IEC/IEEE 60802 Generic traffic types vs. Traffic classes

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References

See
http://www.ieee802.org/1/files/public/docs2020/dg-turner-traffic-classification-0920-v01.pdf
from Max Turner

Principle

When specifying traffic class types, a two step approach seems to be needed.

This two step approach allows a clear differentiation between “Ethernet interface and network” and “application”.

1.) First do generic traffic type (class) definition and second define instances of the generic types

2.) Translate the different use cases into a list of possible traffic classes based on this generic traffic types

Stream

- time-aware stream
- stream

Stream traffic is an unidirectional flow of data from a Talker to one or more Listeners, which is usually sent periodically. Network resources and/or bandwidth may be reserved in order to meet the application requirements (e.g., latency).

System view - streams are either:

- dynamic planned and configured in a network by means of (ad-hoc) stream reservation mechanisms (online ad-hoc planning)
- statically planned and/or configured by means of traffic engineering tools (offline planning)

Stream traffic shall be configured such that its configuration is not affected by the spanning tree mechanisms alone.

Expected behavior of streams in case of frame loss

- No retransmission

Expected behavior of the application interface

- Buffered communication (only the latest received frame is of interest)

Non-stream

- non-stream (traffic engineered)
- non-stream (bulk)

Non-stream traffic is a flow of data from a Sender to one or more Receivers which is usually send sporadically and share network resources which are reserved to meet potential application requirements.

Ethernet interface and network is configured at run-time to establish a path between Sender and Receiver. Non-stream traffic configuration may be affected by the spanning tree mechanisms.

Expected behavior in case of frame loss
- Retransmission

Expected behavior of the application interface
- Queued communication (all received frame are of interest)

Generic traffic types
Stream

time-aware stream [are used for]

- periodic, deadline*(latency), zero congestion loss, time-triggered transmit (optional per frame), traffic engineered transmission path
  - No retransmission (in case of frame loss)

- periodic, latency(network resources), zero congestion loss, time-triggered transmit (optional per frame), traffic engineered transmission path
  - No retransmission (in case of frame loss)

stream [are used for]

- periodic, latency(network resources), time-triggered transmit, learned path
  - No retransmission (in case of frame loss)

* Multiple streams may share the same deadline value

Generic traffic types
Non-stream

non-stream (traffic engineered*) [are used for]
- network management
- events and alarms
  - Acknowledge transmission; retransmission in case of error
- configuration and diagnostic (for application AND network)
  - Acknowledge transmission; retransmission in case of error
- intra-domain

non-stream (bulk) [are used for]
- best effort
- Inter-domain

* Expected bandwidth usage engineered offline, (optional) Ethernet interfaces configured accordingly

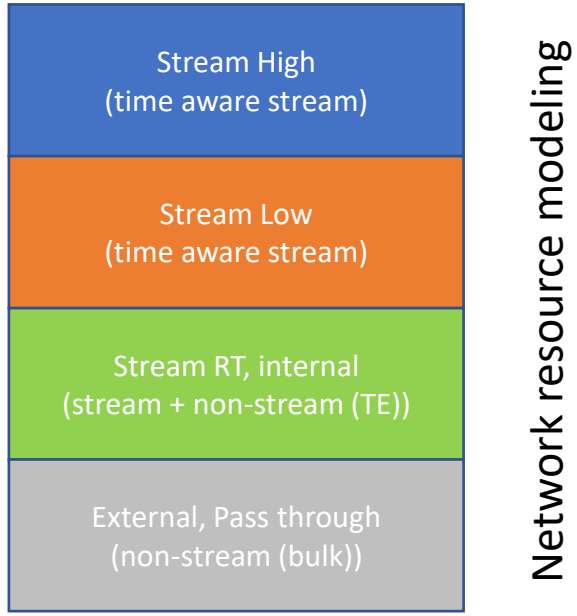
Generic traffic types Network resources

Network resources need to be assigned to the four generic traffic classes

- time-aware stream
- stream
- non-stream (traffic engineered)
- non-stream (bulk)

to ensure

- Zero congestion loss for class time-aware stream
- Bandwidth assignment for both TE classes, class stream and class non-stream
- Protection against external/pass-through traffic for non-stream (bulk)



Sanity check

Q:
How do we sort in an application (Iso application) which requires a common deadline (Listener) for frames together with a latest transmit time (Talker)?

A:
time-aware stream [are used for]
- periodic, deadline*(latency), zero congestion loss, time-triggered transmit (optional per frame)
    - No retransmission (in case of frame loss)

* Multiple streams may share the same deadline value

Seems to work!

Example

Example usage

Vertical “A” defines the usage of the following traffic classes based on the traffic types:

1. **[time-aware-stream]** Periodic, traffic engineered path, time-sensitive stream, zero congestion loss, defined receive deadline (engineered max latency)
2. **[time-aware-stream]** Periodic, traffic engineered path, time-sensitive stream, zero congestion loss, engineered max latency
3. **[stream]** Periodic, learned path, time-sensitive stream, defined bandwidth, engineered max latency
4. **[non-stream]** Event-driven, learned path, defined bandwidth, network management
5. **[non-stream]** Event-driven, learned path, defined bandwidth
6. **[non-stream]** Event-driven, learned path, defined bandwidth
7. **[non-stream (bulk)]** Event-driven, learned path, defined bandwidth
8. **[non-stream (bulk)]** Event-driven, learned path, defined bandwidth

Conclusion

Conclusion

Defining generic traffic classes seems to be possible and should help in the IEC/IEEE 60802 discussion.

Generic traffic types would allow different IEEE 802 feature selections to achieve the specified goals.

Generic traffic types – as templates - are assigned to traffic classes which are used by applications.

Questions ?