



Traffic Categories & Overall Performance Goals

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Purpose

- To build consensus on
 - Traffic types
 - Priority
 - Overall required performance goals
- Understanding and agreeing on above parameters is required for optimum TSN strategy

Automotive In-Vehicle Traffic Types

- Command & Control 1 – Time critical and safety-relevant control signals
- Command & Control 2 – Status, A/C, seats, infotainment system, etc.
- Network Control/Management – PTP, LLDP, network configuration, network diagnostics
- Audio – Chimes/Alerts, entertainment
- Video Stream 1 – Sensor fusion related features (AR/V2V/ Driver Assist)
- Video Stream 2 – Camera at low speed, Streaming, Map, Entertainment, Web, Audio
- Best Effort – Data upload, OTA download, vehicle diagnostic

Traffic Priority

PCP	Priority	Traffic type	Attributes	Criticality	Link Utilization	Loss Tolerance
7	Highest	Command & Control 1 Timing constraint: 1ms	Size: 64 – 512 bytes Periodicity: 1 – 20ms	High	1 - 5%	None
6	.	Reserved for future use	N/A	N/A		N/A
5	.	Video Stream 1 Timing constraint: 2ms	Size:1518 bytes AVB SR - A	High	1 - 5%	Few
4	.	Command & Control 2 Timing constraint: 100ms	Size: 64 –1518 bytes Periodicity: 21 – 500ms	Medium	1 - 40%	Few
3	.	Network Control/Management Timing constraint: 100ms	Size: 64 – 500 bytes	Medium	1 - 5%	Few
2	.	Reserved for future use	N/A	N/A		N/A
1	.	Video Stream 2 Timing constraint: 50ms	Size:1518 bytes AVB SR - B	Low	1 - 20%	Some
0	Lowest	Best Effort (Data Tx, Diag., Others) Timing constraint: 2000ms	Size: 64 – 1518 bytes	Low	25%+	Some

Definitions

- PCP: Priority Code Point.
- Timing constraint (latency) - The time within which an Ethernet frame is required to be received.
 - Measured from MAC (source) to MAC (destination) as time taken from first bit out to last bit in with a maximum of 3 hops.
- Periodicity - Rate at which streams are scheduled
- Criticality - Application criticality rating
 - High: Critical system malfunction may occur if packet is lost or delayed.
 - Medium: Degraded operation may occur if packet is lost or delayed.
 - Low: Packet loss can be compensated by retransmission; delayed packets will not cause major loss in functionality.
- Loss Tolerance - Tolerance to consecutive packet loss
 - None: 0 frame loss
 - Few: TBD
 - Some: TBD

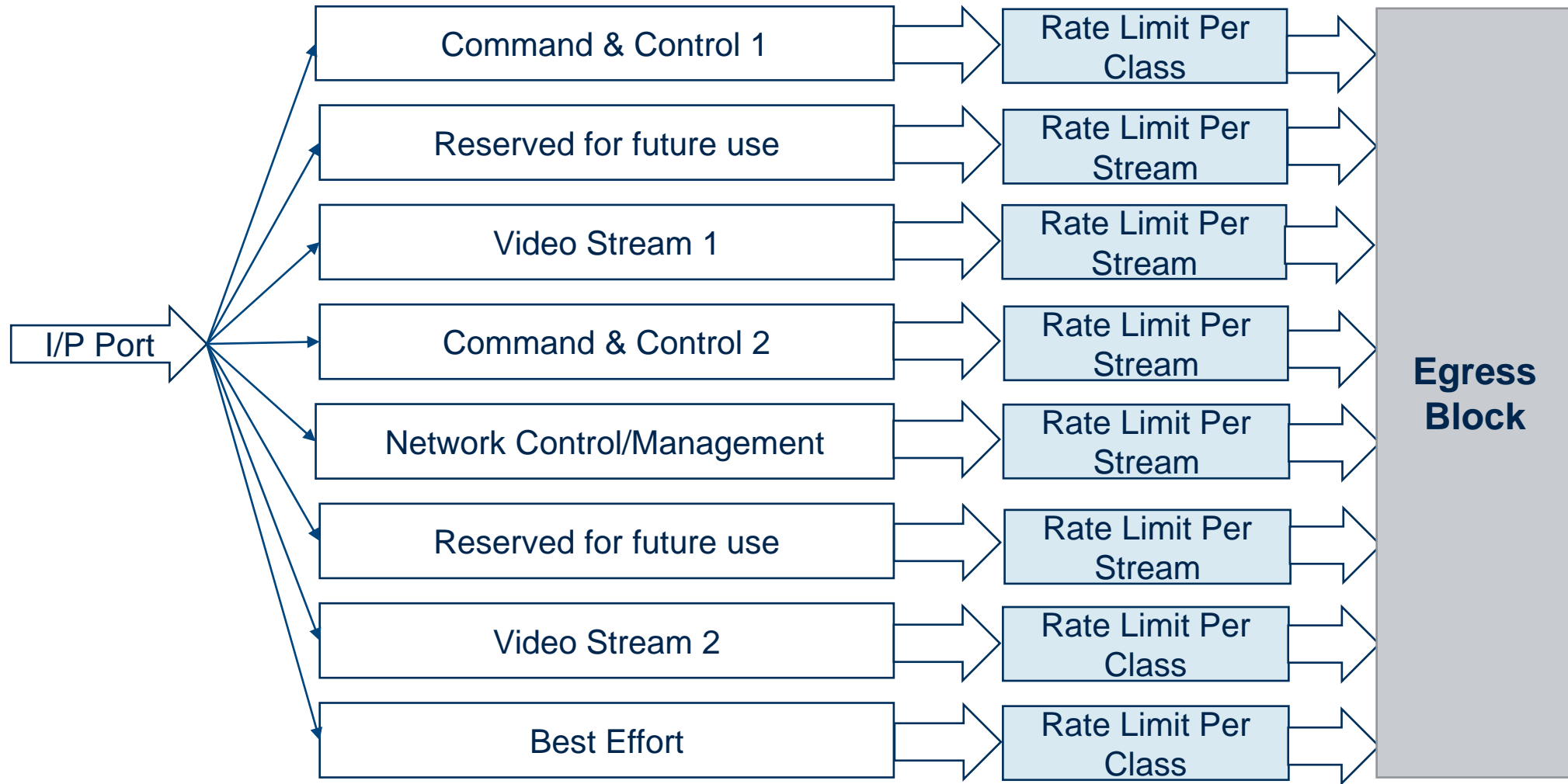
Video utilization over Ethernet

Video Type	Raw Rate (Mb/s)	150:1 Rate (Mb/s)	35:1 Rate (Mb/s)
NTSC 720x486 d32 @30FPS	342	2.3	9.8
720p HD 1280x720 d24 @30FPS	676	4.5	19.3
1080p HD 1920x1080 d24 @30FPS	1523	10.2	43.5

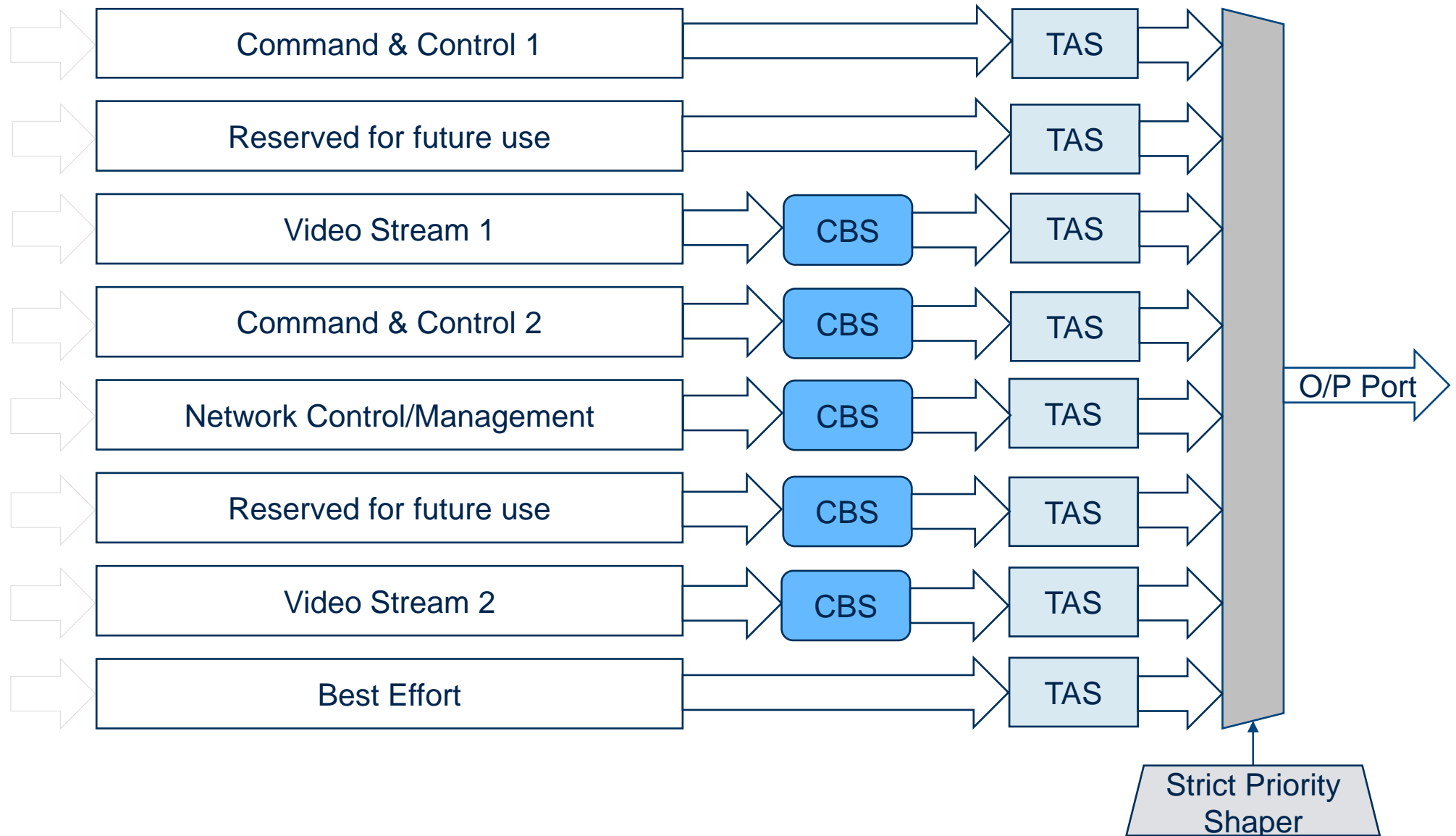
Too many input/output combinations

Examples of Ingres/Egress profile that well-defined priority classes can feed into

Ingress Profile



Egress Profile



Definitions

- CBS – Credit Based Shaper
- TAS – Time Aware Shaper



Thank you!