

# Guaranteed QoS Synthesiser (GQS)

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# GQS goals (realised)

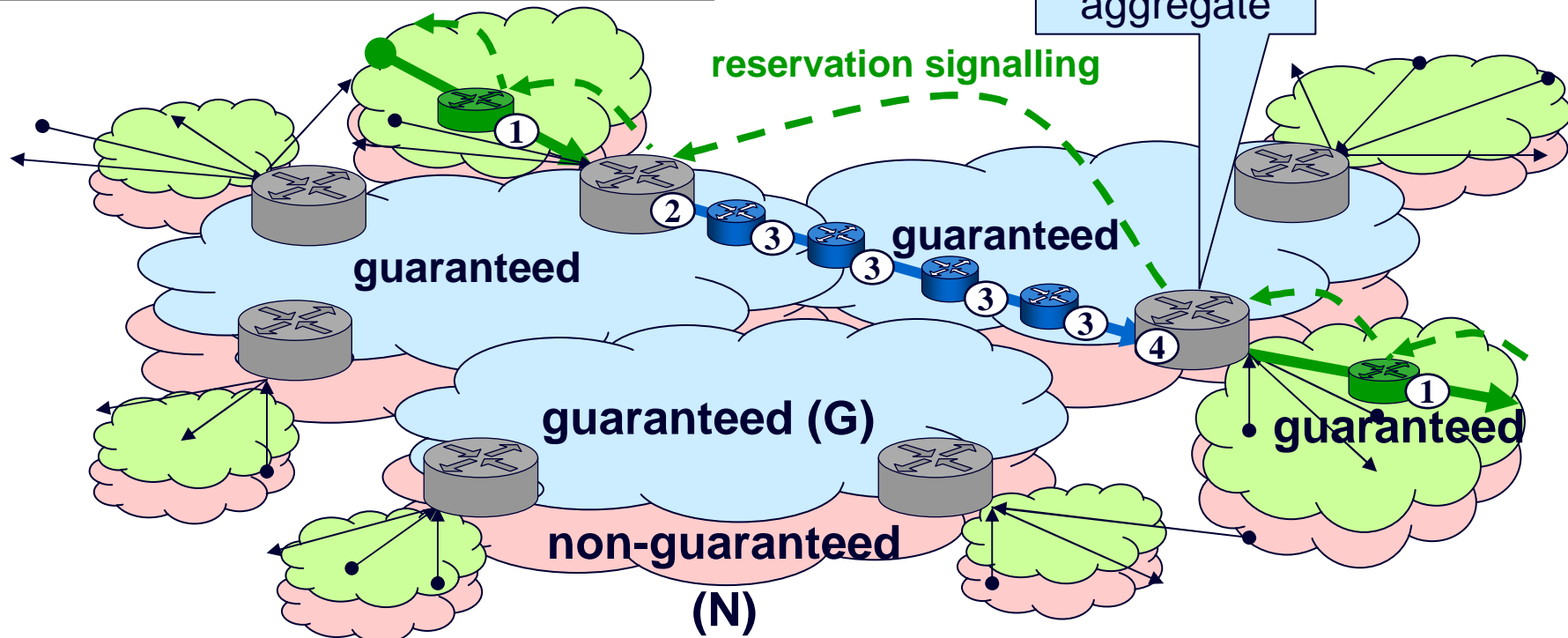
- v cheap Internet-wide statistical guarantees for inter-domain  $\mu$ flows
  - cores rarely congest but if/when they do you're screwed
- uses existing protocols, but not their architectures
  - RSVP (other signalling possible), DSCP, ECN
  - not Intserv, not Diffserv, not e2e ECN
- neither path signalling nor state...
  - ...on core AND border routers
- incremental deployment
  - scales better as more networks join
- no-one has to trust anyone else
  - incentives against inter-provider cheating



# GQS

## system arrangement

IP routers	Data path processing
Reservation enabled 	① Reserved flow processing
RSVP/ECN gateway 	② Policing flow entry to G ④ Meter congestion per peer
ECN only 	③ Bulk ECN marking G prioritised over N



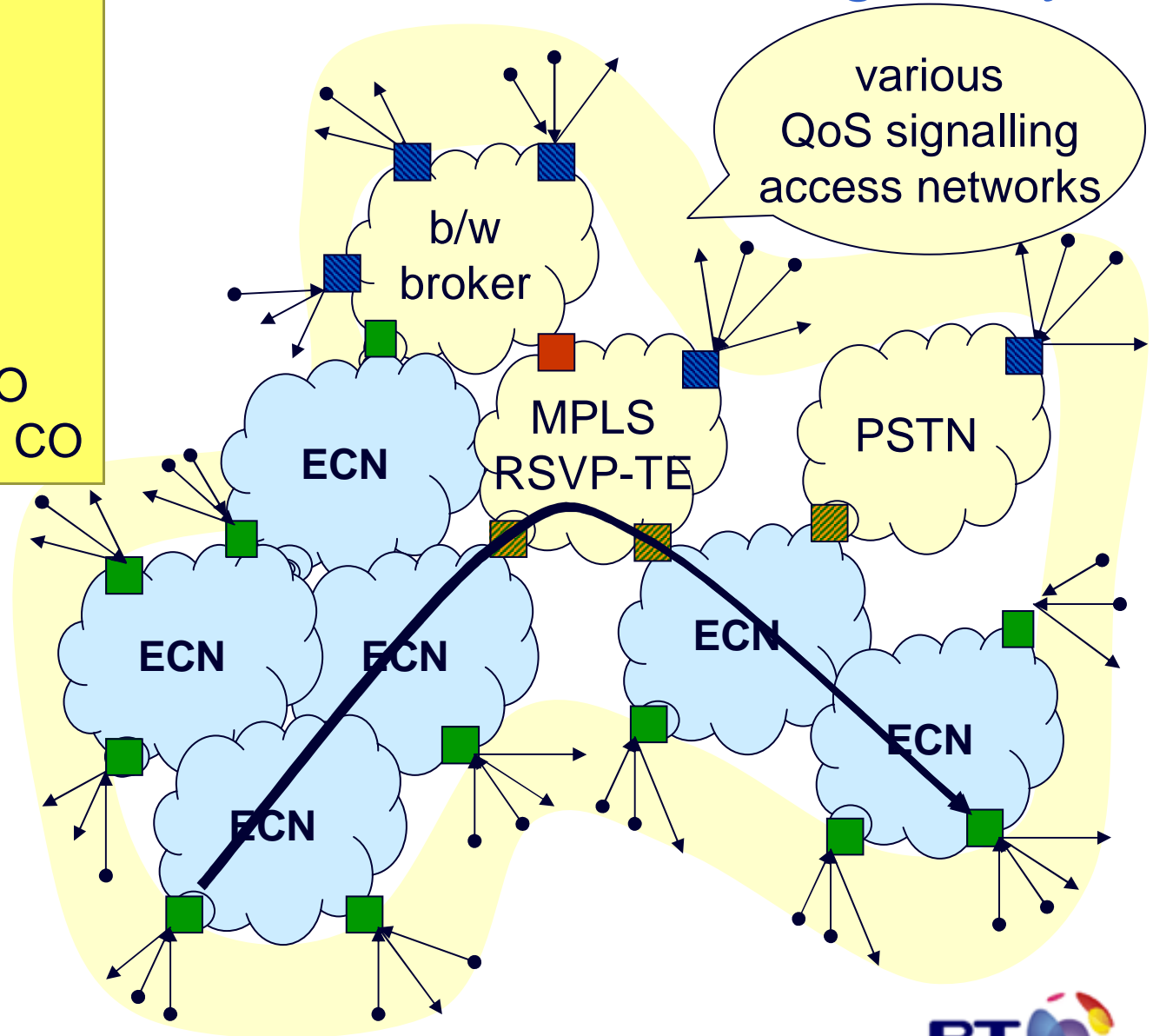
legend

- connection-oriented (CO)
- connectionless

gateways

- GQS
- GQS/core CO
- core CO/core CO
- access CO/core CO

heterogeneity

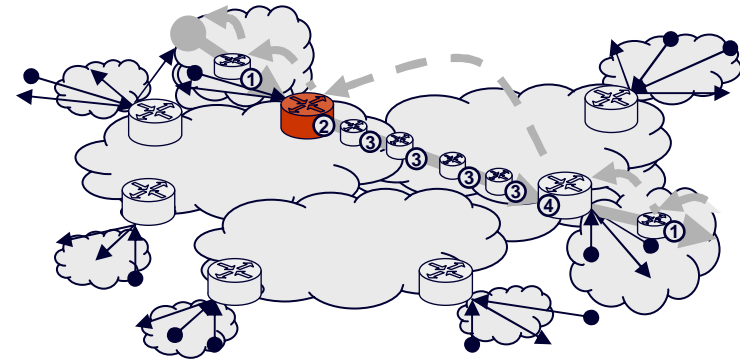
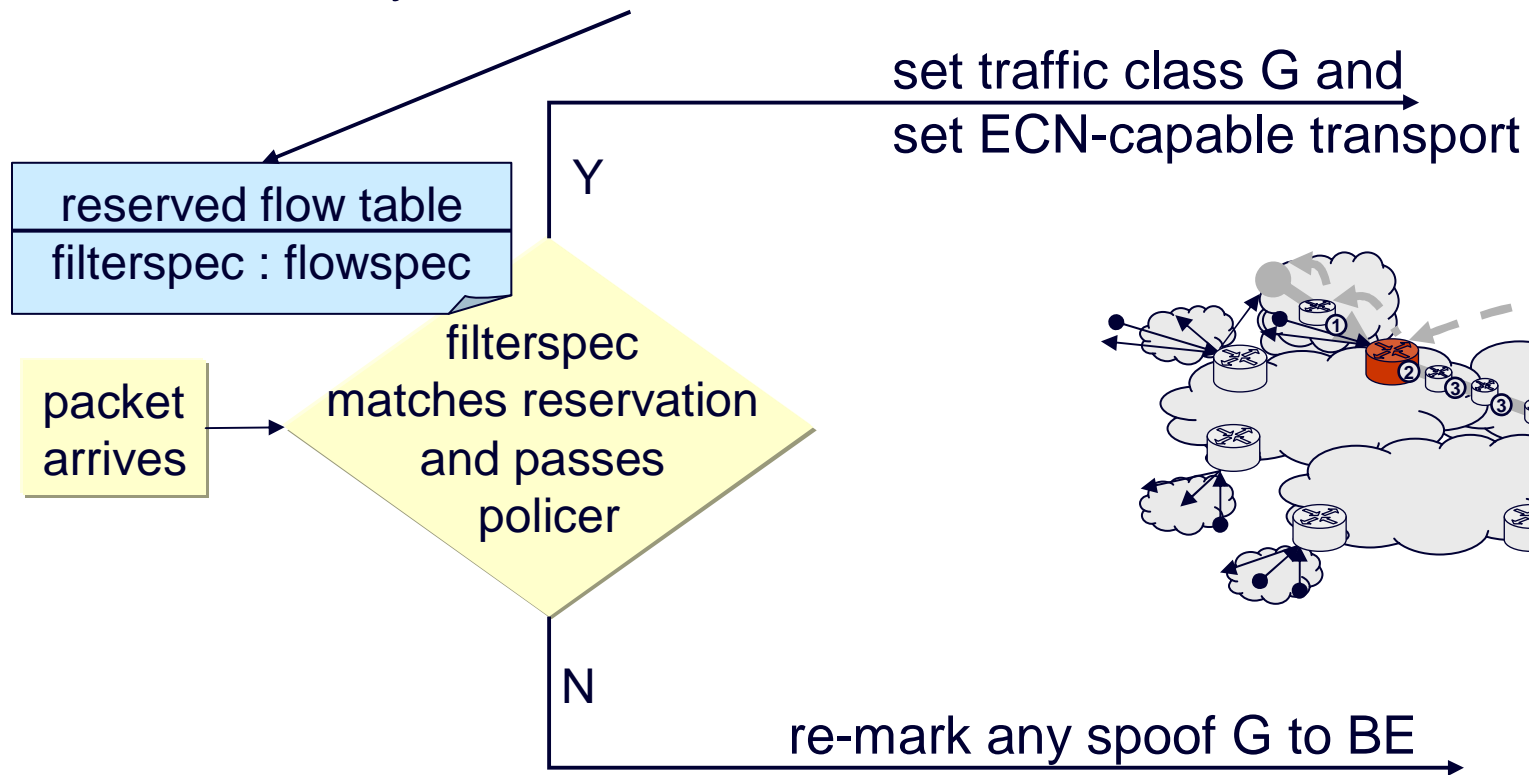


assume app layer signalling (SIP) initiates out of band

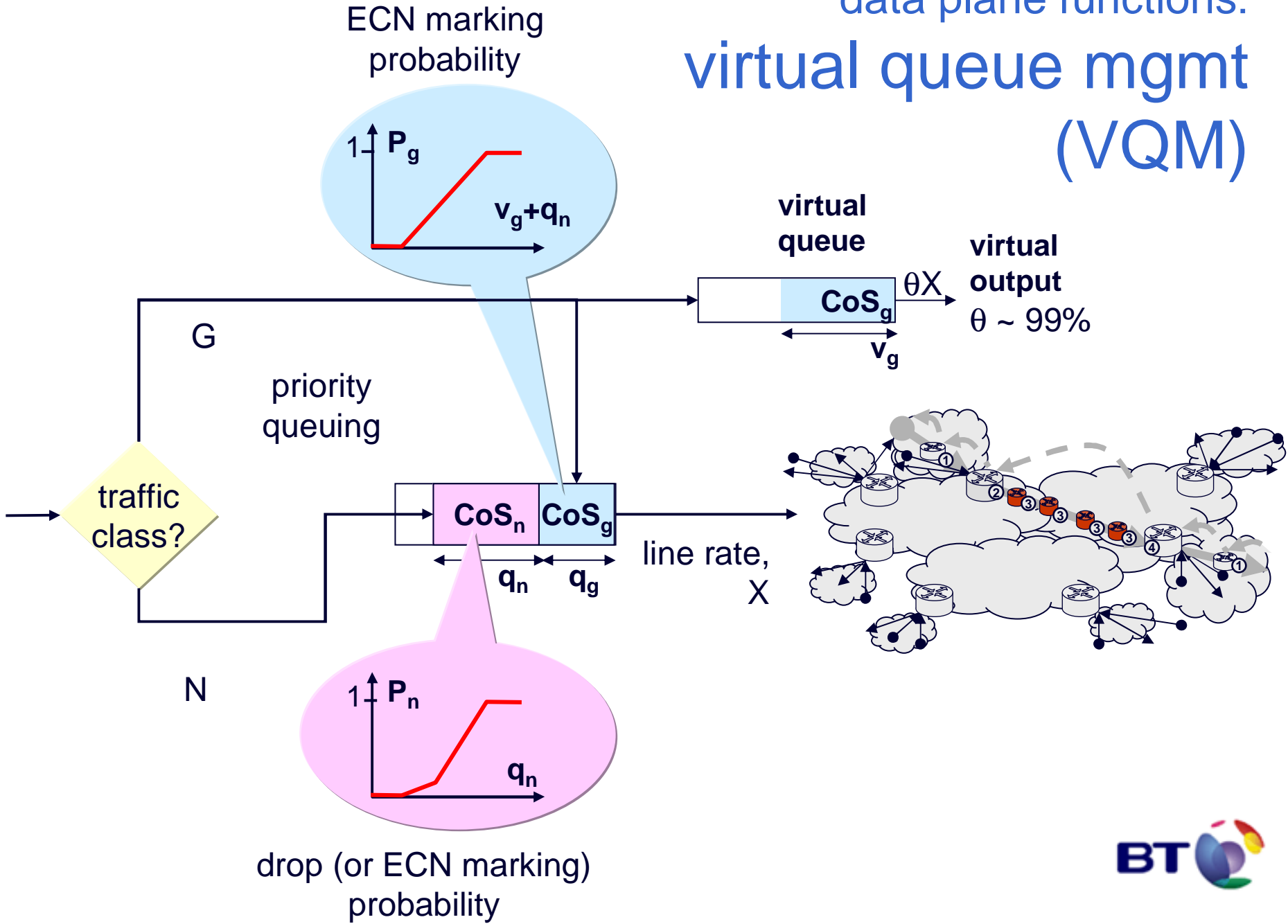


# data plane functions: ingress GQS

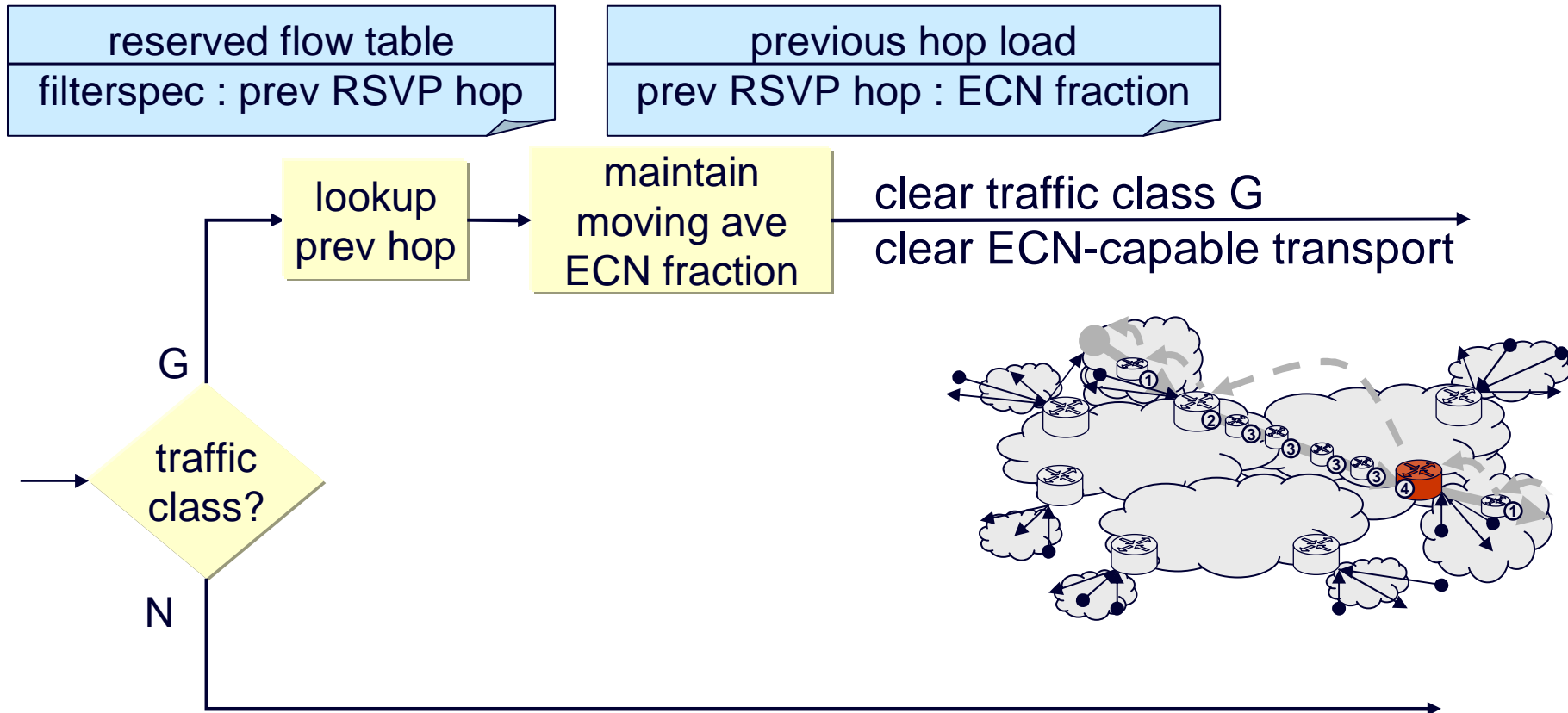
explanation easier if we start by assuming we have already admitted a flow



# data plane functions: virtual queue mgmt (VQM)



# data plane functions: egress GQS



# Q wot, no inter-domain signalling gateway?

A no ☺

Q wot, no per session inter-domain charging?

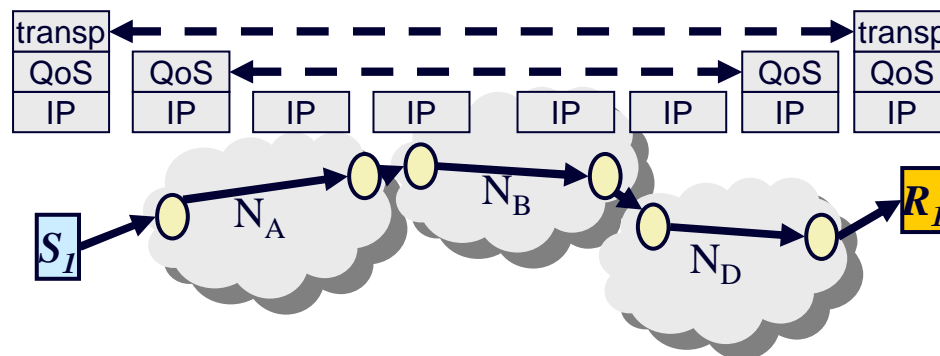
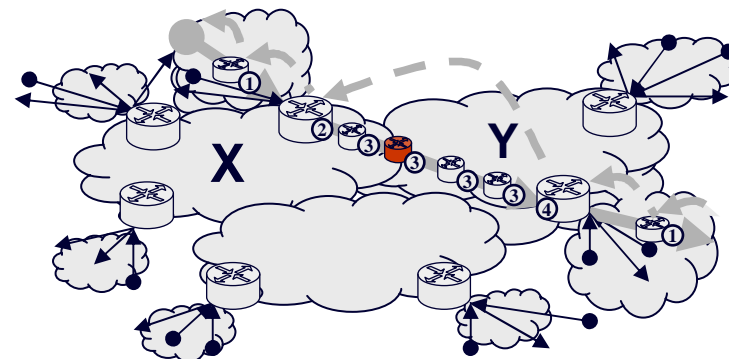
A no ☺

could by intercepting signalling, but not necessary,  
so if you did I'd hide it ☺

Q can't X admit calls despite congestion in Y?

A emulate inter-domain policing

monthly charge for bulk ECN counter at each border  
dead simple to meter & account





## summary

- it works
- it's simple
- it's cheap
- it's robust
- it's secure
- it's deployable
- what else do you want?

## status

- two implementations (2000-4)
  - FreeBSD & Linux
- extensive simulation
- full design documentation
- looking for vendor take-up



# Guaranteed QoS Synthesiser (GQS)

spare slides



## no time for...

- probing when no active flows between gateway pair
- robustness during re-routes
- ECN mechanisms for incentives
  - ingress setting of ECT(0) & ECT(1)
- VBR
- preventing starvation
- policy-based admission control

# inter-class load self-balancing

