

Three State PCN Marking

draft-babiarz-pcn-3sm-00

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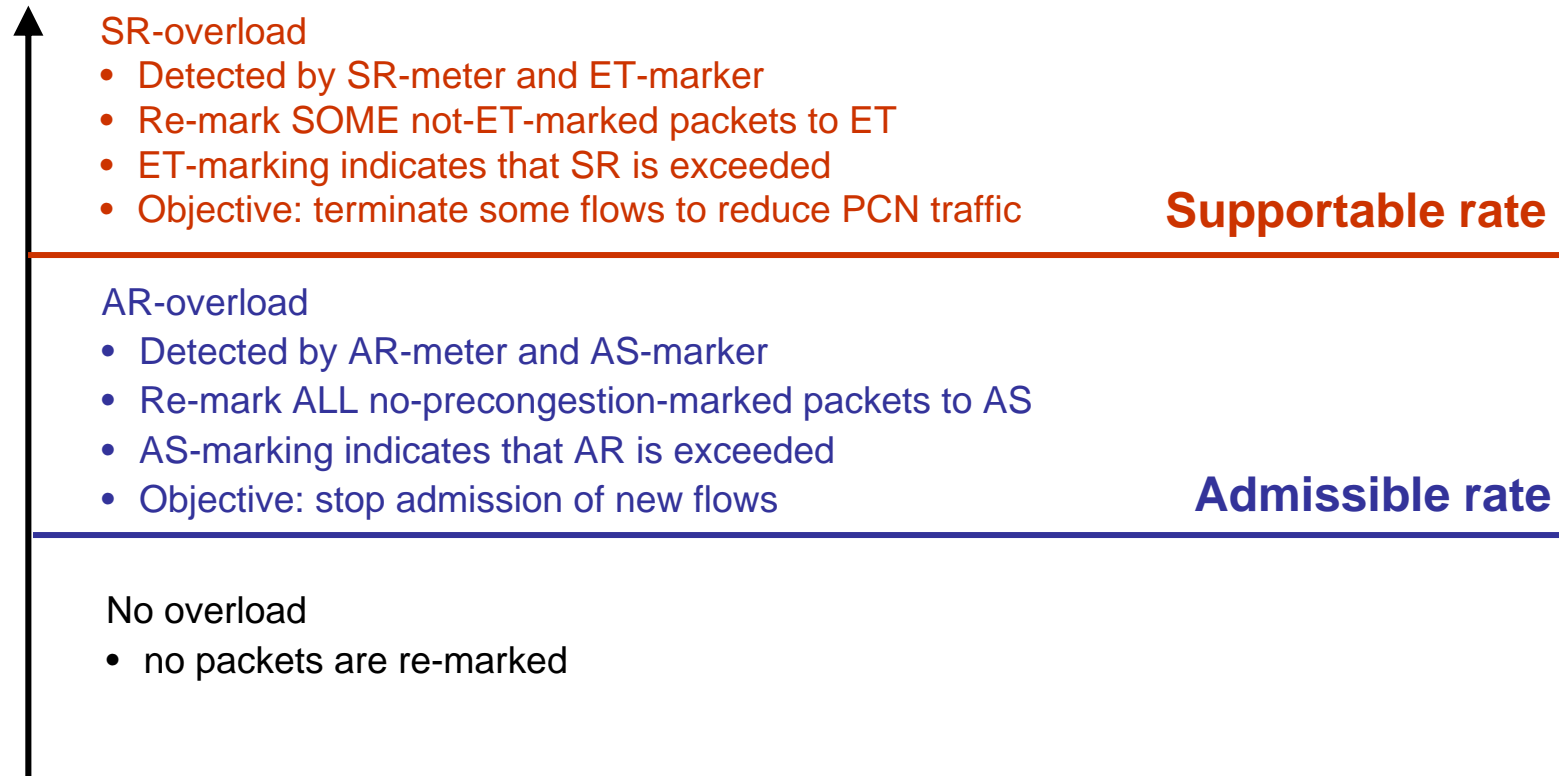
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Contribution of 3sm Draft

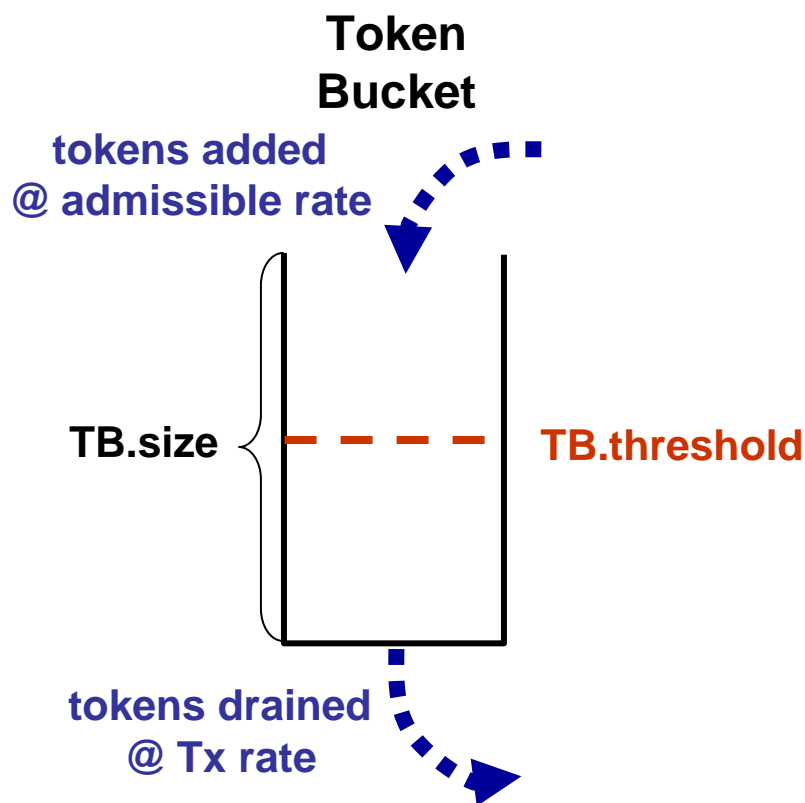
- Based on draft-babiarz-pcn-explicit-marking-00
 - New terminology
 - More about meters and markers
- Meter for admissible rate and admission-stop marker
 - Support admission control
 - Similar to “step” marking in draft-briscoe-tsvwg-cl-phb-03
- Meter for supportable rate and excess-traffic marker
 - Allows marking frequency reduction
 - Support flow termination for both MFT and MRT
- Marked flow termination (MFT)
 - vs. measured rate termination (MRT) from cl-draft

Principle of Operation

PCN
traffic
rate



Admissible-Rate-Meter and Admission-Stop-Marker



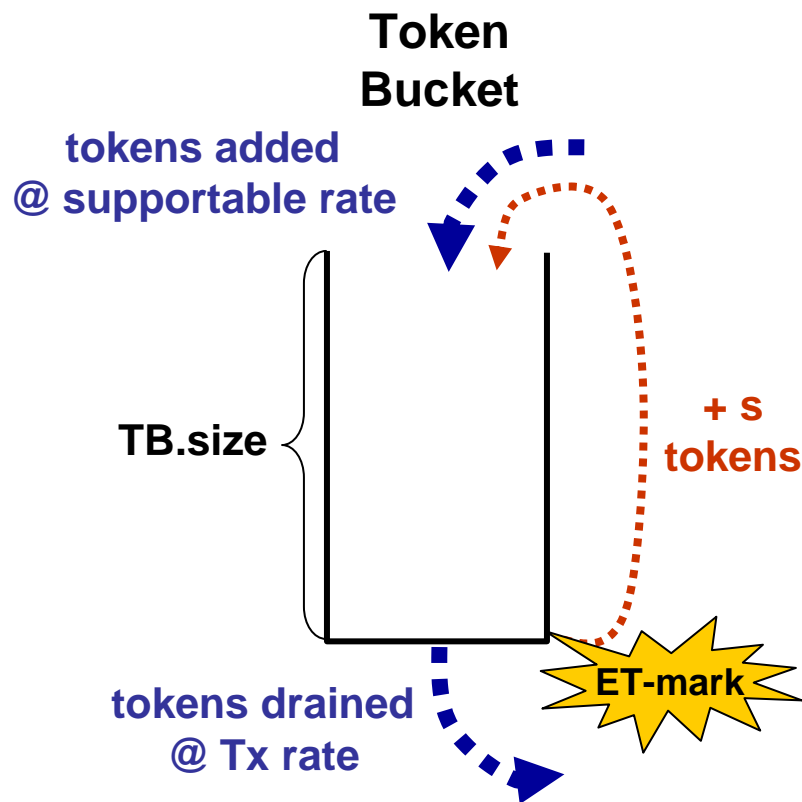
- **Marking action**

- Packets are AS-marked if fill state is below **TB.threshold**

- **Behavior**

- Tx rate < AR: fill state increases but does not exceed **TB.size**
 - Tx rate > AR: fill state decreases and eventually stays below **TB.threshold**
- ⇒ All unmarked packets are AS-marked

Supportable-Rate-Meter and Excess-Traffic-Marker





- **Marking action**

- Packets are ET-marked if fill state is smaller than packet size
- If packet is marked, “s” additional tokens are added to the bucket

- **Behavior**

- Tx rate < SR: fill state increases, but does not exceed TB.size
- Tx rate > SR: fill state decreases
- When packet is marked, next “s” bytes will not be marked
- ⇒ Fewer packets are ET-marked (marking frequency reduction)
- ⇒ “s” = slow-down parameter for ET-marking

Two Flow Termination Alternatives

- **Measured rate termination (MRT)** 
(slow-down parameter $s=0$)
 - **Mark all** packets with ET that are above SR
 - PCN egress measures rate of ET-marked packets (ET-rate)
 - PCN egress signals ET-rate to corresponding PCN ingress for termination
- **Marked flow termination (MFT)** 
(slow-down parameter $s>0$)
 - **Mark only some** packets with ET that are above SR
 - PCN egress detects ET-marked packets
 - PCN egress signals marked flows to corresponding PCN ingress for termination

Characteristics of Proposed Mechanisms

- AR-metering and AS-marking
 - Strong signal: all or no packets are AS-marked
 - Coarse and fast measurement suffices to recognize that traffic rate is above AR
 - Egress node only needs to monitor for AS-marked packets
 - Fast indication to block new flows
 - Does not depend on traffic rate of ingress-egress aggregate
 - Works well with probing if one or only a few packets are sent since either all or no packets are AS-marked
- SR-metering and ET-marking
 - Supports both
 - Measured rate termination
 - Marked flow termination
 - ET-marking may signal rate adaptation in the future
- Marked flow termination
 - No rate measurement of ET-marked packets required
 - Works well with multipath routing: only marked flows are terminated

Open Issues

- Complete analysis of general behavior
 - multiple bottlenecks
 - bi-directional flows
- Which packets need to be respected for metering?
 - ET-marked packets belong to flows that are terminating soon
- Recommendations for good values of the slow-down parameter “s”
 - Achieve fast excess rate reduction
 - Avoid over-termination
- Exact method to detect AR-overload at the PCN egress node?
 - Only fraction of AS-marked packets needed
 - No exact measurement of AS-marked bytes required
- Performance comparison of different termination options
 - Measured flow termination
 - Marked flow termination