

Don't Be Fooled by Sales, understand VLAN properly

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Agenda

- Introduction
- The birth of VLAN
- VLAN on Mikrotik
- VLAN on RouterOS
- Demo
- Q & A

What is GLC?

- Garda Lintas Cakrawala (www.glcnetworks.com)
- Based in Bandung, Indonesia
- Areas: Training, IT Consulting
- Certified partner for: Mikrotik, Ubiquity, Linux foundation
- Product: GLC radius manager
- Please check our schedule on website



About me



- Name: Achmad Mardiansyah
- Base: bandung, Indonesia
- Linux user since 1999, mikrotik user since 2007,
- Mikrotik Certified Trainer
(MTCNA/RE/WE/UME/INE/TCE/IPv6)
- Mikrotik Certified Consultant
- Teacher at University (Bandung, Indonesia)
- Currently a student :-)
- Website contributor: achmadjournal.com,
mikrotik.tips, asysadmin.tips
- More info:
<http://au.linkedin.com/in/achmadmardiansyah>

Past experiences



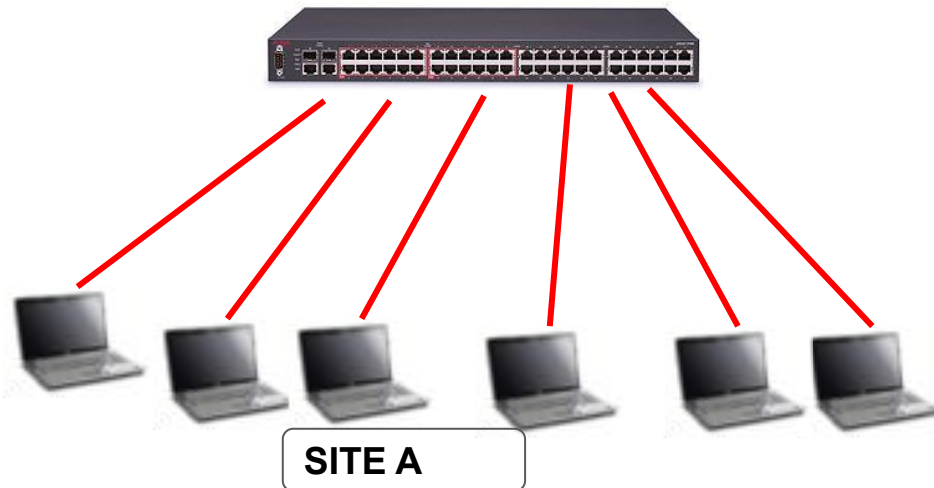
- 2020 (**Congo DRC, Malaysia**): IOT integration, network automation
- 2019, **Congo (DRC)**: build a wireless ISP from ground-up
- 2018, **Malaysia**: network revamp, develop billing solution and integration, setup dynamic routing
- 2017, **Libya (north africa)**: remote wireless migration for a new Wireless ISP
- 2016, **United Kingdom**: workshop for wireless ISP, migrating a bridged to routed network
- 2015, **West Kalimantan**: supporting wireless infrastructure project



The birth of VLAN

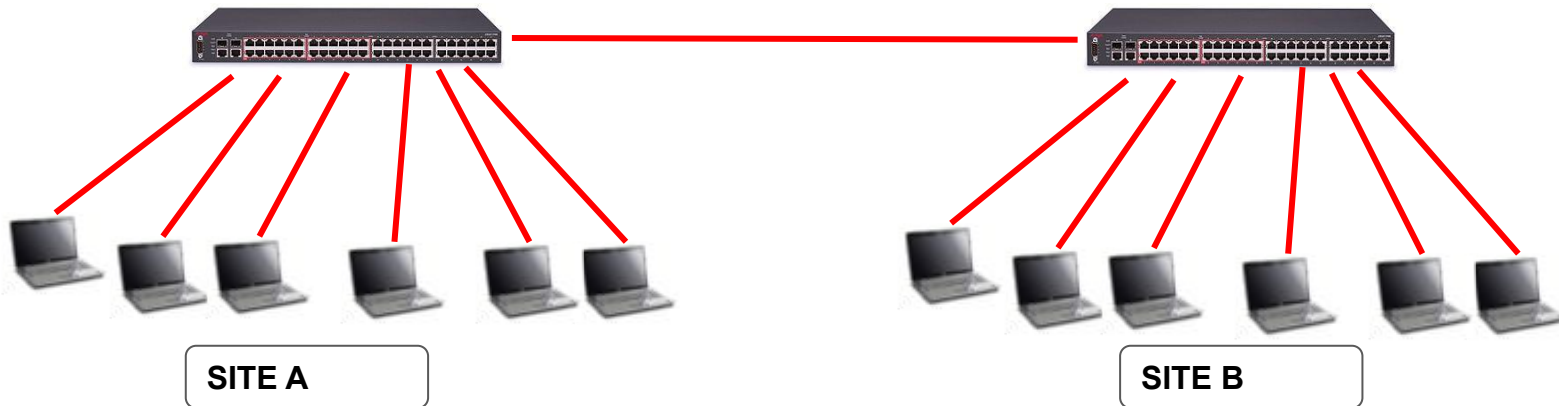
Typical network, no internet

- All computers just connect to one switch (concentrator)
- One network segment, **one broadcast domain**
- **Collision domain** is already splitted by switch



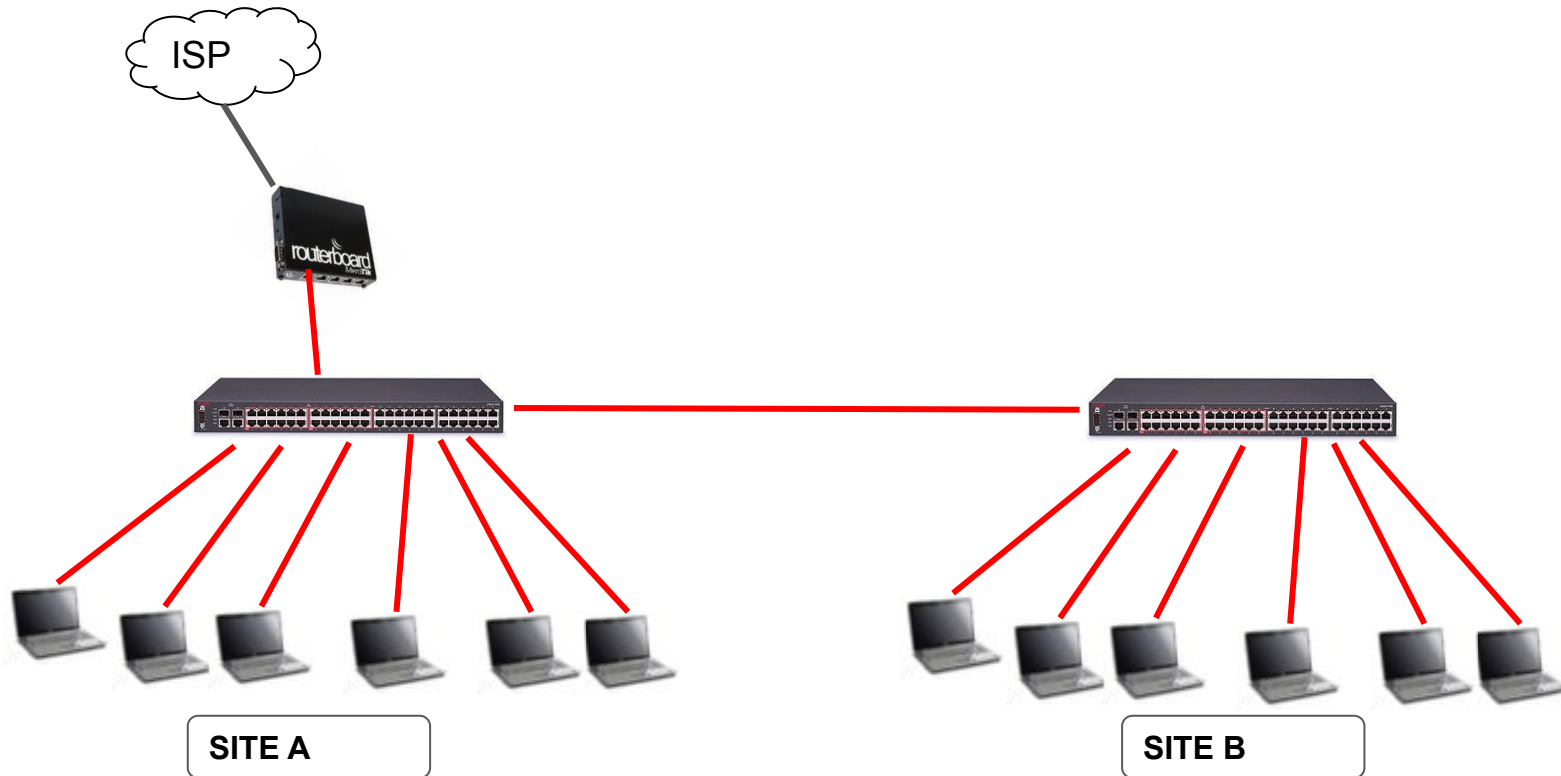
Typical network, more switches, no internet

- Network segment is extended
- Still one network segment, **single broadcast domain**



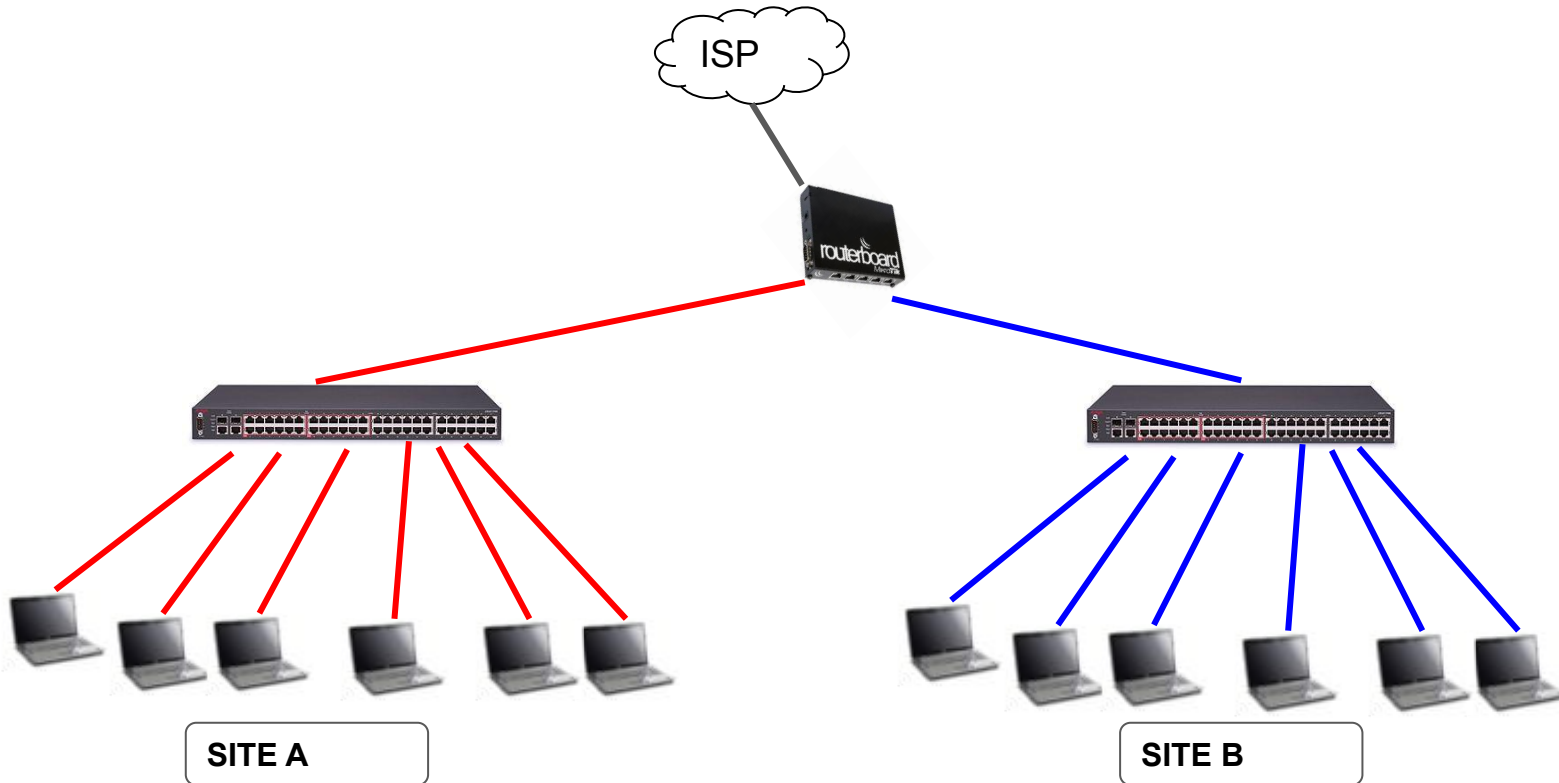
Typical network, with internet connection

- We add a router to connect to other network (internet is a collection of networks)



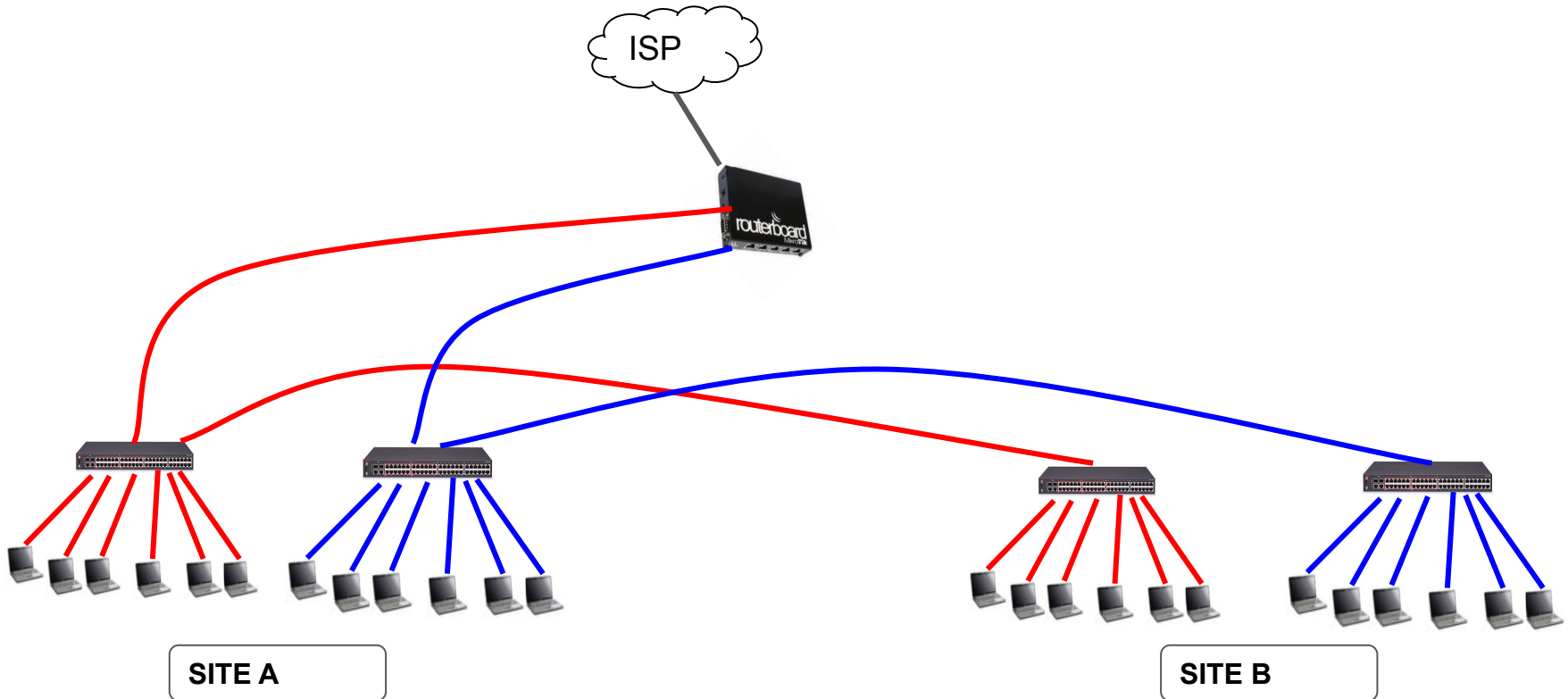
Typical network, with internet and segmentation

- A router is used to divide network based on layer 3 (network) -> different ip address segment
- **One switch -> one segment**



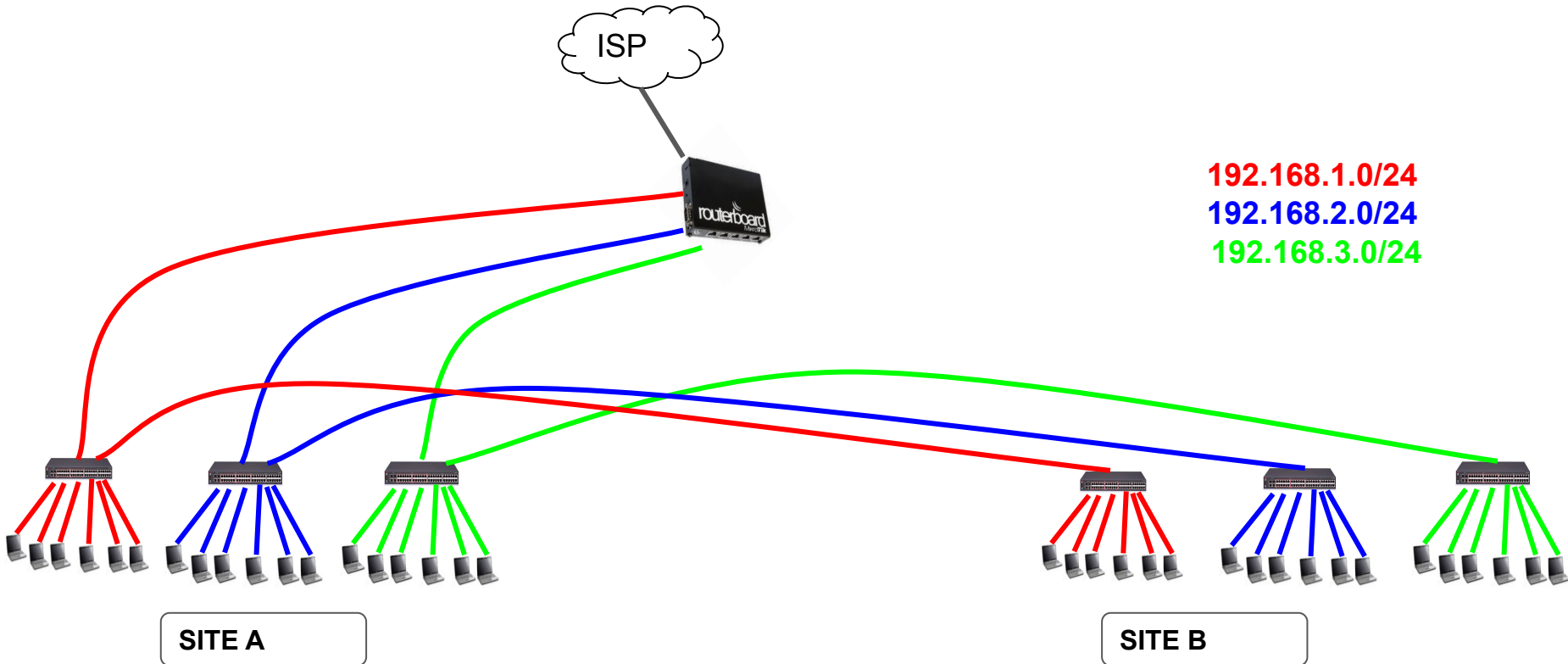
Multiple segments in one site

- One switch -> one segment
- You need more switches



More segments in one site

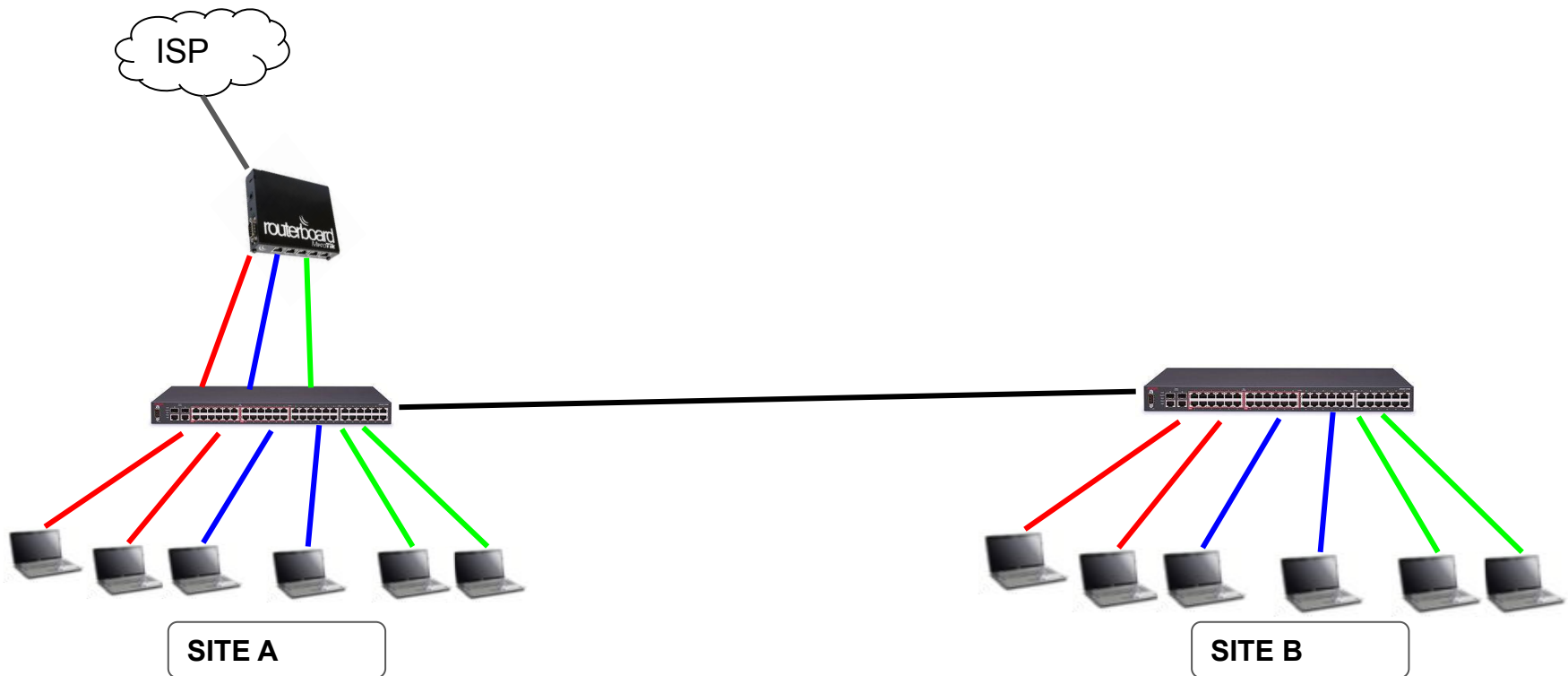
- One switch -> one segment
- You need more switches, more money



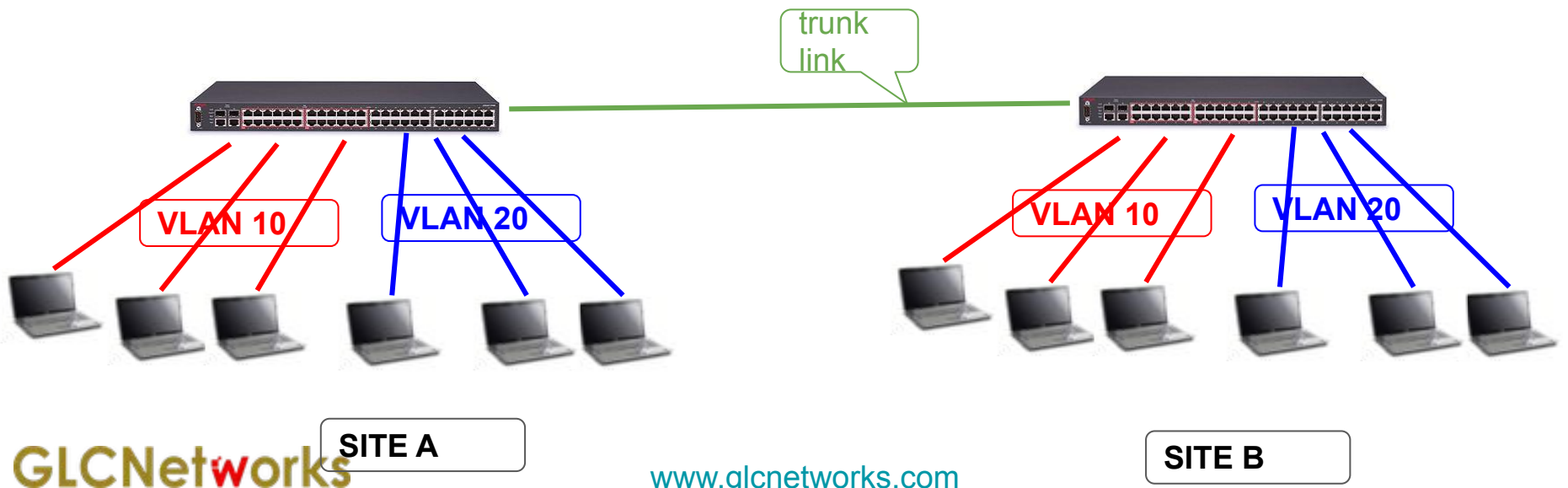
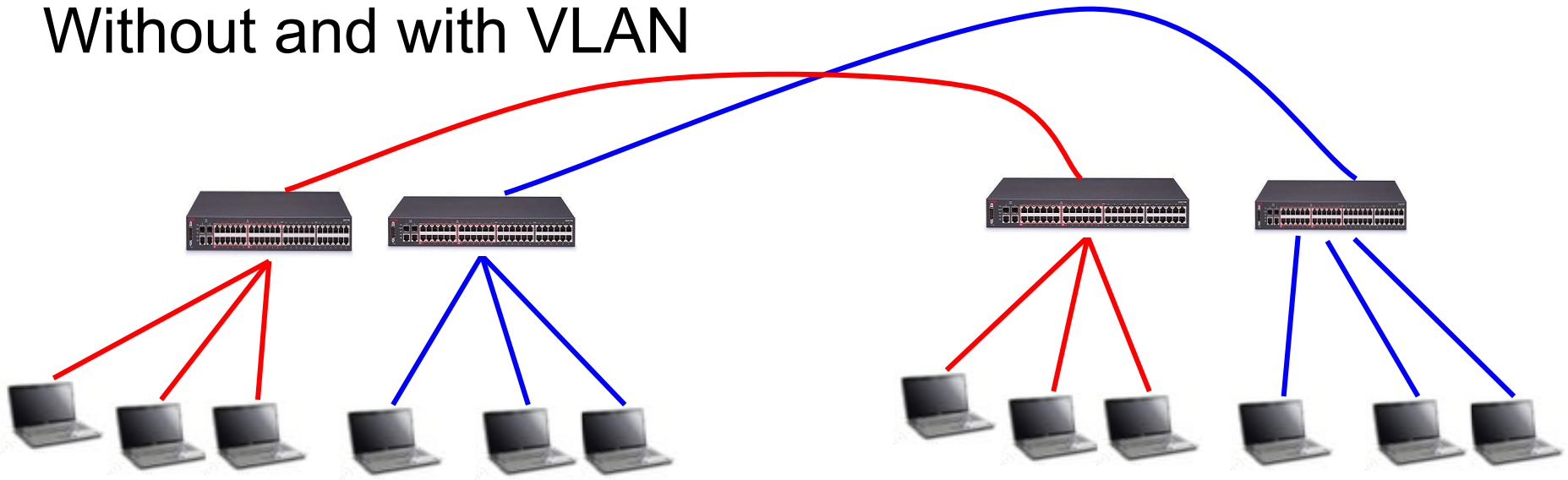
192.168.1.0/24
192.168.2.0/24
192.168.3.0/24

What VLAN can do

- **One switch multiple segment**, divide the switch based on ports
- less equipment, save money, save space
- **Requires more knowledge**

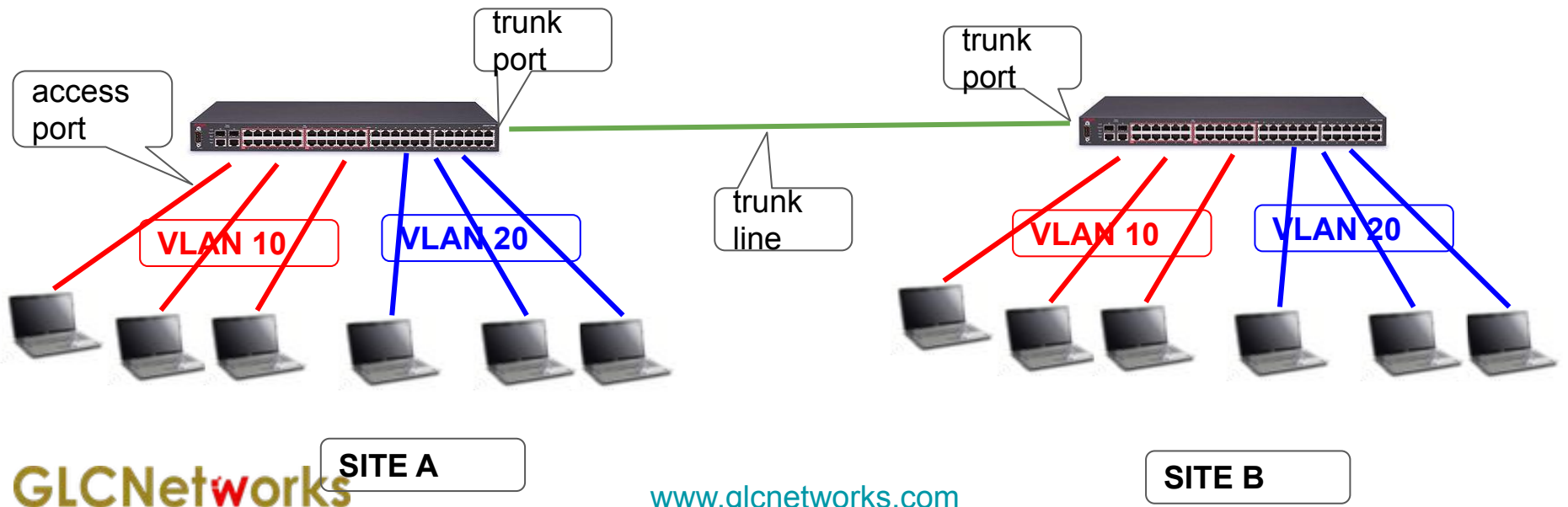


Without and with VLAN



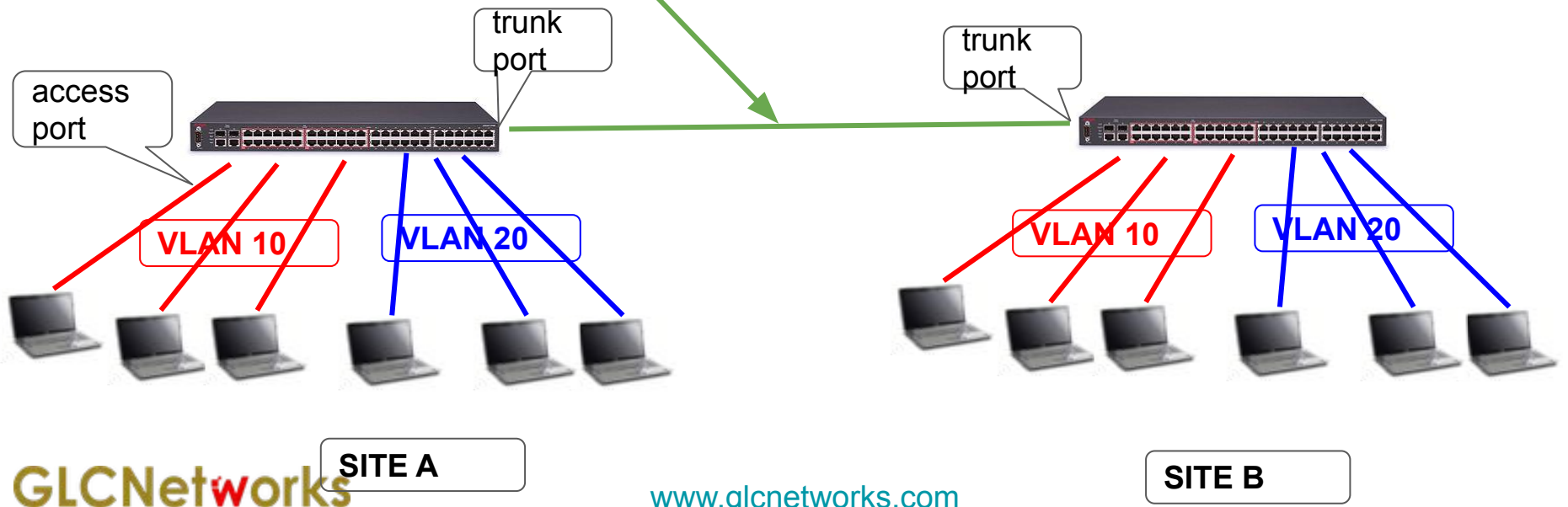
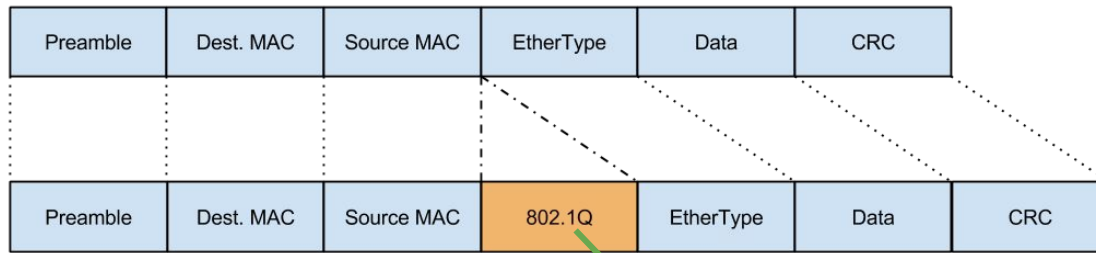
VLAN terms

- **VLAN:** a feature on layer 2 device (switch) to do virtual segmentation on physical switch
- The segmentation can be extended to other switch using “trunk” link. Borrowed from telco terms “**trunk**” (a link to connects 2 telco exchanges)
- Port types:
 - Access port -> to connect to end-devices
 - Trunk port -> to connect to other VLAN switch



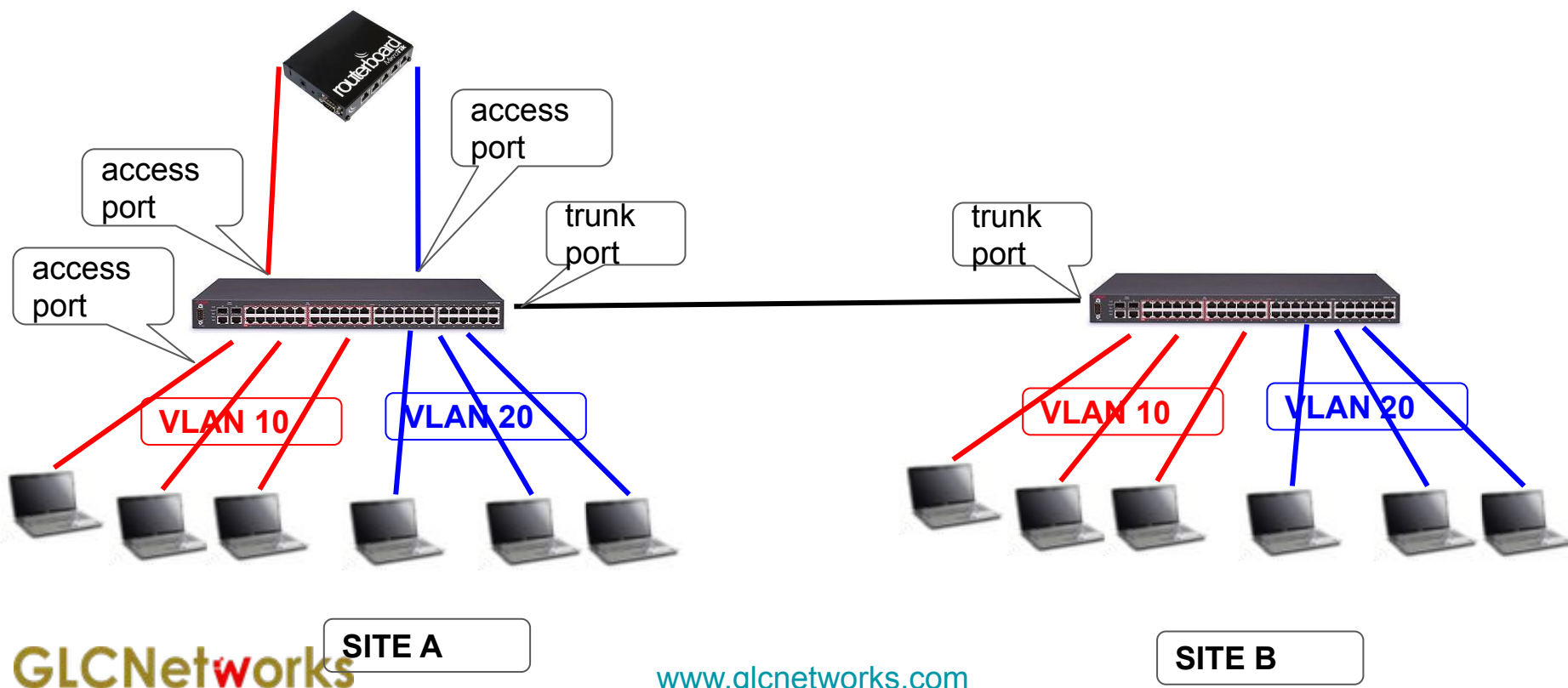
What happened on trunk ports

- The layer-2-header of outgoing frame will be modified by adding VLAN tag on the header
- This tag will be recognised at the other end



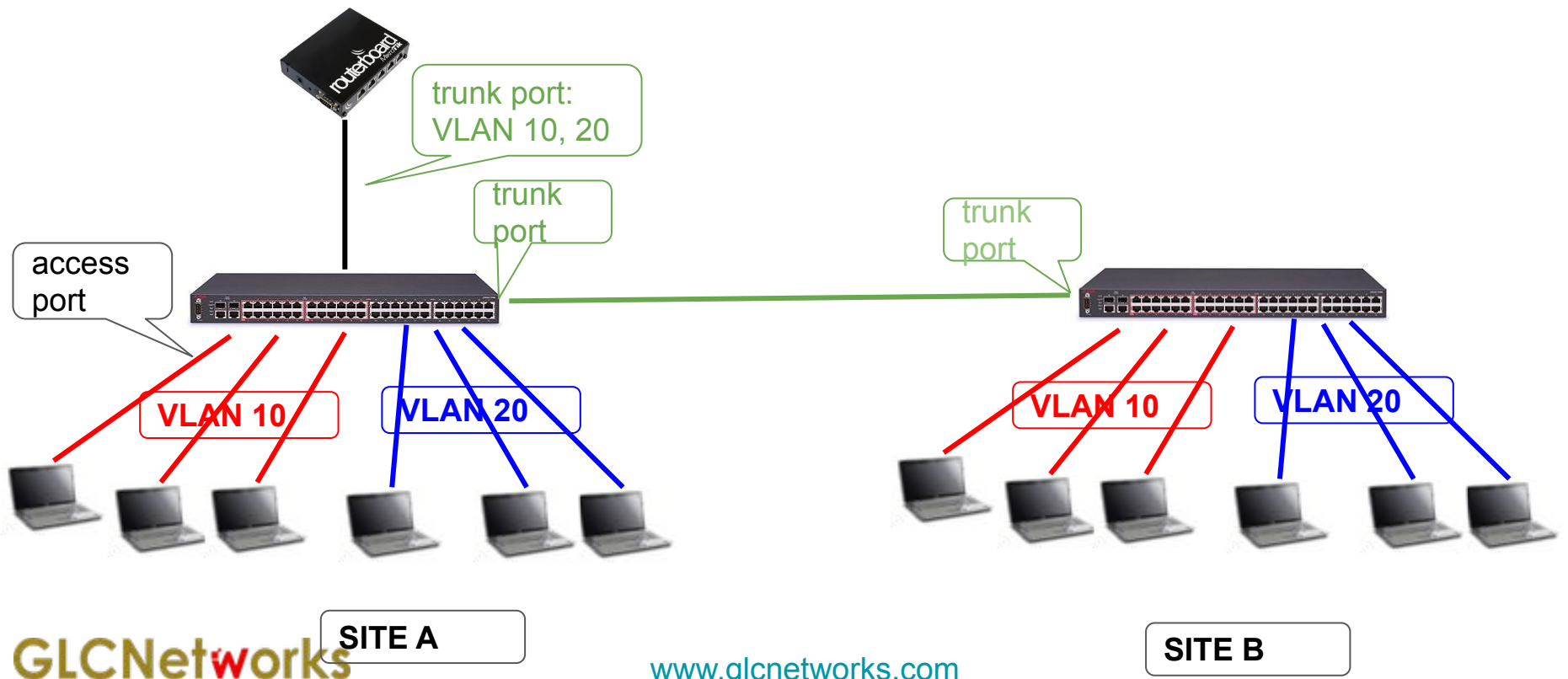
Inter-VLAN communication

- 1 VLAN = 1 network segment = 1 network ID = 1 broadcast domain
- Meaning: we need a router to route packets between VLAN
- IP address on router's interfaces will become the gateway of each VLAN



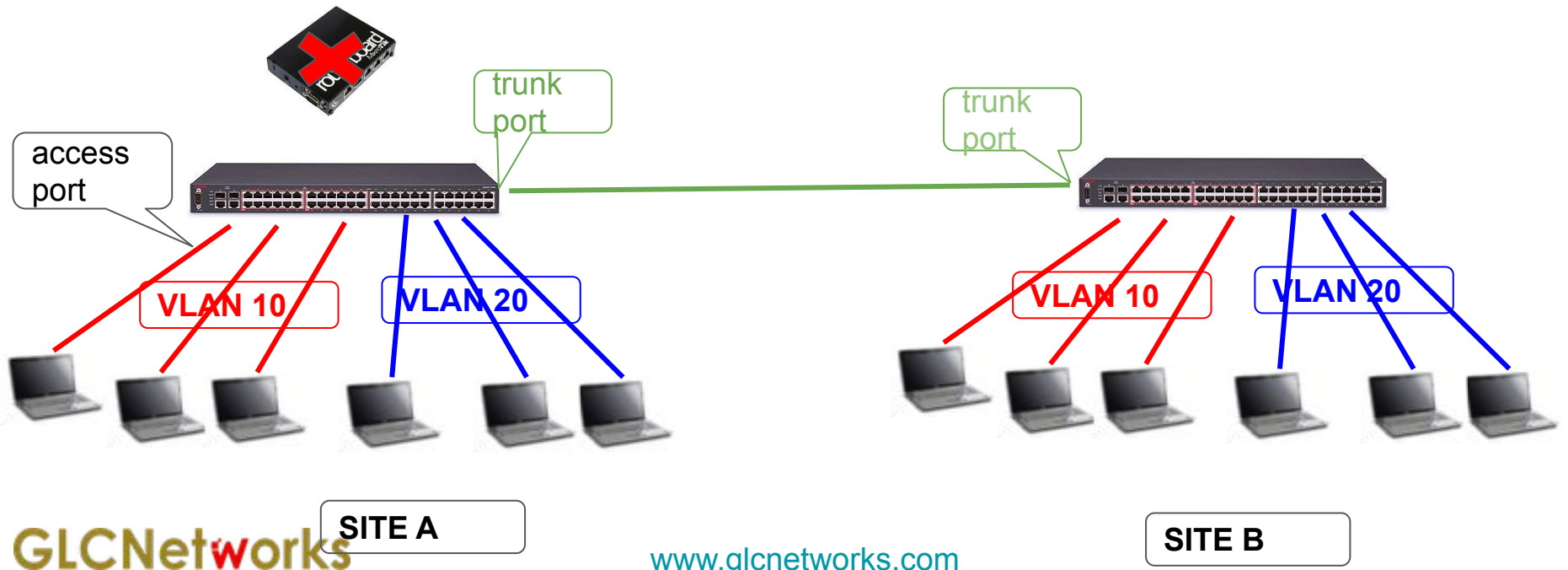
What If the router supports VLAN tag (trunk)?

- VLAN routing can be done using **only 1 port (1 cable)**
- We need to assign IP address on VLAN interface at the router



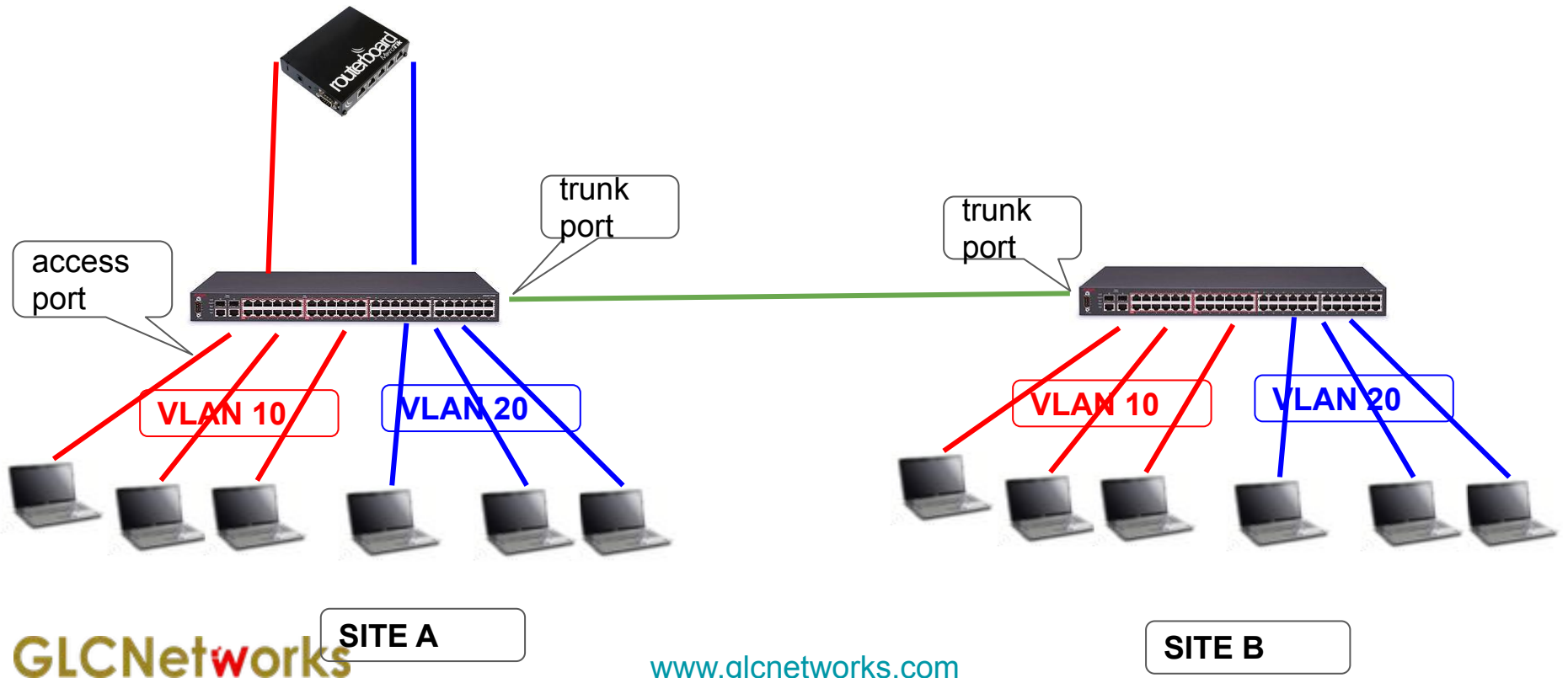
What if the switch is a layer-3 switch?

- Meaning: routing function will be done internally on switch.
- Meaning: the switch is a router.
- Layer-3 switch is much more expensive (especially at vendor XXX)



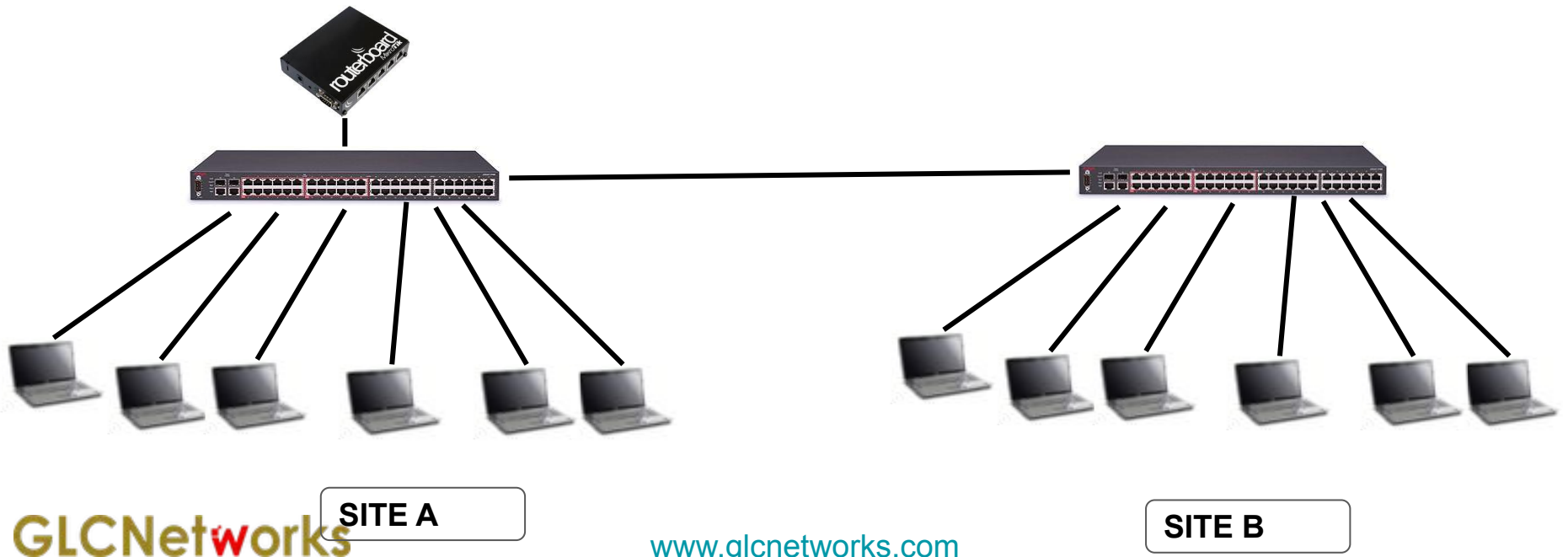
A (very funny) story (1)...

- A client using **layer-3-switches** to build their internal network, and **use Mikrotik router to do inter-VLAN routing. whoops...!!**
- Question: why do you buy a layer-3 switches then?
- **Congratulations to sales team... ;-)** well done..!!



A (very funny) story (2)...

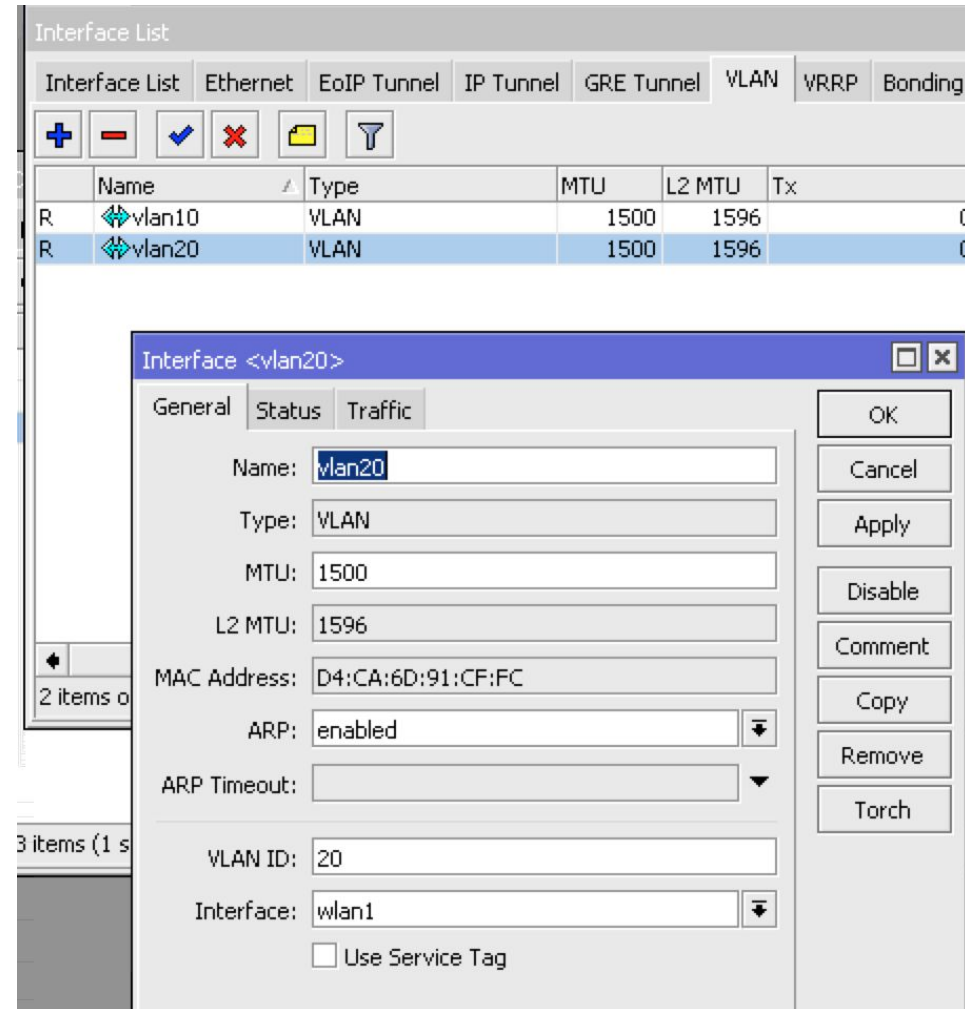
- A client has vlan running on their network
 - VLAN for wired connectivity
 - VLAN for wireless
 - VLAN for server, etc
- And then they plan to add a dedicated firewall on their network
- They cant figure out how their vlan works
- So they **remove ALL VLANs** and the it become a **FLAT network**



VLAN on Mikrotik

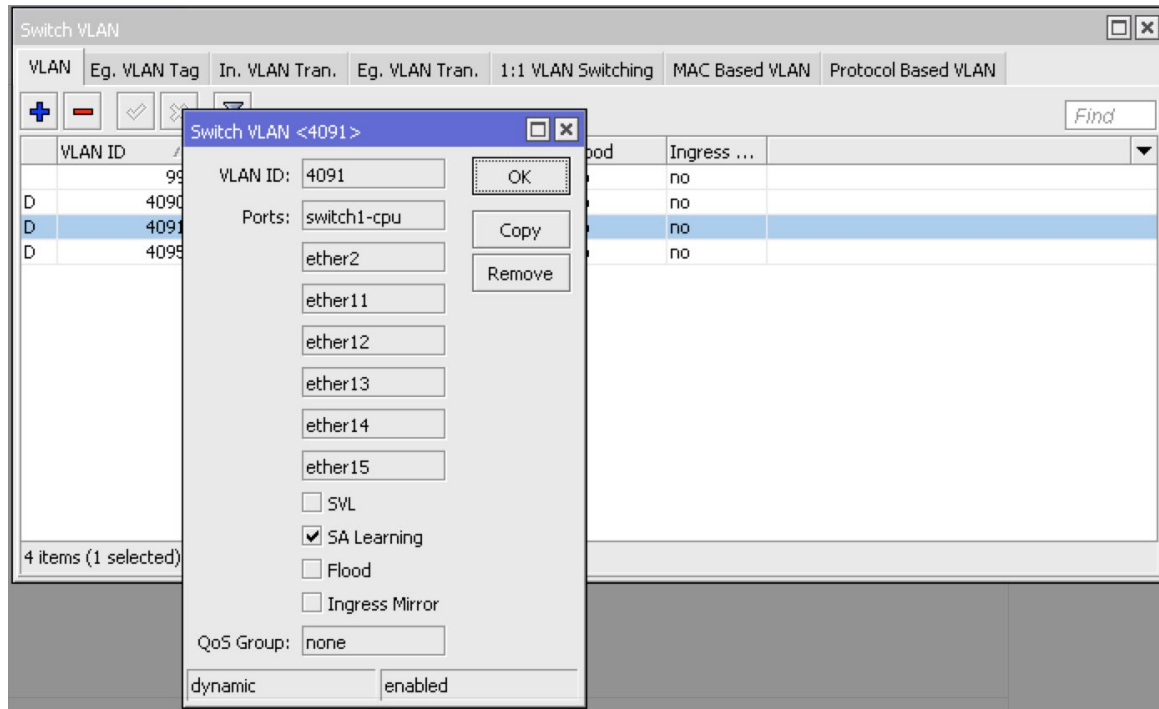
VLAN on Mikrotik router

- By default configuration, mikrotik is a router (layer 3 device)
- Mikrotik can do inter-VLAN routing
 - Without trunk
 - With trunk
- Mikrotik can be configured to become a layer 2 devices
- There is a vlan facility on interface menu for trunk port



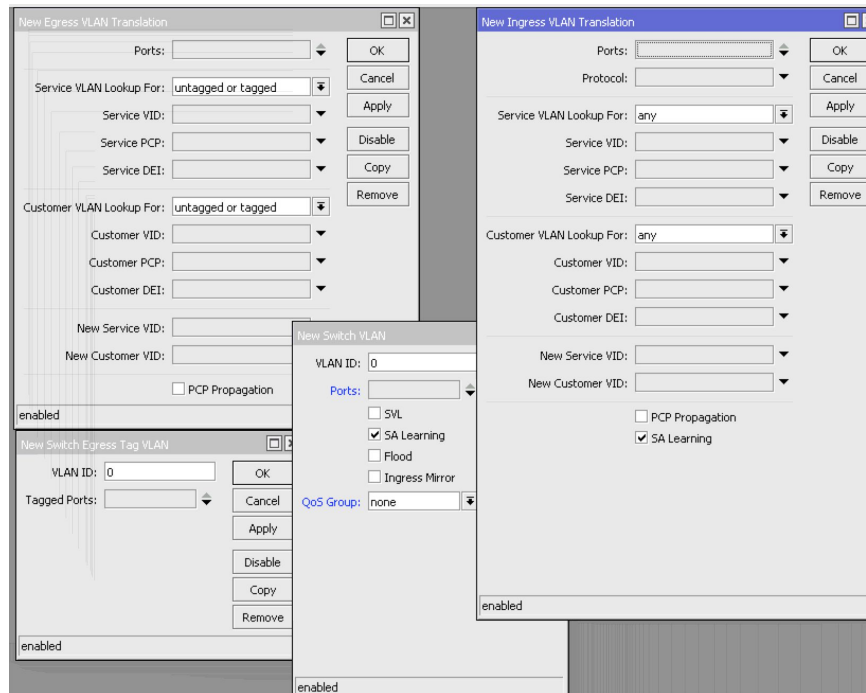
VLAN on Cloud Router Switch (CRS)

- Fully compatible with IEEE802.1Q and IEEE802.1ad VLAN
- 4k active VLANs
- From any to any VLAN translation and swapping
- 1:1 VLAN switching - VLAN to port mapping
- VLAN filtering
- Flexible VLAN assignment:
 - Port based VLAN
 - Protocol based VLAN
 - MAC based VLAN



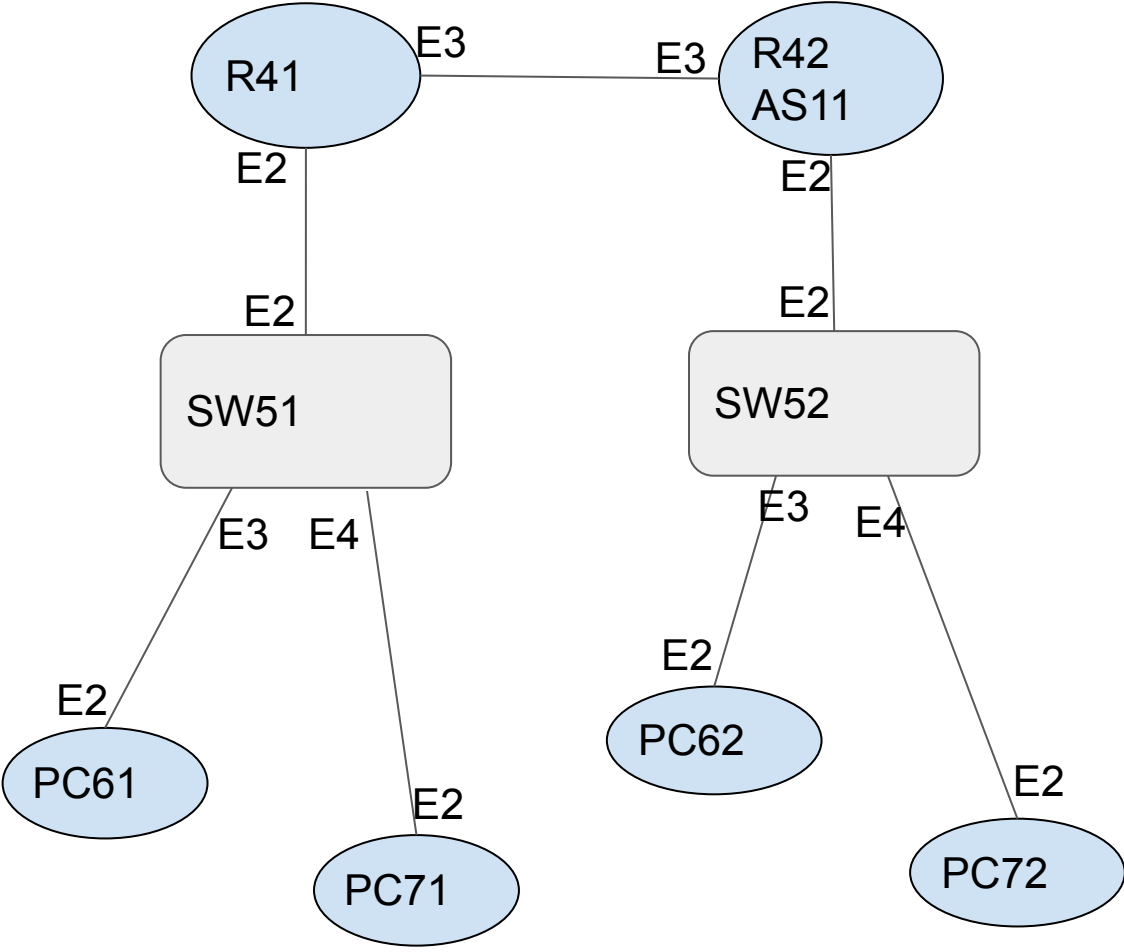
VLAN on CRS

- CRS has more layer2 features which is bound to hardware
- VLAN configuration on CRS1xx / CRS2xx is slightly different than CRS 3XX
- VLAN command on CRS is slightly different than routers, however the concept is same

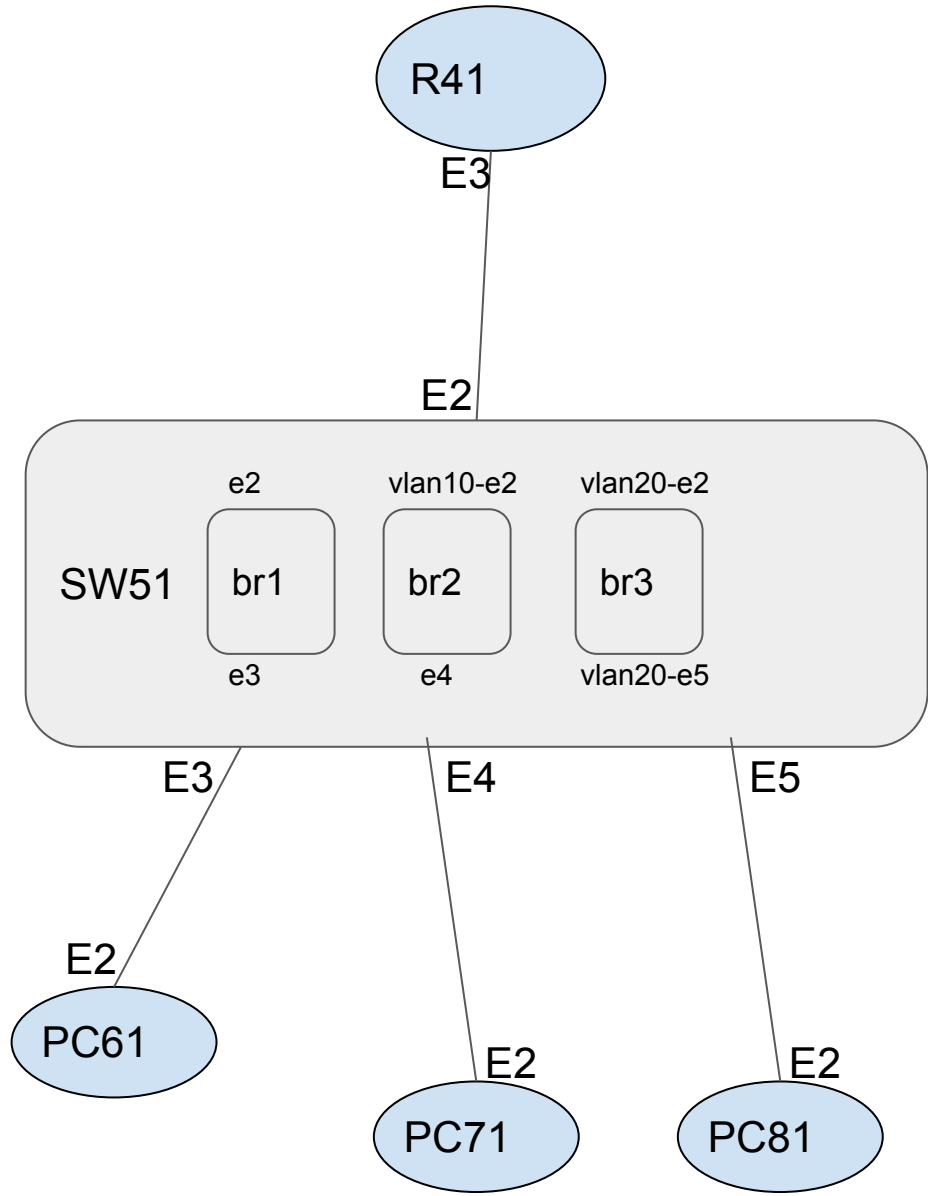


Demo

TOPOLOGY
LAB: VLAN



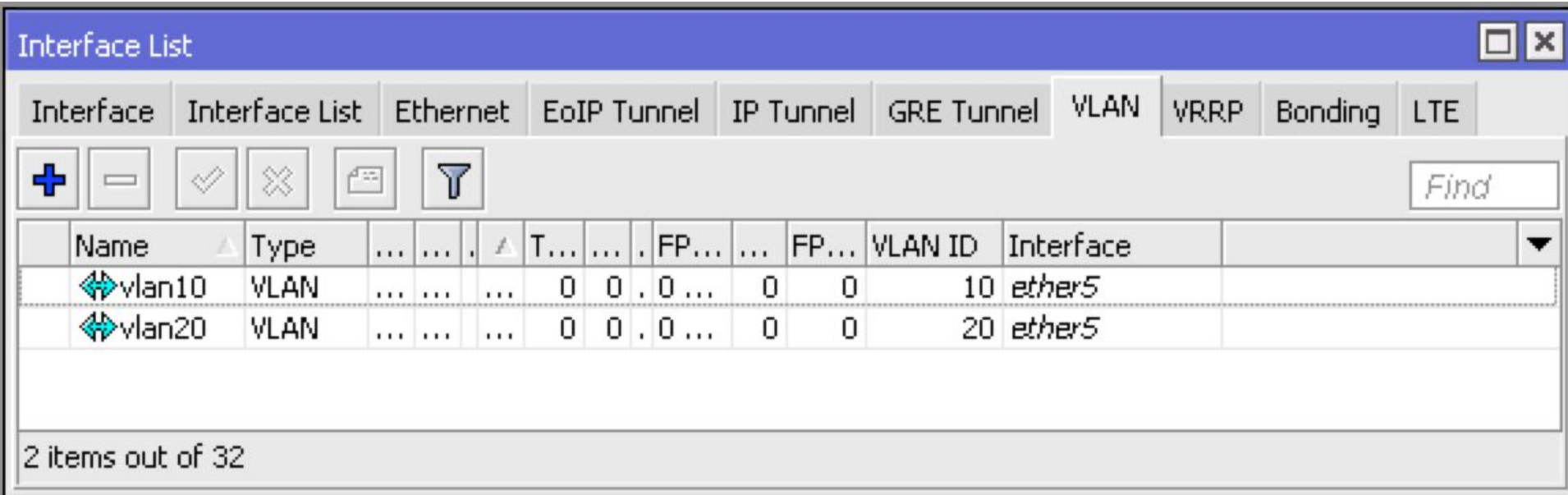
TOPOLOGY
LAB: VLAN



VLAN on RouterOS

Ether5 is used to route vlan 10 and 20:

- `/interface vlan add name=vlan10-e2 vlan-id=10 interface=ether2`
- `/interface vlan add name=vlan20-e2 vlan-id=20 interface=ether2`



The screenshot shows the Mikrotik WinBox 'Interface List' window. The 'VLAN' tab is selected. The table below lists the configured VLANs:

Name	Type	...	...	...	T...	...	...	FP...	...	FP...	VLAN ID	Interface
vlan10	VLAN	...	...	...	0	0	.0	...	0	0	10	ether5
vlan20	VLAN	...	...	...	0	0	.0	...	0	0	20	ether5

2 items out of 32

QA

Some info

- Hope you are more curious now
- These materials are part of Mikrotik Certified course
- If you are interested, you can sign up to our website

End of slides

- Thank you for your attention
- Please submit your feedback: <http://bit.ly/glcfeedback>
- Like our facebook page: “GLC networks”
- Stay tune with our schedule