             uint32
        +--rw admin-idle-slope?            uint64 <0>
        +--rw class-measurement-interval   uint32
        +--rw lock-class-bandwidth?        boolean <false>
```

CBS YANG Model – Example Instance Data

```xml
<interfaces xmlns="urn:ietf:params:xml:ns:yang:ietf-interfaces">
  <interface>
    <name>0</name>
    <type xmlns:ianaift="urn:ietf:params:xml:ns:yang:iana-if-type">ianaift:ethernetCsmacd</type>
    <cbs-parameters xmlns="urn:ieee:std:802.1Q:yang:ieee802-dot1q-fqtss">
      <port-transmit-rate>1000000000</port-transmit-rate>
      <class> <!-- Reserve 10% (100Mbps) for class 5, on 1ms interval -->
        <traffic-class>5</traffic-class>
        <delta-bandwidth>10000000</delta-bandwidth>
        <admin-idle-slope>100000000</admin-idle-slope>
        <class-measurement-interval>1000000</class-measurement-interval>
        <lock-class-bandwidth>true</lock-class-bandwidth>
      </class>
      <class> <!-- Reserve 5% (100Mbps) for class 4, on 1ms interval -->
        <traffic-class>4</traffic-class>
        <delta-bandwidth>5000000</delta-bandwidth>
        <admin-idle-slope>50000000</admin-idle-slope>
        <class-measurement-interval>1000000</class-measurement-interval>
        <lock-class-bandwidth>true</lock-class-bandwidth>
      </class>
    </cbs-parameters>
  </interface>
</interfaces>
```

Summary and Proposal

- A YANG model is needed for configuration of credit-based shaper on interfaces

- An initial YANG model has been proposed based on FQTSS MIBs

- **_Proposal:_** Develop a new PAR for IEEE 802.1 standard CBS YANG model

  - Will have a motion for PAR development

Building a world that works