

# Path Congestion Metric

[draft-dang-ippm-congestion-01](#)

Joanna Dang [dangjuanna@huawei.com](mailto:dangjuanna@huawei.com),  
Jianglong Wang [wangjl1.bri@chinatelecom.cn](mailto:wangjl1.bri@chinatelecom.cn)

# Overview

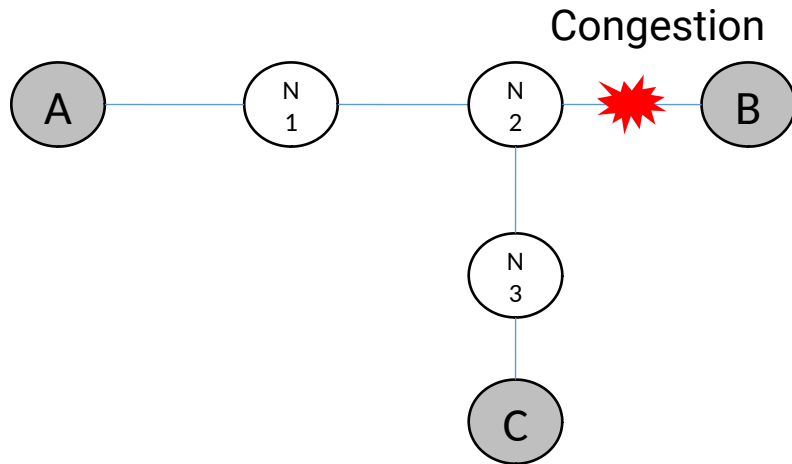
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- Charter for IPPM WG: define **specific metrics** and procedures for accurately measuring and documenting these metrics.
- Path Congestion Metric [*draft-dang-ippm-congestion-01*] is mainly measuring E2E path congestion.

# Motivation

- Two Path

- Path1: A->N1->N2->B
- Path2: C->N3->N2->B



- NodeA/NodeC doesn't sense the congestion between node N2 and Node B.
- We don't know why the congest occurs or which path the congestion affects.

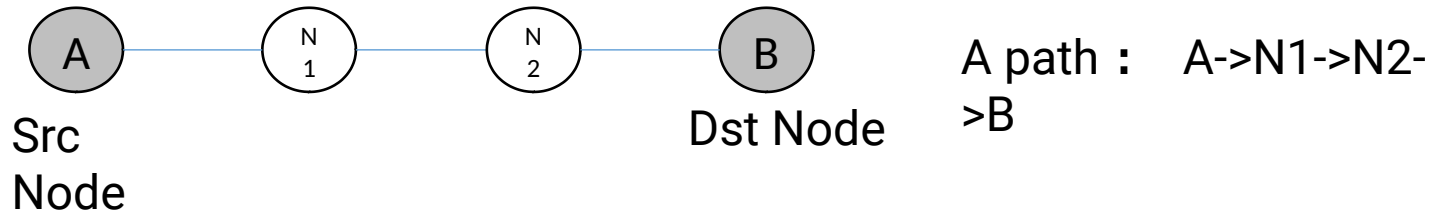
**Path Congestion Metric is required.**

- If path1 is congested by measurement, nodeA will adapted part of the traffic to relief the congestion between N2 and B.
- If path2 is congested by measurement, nodeC will adapted part of the traffic to relief the congestion between N2 and B.

**As a result, the congestion will be avoided and the service experience in path1 and path2 will also be guaranteed.**

# Path

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- Has a definite Src node and Dst Node
- A path of multiple paths in the equal-cost multi-path (ECMP) or unequal-cost multiple (UCMP) scenarios
- Be unidirectional
  - Statistics on the number of packets at the Src node and the Dst node
  - One-way delay measurement

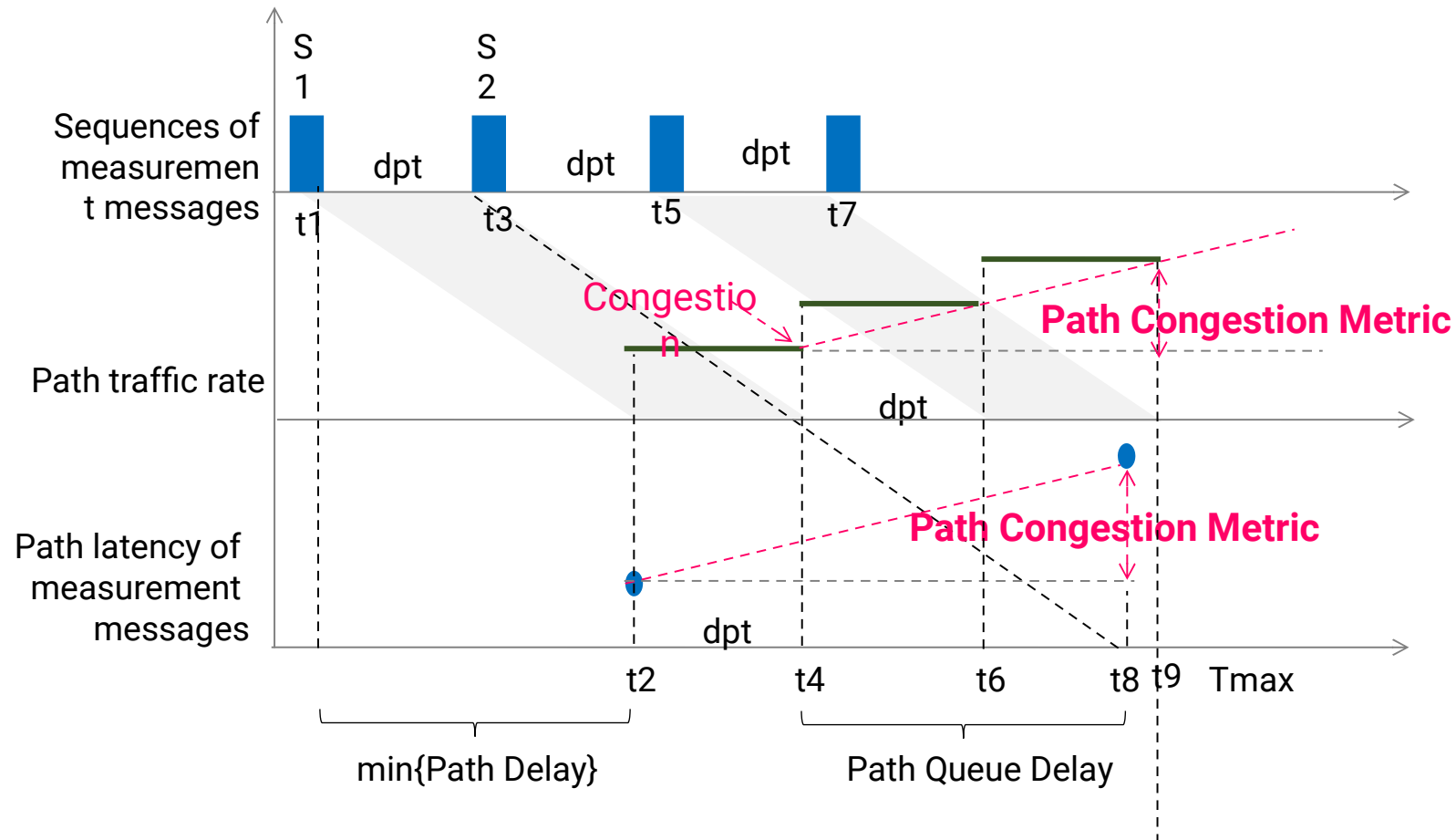
# Path Congestion Metric

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**There are 3 scenarios about path congestion metric.**

- No packet loss occurs, **path congestion metric is**
  - 0 when there is no path congestion.
    - Path Delay = (Propagation Delay + Transmission Delay)
    - In one cycle, the number of packets received by the Dst is the same as sent packets by the Src.
  - >0 when the path is congested.
    - Path Delay = (Propagation Delay + Transmission Delay + Path Queue Delay)
    - In one cycle, the number of packets received by the Dst is less than sent packets by the Src.
- When packet loss occurs, packet loss is more serious than congestion. Therefore, the packet loss problem is solved first and then the path congestion metric is monitored.

# Methodologies for a Type-P-Path-Congestion Metric



## Short-term measurement

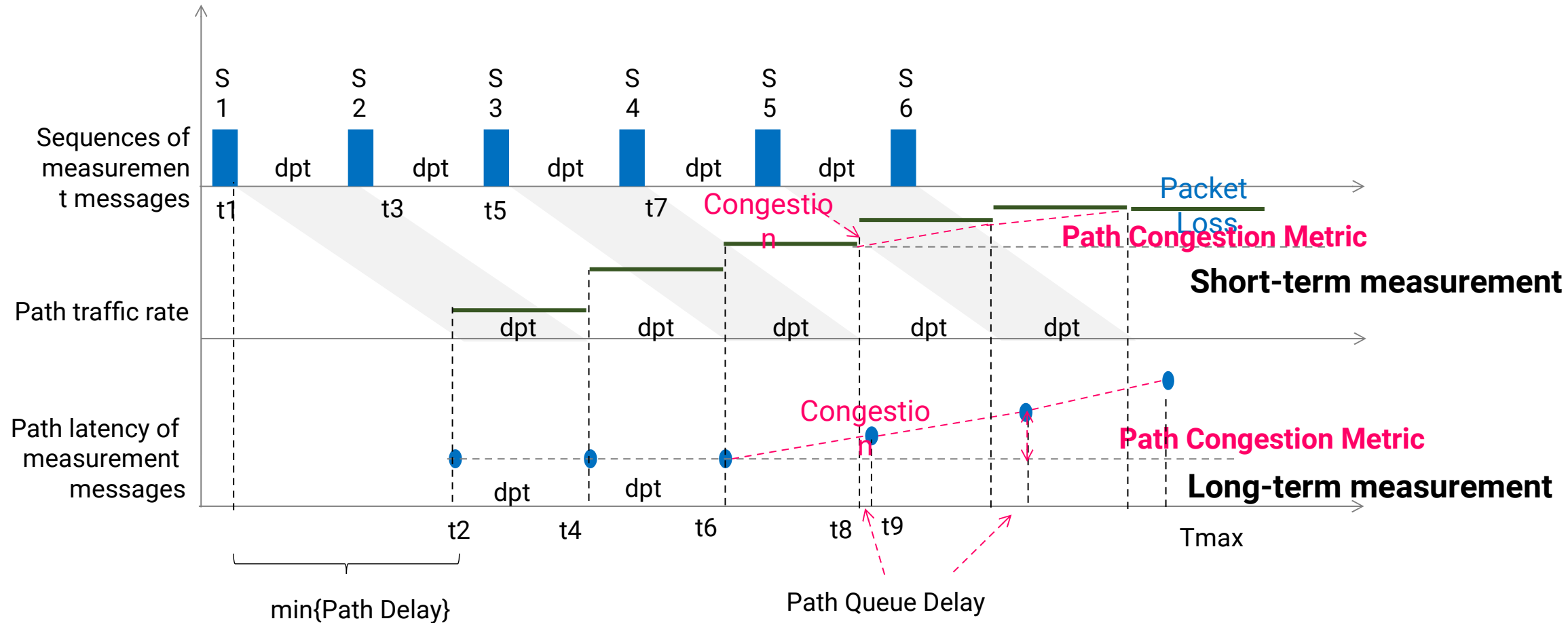
- Although not receiving the second measurement packet, but the number of service traffic packets reached at Dst is periodically counted after receiving the first measurement packet.

## Long-term measurement

- The Dst receives the second measurement packet.

**When the period is shorter, the measurement accuracy is higher.**

# Methodologies for Samples of Path Congestion



# Next Step

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- Think deeply in conjunction with In-situ OAM (IOAM) and Segment Routing Version6 (SRv6) scenarios
- Make congestion adjustment and avoidance



**Thank you!**