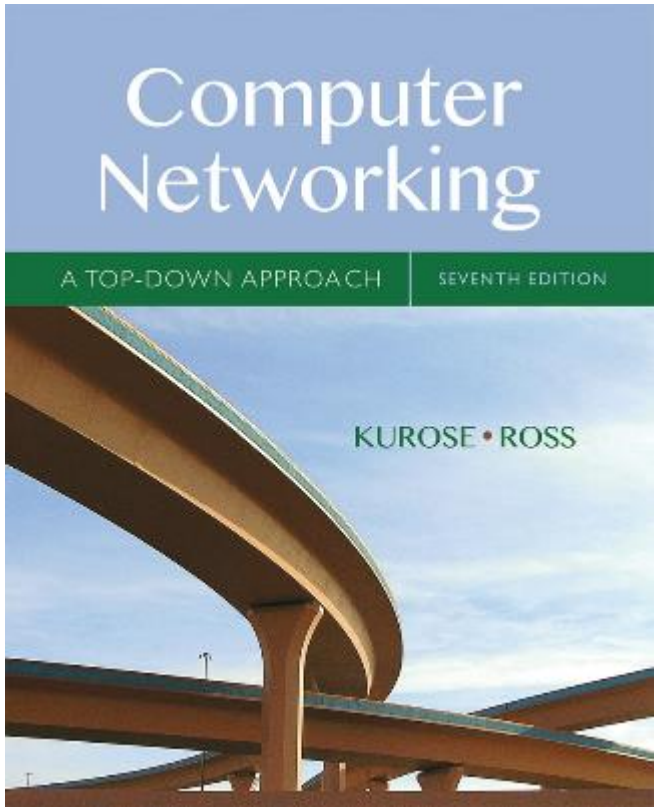
شبکه های کامپیوتری ۲

جلسه ۱۷ فصل ۹

Differentiated Services

دانشگاه صنعتی اصفهان
دانشکده مهندسی برق و کامپیوتر

Chapter 9 Multimedia Networking



Computer Networking: A Top Down Approach

7th edition
Jim Kurose, Keith Ross
Pearson/Addison Wesley
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Thanks and enjoy! JFK/KWR

Multimedia networking: outline

9.1 multimedia networking applications

9.2 streaming *stored* video

9.3 voice-over-IP

9.4 protocols for *real-time* conversational applications

9.5 network support for multimedia

Differentiated services

- want "qualitative" service classes
  - "behaves like a wire"
  - relative service distinction: Platinum, Gold, Silver
- *scalability:* simple functions in network core, relatively complex functions at edge routers (or hosts)
  - signaling, maintaining per-flow router state difficult with large number of flows
- don't define service classes, provide functional components to build service classes

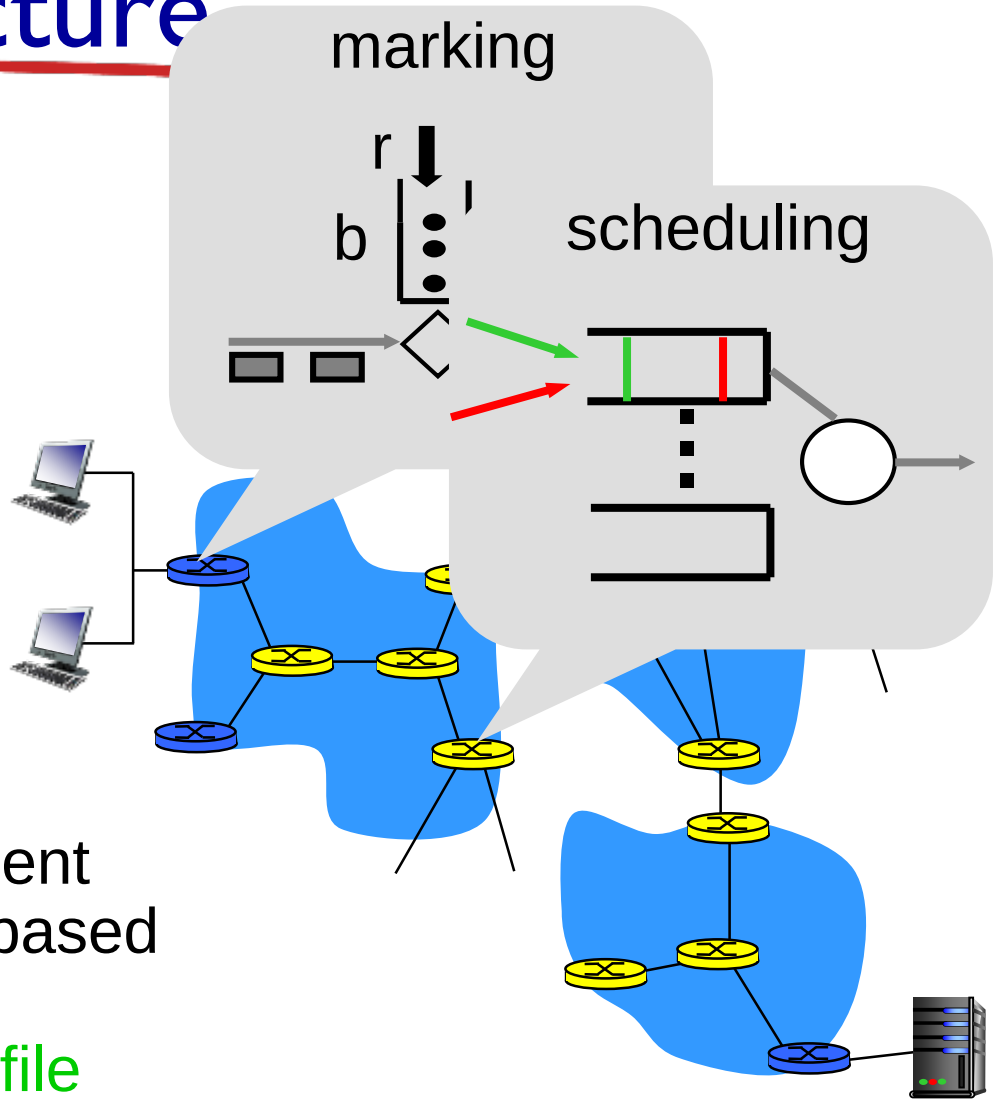
Diffserv architecture

edge router:

- per-flow traffic management
- marks packets as in-profile and out-profile

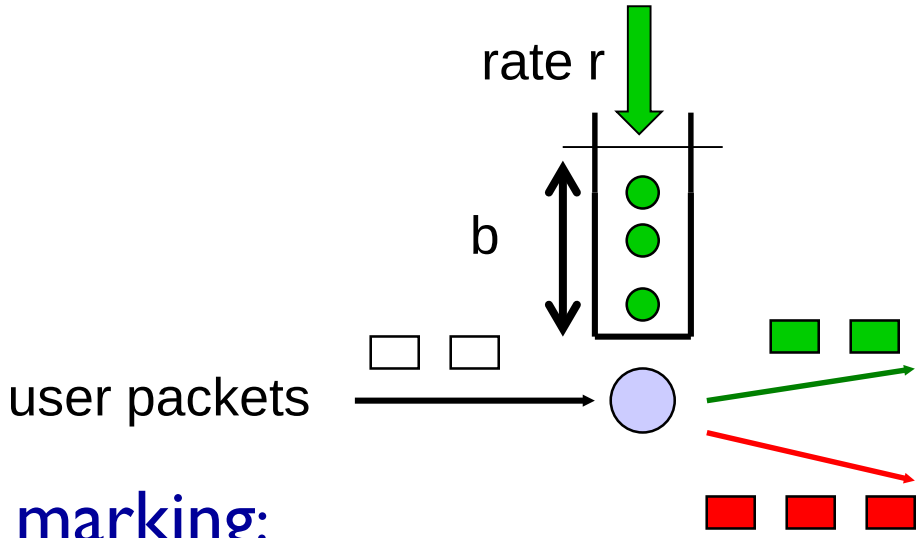
core router:

- per class traffic management
- buffering and scheduling based on marking at edge
- preference given to in-profile packets over out-of-profile packets



Edge-router packet marking

- profile: pre-negotiated rate r, bucket size b
- packet marking at edge based on per-flow profile



possible use of marking:

- class-based marking: packets of different classes marked differently
- intra-class marking: conforming portion of flow marked differently than non-conforming one

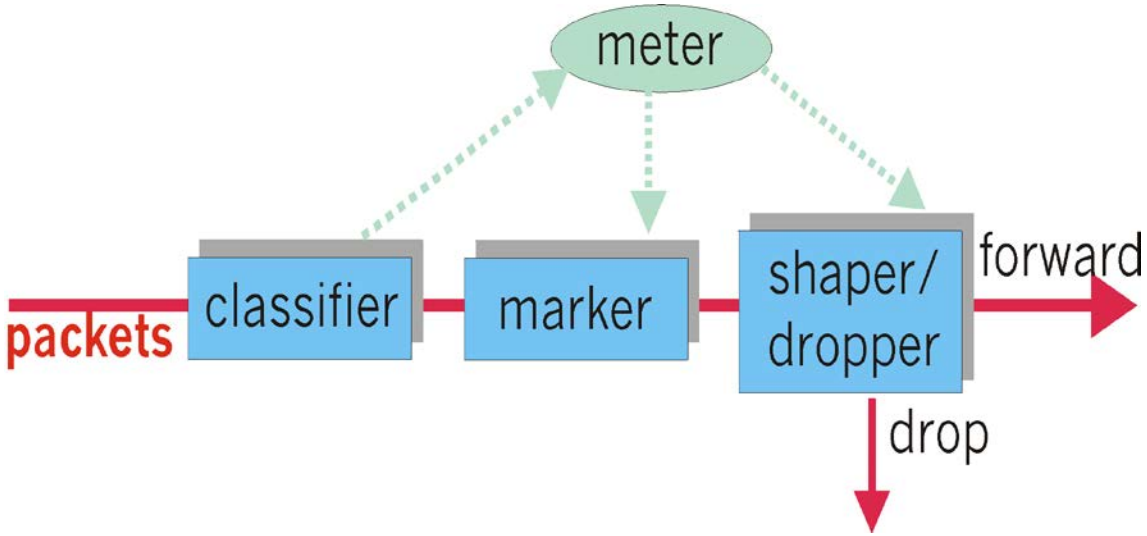
Diffserv packet marking: details

- packet is marked in the Type of Service (TOS) in IPv4, and Traffic Class in IPv6
- 6 bits used for Differentiated Service Code Point (DSCP)
  - determine PHB that the packet will receive
  - 2 bits currently unused

Classification, conditioning

may be desirable to limit traffic injection rate of some class:

- user declares traffic profile (e.g., rate, burst size)
- traffic metered, shaped if non-conforming



Forwarding Per-hop Behavior (PHB)

- PHB result in a different *observable (measurable)* forwarding performance behavior
- PHB does *not* specify what mechanisms to use to ensure required PHB performance behavior
- examples:
  - class A gets x% of outgoing link bandwidth over time intervals of a specified length
  - class A packets leave first before packets from class B

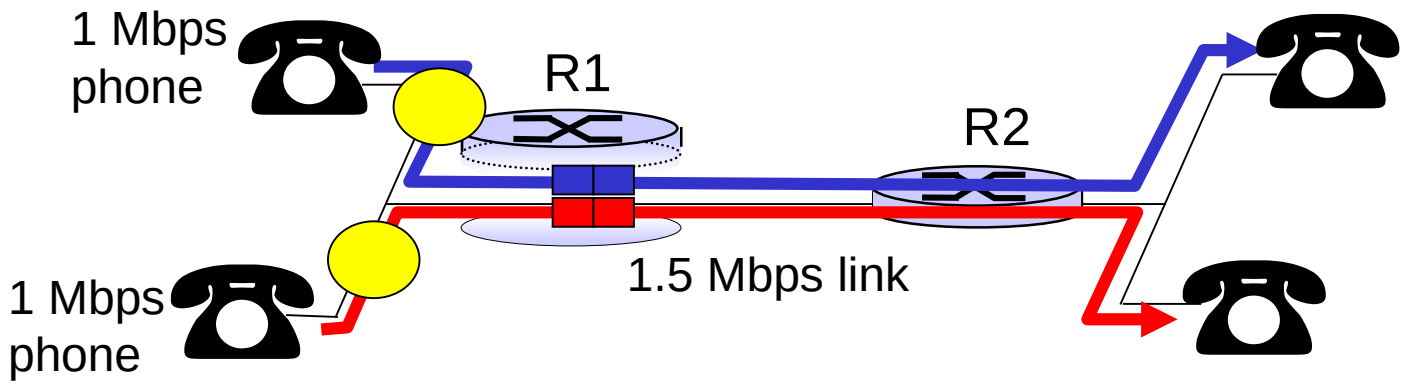
Forwarding PHB

PHBs proposed:

- *expedited forwarding:* packet departure rate of a class equals or exceeds specified rate
  - logical link with a minimum guaranteed rate
- *assured forwarding:* 4 classes of traffic
  - each guaranteed minimum amount of bandwidth
  - each with three drop preference partitions

Per-connection QOS guarantees

- *basic fact of life:* can not support traffic demands beyond link capacity

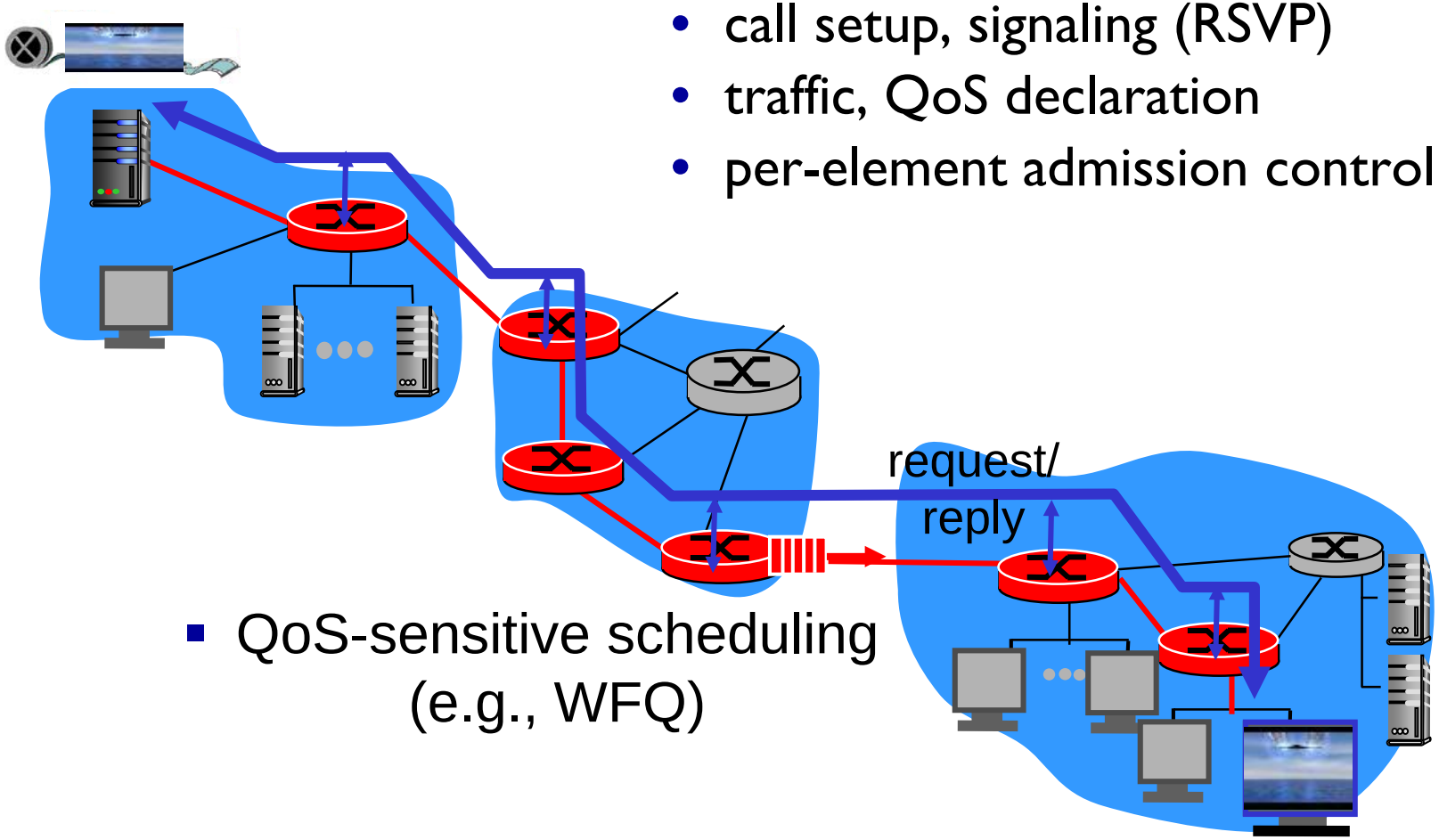


Principle 4

call admission: flow declares its needs, network may block call (e.g., busy signal) if it cannot meet needs

QoS guarantee scenario

- *resource reservation*
  - call setup, signaling (RSVP)
  - traffic, QoS declaration
  - per-element admission control



- QoS-sensitive scheduling (e.g., WFQ)

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