CS 925

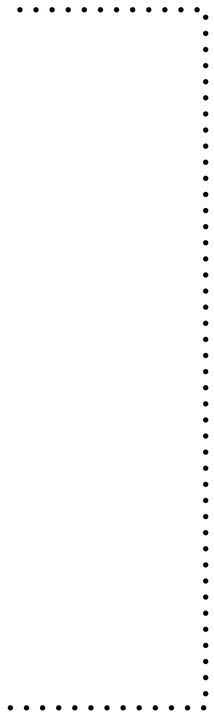
Lecture 7

Traffic Management

Tuesday, February 13, 2024

Traffic Flow

- A distinguishable stream of traffic that needs/requires some specific treatment
- Distinguishable by
  - IP addresses & TCP/UDP port numbers
  - IP TOS/DSCP field
  - IPv6 flow label
  - VLAN tags (IEEE 802.1Q)
  - MPLS label
  - Deep packet inspection



Access Control List (ACL)

Soft State

- A transient state within a device, typically result of an observation
  - time limited
  - self-learned
  - can be wrong (to some extent)
- Soft vs “hard” state (e.g., result of deliberate configuration or routing protocol actions)

Quality of Service in IP

- Type of Service (TOS) field in IPv4, Traffic Class in IPv6
  - 8 bits
  - priority (3 bits)
  - bits to request high throughput, low latency, low loss, and low monetary cost
  - set by traffic generating applications
- For most parts, this attempt has failed:
  - no cost for requesting higher category of service
  - no broad agreement on how to handle the different categories

QoS in Ethernet

- VLAN (802.1Q) header:

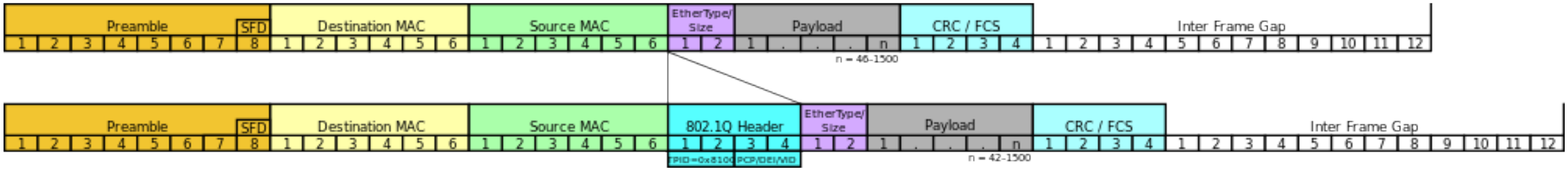
  TPID (16 bits) 0x8100

  TCI - Tag Control Information (16 bits)

    PCP - priority code point (3 bits)

    DEI - drop eligible indication (1 bit)

    VID - VLAN Identifier (12 bits)

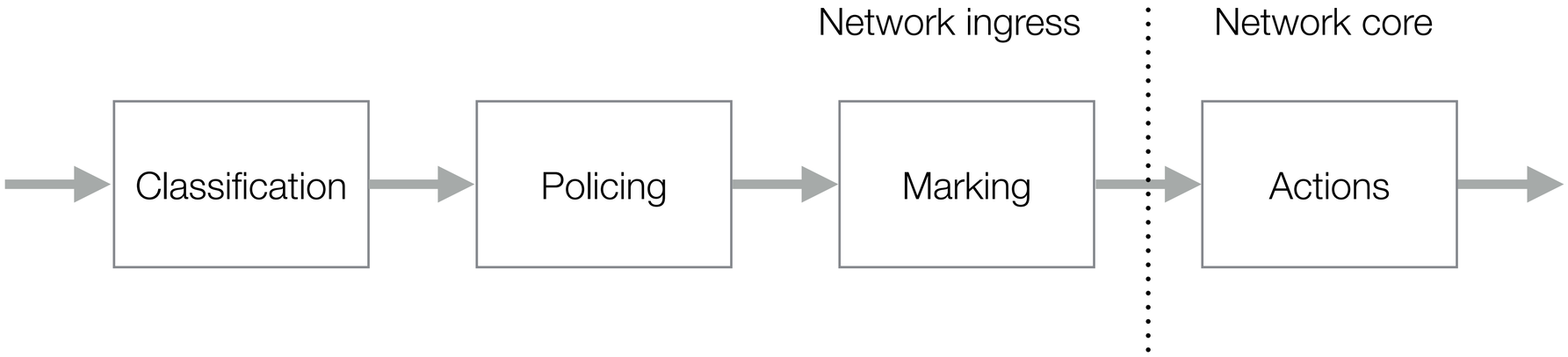


Differentiated Services

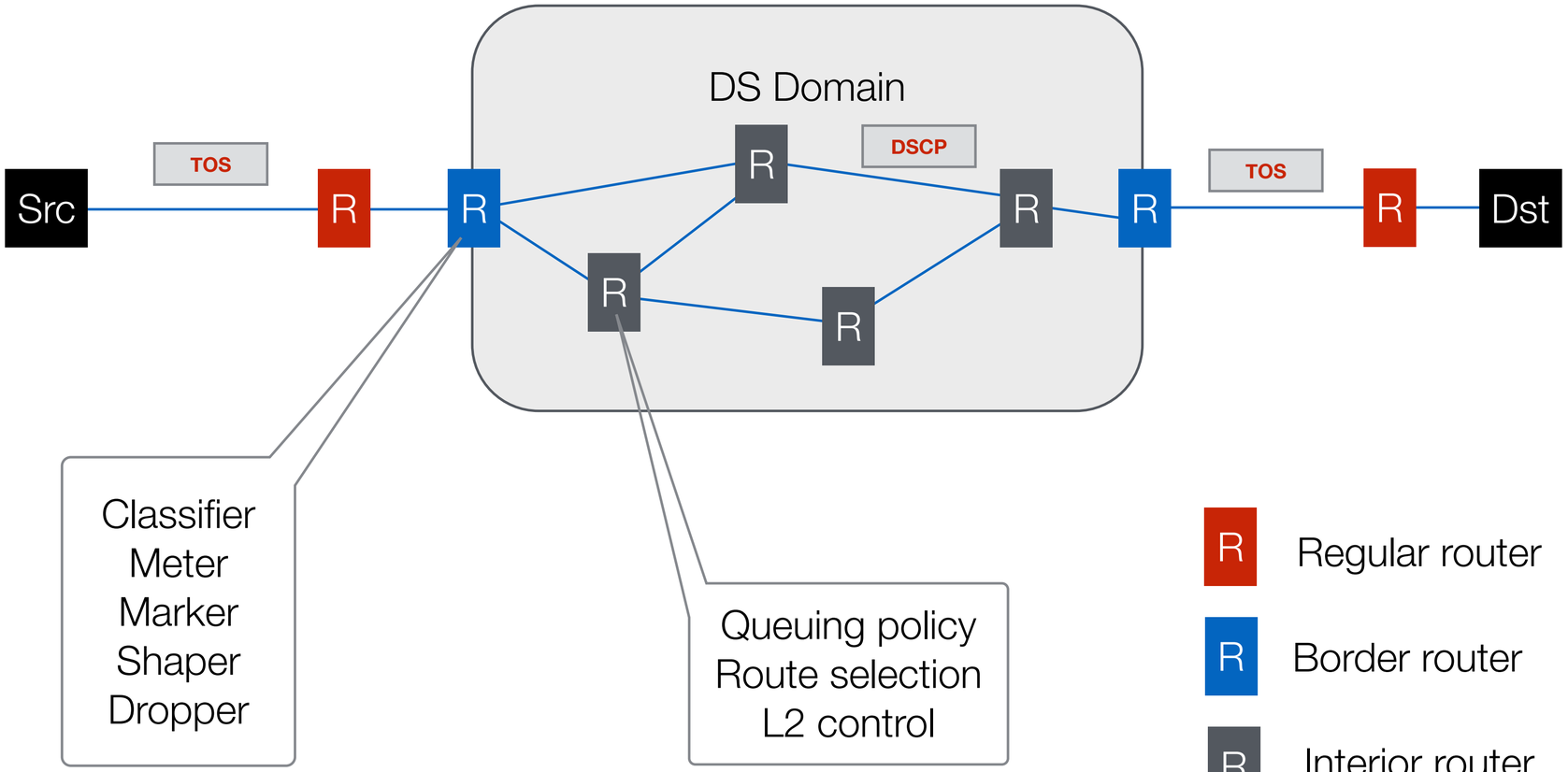
- Domain-based solution
- Relative guarantees
- Few classes of service
- Framework rather than a complete and prescriptive solution
- Reuses TOS field (called DSCP - Differentiated Services Code Point)
- Currently being superseded by Software Defined Networks

QoS Model

- Classification - identifies flows
- Policing - ensures traffic volume compliance
- Marking - makes flows easily distinguishable
- Actions
  - scheduling
  - routing



Differentiated Services



Network Scheduling

- A method to decide
  - which packet to forward first
  - which packet to drop
- a.k.a. packet scheduling, queuing discipline, etc.