



# Path Computation Based on Precision Availability Metrics

draft-contreras-pce-pam-02

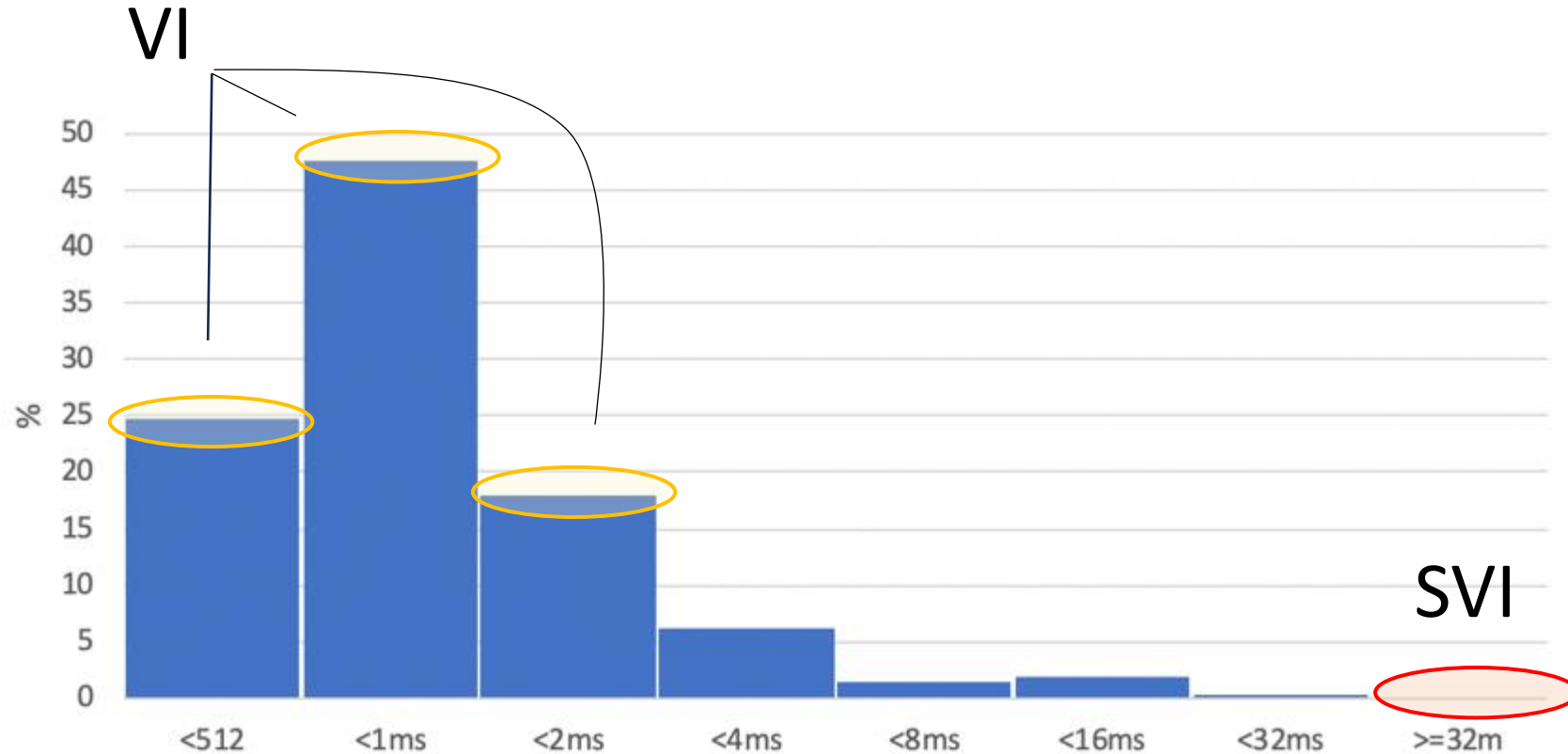
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# Motivation

- Some communication services present performance requirements expressed as Service Level Objectives (SLO)
  - E.g., RFC 9543 Network Slice [RFC 9543] or deterministic [RFC5878] [RFC8655] services
- IPPM WG is defining Performance Availability Metrics (PAM) for defining and monitoring SLOs [I-D.ietf-ippm-pam]
- PCE nowadays can compute or select paths based on metrics that can represent a bound or maximum
  - The path metric must be less than or equal such value
  - The path metric observed represents the current behavior
- For services with SLOs is convenient to evaluate the path behavior along the time before selection

# Statistical distribution of latency (e.g., histogram)



# PAM metrics

- **Violated Interval (VI)** is a time interval during which at least one of the performance parameters presents degradation respect to a predefined optimal level threshold.
- **Severe Violated Interval (VI)** is a time interval during which at least one of the performance parameters presents degradation respect to a predefined critical level threshold.

- **Violated Interval Ratio (VIR)** is defined as the ratio of the summed numbers of VIs and SVIs to the total number of time unit intervals along a predefined availability period.
- **Severely Violated Interval Ratio (SVIR)** is defined as the ratio of SVIs to the total number of time unit intervals along a predefined availability period.

# PRECISION METRIC Object

Proposed new PRECISION METRIC Object

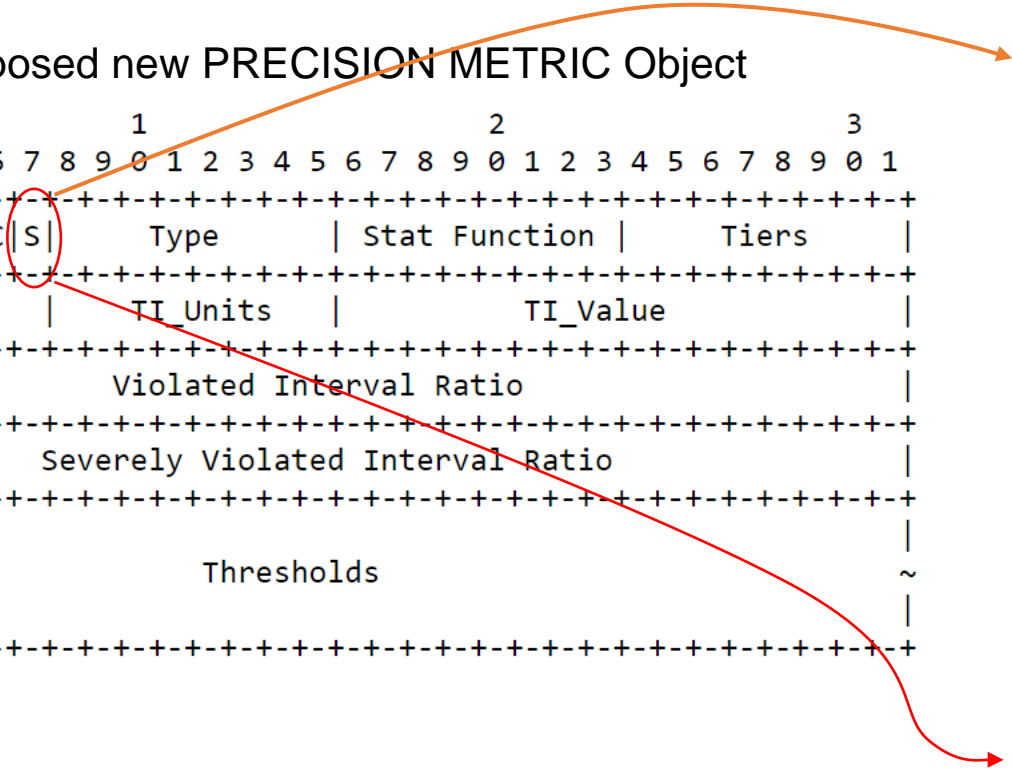
0										1										2										3																			
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AvPeriod										TI Units										TI_Value																													
										Violated Interval Ratio																																							
										Severely Violated Interval Ratio																																							
																														Thresholds																			

S=0 - only an optimal and critical thresholds are considered

0										1										2										3									
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
										Optimal Threshold										Tier Boundary																			
										Optimal Threshold																													
										Critical Threshold																													

S=1 - several thresholds are considered

0										1										2										3									
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										Tier 1 Boundary																													
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										...																													
										Tier N-1 Boundary																													
										Threshold for Tier N-1																													
										Critical Threshold																													



# Examples

- From [I-D.ietf-ippm-pam], consider a path delay metric is statistically defined in the form of:
  - not to exceed 30 ms for any packet;
  - to not exceed 25 ms for 99.999% of packets;
  - to not exceed 20 ms for 99% of packets
- Assume availability expectation for this service is VIR of 5% and SVIR of 0,2%, with availability period of one day, and time interval is considered 1 hour

0										1										2										3									
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
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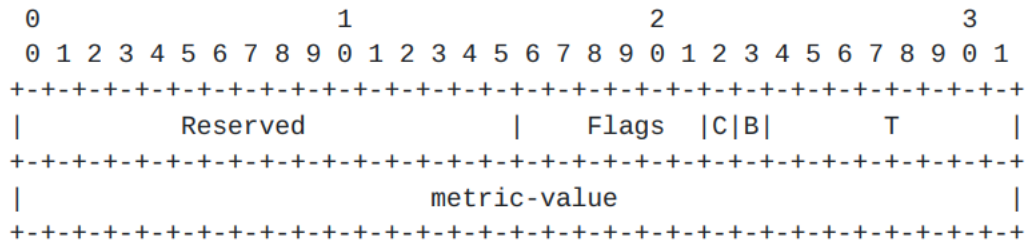
# Next steps

- Continue with the analysis of potential impacts on the Routing Backus-Naur Form grammar
- Collect feedback from the WG
- Clarify what is the better way to follow: extension of METRIC Object vs new PRECISION METRIC Object
  
- Prepare new version for IETF 120

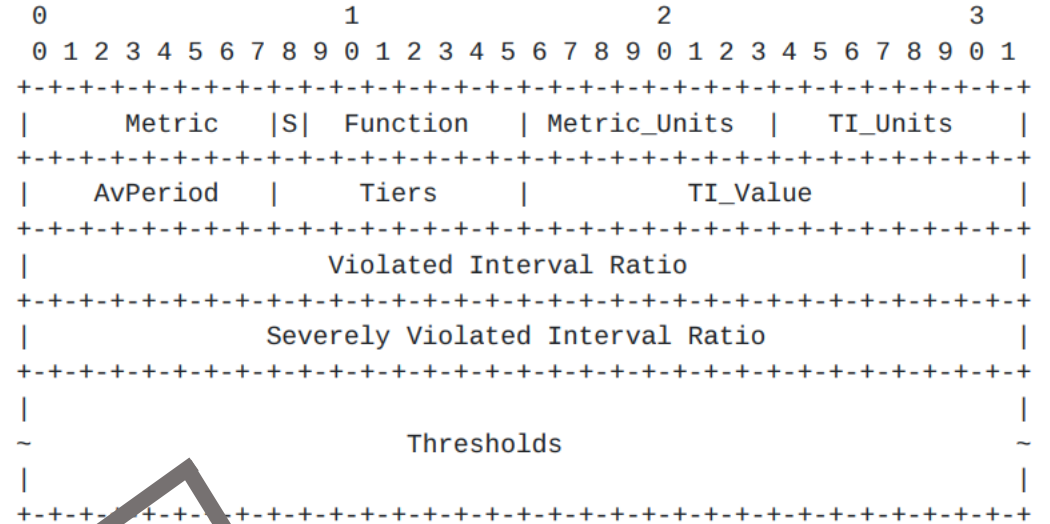
# Backup - Proposal in v00/01

## Extension of METRIC object

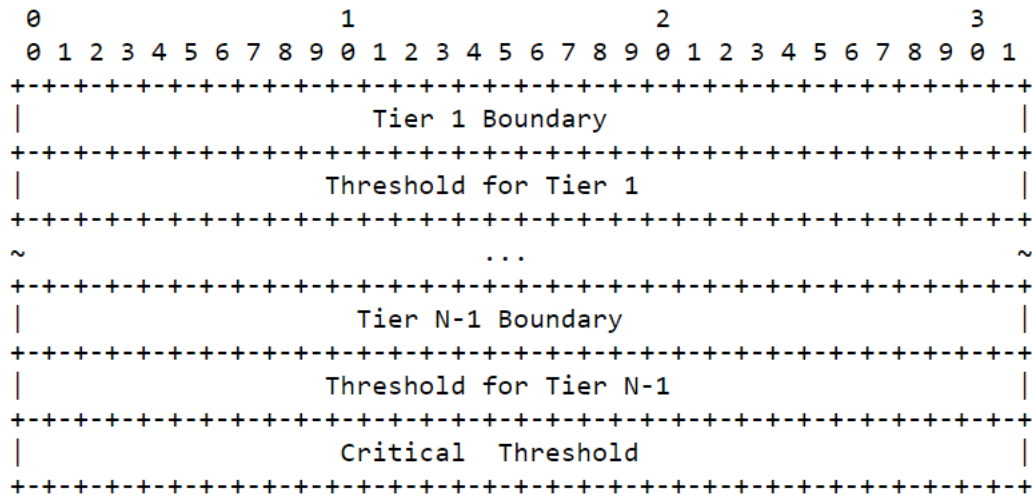
METRIC Object as per RFC5440



METRIC Object extension  
(for T == PAM type)



PAM metric assessed against a multi-tiered SLO, presenting different thresholds per tier



PAM metric assessed against an optimal (for VI) and a critical (for SVI) thresholds

