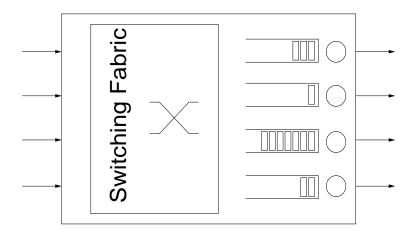Today: **switched** Ethernet

• Not bus anymore but switch

$\rightarrow$ contention moved from bus to "single point"

$\rightarrow$ switch: a computer

• Ethernet frames are logically scheduled

$\rightarrow$ e.g., who goes first (FIFO, priority), buffering

Diagram of 4-port switch (output-buffered):

$\longrightarrow$ called interconnection networks

$\longrightarrow$ switching fabric: hardware

- Ethernet switch **emulates** CSMA/CD

  $\rightarrow$ backward compatibility

  $\rightarrow$ use same DIX/IEEE 802.11 frame format

- upon buffer overflow: send collision signal

  $\rightarrow$ note: in a switch there are no collisions

  $\rightarrow$ switch emulates collision

  $\rightarrow$ transparent to legacy NIC

  $\rightarrow$ for incremental deployment

Internet: new technology must respect legacy

  $\longrightarrow$ key requirement of any practical solution

Long distance Ethernet: e.g., 1000Base-LX

$\longrightarrow$ what about length limit of CSMA/CD?

Medium-haul GigE/10GigE (802.3ae): 500m, 5km, 40km

- solution: disable CSMA/CD

    $\rightarrow$ switch-to-switch: disable at both ends

    $\rightarrow$ purely point-to-point link

    $\rightarrow$ backward compatibility: not an issue anymore

- flow control

    $\rightarrow$ send pause frame to prevent buffer overflow

QoS: IEEE 802.3p

    $\longrightarrow$ frame tagging conveys priority

    $\longrightarrow$ priority classes supported at switches

    $\longrightarrow$ useful for VoIP (voice-over-IP)

Note: today's Ethernet is a hybrid mix of switch, CSMA/CD, short- and long-distance LAN

    $\longrightarrow$ never would have been designed this way

    $\longrightarrow$ a result of incremental legacy-respecting changes