Lab Course „RouterLab“

Virtual LAN (VLAN)
RouterLab Policies

- RouterLab = Experimental Platform
- Please do not ...
  - reserve more time than you need!
  - work on devices without reservations!
  - interfere with other users!
  - try to „hack“ the RouterLab
  - ...
- We trust you!
- In case of violations we will ban you from this course!
  - Note: We monitor user behavior
Definitions

- **LAN**
  - broadcast domain
  - Hubs or switches „connect“ different LAN segments
  - Ethernet

- **Virtual LAN (VLAN)**
  - Group of devices can communicate with each other as if they were on the same LAN
  - configured on switches (and routers)
„Types“ of VLANs

❖ Post-based VLANs
  ❖ A switch port is exclusively used by one VLAN

❖ Trunking
  ❖ Required if multiple VLANs share the same physical link/switch port
  ❖ A VLAN ID is added to the Ethernet header
  ❖ Switches forward Ethernet frame with VLAN ID X to all ports that are enabled for „trunking“ of X
Port-based VLANs

- Each switchport
  - can be assigned to a VLAN
  - accepts incoming traffic from a specific VLAN
  - forwards packets to ports that belong to the same VLAN

- Configuration
  - (config-if) switchport access vlan <vlan-id>
  - (config-if) switchport mode access
Trunking (802.1Q)

- Needed if multiple VLANs on same link

- **Switch**
  - (config-if) switchport trunk encapsulation dot1q
  - (config-if) switchport trunk allowed vlan 500,501
  - (config-if) switchport mode trunk

- **Cisco**: subinterface, e.g., f0/0.100
  - (config-subif) encapsulation dot1Q <vlan_id>

- **Juniper**: extra unit
  - vlan-tagging
  - unit 500 {vlan-id 500}

- **Loadgen**: extra interface ethX.<vlan-id>
  - vconfig add ethX <vlan-id>
(Native) VLANs

Trunking

10.2.2.1
VLAN2

10.3.3.1
VLAN3

802.1Q

Fast Hub

802.1Q

10.2.2.2
VLAN2

10.3.3.2
VLAN3

10.1.1.2
VLAN1

ETH DATA

10.1.1.1
VLAN1

10.1.1.3
VLAN1

10.1.1.2
VLAN1

10.1.1.3
VLAN1

VLAN1 untagged traffic (native VLAN)
VLANs - Summary

❖ Rule of thumb
  ❖ Use access mode if a physical link corresponds to a single VLAN
    • No subinterfaces on routers/loadgens required

❖ The following is possible:
  ❖ Example: Send Ethernet frame on direct link from router to switch
  ❖ Router: Adds VLAN tag (vconfig)
  ❖ Switch: Removes VLAN tag on *outgoing* port (access mode) before forwarding

❖ More info in FAQ!!!
Worksheet – Question 1

- Configure VLANs
- Figure out whether to use access or trunk mode
Enable routing between VLANs
- Devices in VLAN X should be able to communicate with devices in VLAN Y
- Configure static routes