



Deployment Models for PCN-Based Admission Control and Flow Termination Using Packet- Specific Dual Marking (PSDM) draft-menth-pcn-psdm-deployment-00

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What is PSDM?

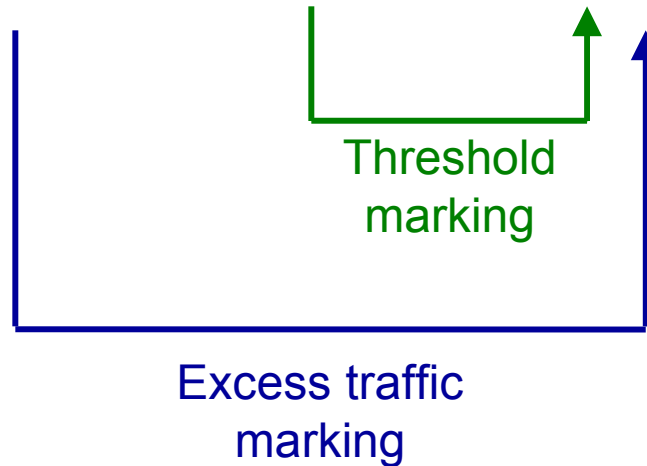
- ▶ An encoding (Experimental extension of Baseline encoding)
 - draft-menth-pcn-psdm-encoding-00
- ▶ A deployment model
 - draft-menth-pcn-psdm-deployment-00

PSDM Encoding

DSCP	00	10	01	11
DSCP1	Not-PCN	NM	EXP	PM
DSCP1	Not-PCN	NM (not-ExM)	NM (not-ThM)	PM

← Baseline

← PSDM



- ▶ Same Pros as baseline (single DSCP, compatible with tunnelling)
- ▶ But can distinguish threshold & excess traffic marking

PSDM Usage

▶ PCN ingress nodes mark

- Data packets encoded with “NM (not-ExM)”
- Probe packets encoded with „NM (not-ThM)”

‘Flow
adm
pkt’

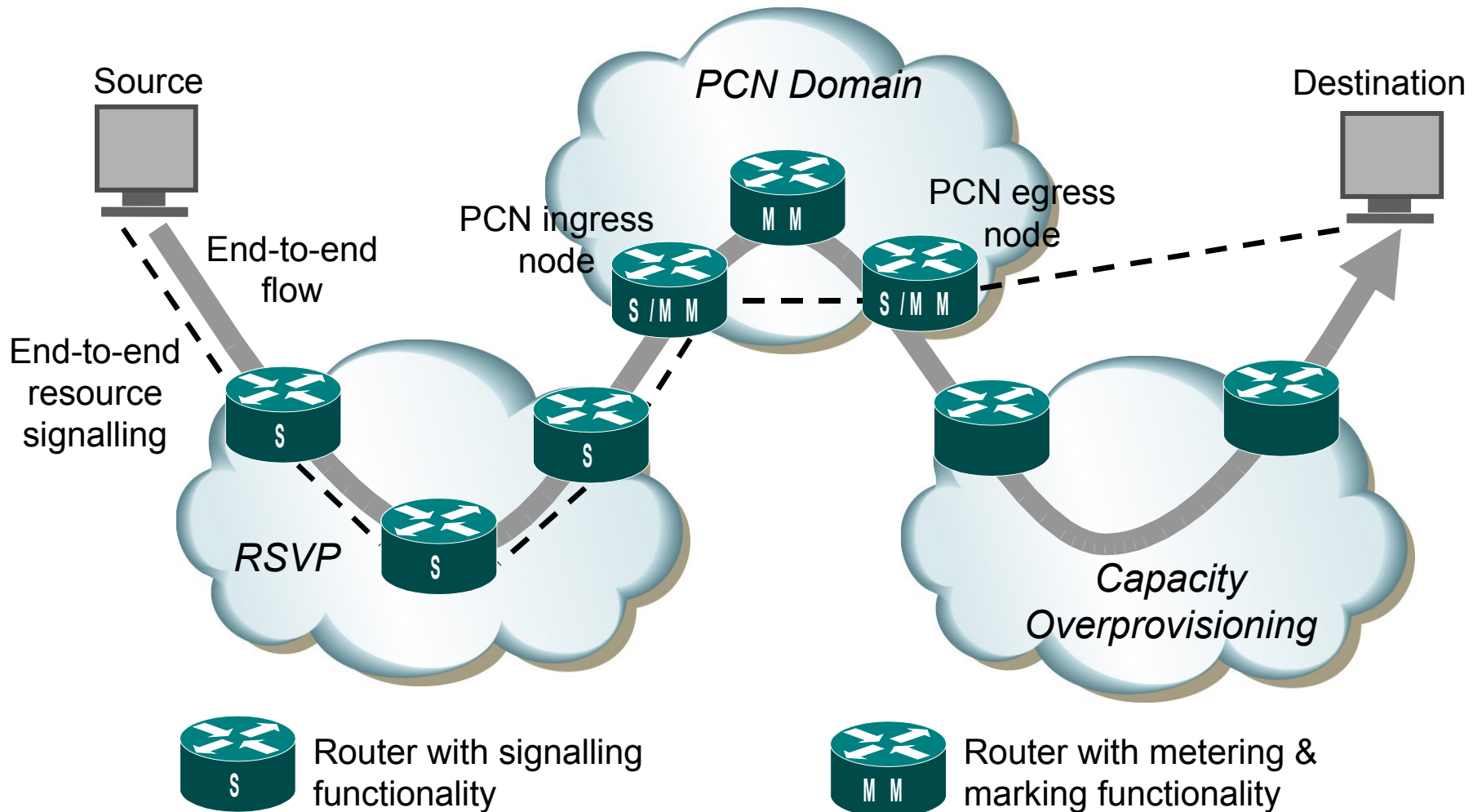
▶ PCN interior nodes

- Threshold meter: meters all PCN traffic
- Excess traffic meter: meters only “NM (not ExM)” pkts

▶ PCN egress nodes interpret

- PM on data packet = excess-traffic-marked pkt
- PM on probe pkt = threshold-marked pkt

Example: Probe-Based Admission Control for IEAs



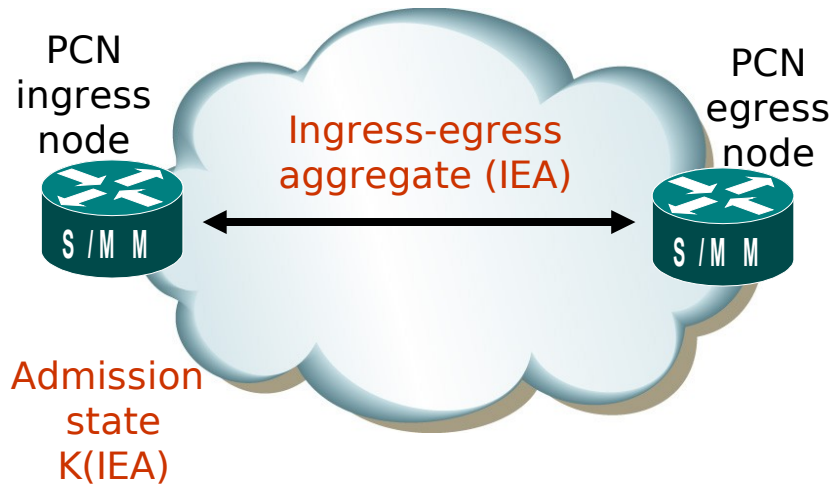
RSVP PATH msg is implicit 'probe'

Deployment Models for Packet-Specific Dual Marking (PSDM)

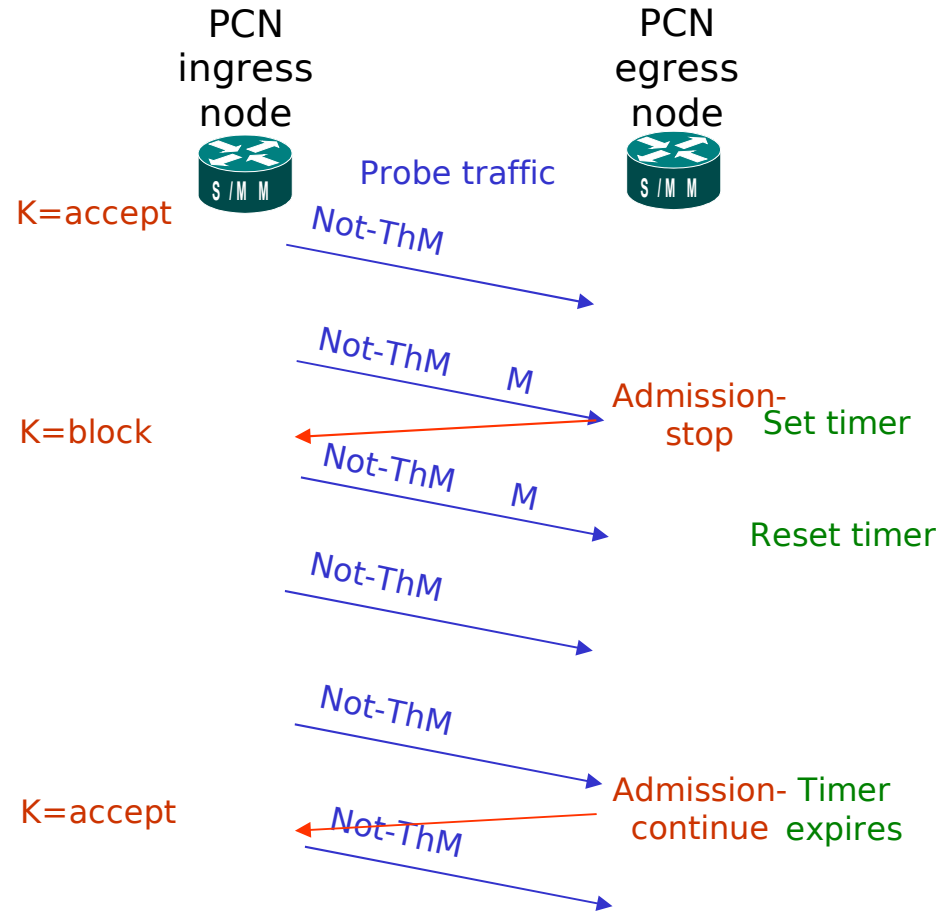
Probe-Based Admission Control for Individual Flows

- ▶ Assumption
 - Admission requests triggered by external protocol, e.g. RSVP
- ▶ RSVP sends
 - PATH message from ingress to egress (downstream)
 - RESV message from egress to ingress (upstream)
- ▶ Implicit probing
 - Ingress marks PATH message with VOICE-ADMIT and not-ThM
 - Egress receives PATH message
 - If PATH message is marked, it sends PATH-TEAR
 - If PATH message not marked, it forwards PATH msg downstream
 - Egress forwards returning RESV to ingress
 - Ingress accepts admission request when its first RESV arrives
- ▶ “Good probing”
 - No extra probe traffic
 - No extra admission delay

Example: Observation-Based AC with Probing



Send regular 'probes' on IEA



Probe-Based Admission Control for IEAs

- ▶ Basic principle
 - Ingress node keeps admission state K per IEA
 - K =accept: accept new flows for this IEA
 - K =block: block new flows for this IEA
 - Ingress node sends probe packets to egress node
 - Egress node
 - Observes probe packets
 - Controls K at ingress by sending admission-stop and admission-continue msgs
- ▶ “Good probing”
 - No per-flow probe packets
 - No admission delay
- ▶ Alternatives for egress nodes to influence new K
 - CLE-based AC with probes
 - Calculate percentage CLE of marked probe packets based on measurement intervals
 - If $CLE < T^{ACont}$, send admission-continue
 - If $CLE \geq T^{AStop}$, send admission-stop
 - Observation-based AC with probes
 - If marked probe packet observed
 - If K =accept, set a timer and send admission-stop
 - If K =block, reset timer
 - If timer expires, send admission-continue

Benefits of PSDM

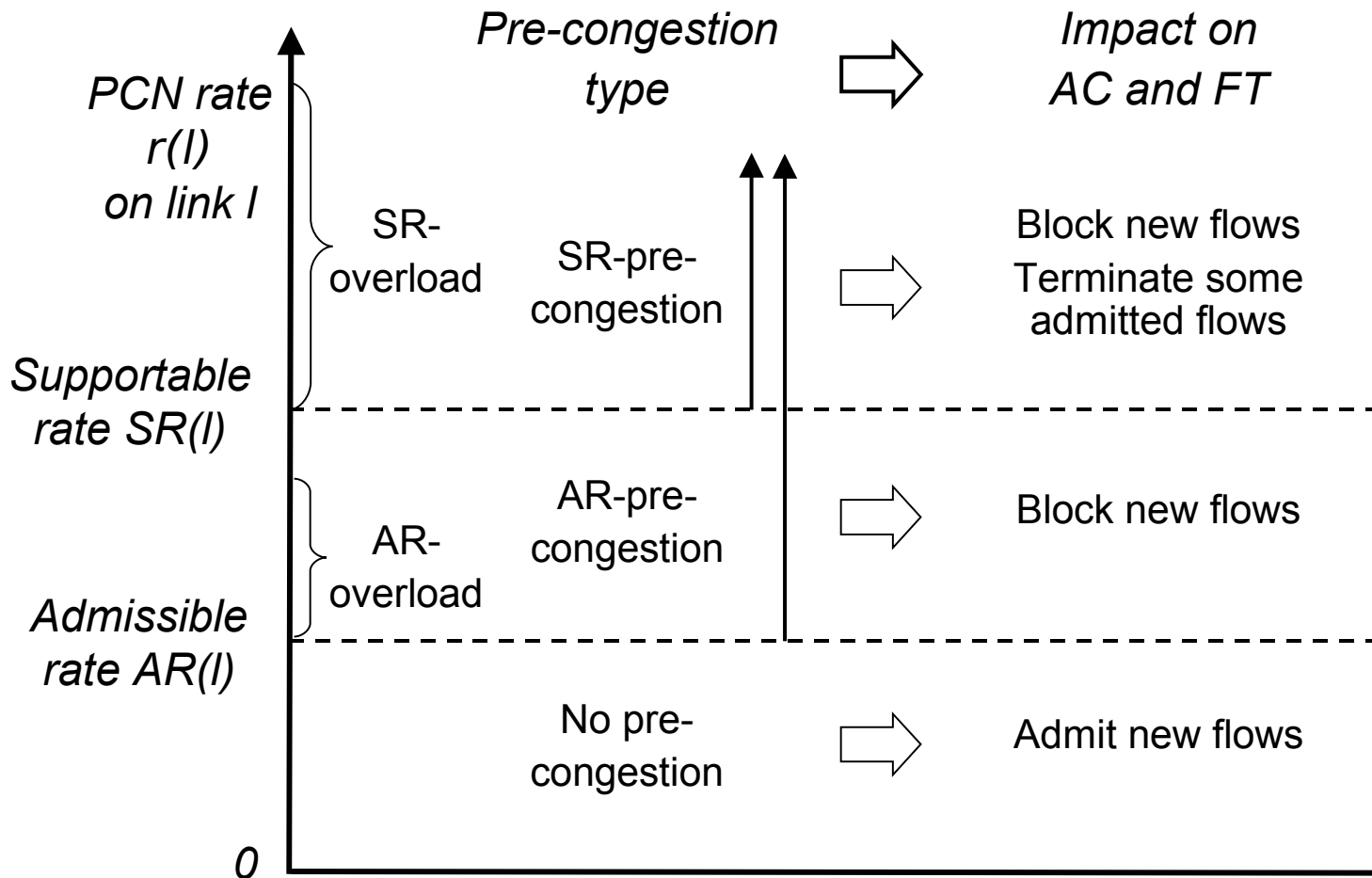
- ▶ PSDM requires only a single DSCP (VOICE-ADMIT)
- ▶ Admission control
 - Probing guarantees correct AC decisions even for empty IEAs
 - Risk of over-admission minimized especially for small IEAs
 - Implicit per-flow probing supports multipath routing
- ▶ Flow termination
 - Excess marking based on supportable rate (SR) provides information about the strength of the SR-overload.
 - Use either measured rate termination (MRT) or marked flow termination (MFT)
 - MFT supports multipath routing

Conclusion

- ▶ PSDM encoding
 - Requires only a single DSCP (VOICE-ADMIT)
 - Supports two different marking schemes
- ▶ PSDM deployment requires
 - Existing flow termination mechanisms
 - New probe-based admission control mechanisms
 - „Good probing“ – no additional delay
 - IEA-based AC possible
 - Implicit per-flow probing possible re-using RSVP signalling
- ▶ Benefits
 - New AC works with small IEAs
 - New AC works with multipath routing

▶ Spare slides

Pre-Congestion Notification (PCN) – Concept



Pre-congestion information is coded into packet headers and carried to PCN egress nodes.

Problem Statement

- ▶ ECN field of VOICE-ADMIT DSCP reused for PCN encoding
 - Only CE codepoint appropriate for marking due to tunneling constraints
- ▶ Potential solutions
 - Redefine tunneling (draft-briscoe-tsvwg-ecn-tunnel) and use 3-in-1 encoding (draft-briscoe-pcn-3-in-1-encoding)
 - Long-term process and potential problems with legacy equipment
 - Use only single marking scheme for AC and FT (draft-charny-pcn-single-marking)
 - AC and FT do not work well for ingress-egress aggregates (IEAs) with only little traffic
<http://www3.informatik.uni-wuerzburg.de/~menth/Publications/papers/Menth08-Sub-8.pdf>
<http://www3.informatik.uni-wuerzburg.de/~menth/Publications/papers/Menth08-Sub-9.pdf>
 - Use VOICE-ADMIT and another DSCP to get two different CE codepoints to support two different marking schemes (draft-moncaster-pcn-3-state-encoding)
 - Requires two DSCPs for marking, not likely to be accepted
 - Use PSDM encoding (draft-menth-pcn-psdm-encoding)
 - Only one DSCP, perfect AC and FT behavior, but requires new edge-behavior (this proposal) <http://www3.informatik.uni-wuerzburg.de/~menth/Publications/papers/Menth08-Sub-14.pdf>

A Short Note on Probing

- ▶ Probe traffic
 - Definition: all PCN traffic that is not data traffic and which is possibly used for AC decisions
- ▶ „Bad probing“
 - Extra probe packets per flow
 - Introduces additional delay for admission decision when PCN ingress node waits for response from PCN egress node
- ▶ „Good probing“
 - No explicit probe packets per flow
 - No additional admission delay
- ▶ PSDM deployment uses „good probing“ for AC

Review: PSDM Codepoints

- ▶ Prerequisite for PCN traffic: DSCP=VOICE-ADMIT
- ▶ Redefinition of ECN field
 - 00: no PCN traffic (not-PCN)
 - 10: not-excess-marked PCN traffic (not-EcM)
 - Subject to excess marking
 - Excess marking meters and possibly re-marks only not-EcM-marked traffic
 - 01: not-threshold-marked PCN traffic (not-ThM)
 - Subject to threshold marking
 - Threshold marking meters all PCN traffic and possibly re-marks only not-ThM-marked traffic
 - 11: marked PCN traffic (M)

PSDM Usage

- ▶ PCN ingress nodes mark
 - Data packets with not-EcM
 - Probe packets with not-ThM
- ▶ PCN egress nodes interpret
 - Data packets
 - Not-EcM = not marked
 - M = marked;
 - Supportable rate (SR) exceeded
 - Terminate traffic!
 - Rate of marked data traffic is estimate for SR-overload
 - Support flow termination; use any method
 - Probe packets
 - Not-ThM = not marked
 - M = marked
 - Admissible rate (AR) exceeded
 - Stop admission!
 - Support admission control; use probe-based AC methods (=contribution of this draft)