

IT 609

Network and System

Administration

VLANs

Tuesday October 26, 2021

VLANs

Ethernet – VLANs

Virtual networks because real networks
aren't good enough

Switching

Unlike hubs, switches are “smart”

Normal rules

Buffer communications

Examine destination address

Forward frame only to the destination port

What if we changed those rules and used the
“brains” in the switch differently?



Link Aggregation

Merge multiple Ethernet connections into one

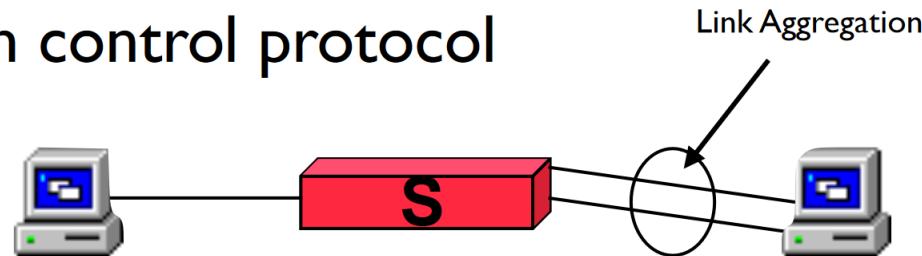
Better performance

Redundancy

Requires a switch that supports the feature

IEEE 802.1AX

Link aggregation control protocol

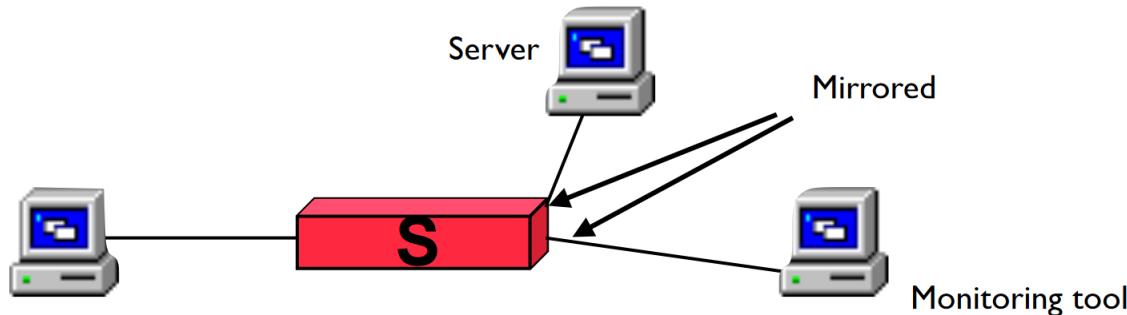


Mirror Ports

Mirror or SPAN (switch port analyzer)

Simple rule - send all traffic that normally goes to one port (or group of ports) also to another port

Useful for network monitoring, troubleshooting



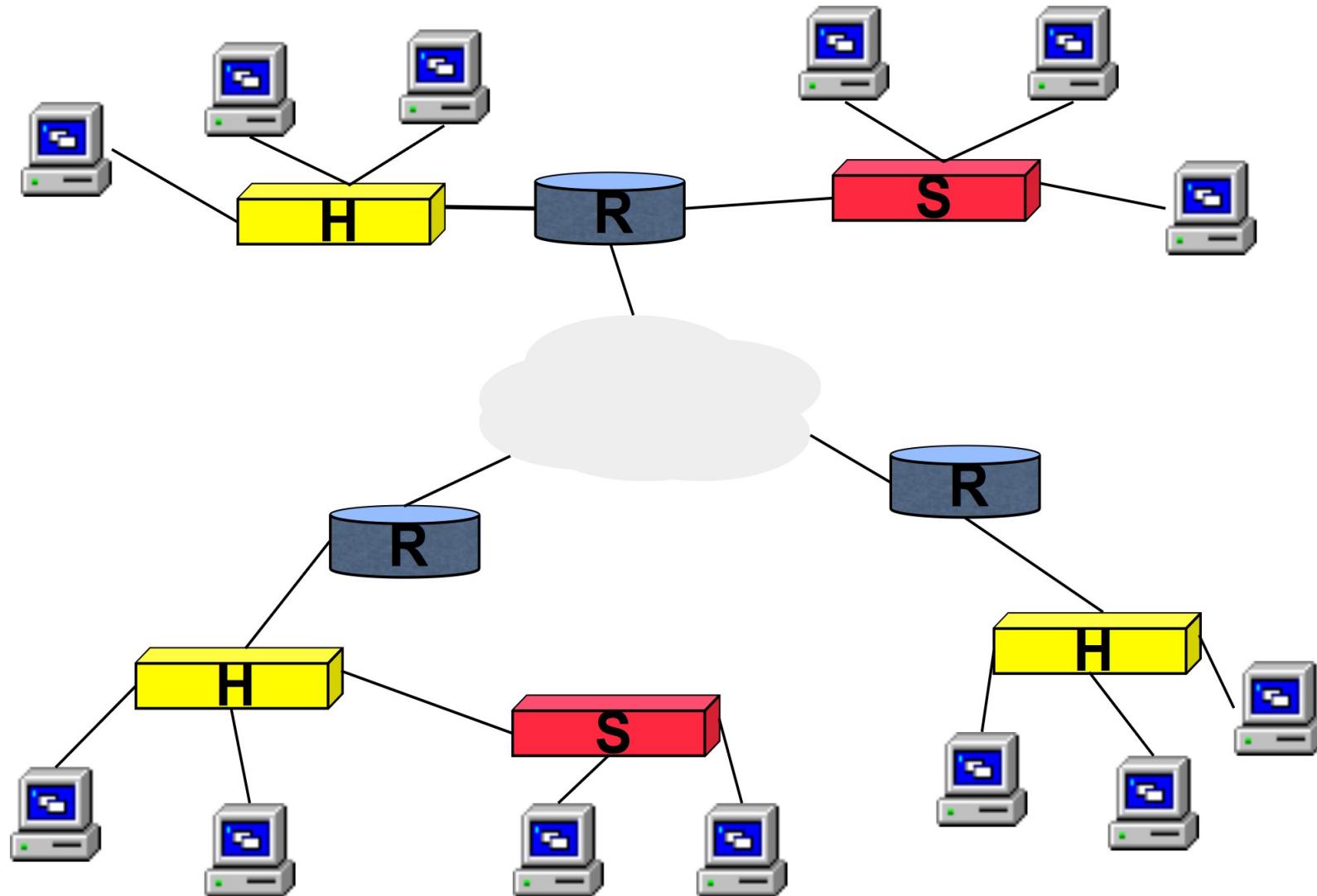
Virtual LAN (VLAN)

VLAN's allow virtual broadcast domains to be created within a switched-based network

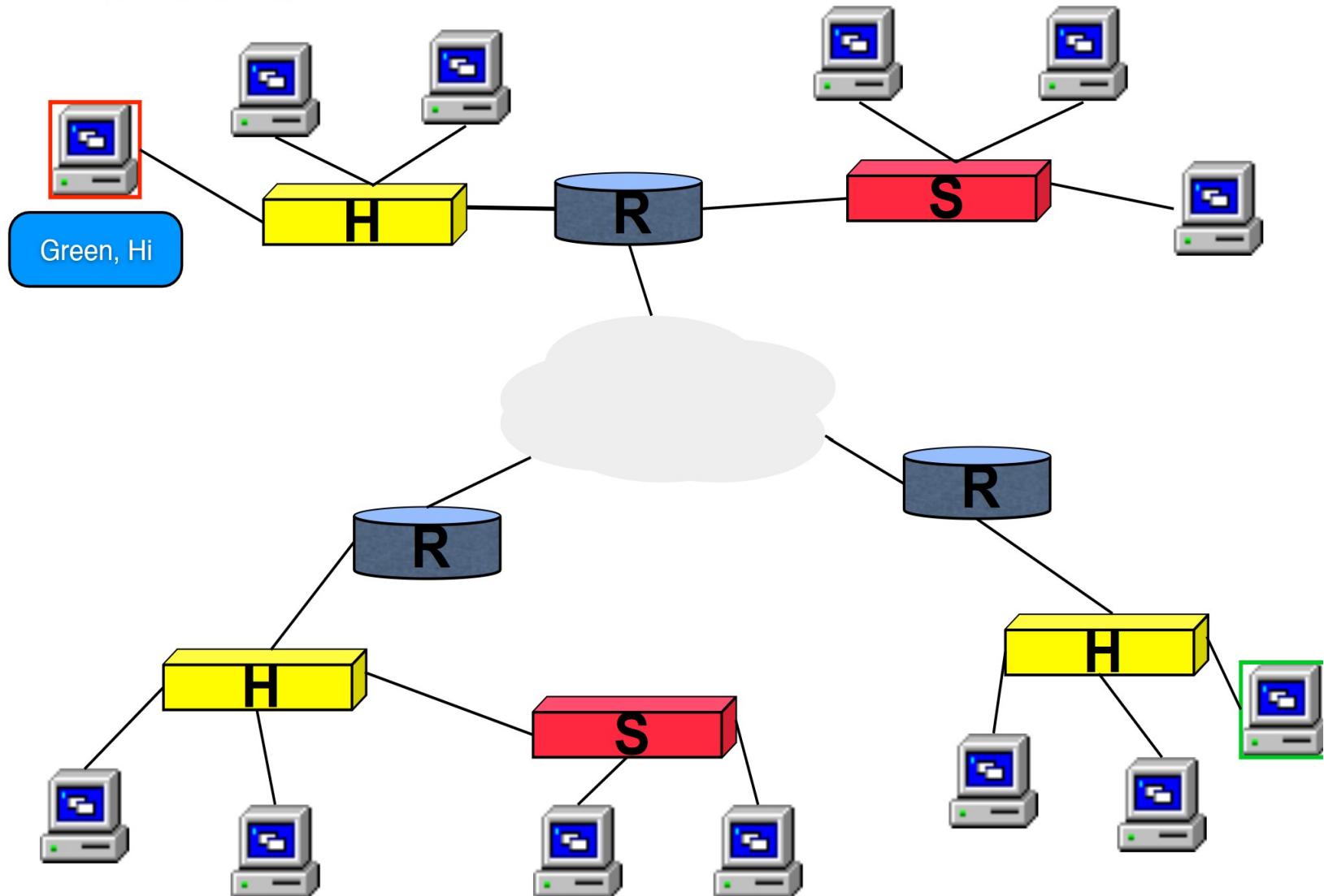
What is this all about?

Why would I want a “virtual broadcast domain”?

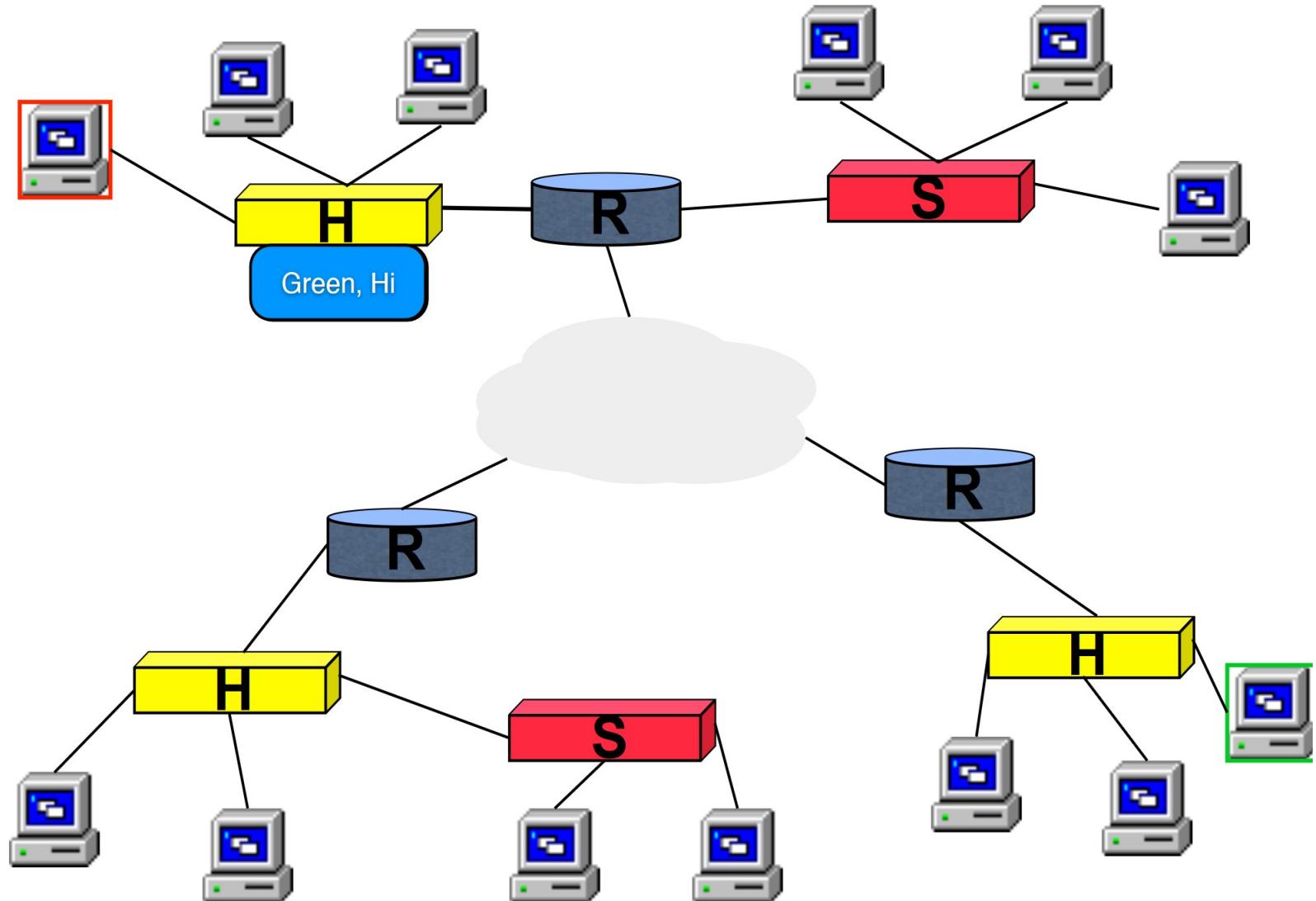
Traditional LAN



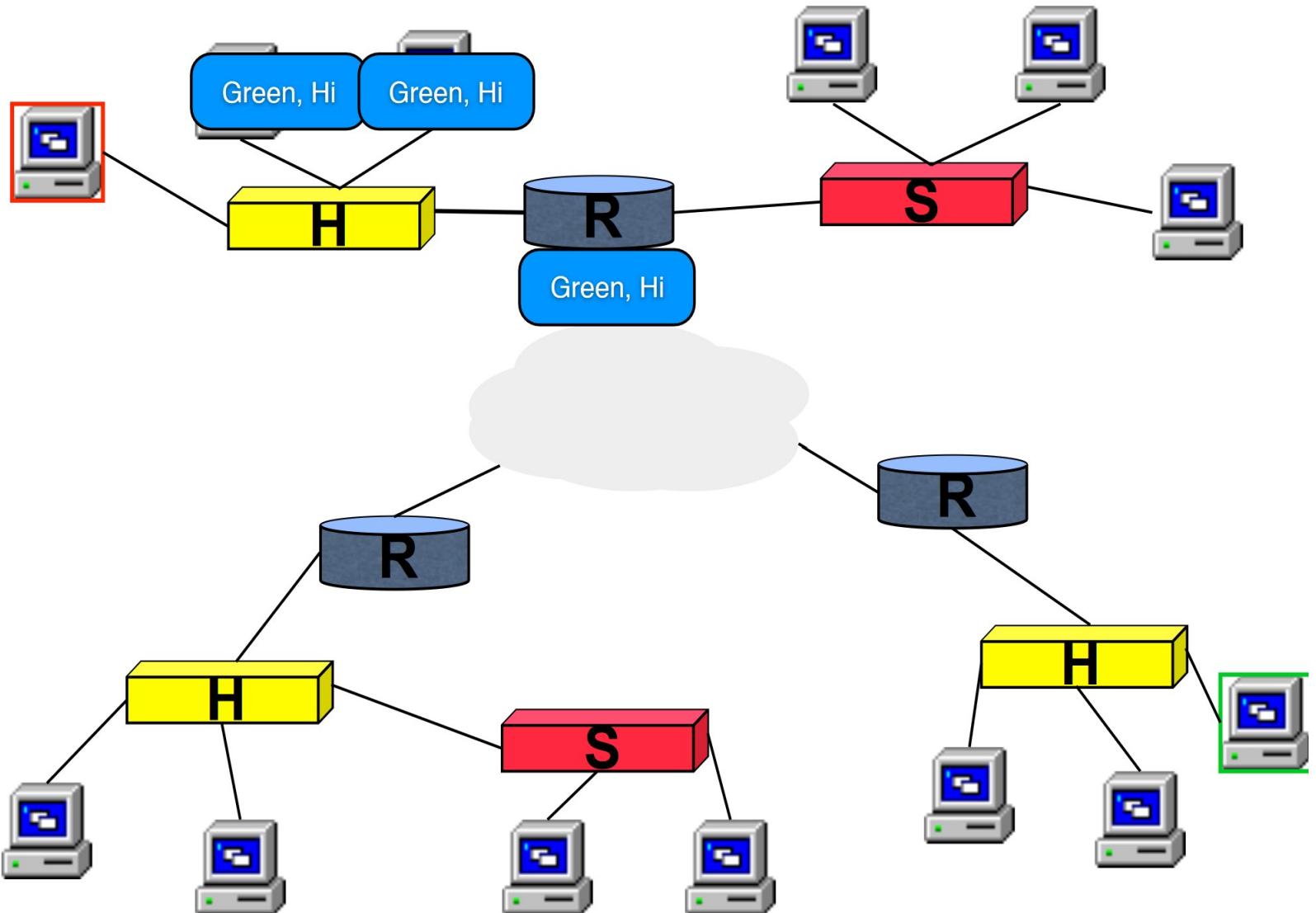
Traditional LAN



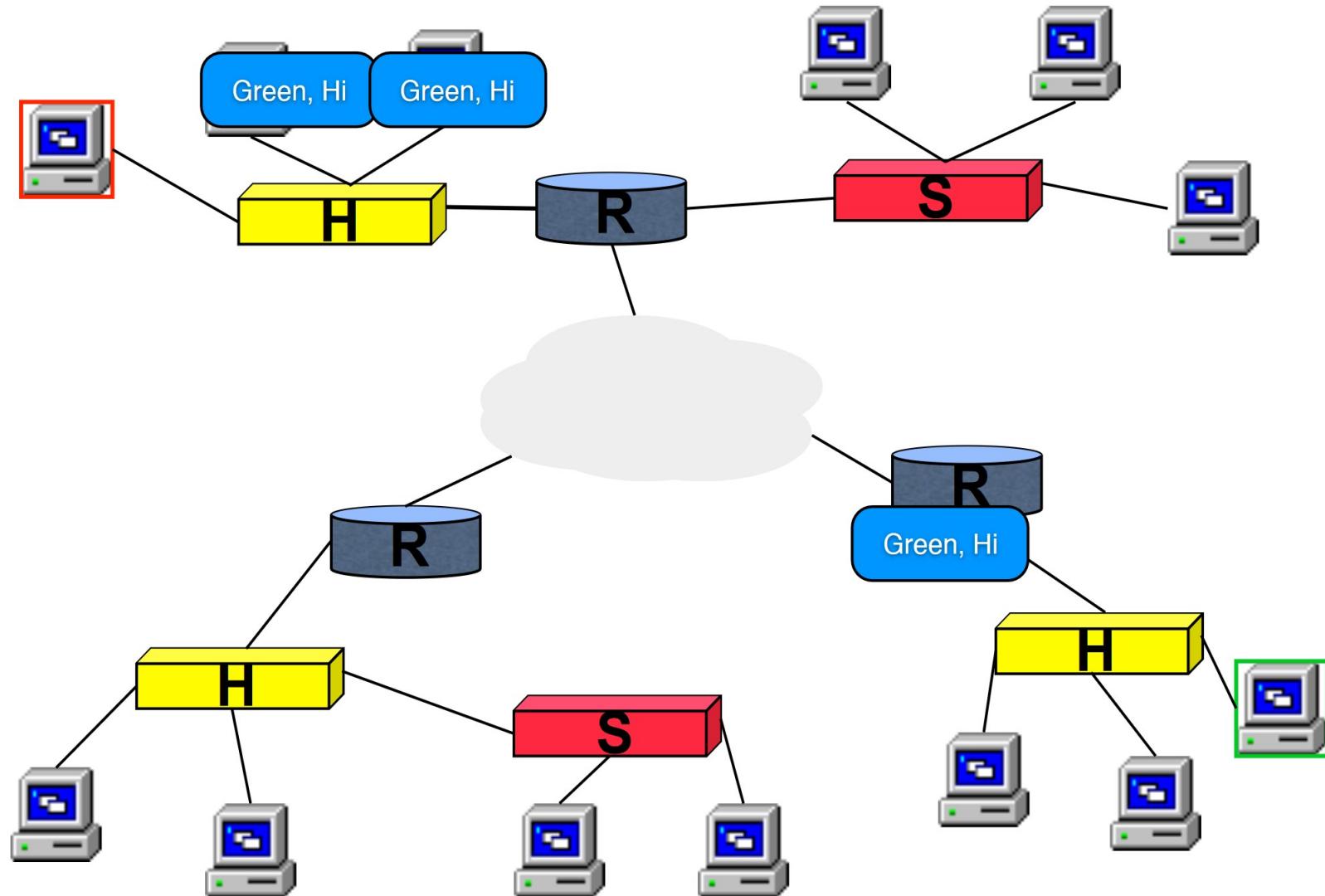
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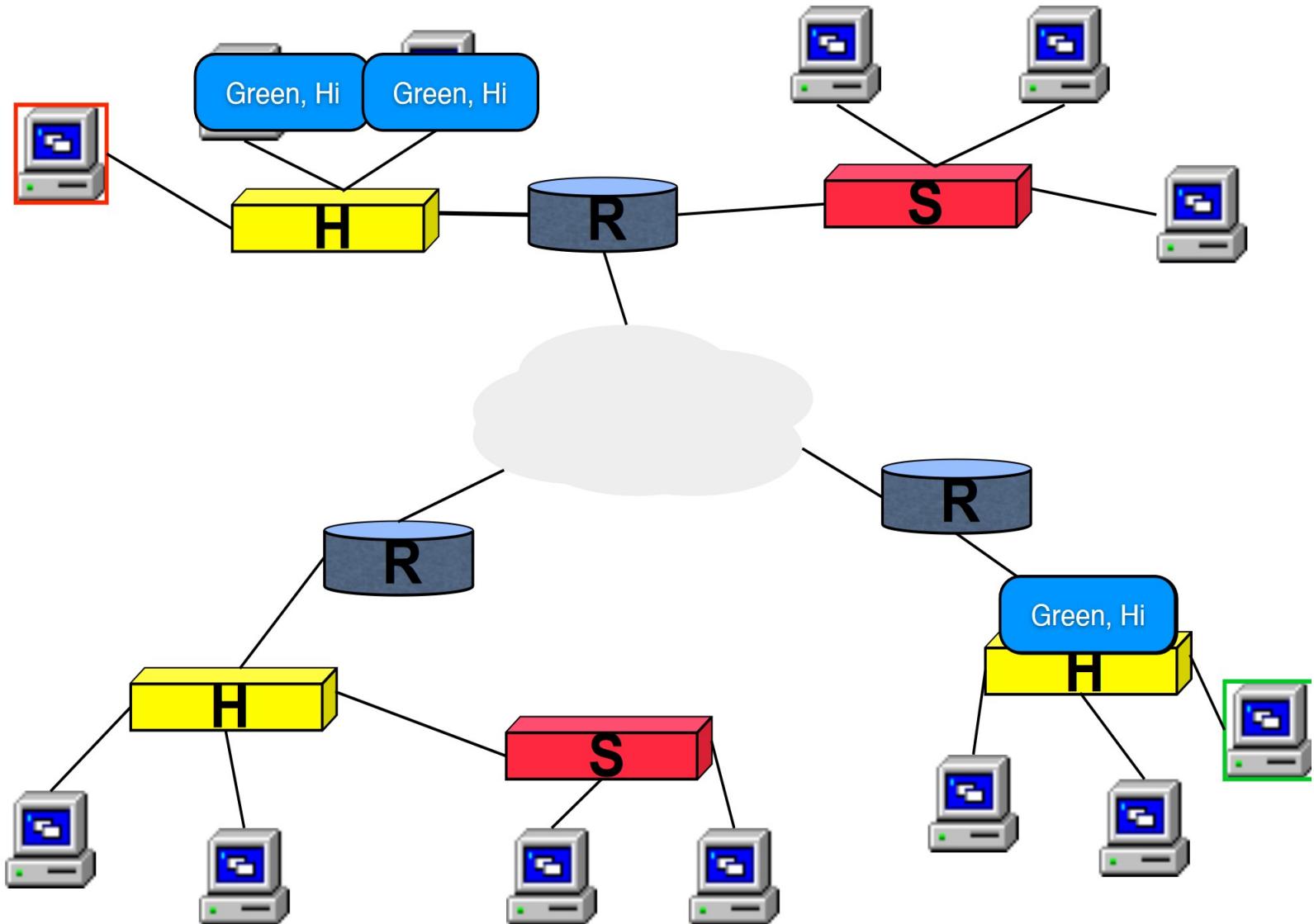
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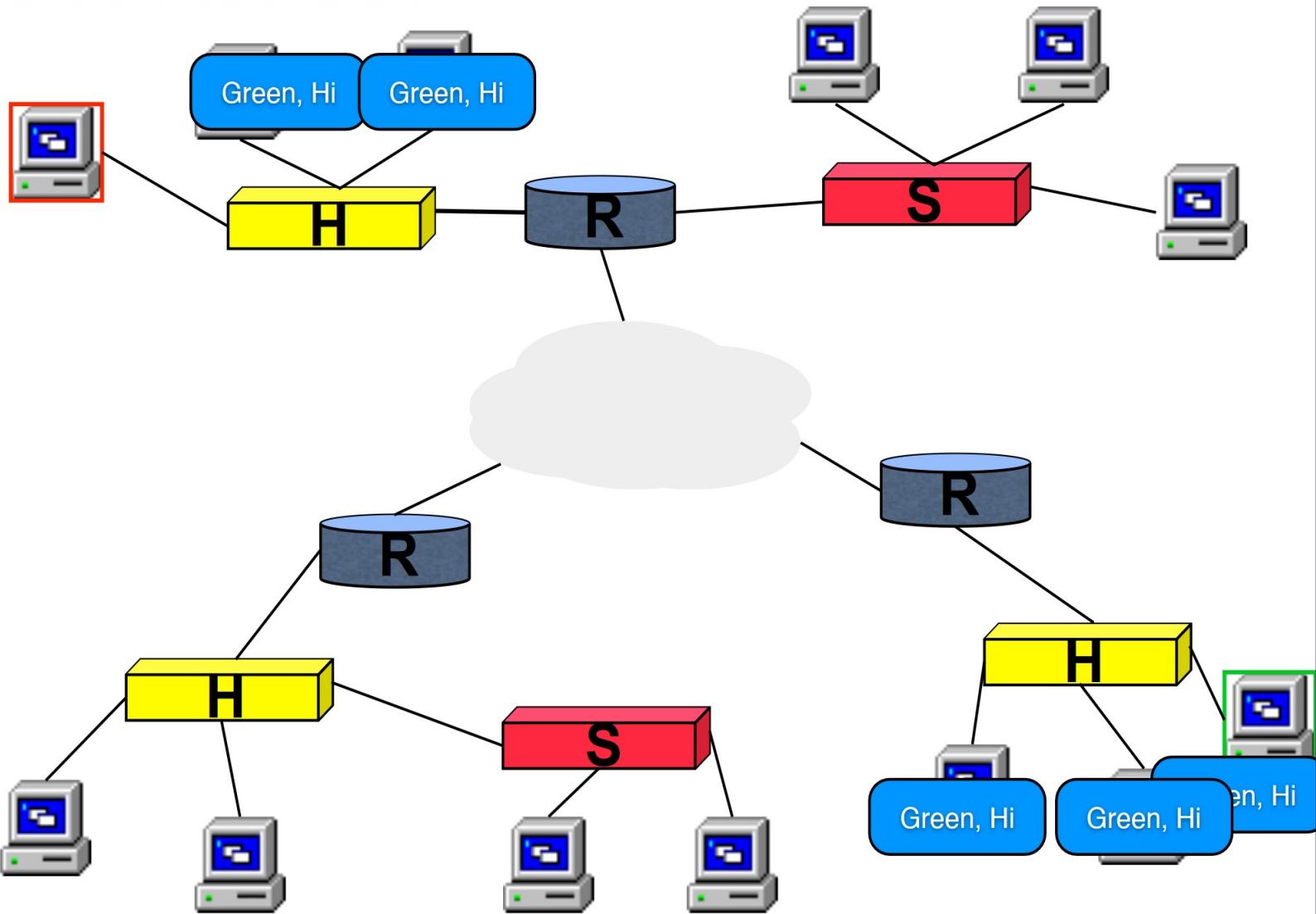
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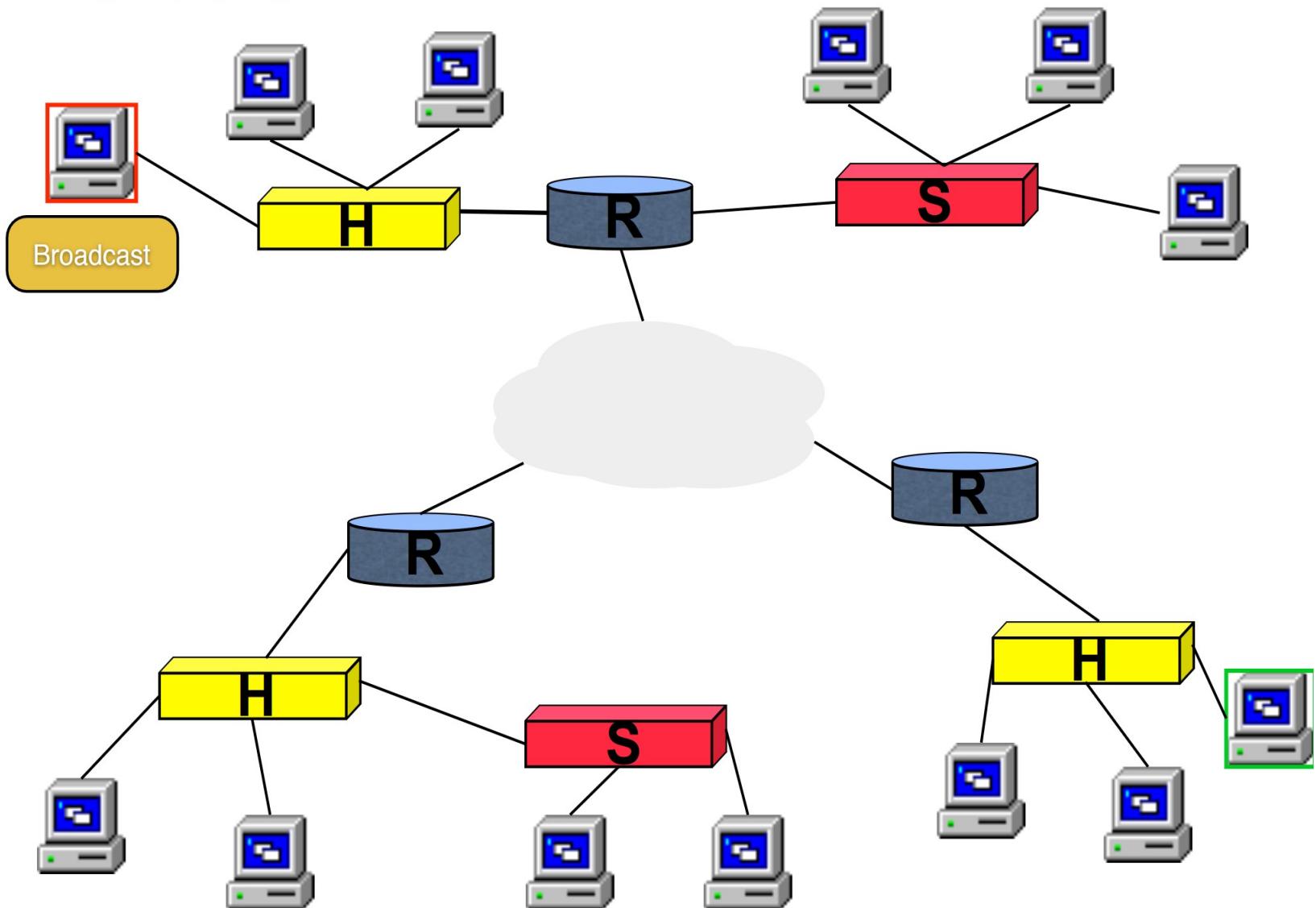
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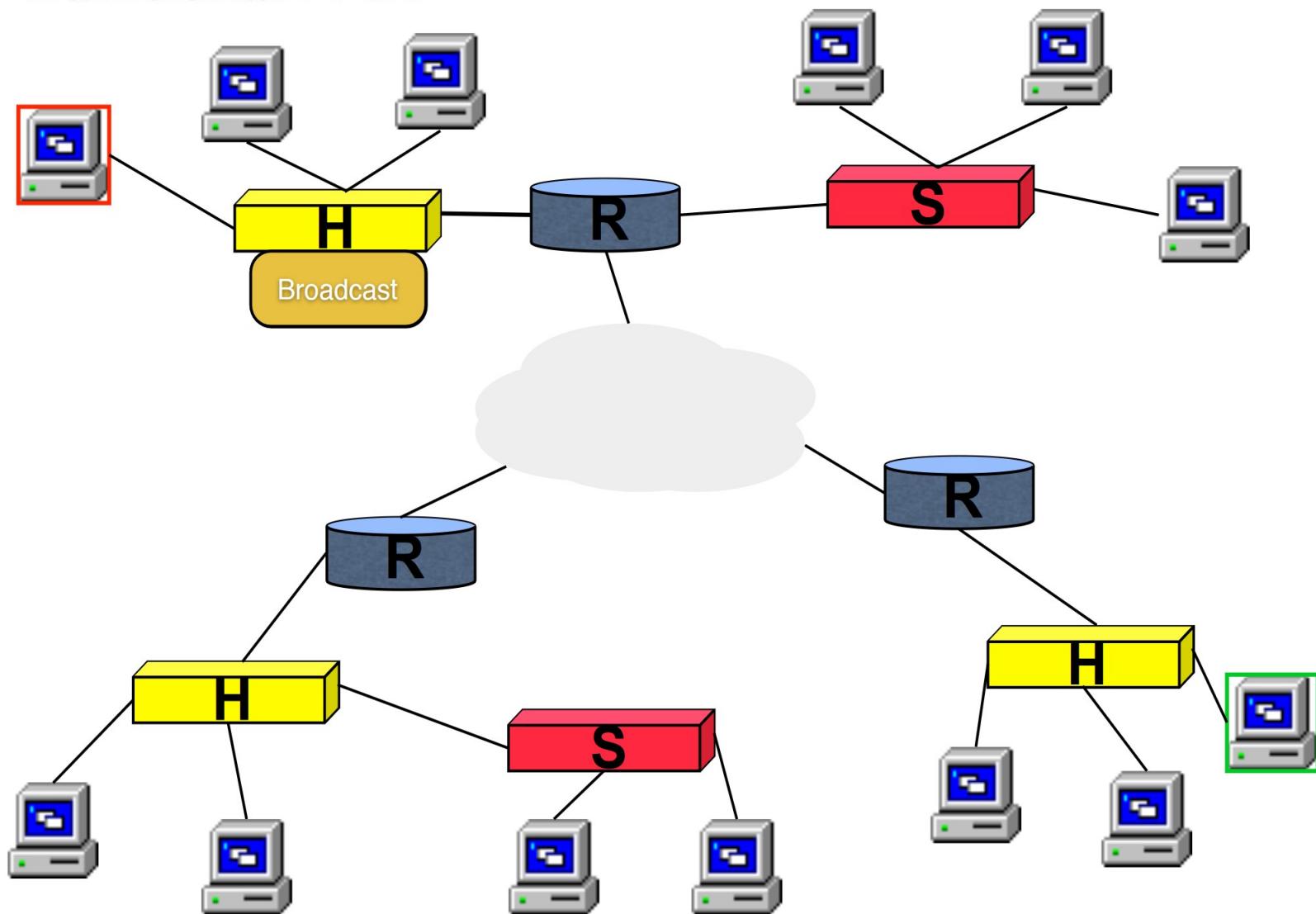
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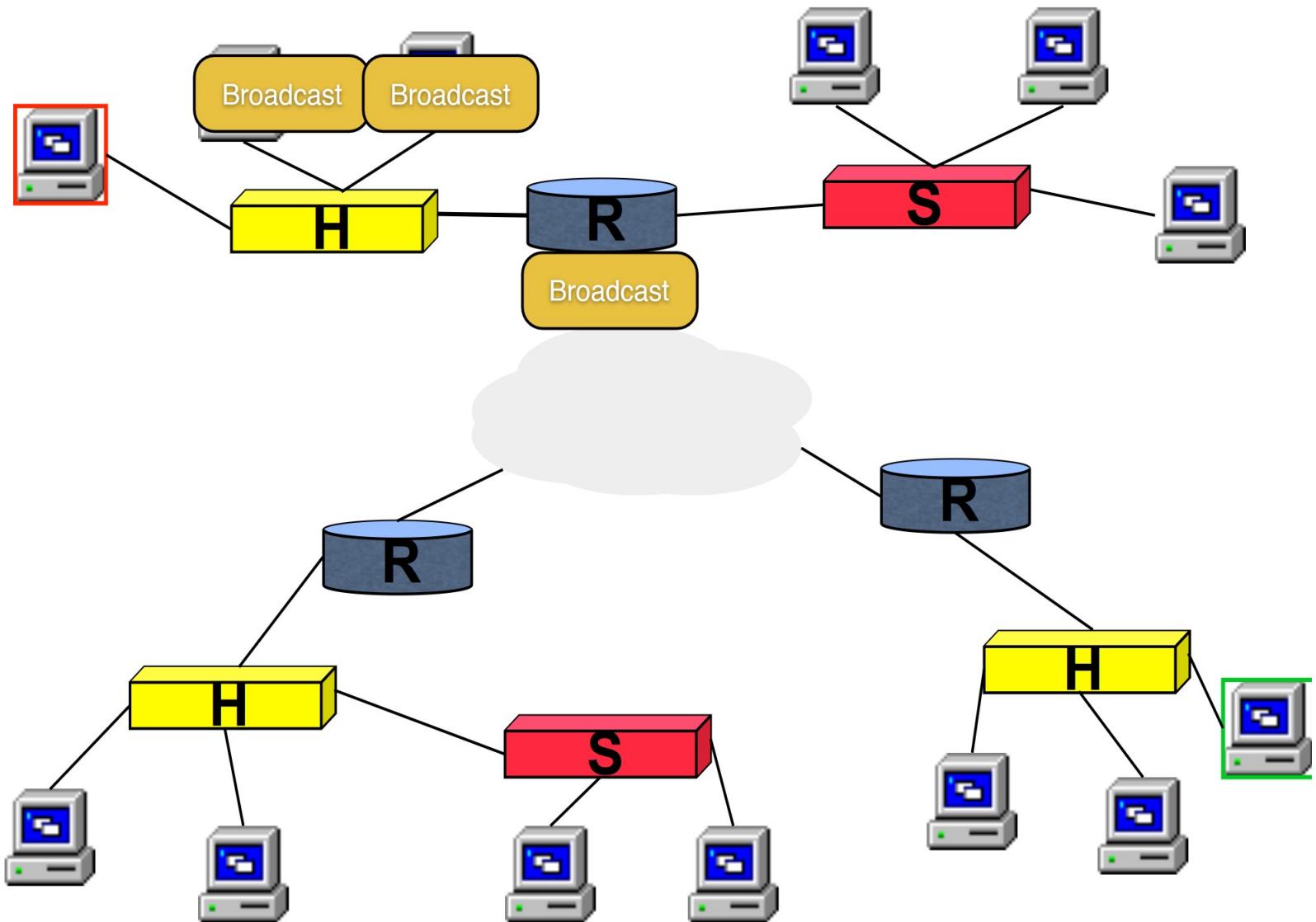
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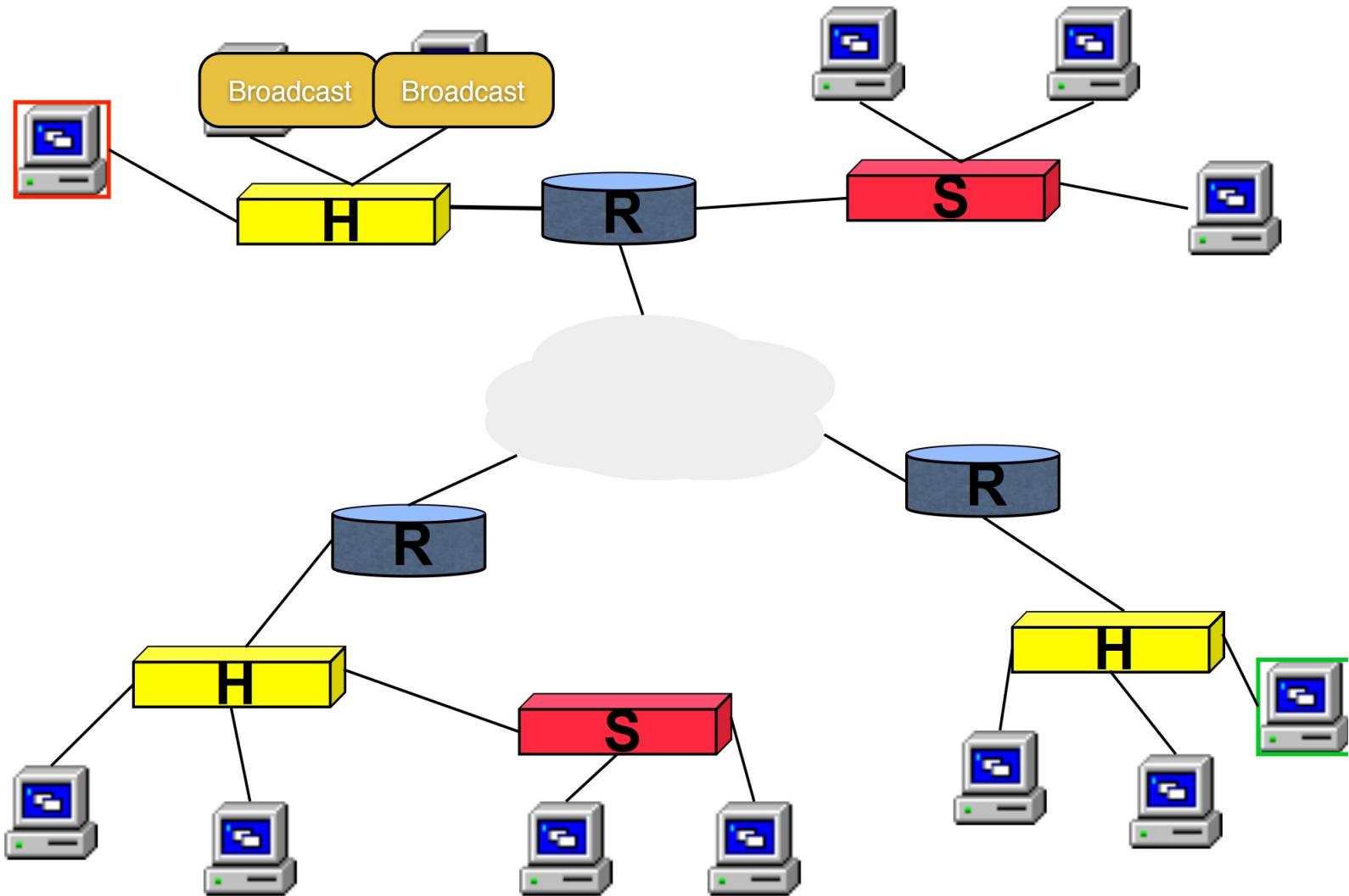
Traditional LAN



Traditional LAN



Traditional LAN



Wired LAN Limits

What if I reorganize my staff so now I want two areas that are on different physical networks to be able to see each other easily?

Run new cabling; hope they are within physical distance limits

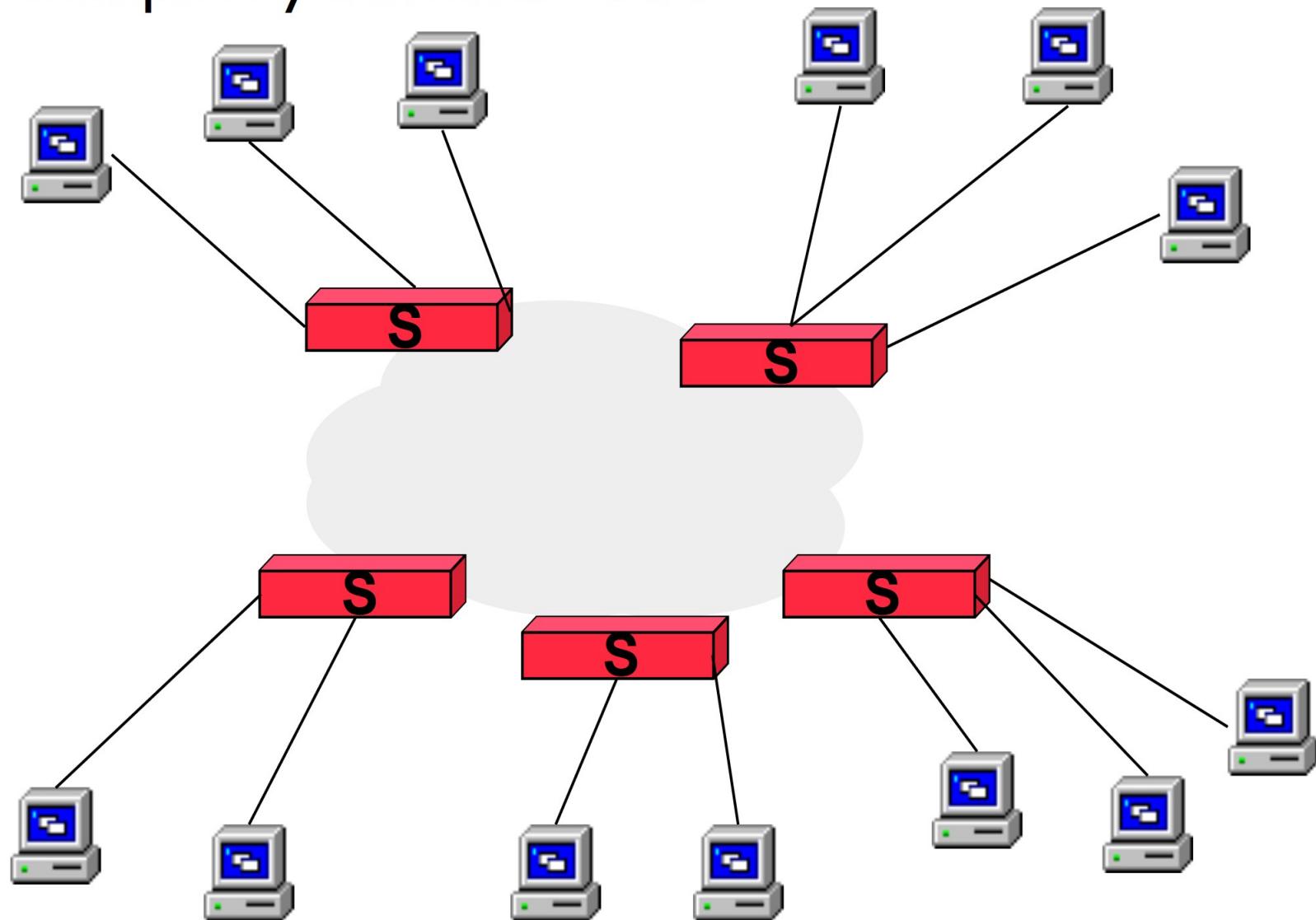
What if I want to group together different machines that are physically separate?

Outside of the physical limits? Not possible

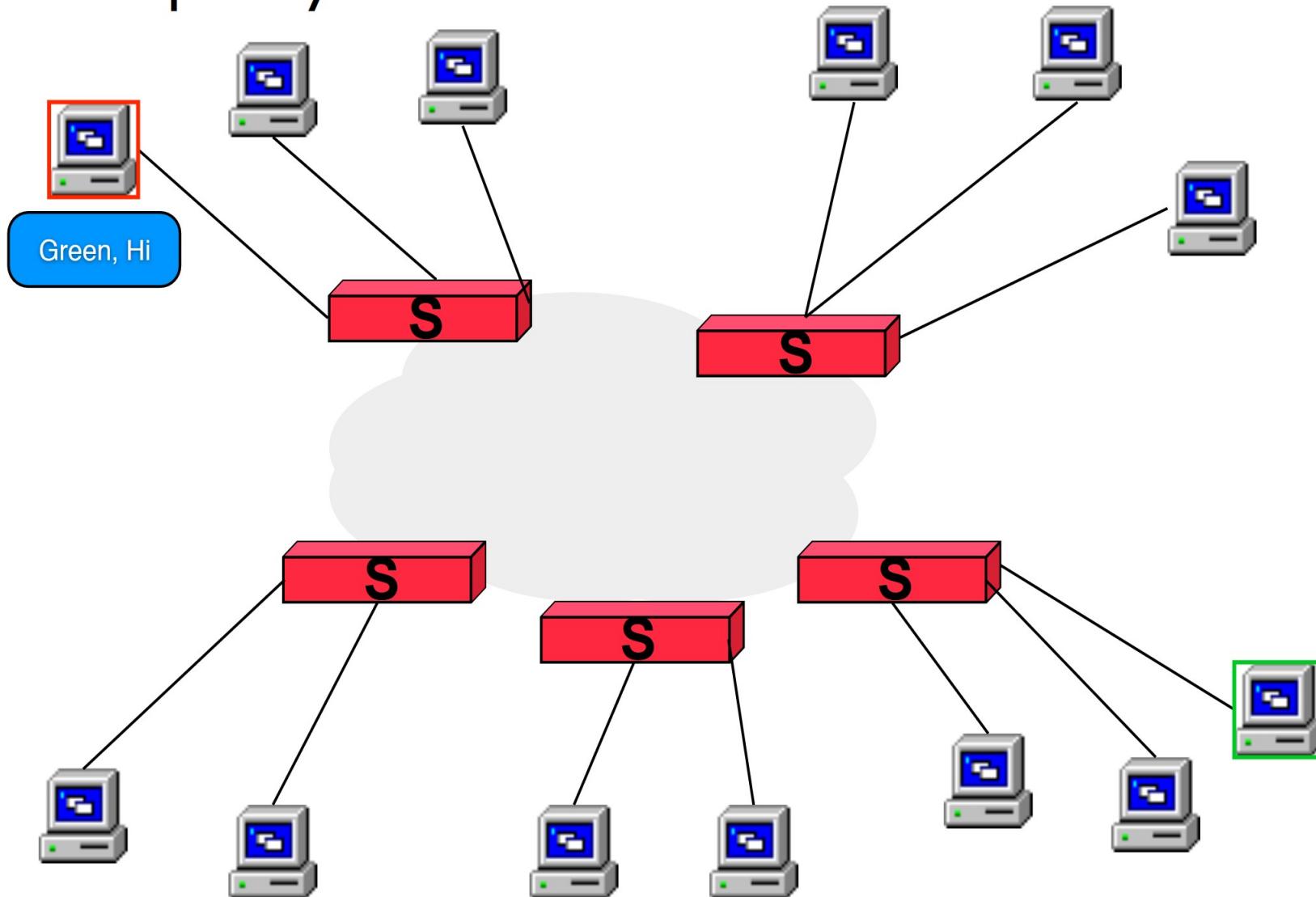
What if I want some device to be seen easily in multiple LANs?

Nope

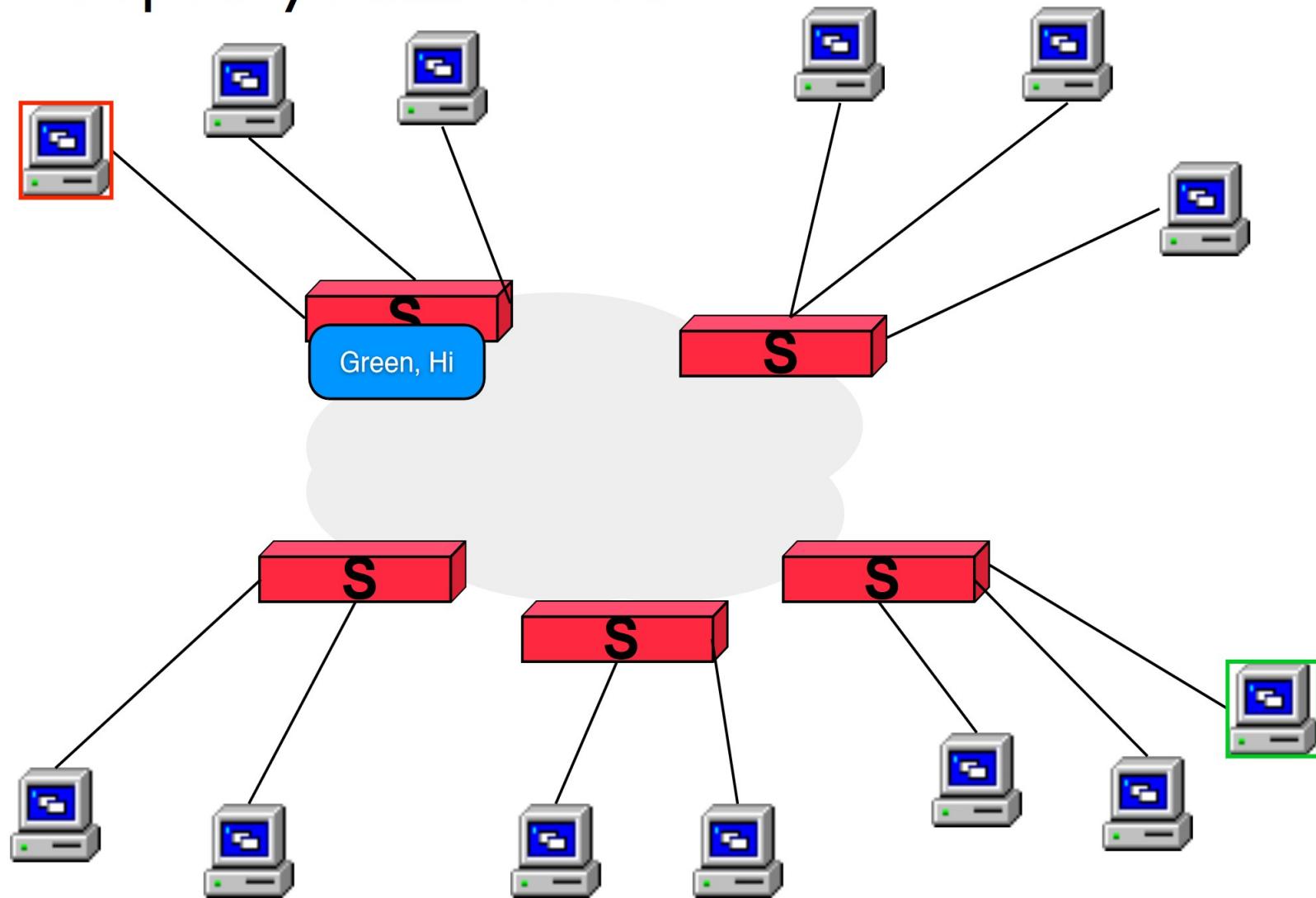
Completely Switched LAN



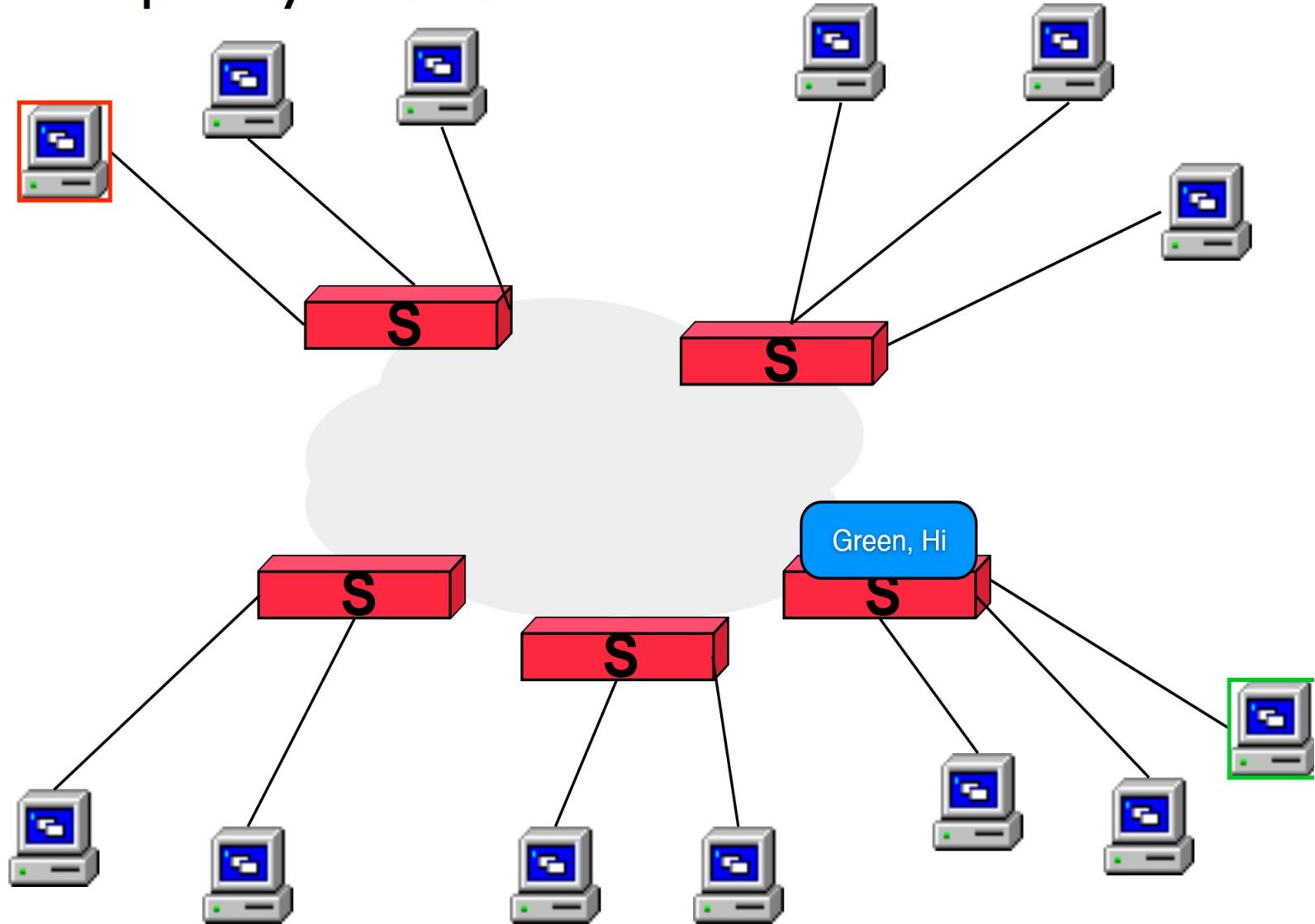
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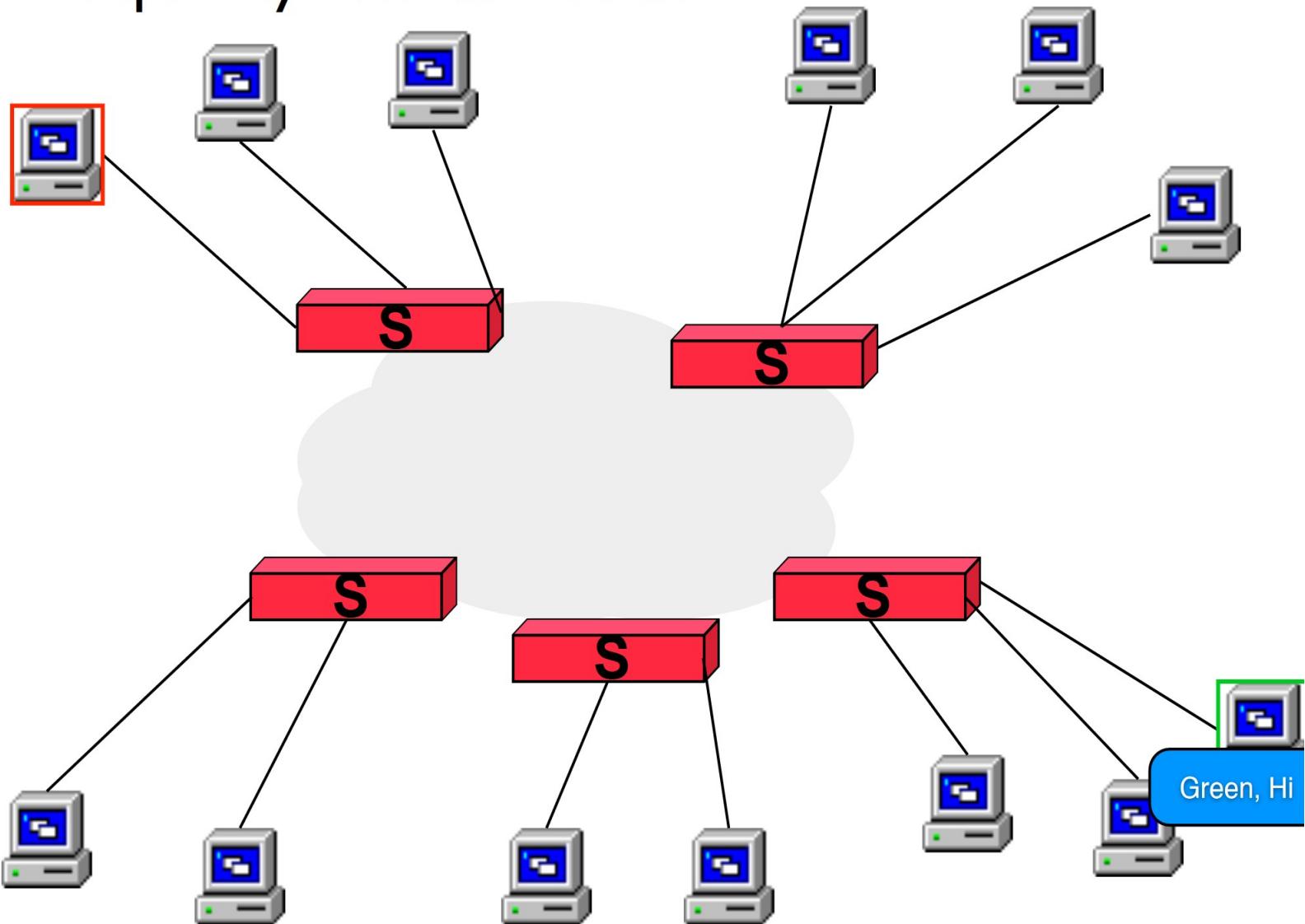
Completely Switched LAN



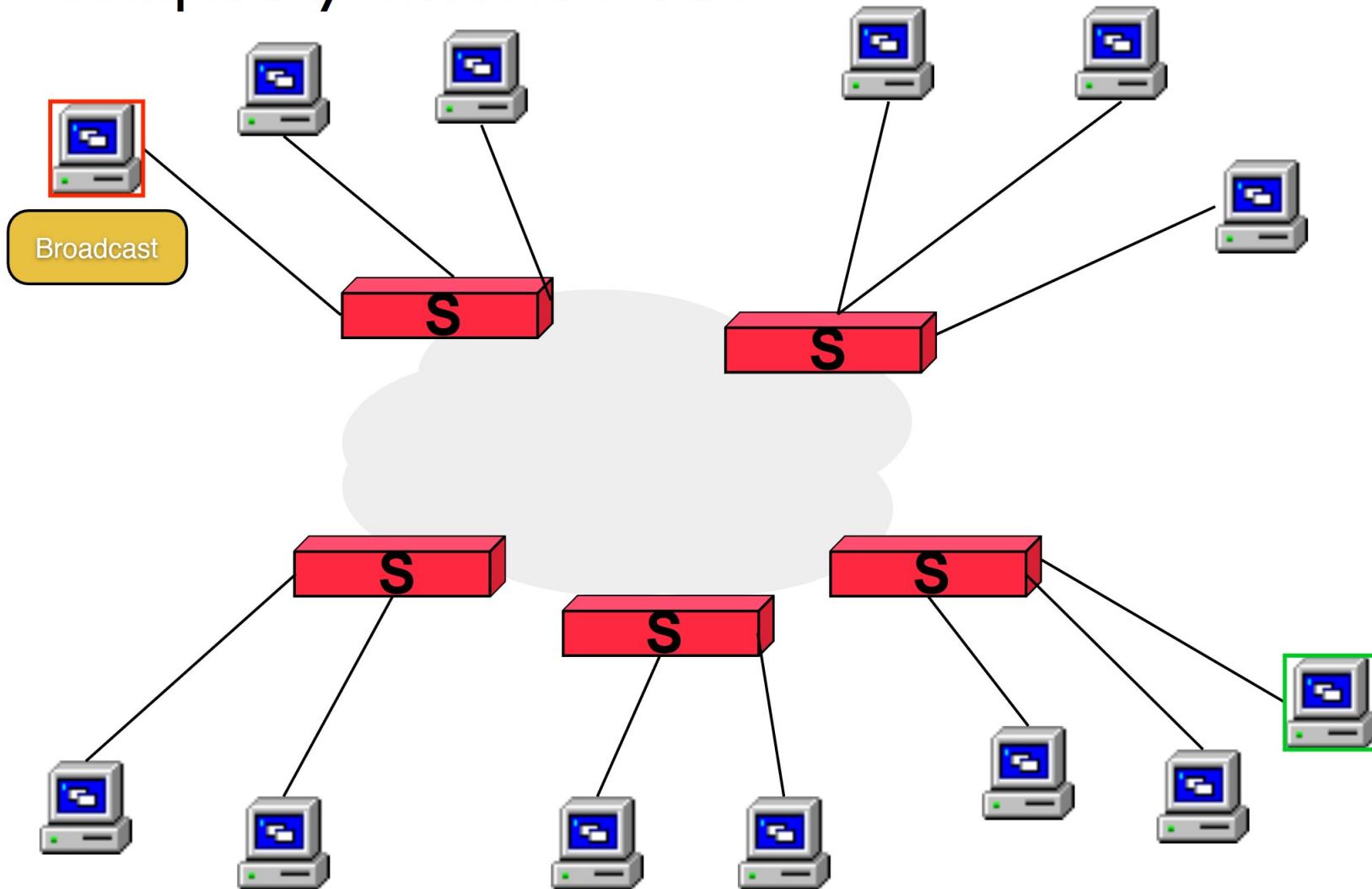
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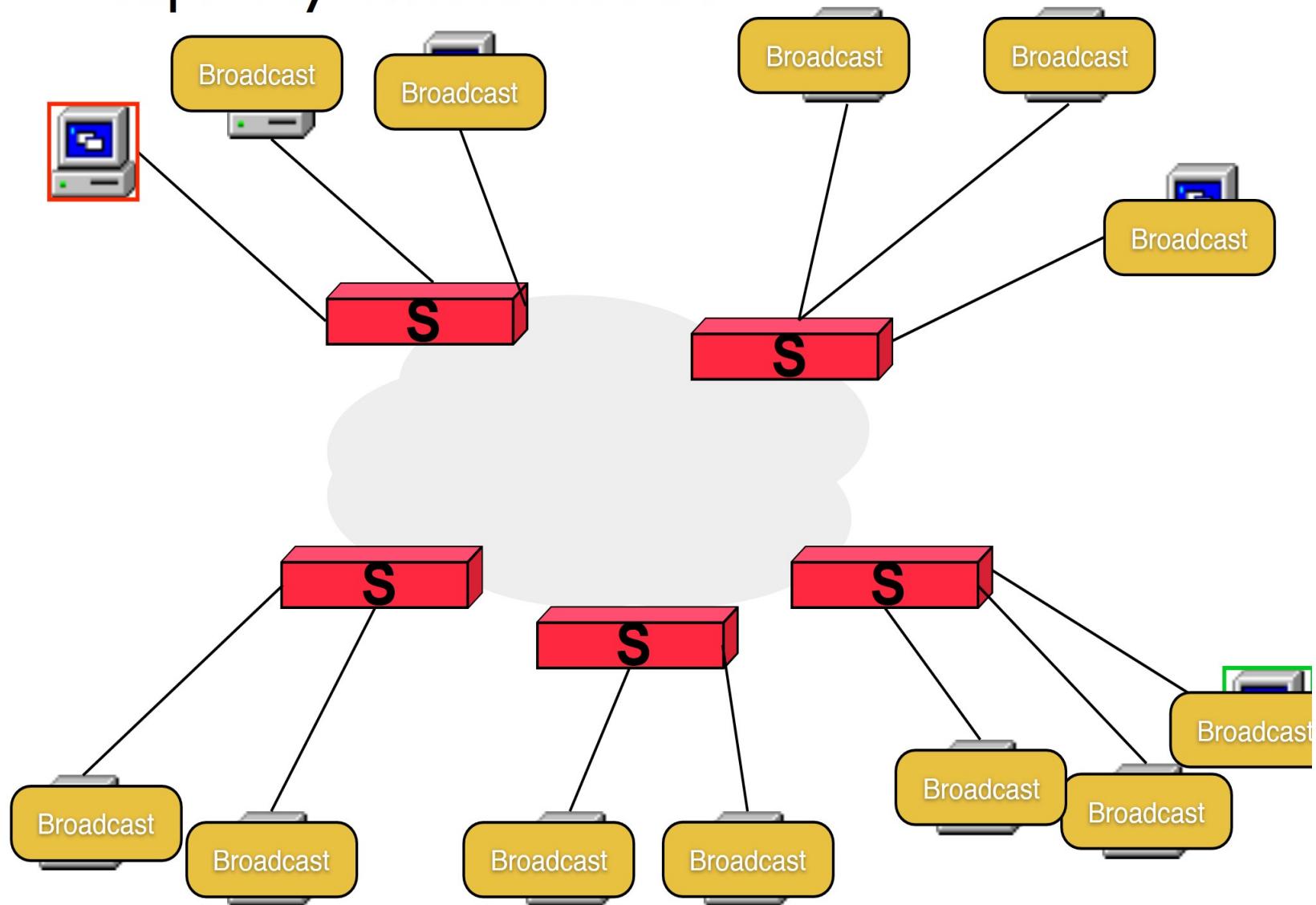
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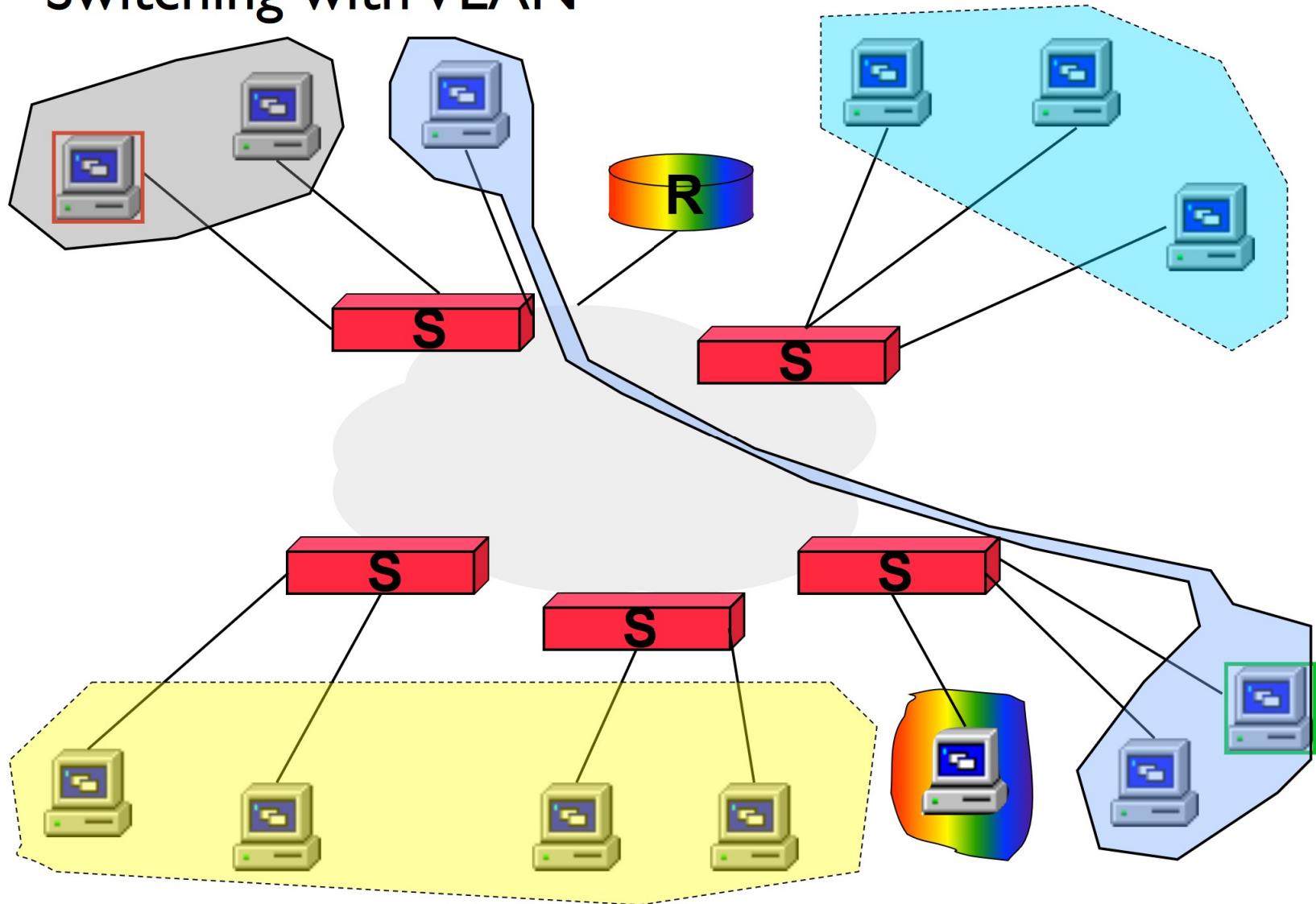
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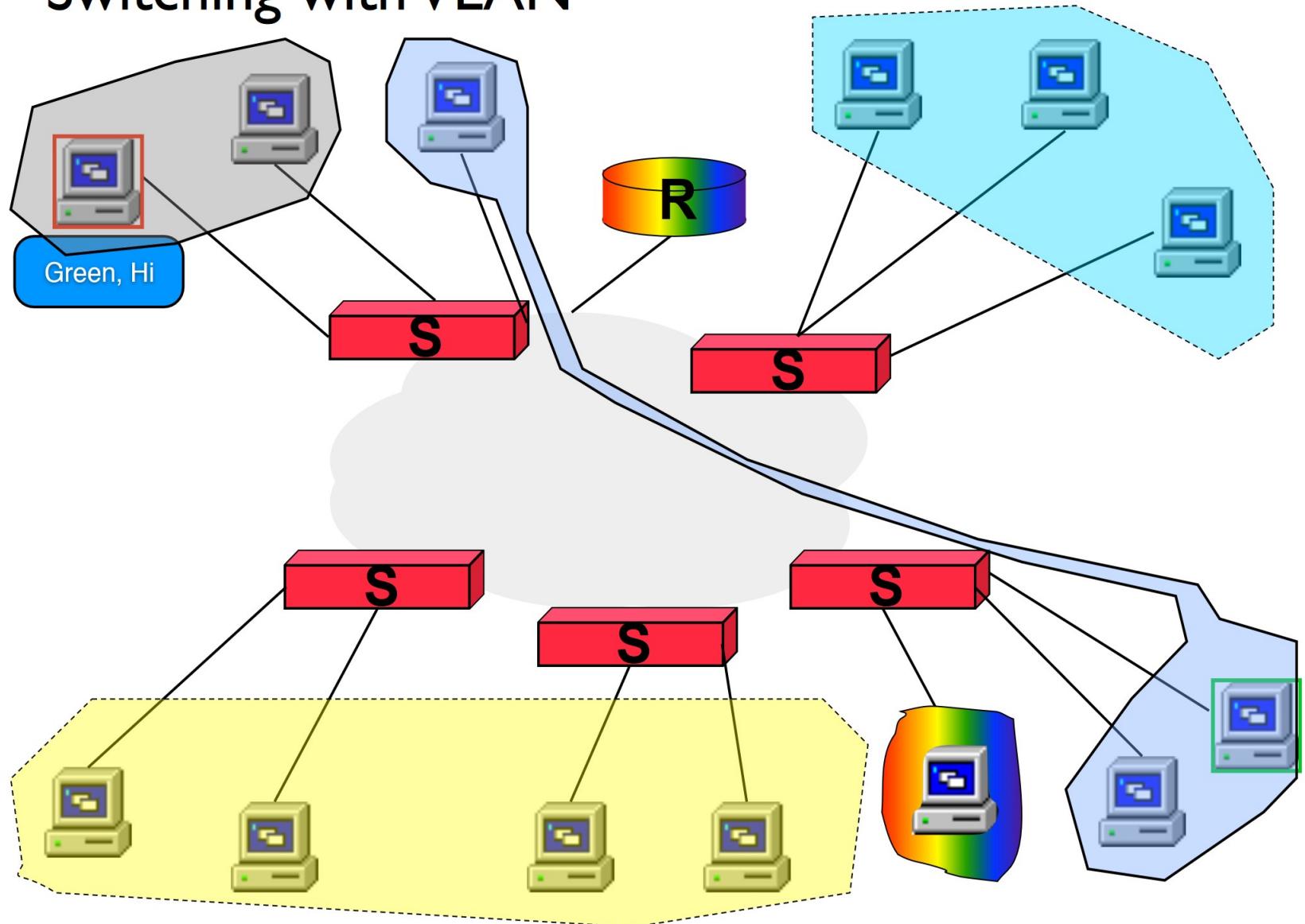
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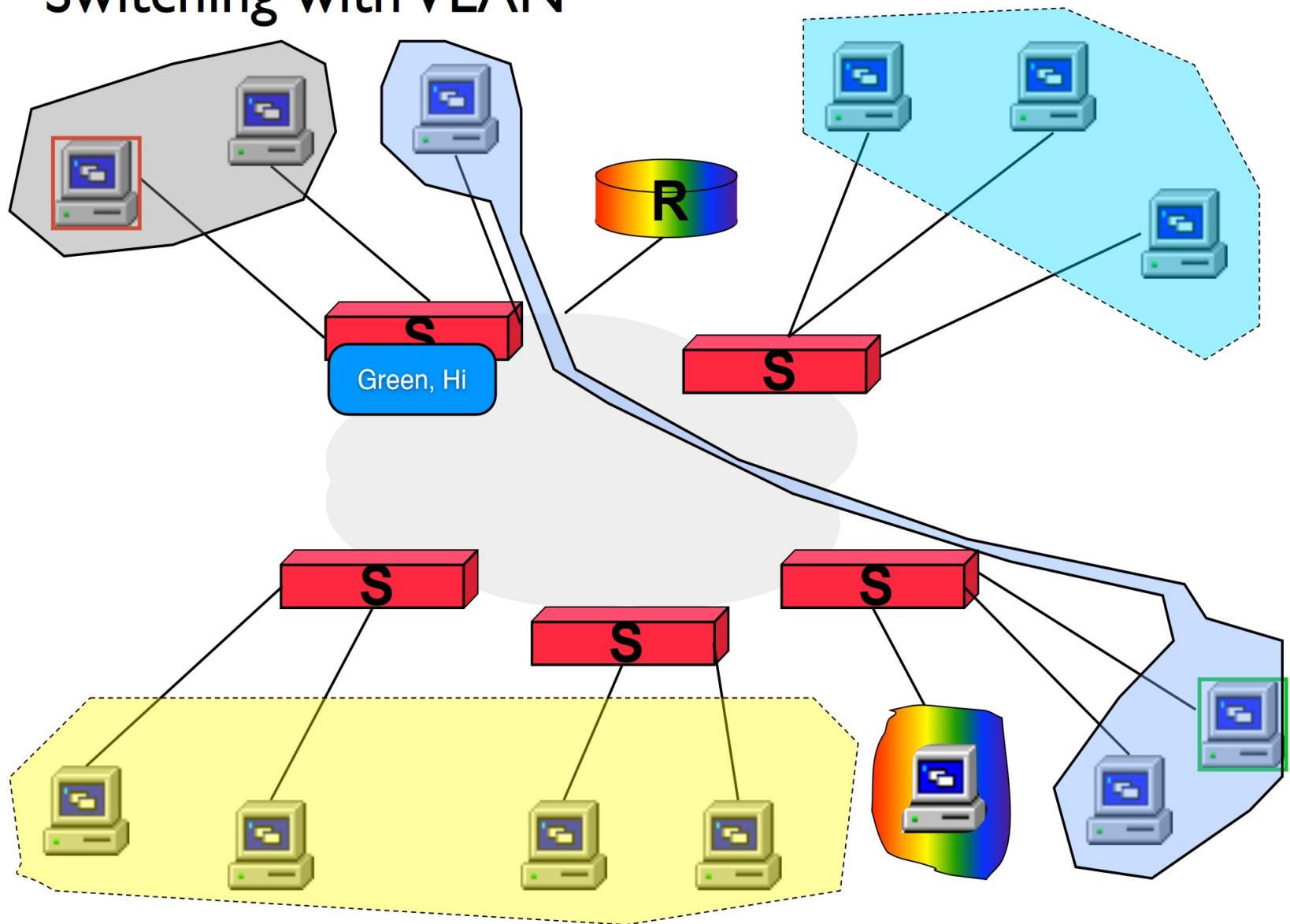
Switching with VLAN



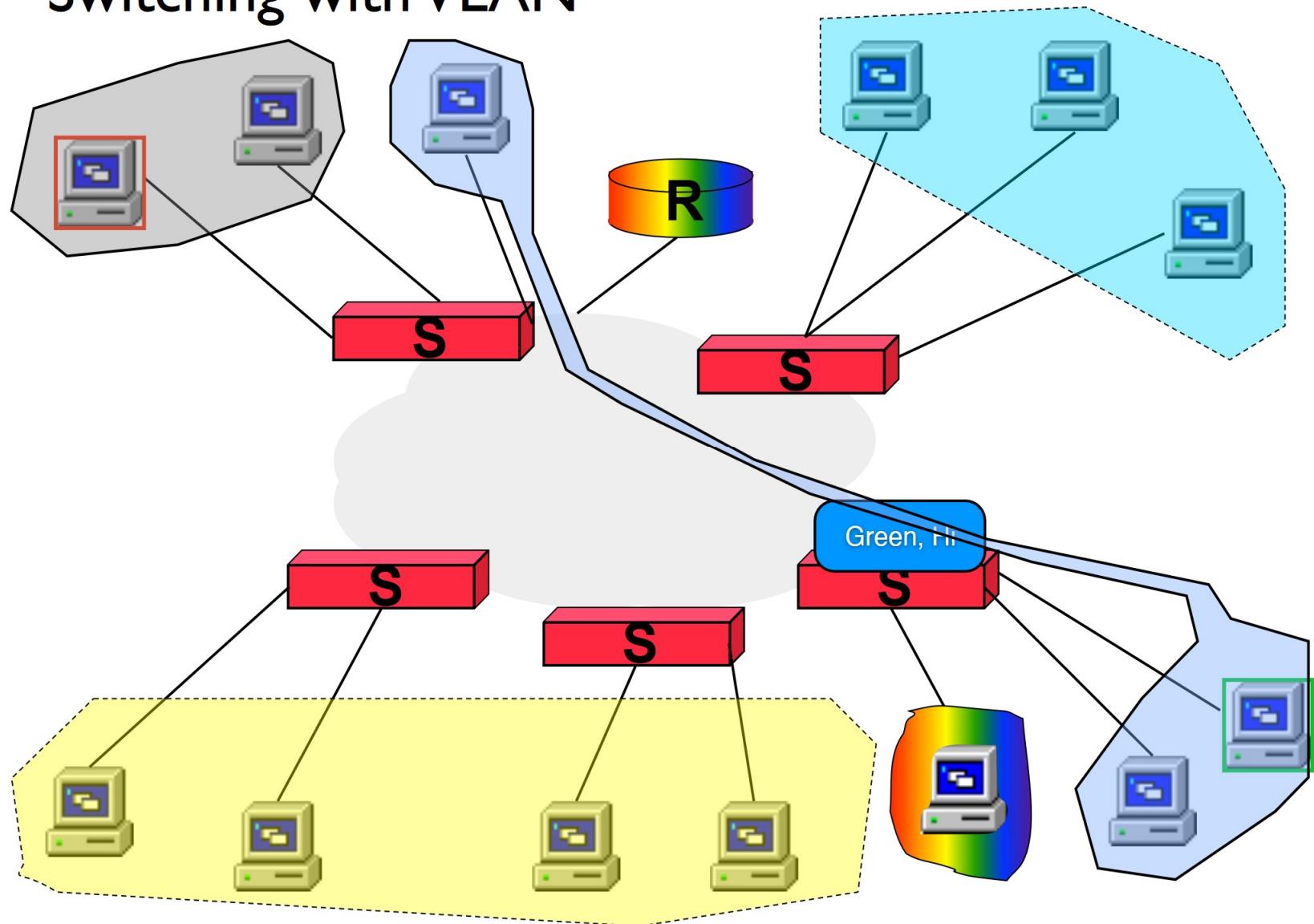
Switching with VLAN



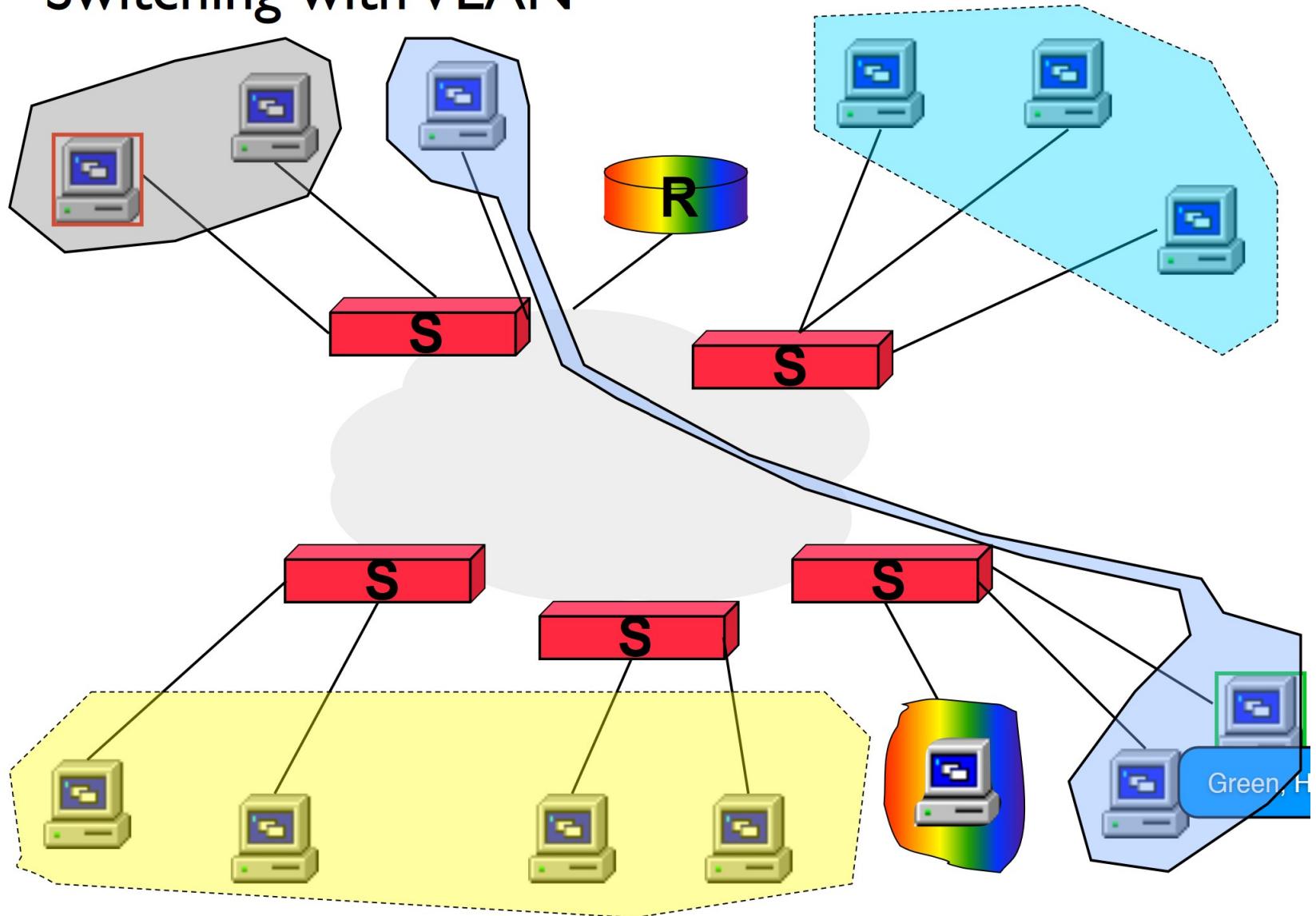
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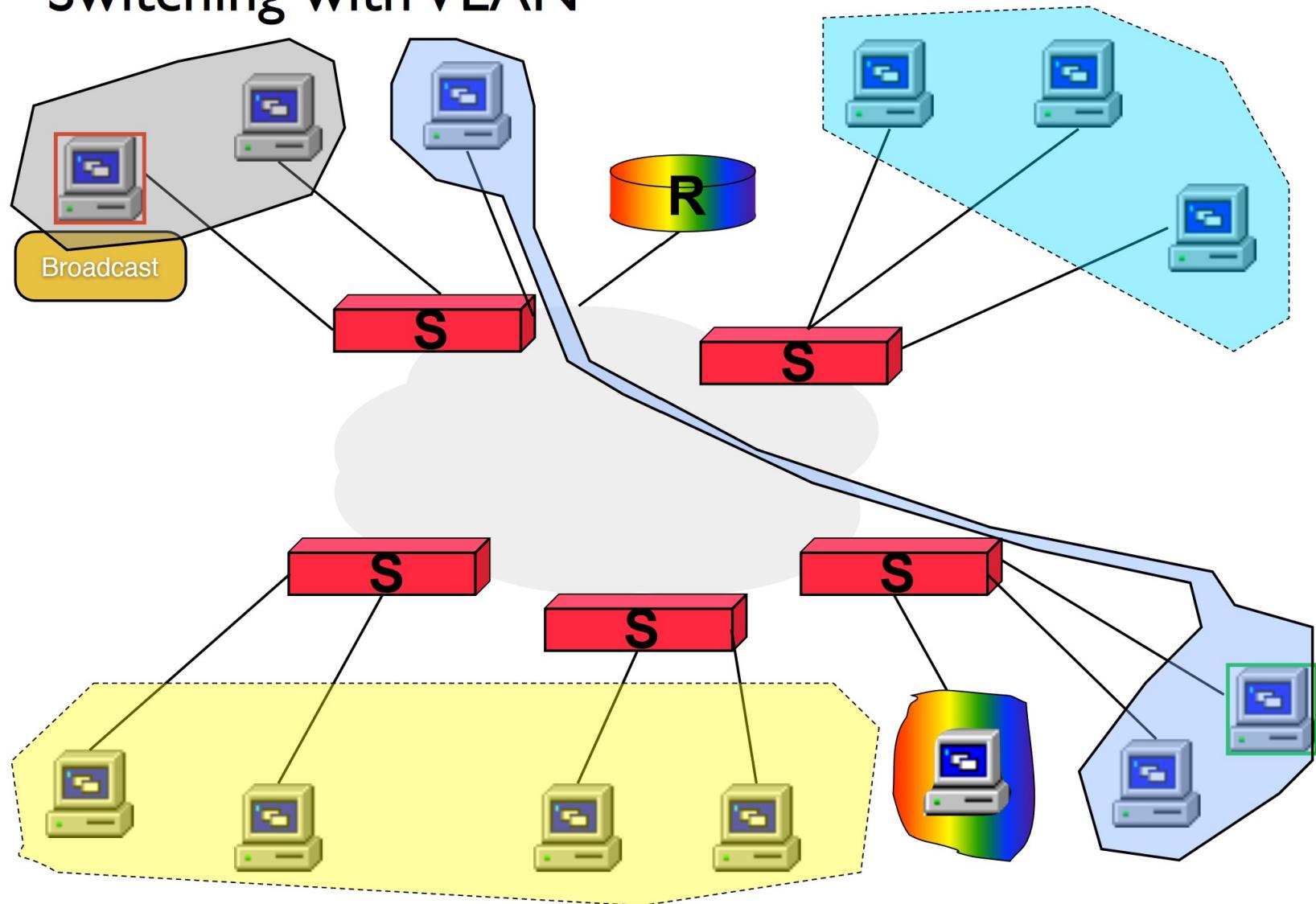
Switching with VLAN



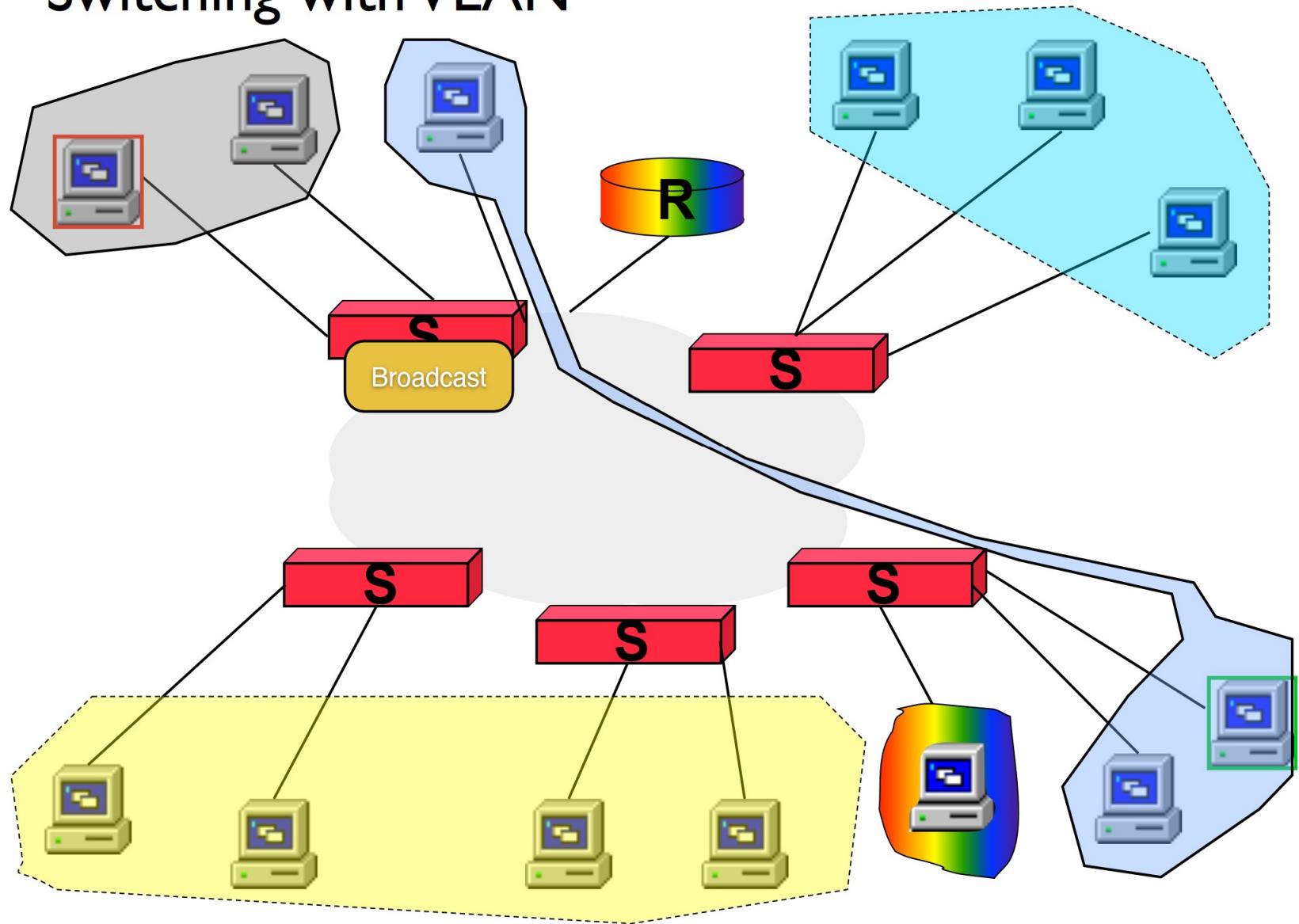
Switching with VLAN



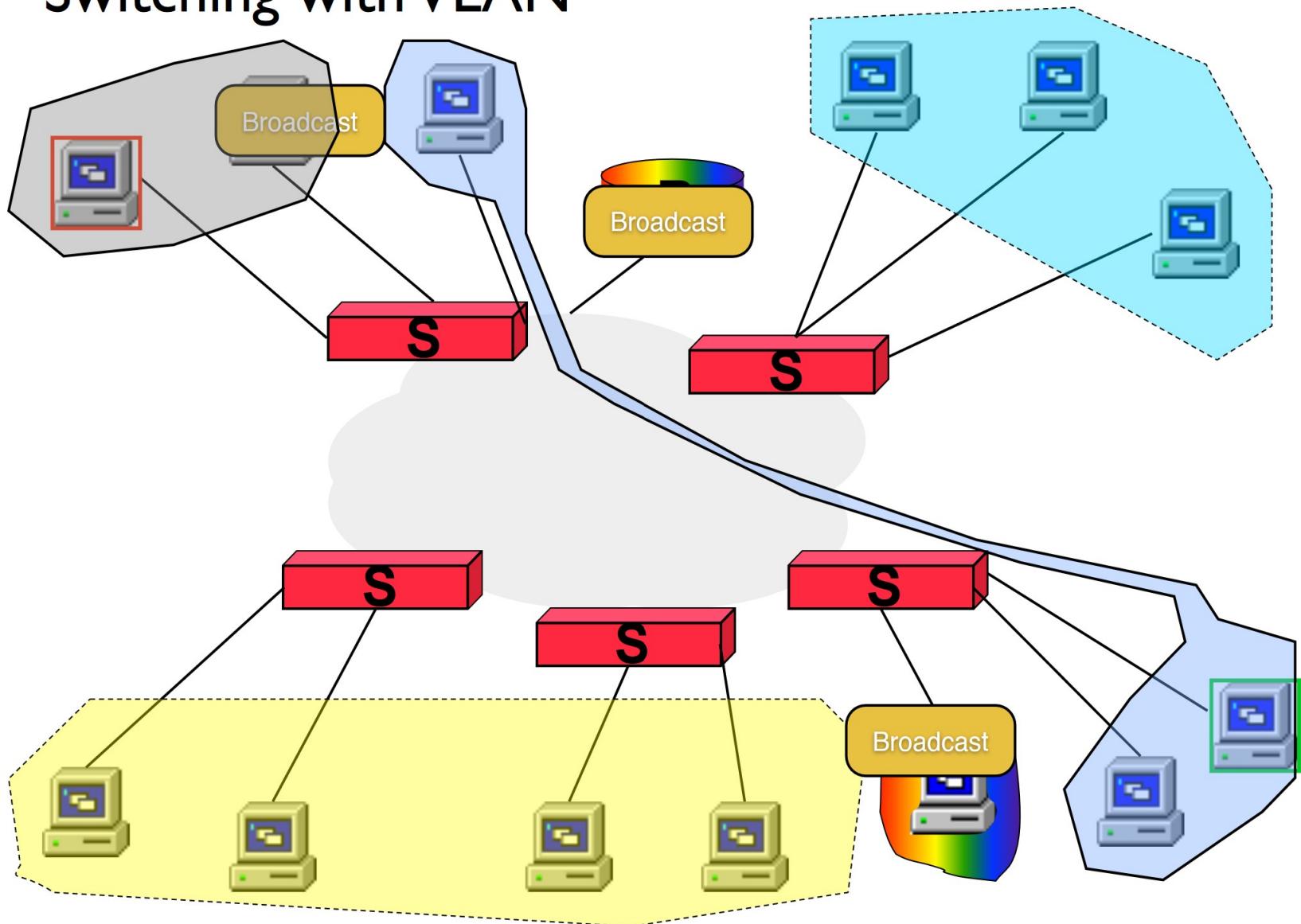
Switching with VLAN



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Switching with VLAN



Virtual LAN (VLAN)

VLAN's allow virtual broadcast domains to be created within a switched-based network

Benefits

Efficiency

Lower cabling costs

Flexibility

802.1Q - official standard name

VLAN Management

Configuration is done completely within the switch - configure a port to be on VLAN “X” instead of VLAN “Y”

Endpoint device doesn’t need to know anything

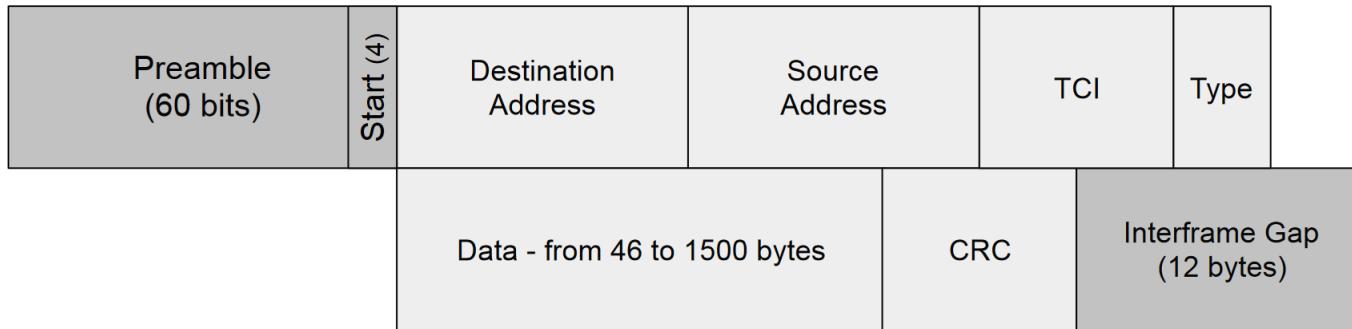
Switches automatically add a VLAN tag to the frame when sending between switches

Switch removes the tag before delivering the frame to a device

Ethernet Frame

Preamble (60 bits)	Start (4)	Destination Address	Source Address	Type
		Data - from 46 to 1500 bytes		CRC
				Interframe Gap (12 bytes)

Ethernet VLAN Frame



TCI - Tag Control Info

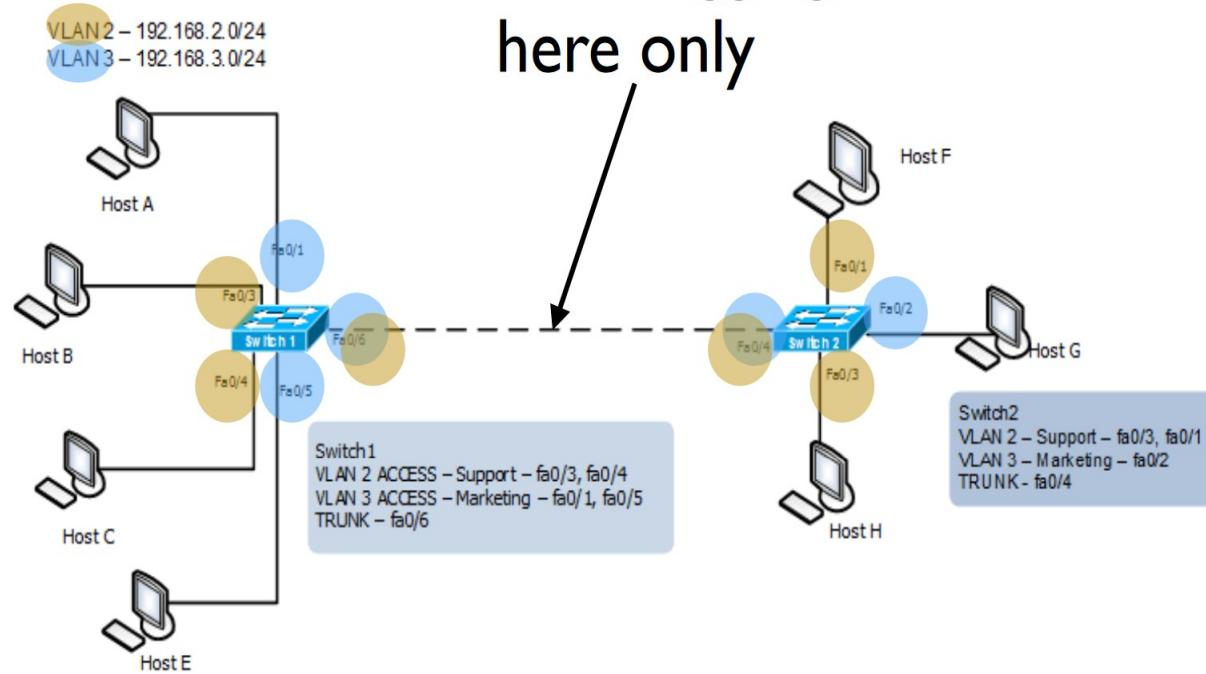
2 bytes = Tagged Frame Type = 0x8100

3 bits = Priority

1 bit = Canonical Format Indicator

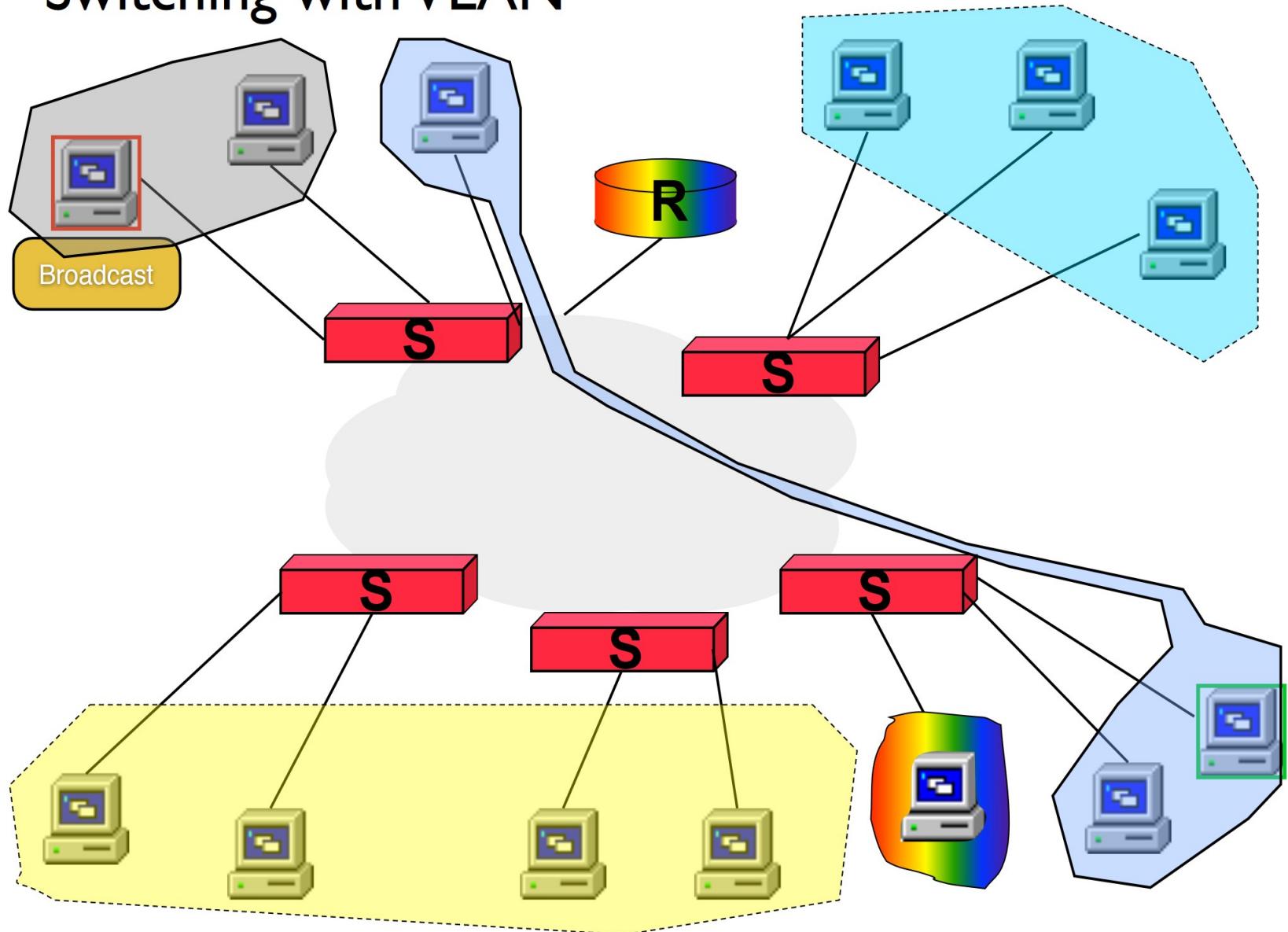
12 bits = VLAN Identifier

802.1Q tagging here only

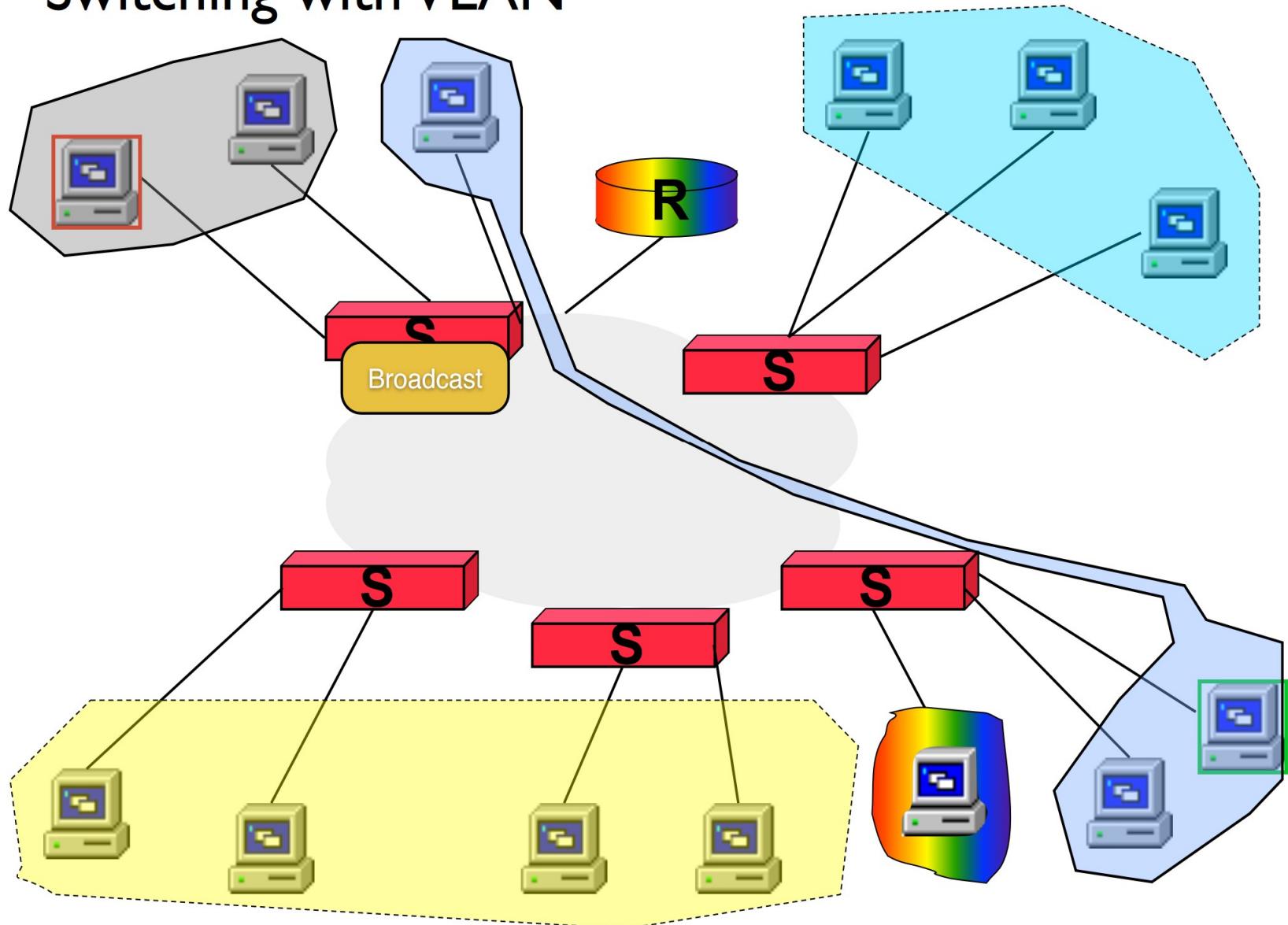


<http://www.mustbegeek.com/configure-vlan-in-cisco-catalyst-switch/>

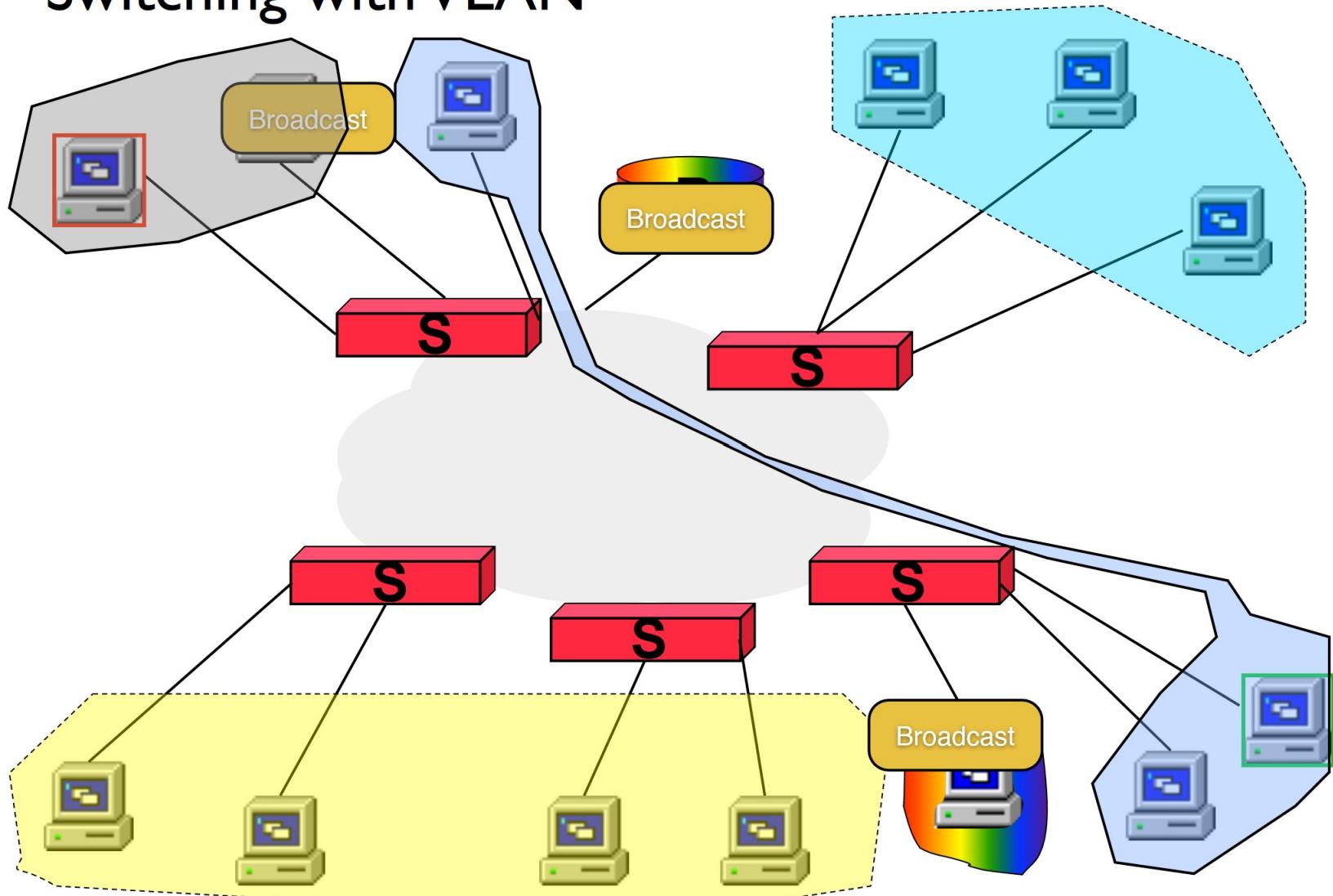
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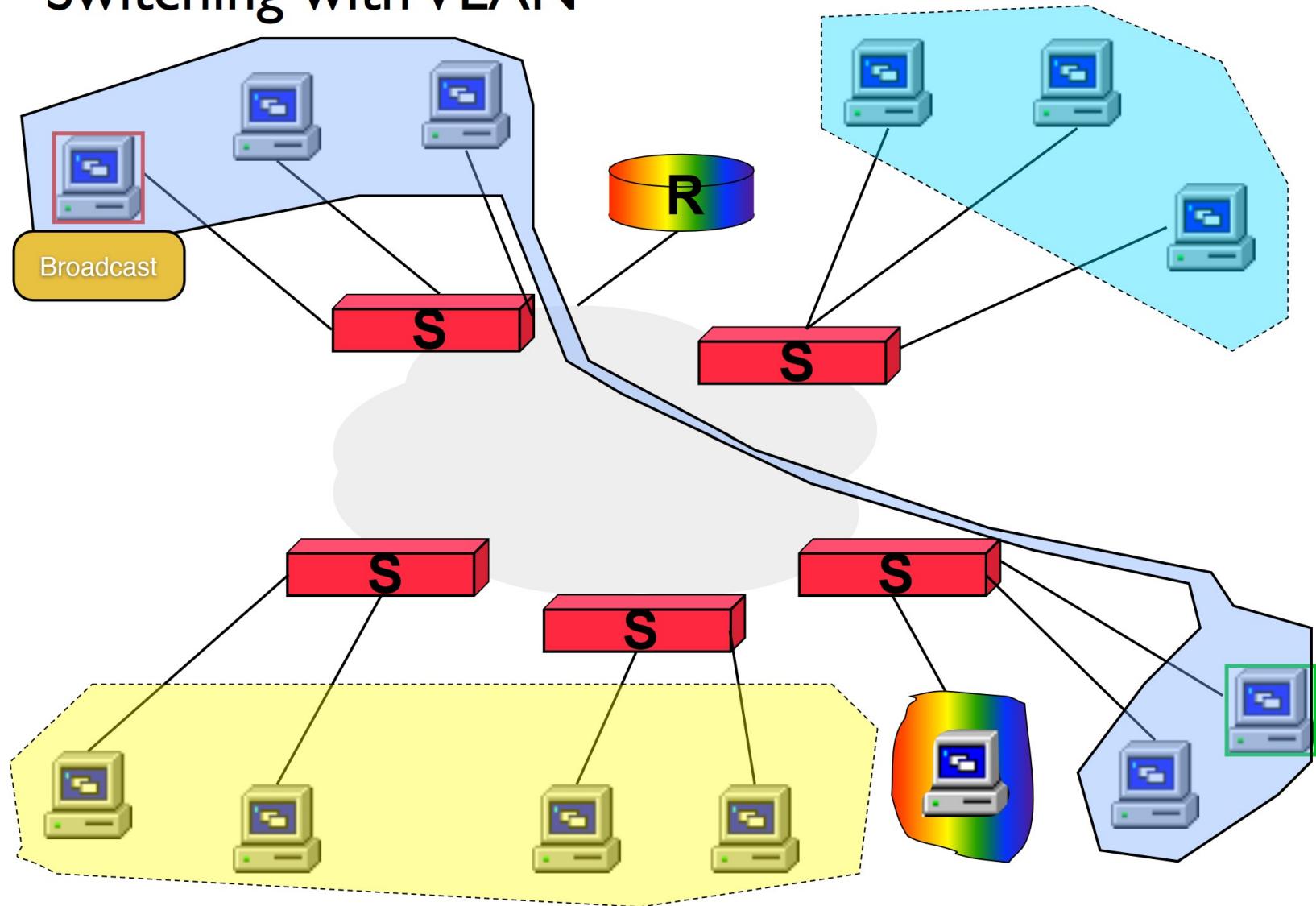
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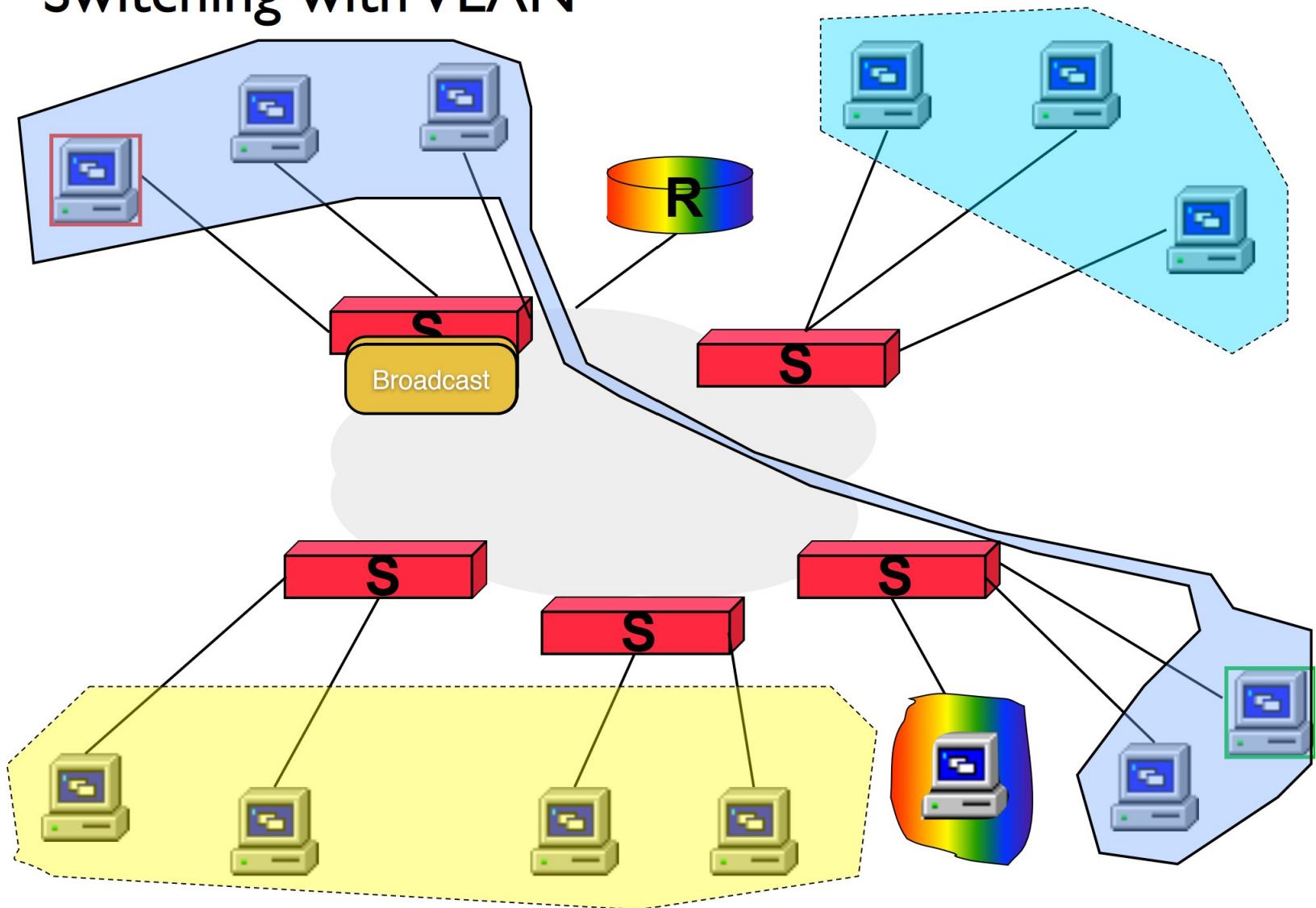
Switching with VLAN



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