

# Single PCN Threshold Marking by using PCN baseline encoding for both admission and termination control

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# Outline

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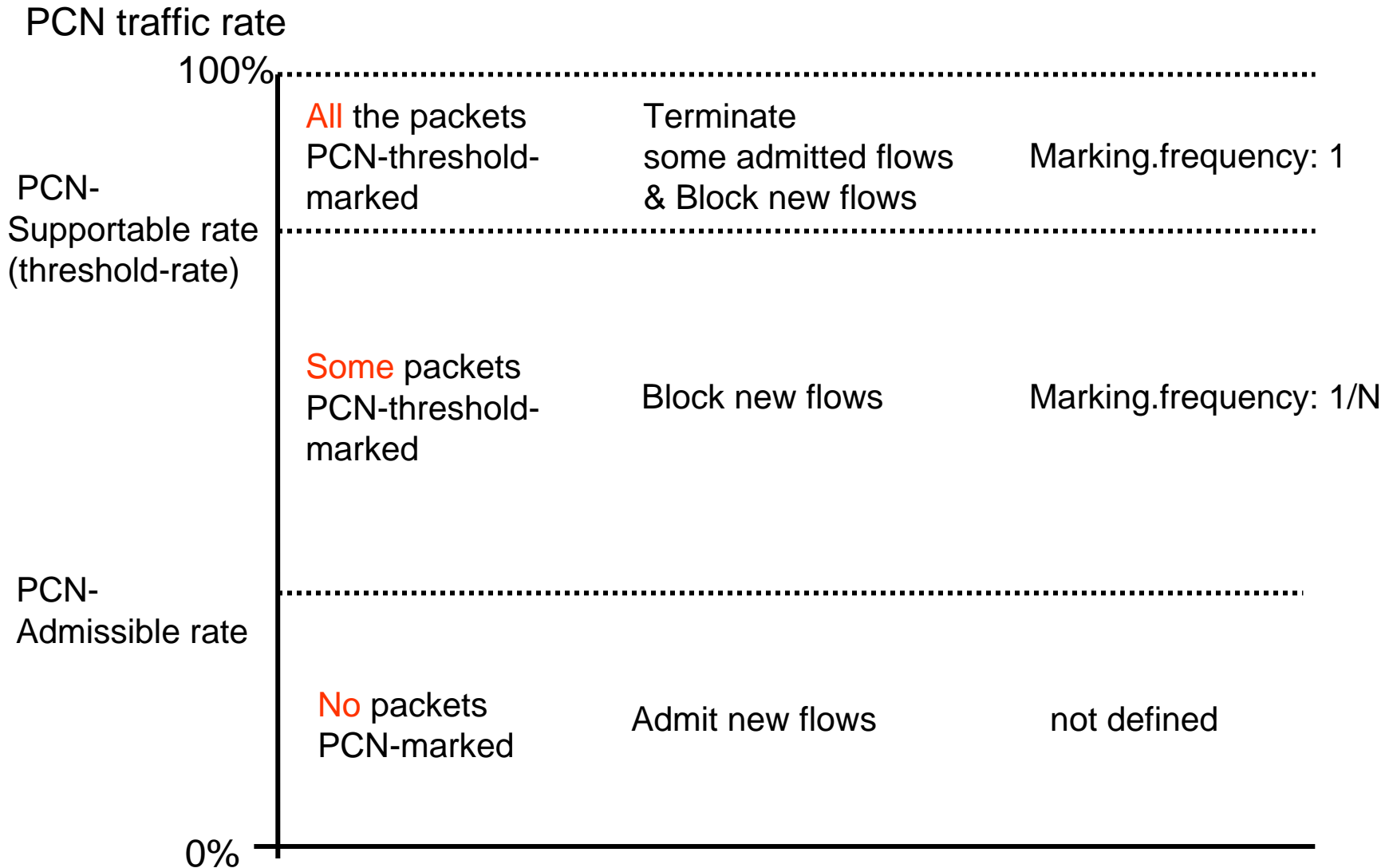
- Motivation
- How to divide three states of congestion
- How to mark according to congestion
- Admission control
- Termination control
- Simulation results – Admission control –
- Simulation results – Termination control–

# Motivation

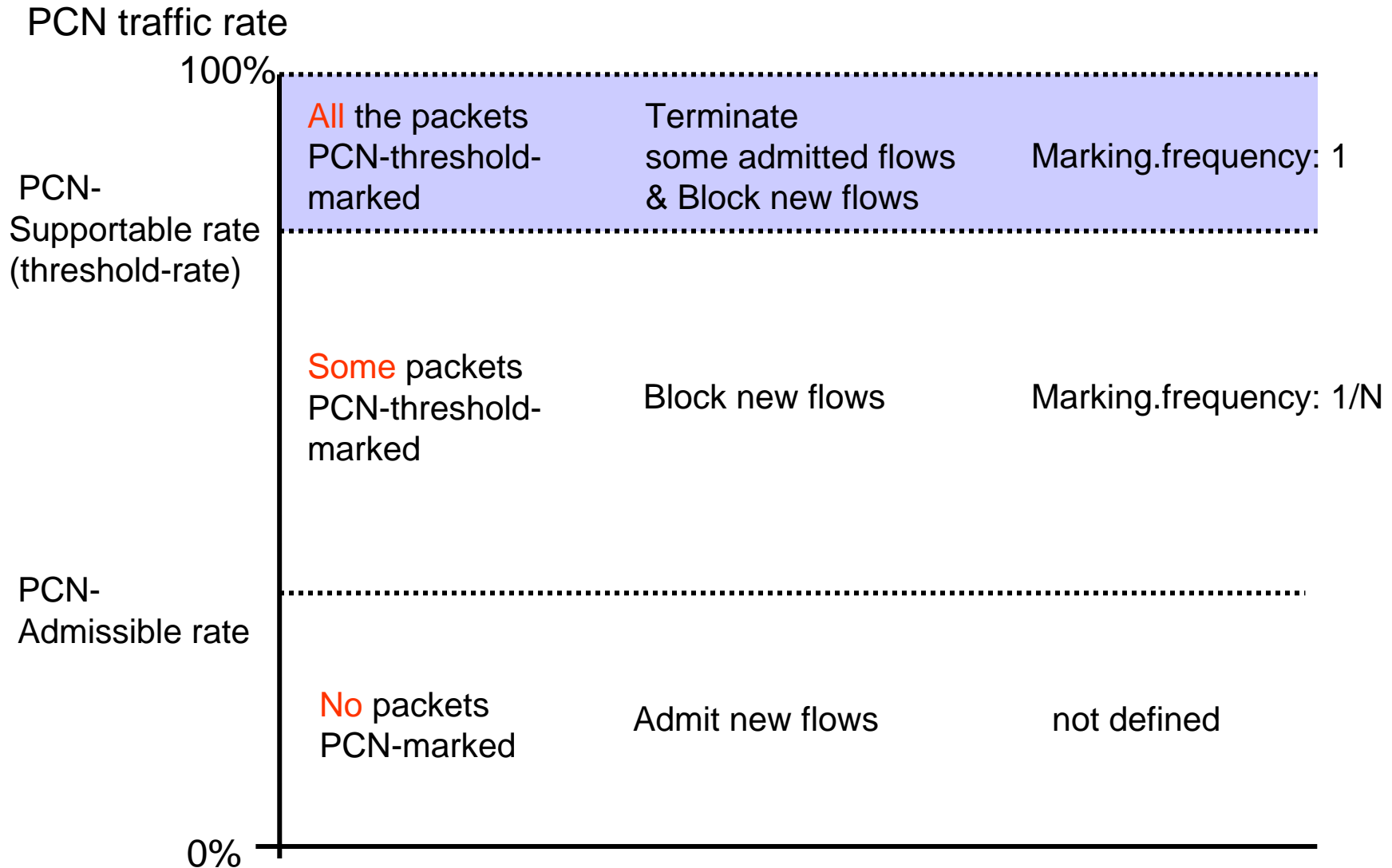
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- Making an algorithm by PCN baseline encoding
- Explicitly detecting whether PCN traffic is more than PCN-Admissible-rate or not
- Explicitly detecting whether PCN traffic is more than PCN-Supportable-rate or not

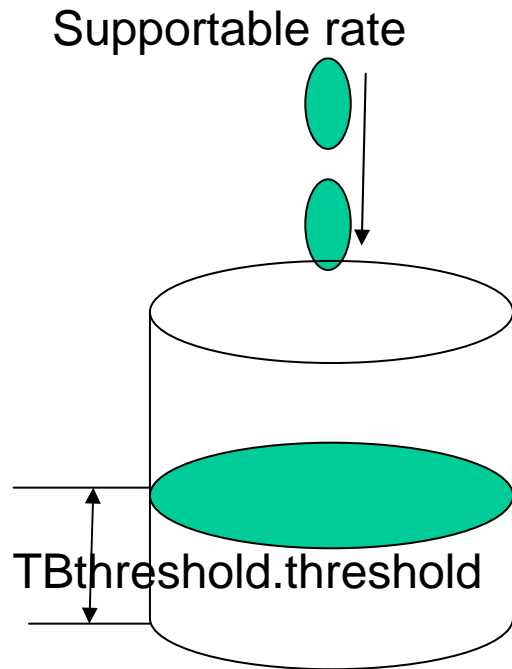
# Marking and control operations



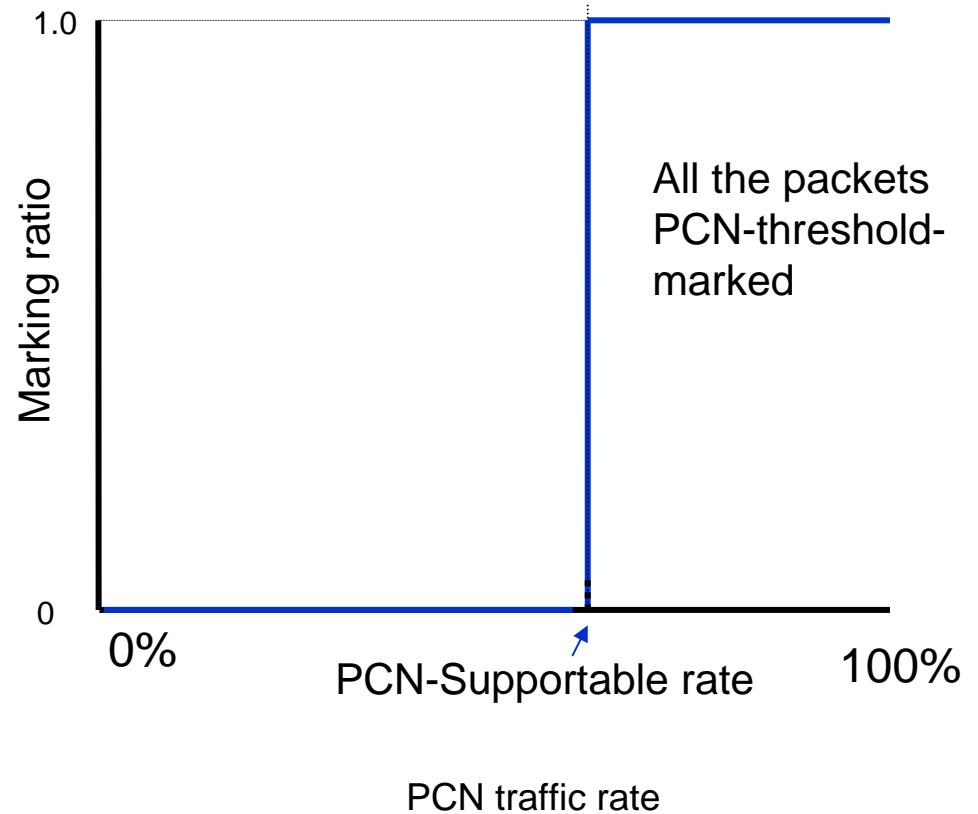
# To achieve all the packets marked



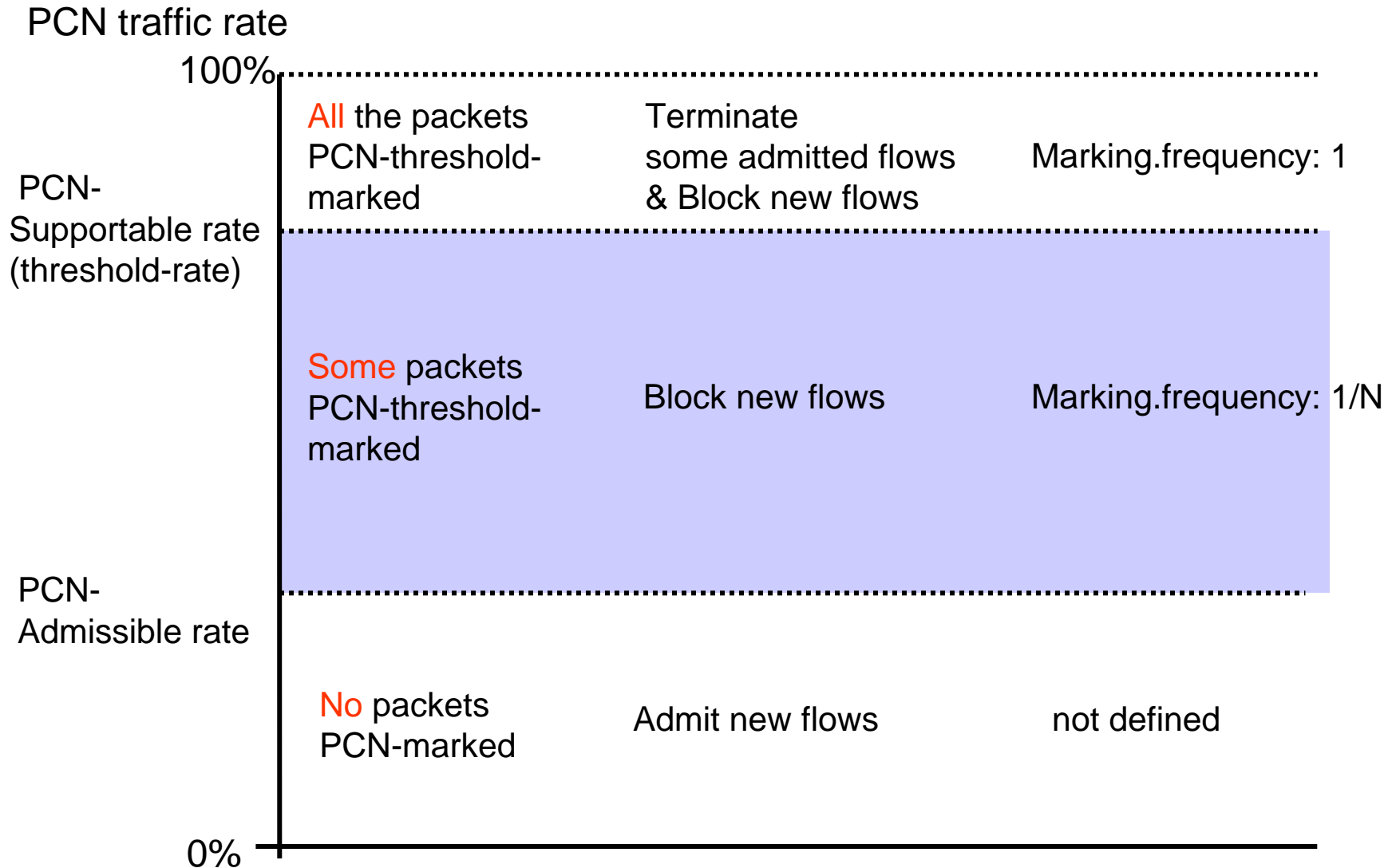
# To achieve all the packets PCN-marked



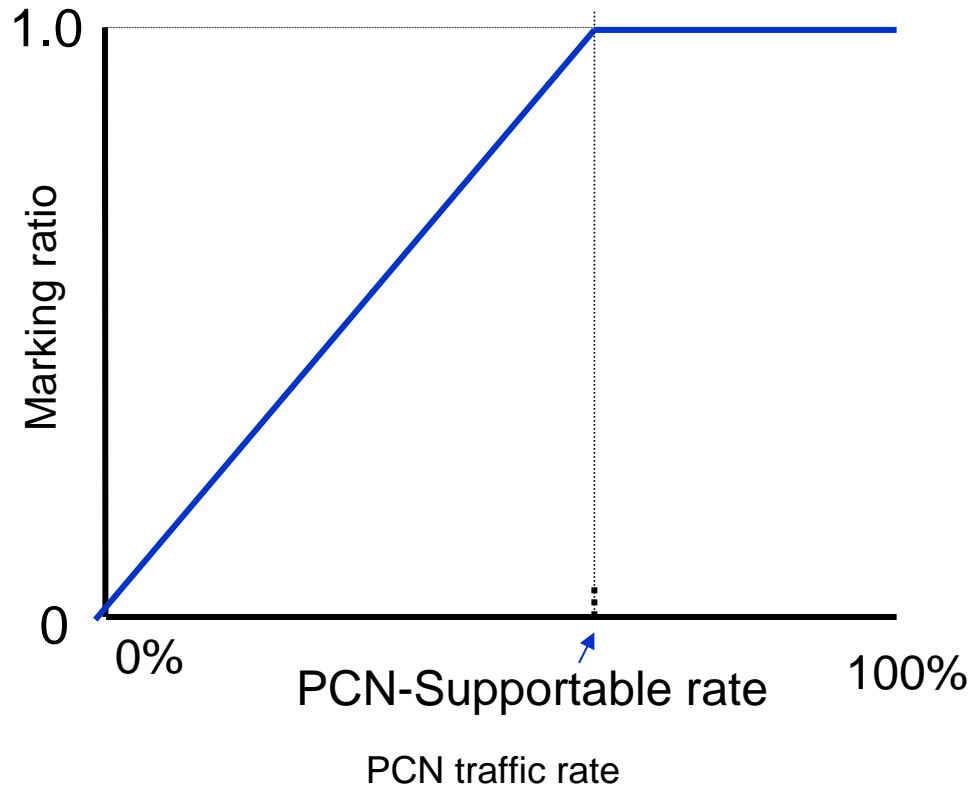
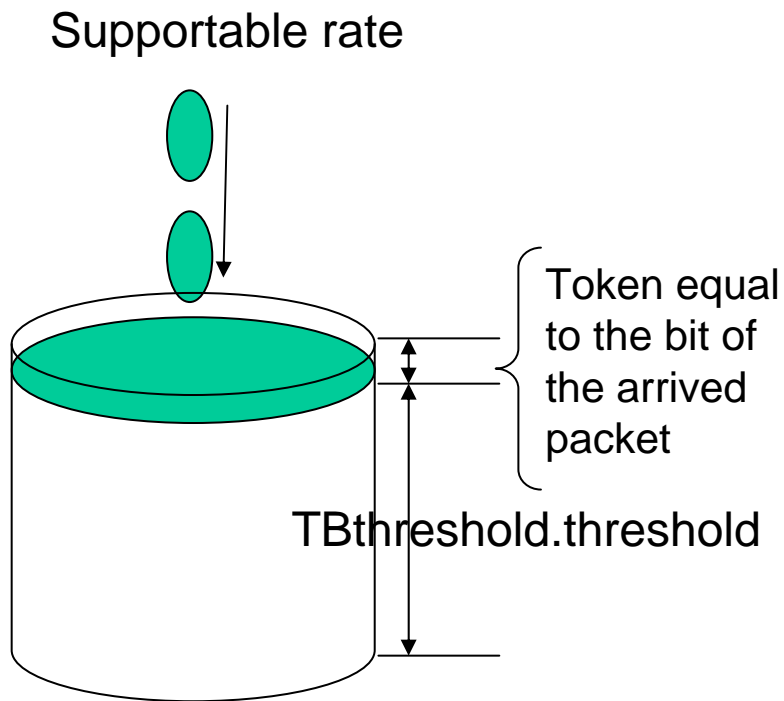
Ordinary Threshold marking



# To achieve some packets marked



# To achieve some packets marked (step:1/2)

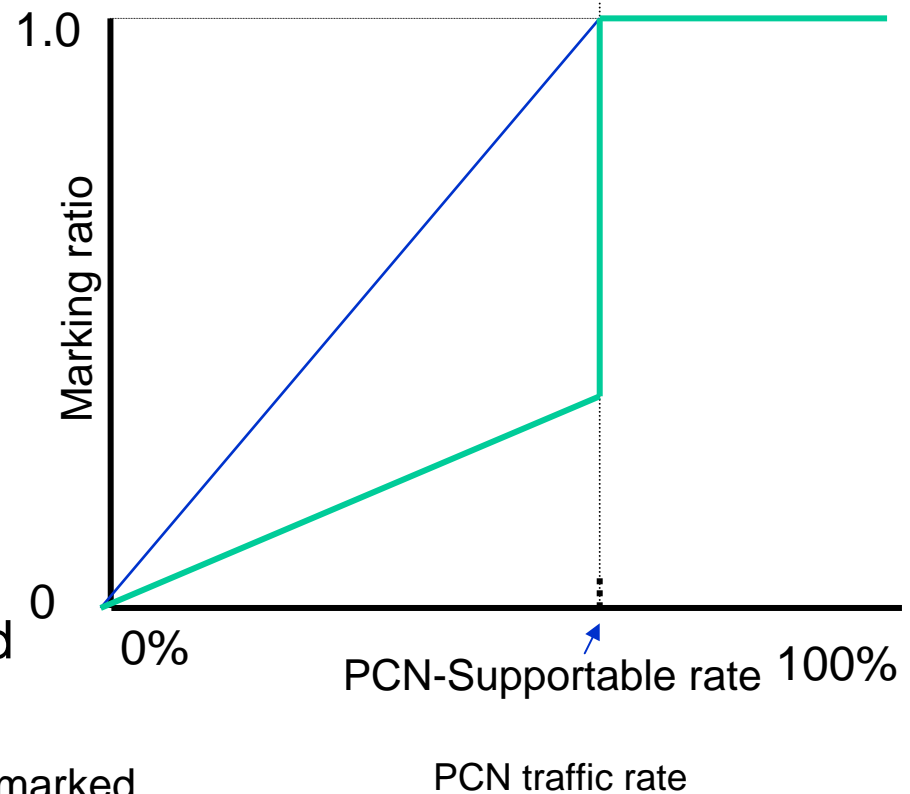
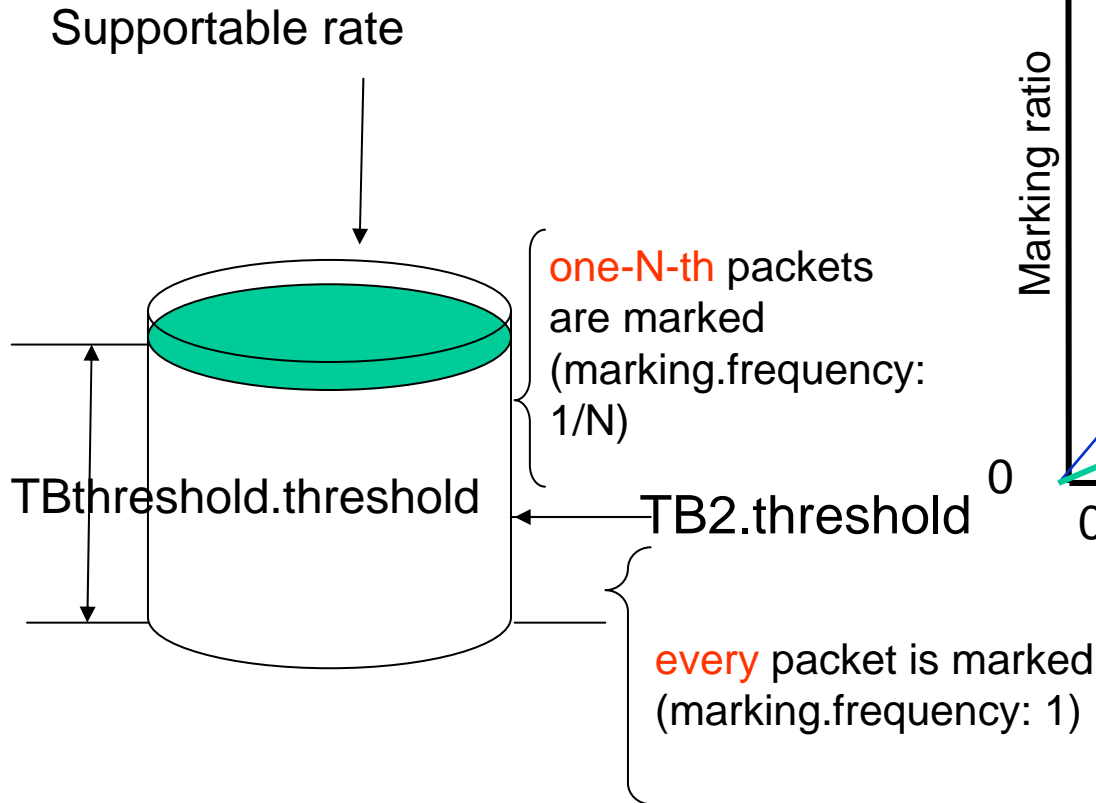




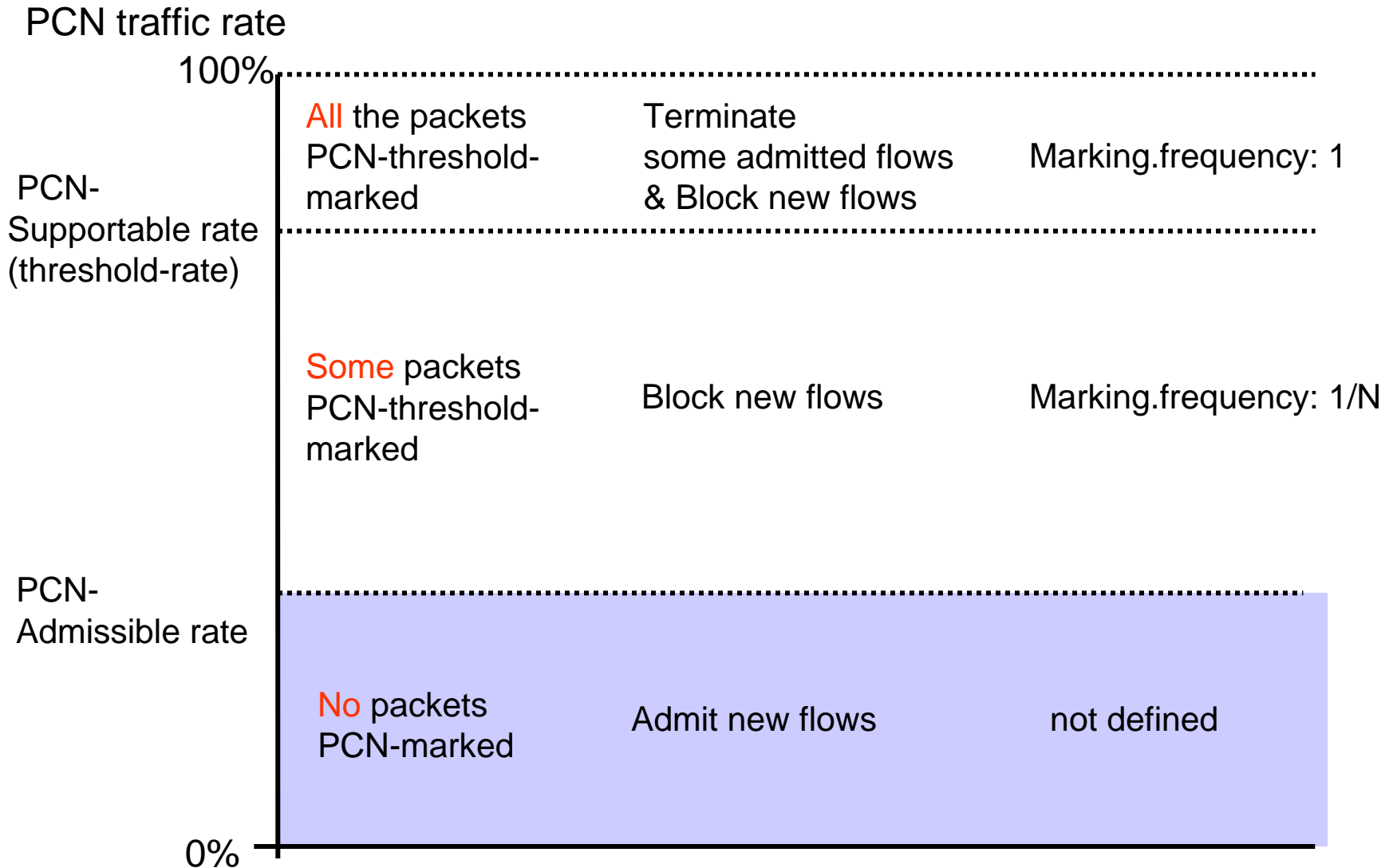
# Marking frequency

- When  $N = 1$  (ordinary marking, marking.frequency = 1 ),
- **M M N N M N M M N N M N**
- 1 2      3      4 5      6
- **N N N N M N N N N M N**
- When  $N=3$  (marking.frequency = 1/3)
- M: marked packet
- N: not marked packet

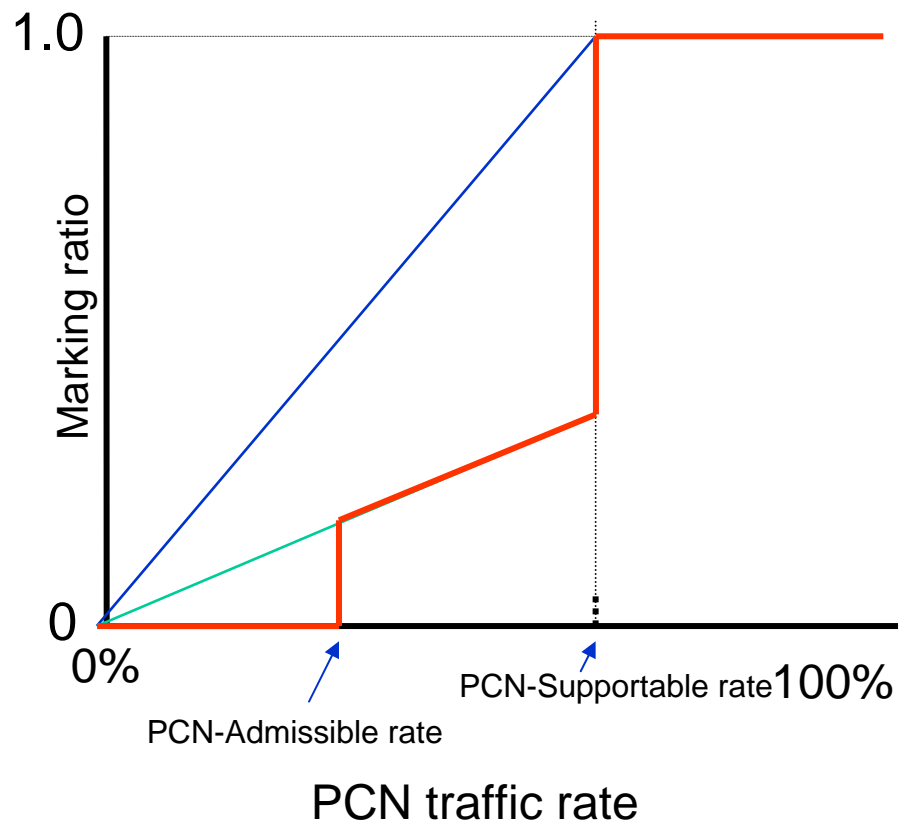
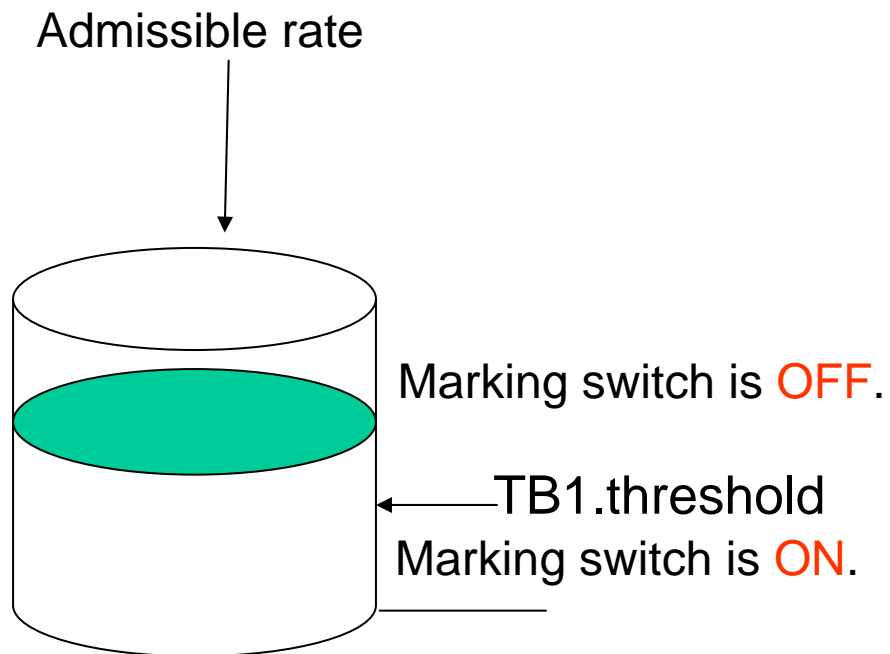
# To achieve some packets marked (step:2/2)



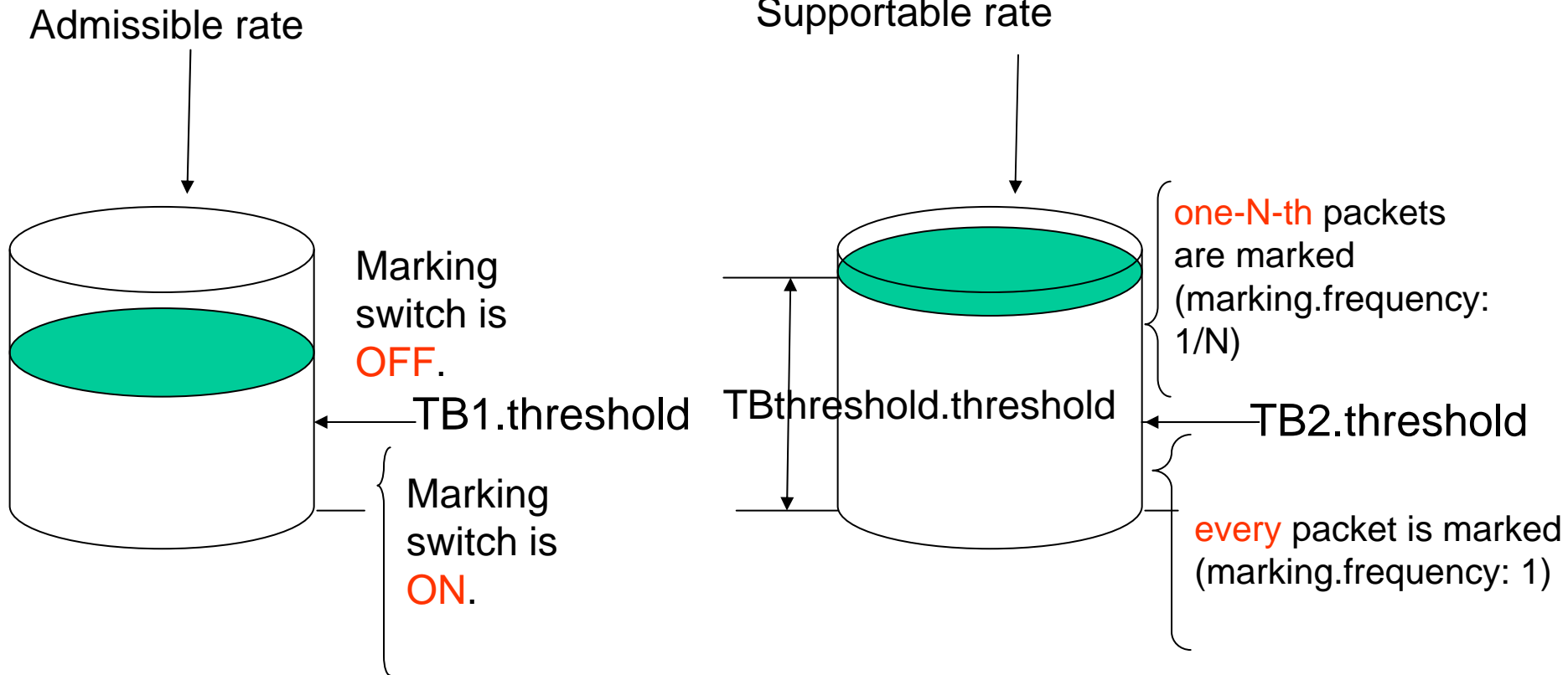
# To achieve no packets marked



# To achieve no packets marked



# Example of Token buckets implementation



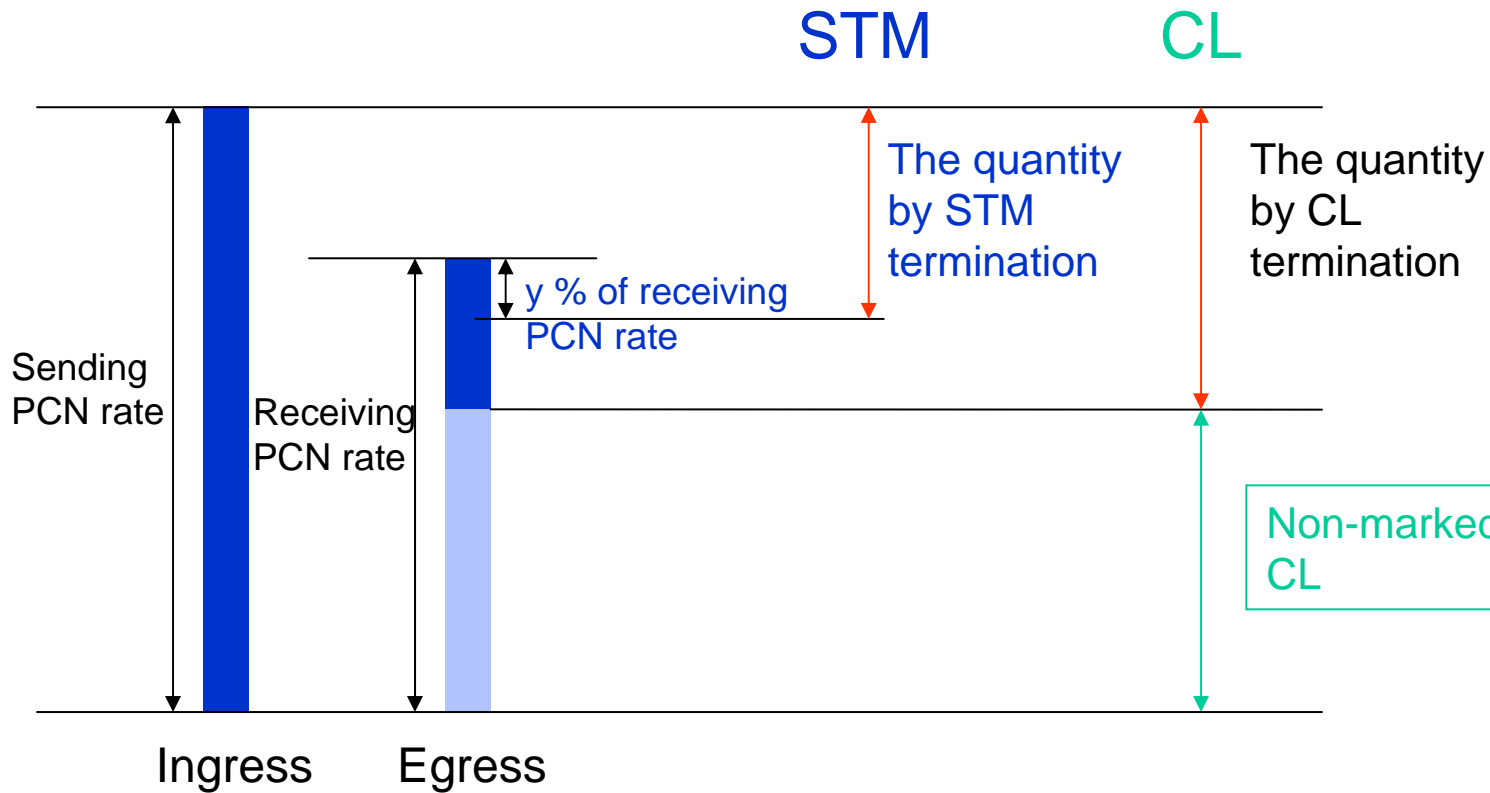
# Admission control

1. Egress measure the CLE per Ingress
2. Egress sends the CLE to Ingress
3. Ingress receives the CLE
4. If the CLE is greater than CLE threshold then Admission stop.
5. If the CLE is less than CLE threshold then Admitting new flows
  - CLE threshold should be chosen less than  $AR/(N*SR)$ .

# Flow Termination Control

- Almost the same as that of CL
  1. Egress detects L-sequential marked packets.
  2. Egress starts measuring receiving PCN rate during some interval.
  3. Egress sends the received PCN rate to Ingress.
  4. Ingress starts measuring sending PCN rate during some interval.
  5. Ingress terminates flows equal to the quantity: sending PCN rate – receiving PCN rate +  $y\% * \text{receiving PCN rate}$ ).
  6. Go back to 1.

# The difference between CL and STM





# Impact to marking behaviour

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- TBthreshold.threshold is not intermediate depth of the token bucket.
- This algorithm uses marking one-Nth packet in threshold marking.

# Basic evaluation – admission control -

- -----
- Type | Over Admission % | Standard deviation %
- |-----
- | STM | CL | STM | CL
- -----
- CBR | 0.285 | 0.028 | 1.243 | 0.818
- -----
- VBR | 1.017 | 0.979 | 2.761 | 2.587
- -----
- SVD | 4.308 | 4.476 | 6.002 | 5.922
- -----

# Basic evaluation – termination control -

Traffic Type	Load (x Link speed)	Over Termination %	
		STM	CL
CBR		5.54	3.57
VBR	1.0	6.95	13.78
SVD		17.34	16.83
CBR		4.94	5.158
VBR	1.5	14.56	23.810
SVD		16.94	17.549
CBR		3.86	21.018
VBR	3.0	30.82	48.645
SVD		38.21	56.552



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