

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



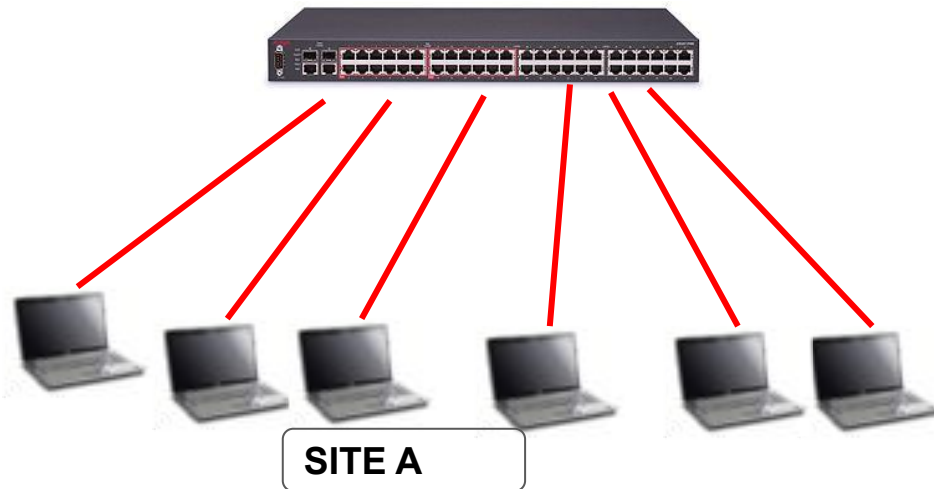
- 2020 (**Congo DRC, Malaysia**): IOT integration, network automation
- 2019, **Congo (DRC)**: build a wireless ISP from ground-up
- 2018, **Malaysia**: network revamp, develop billing solution and integration, setup dynamic routing
- 2017, **Libya (north africa)**: remote wireless migration for a new 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

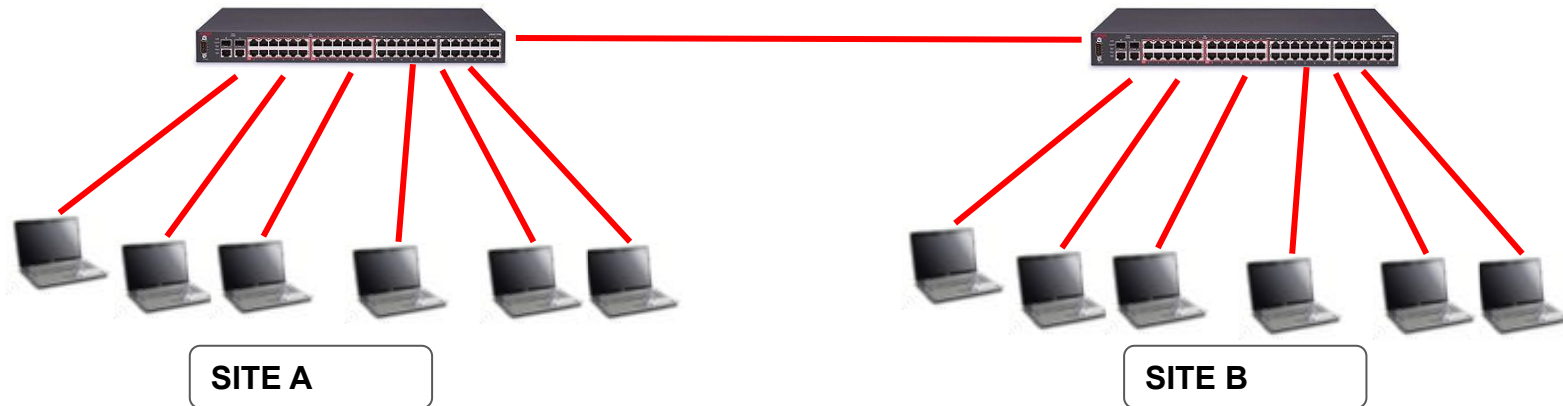
Typical network, no internet

- 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

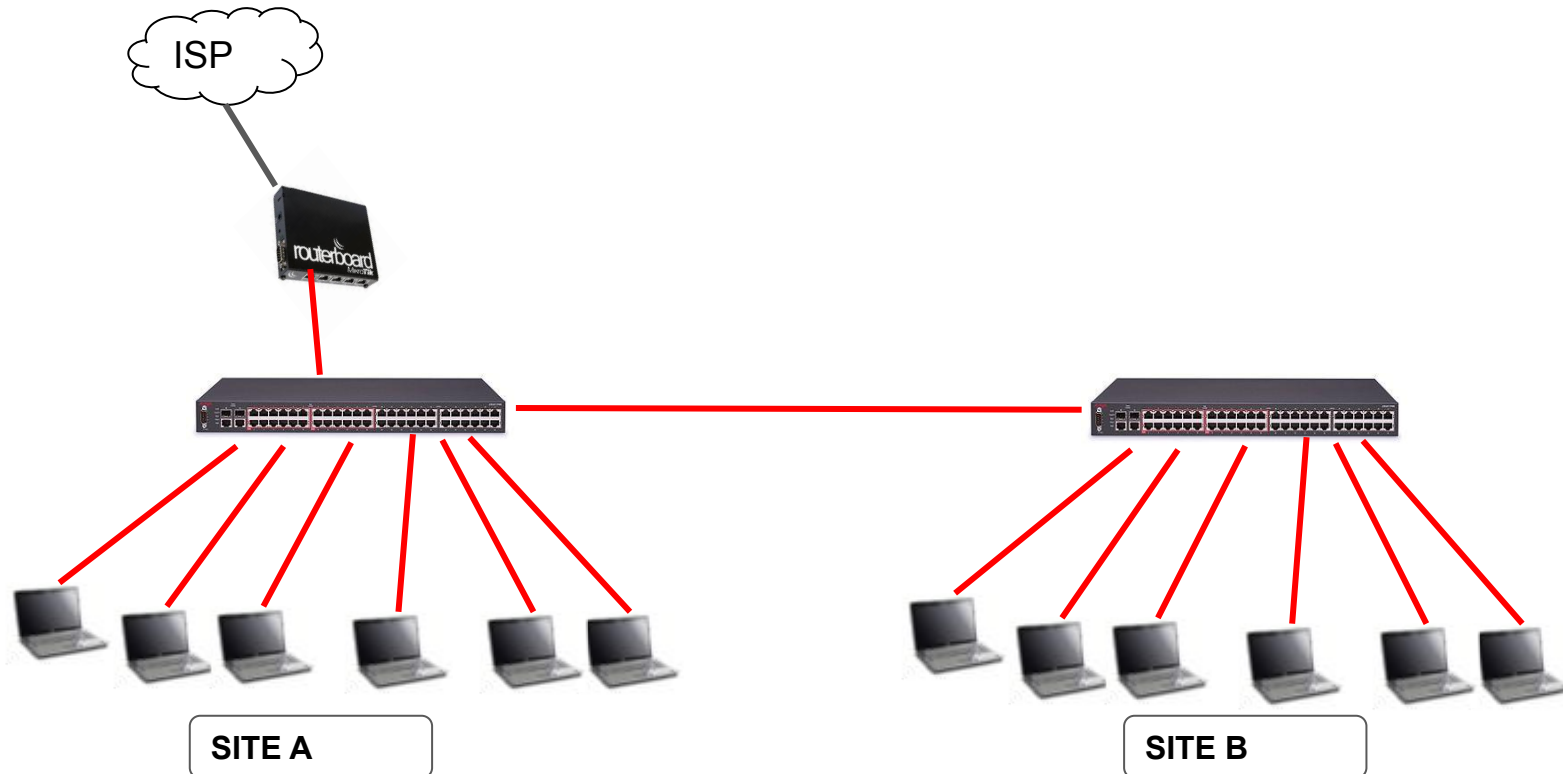
- Network segment is extended
- Still one network segment, **single broadcast domain**



Typical network, with internet connection

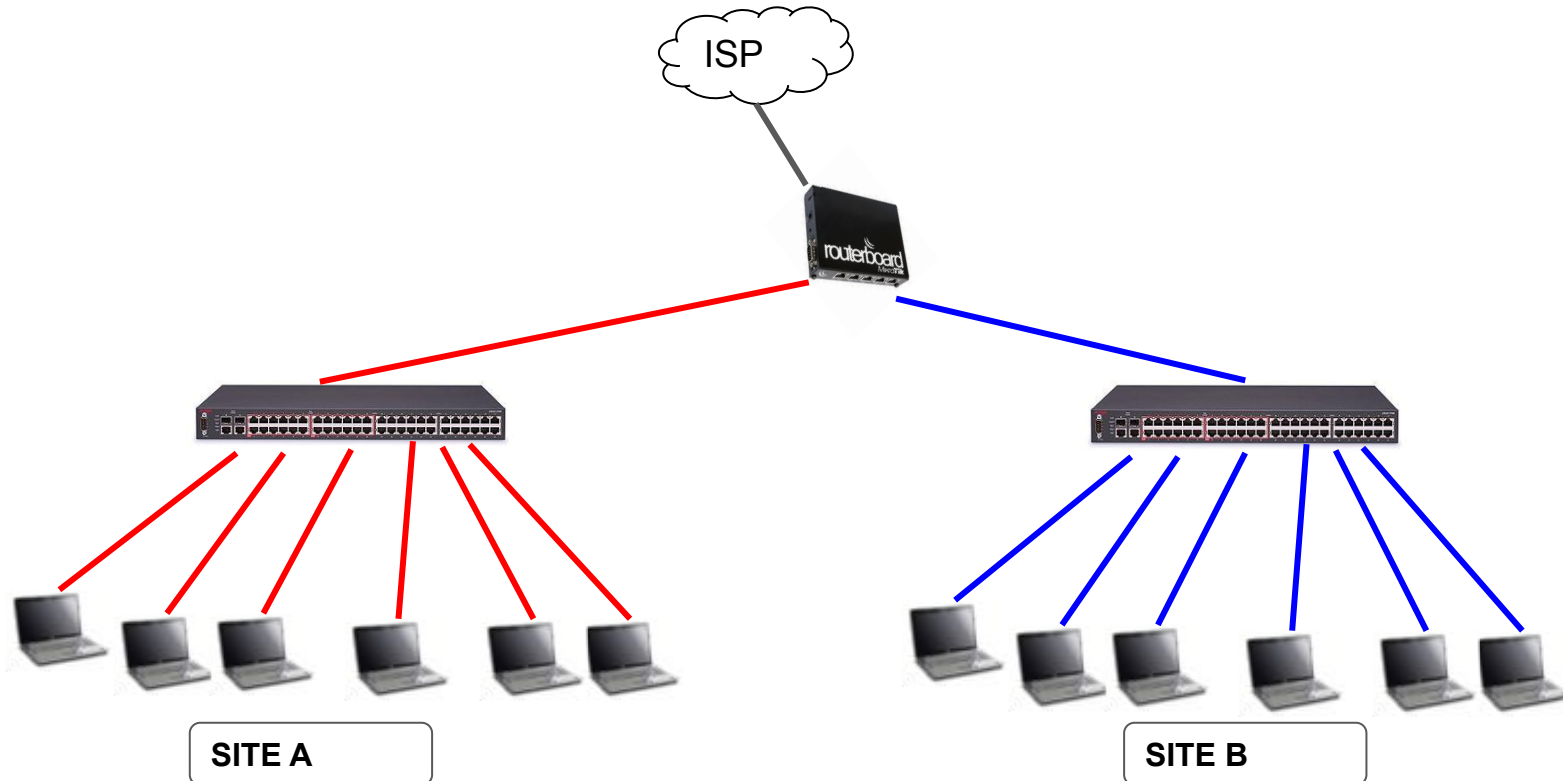
- We add a router to connect to other network (internet is a collection of networks)

-



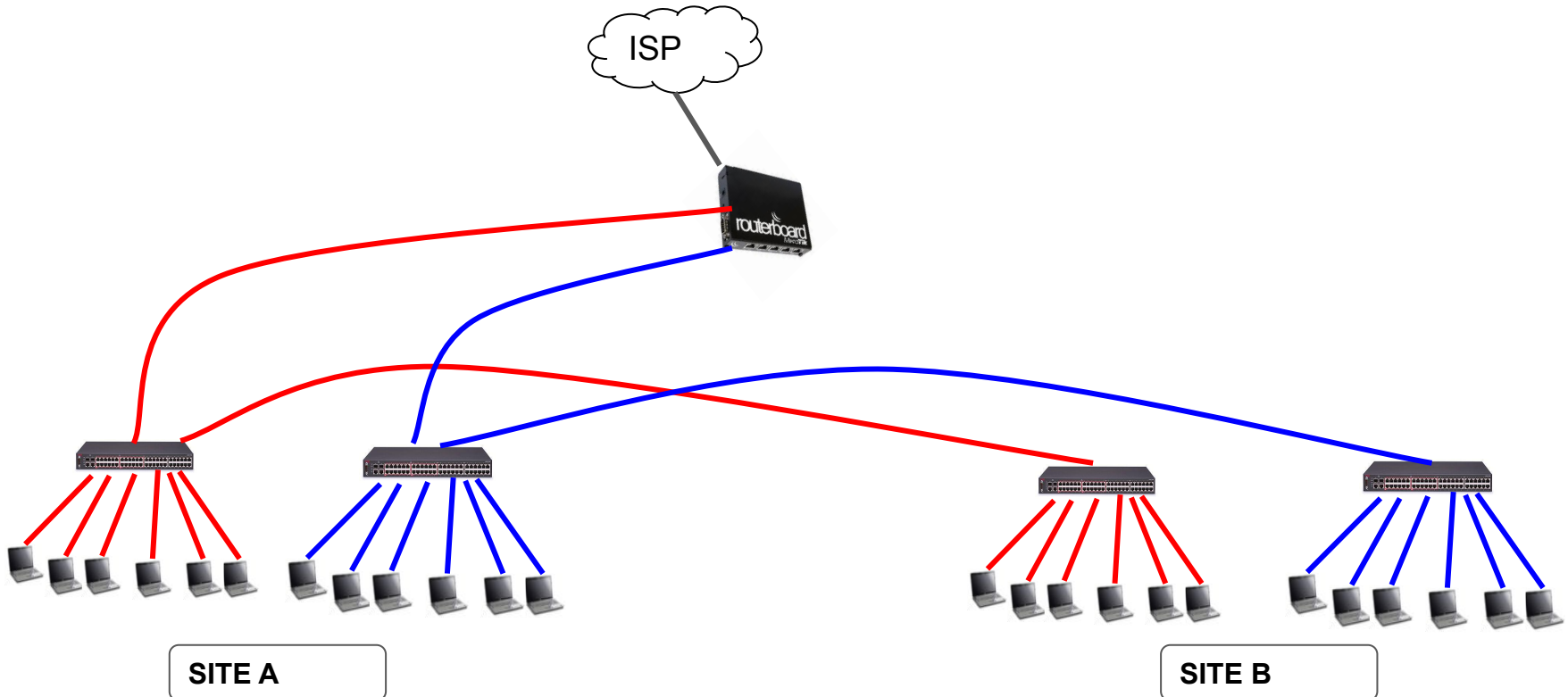
Typical network, with internet and segmentation

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



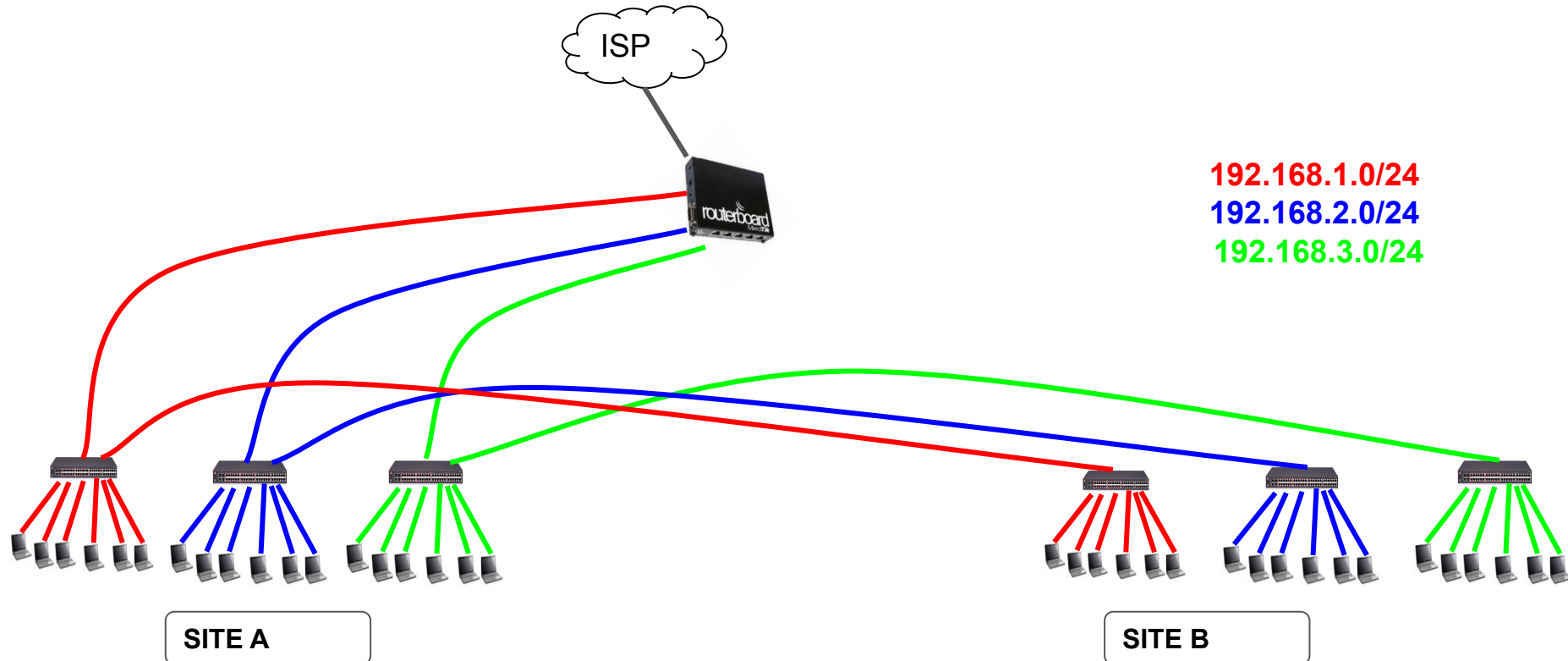
Multiple segments in one site

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



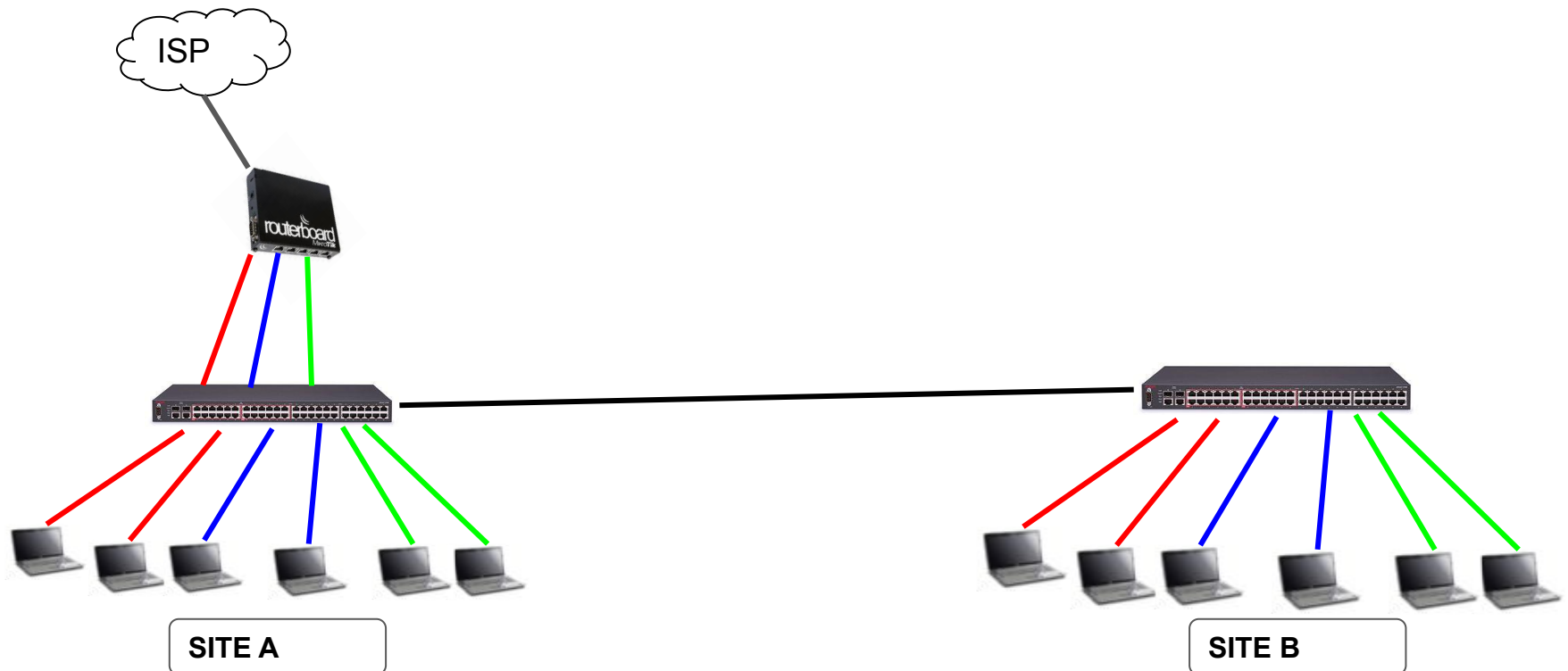
More segments in one site

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

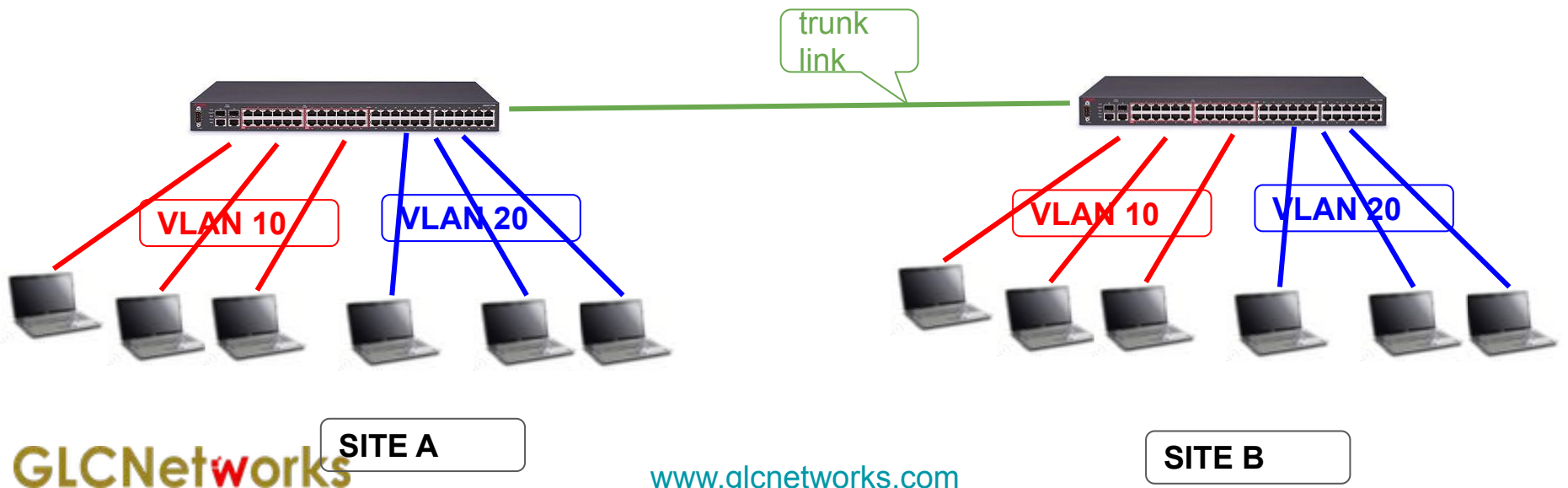
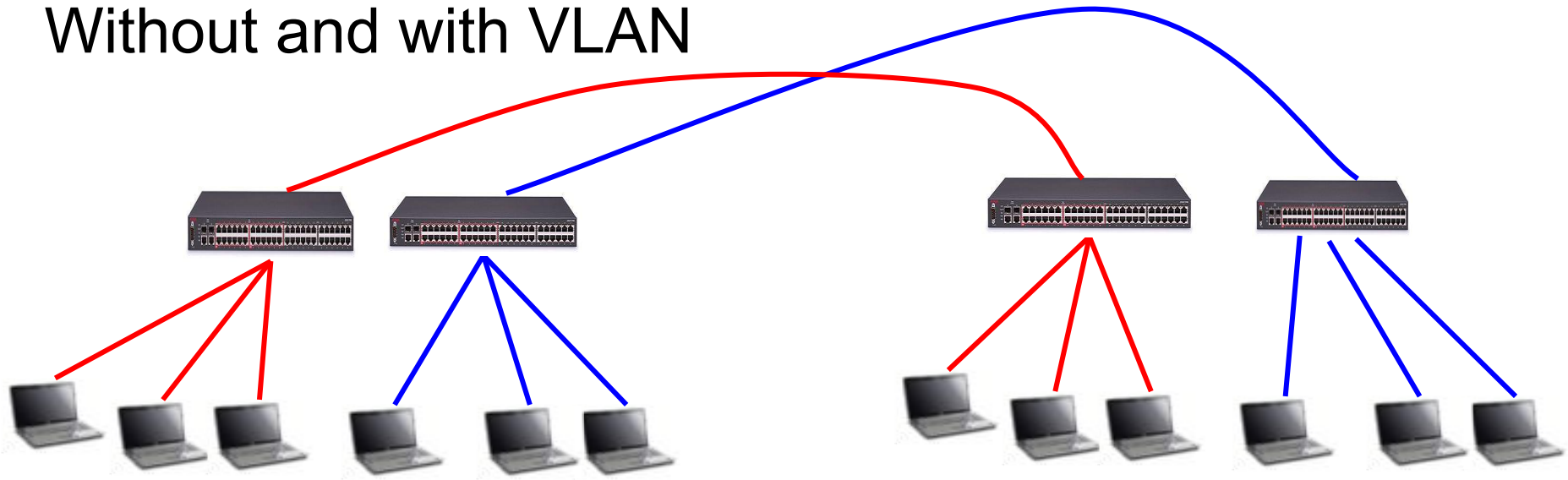


What VLAN can do

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

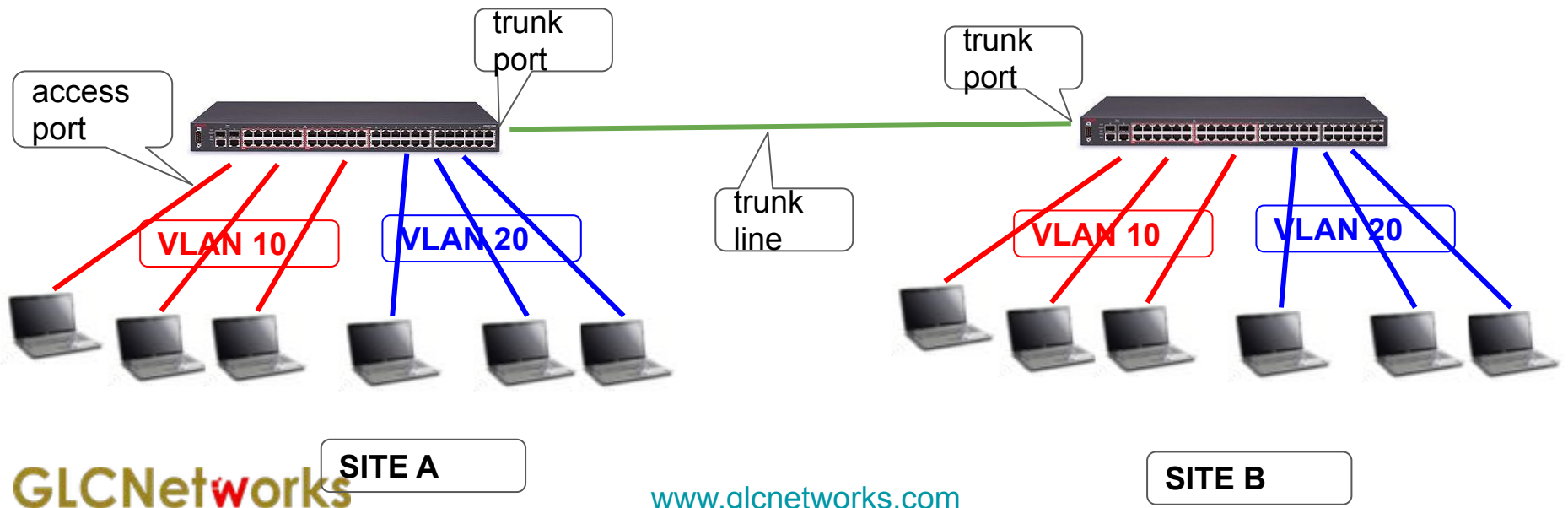


Without and with VLAN



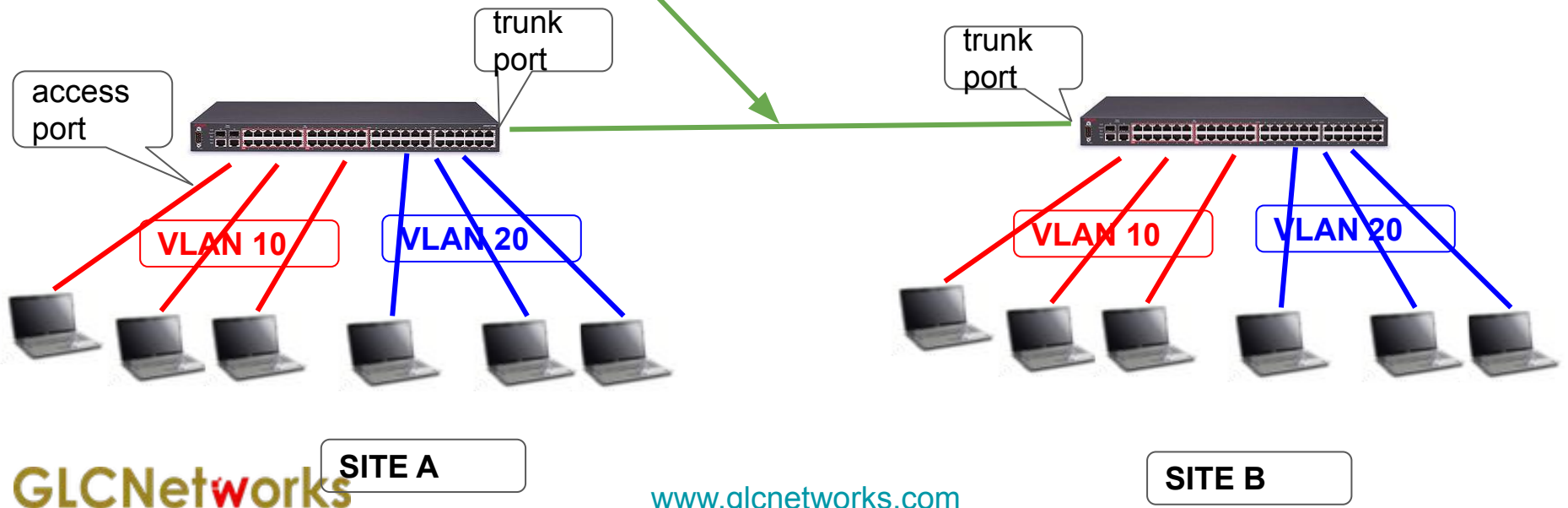
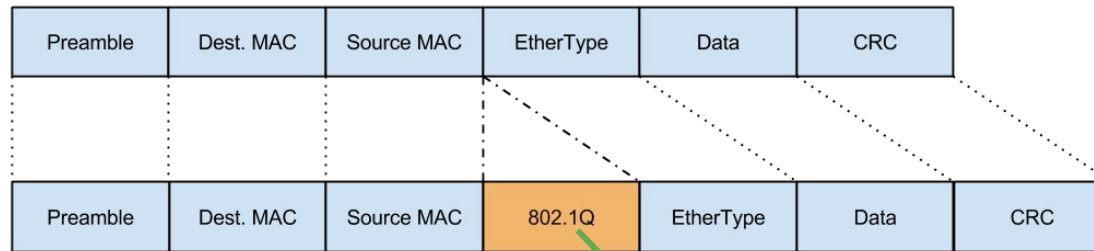
VLAN terms

- **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



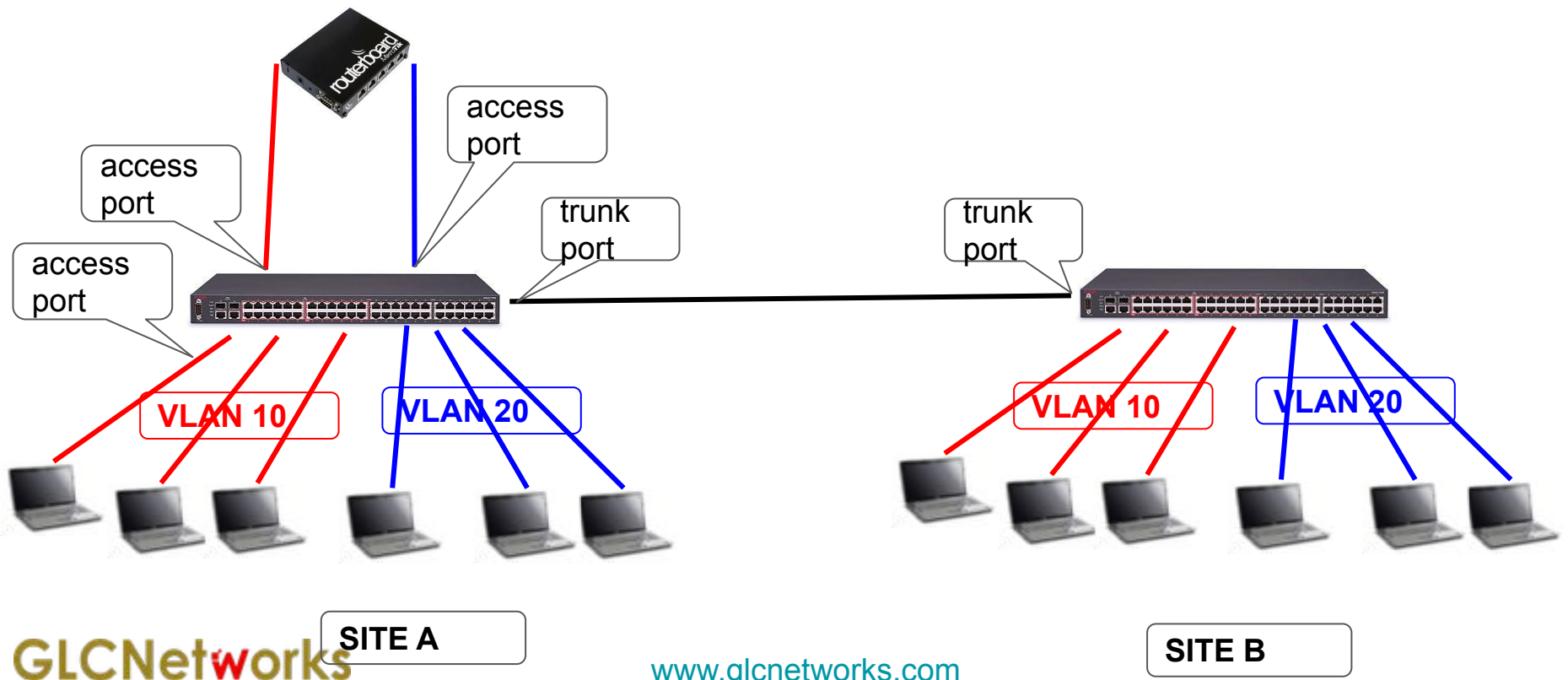
What happened on trunk ports

- 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



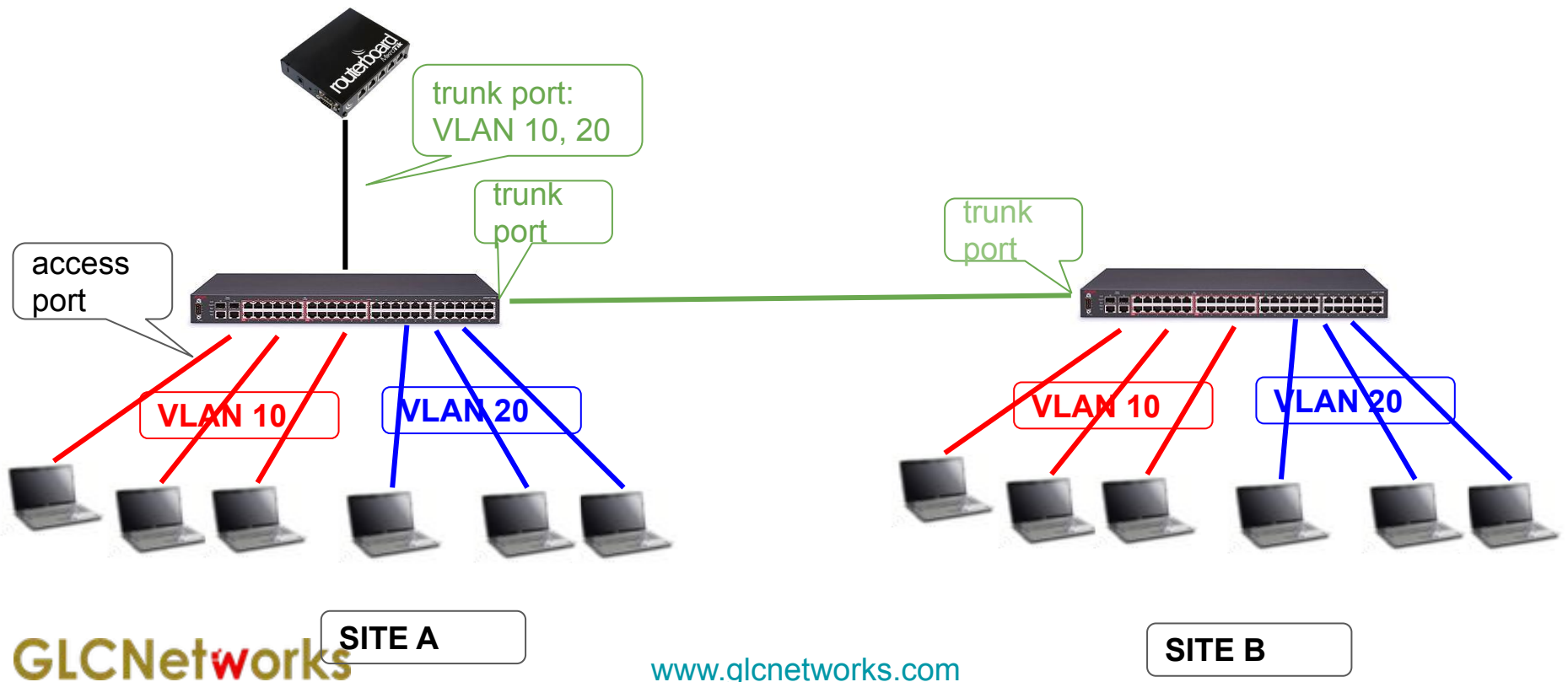
Inter-VLAN communication

- 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



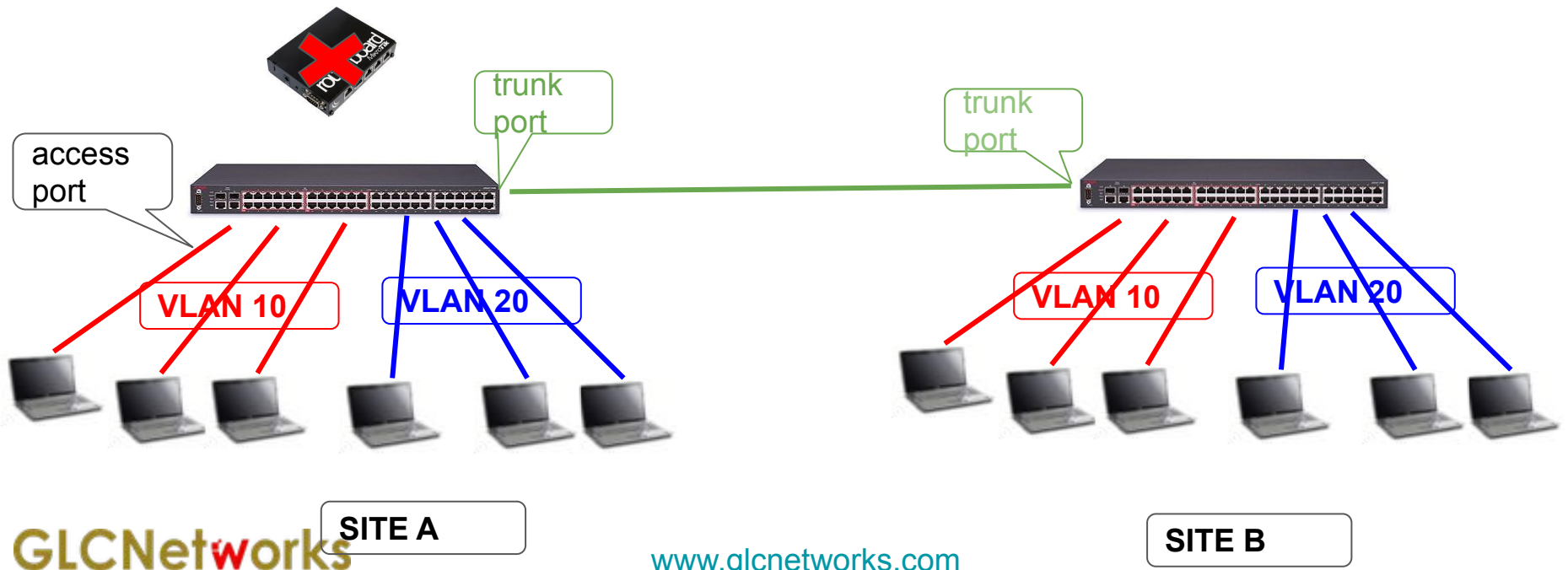
What If the router supports VLAN tag (trunk)?

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



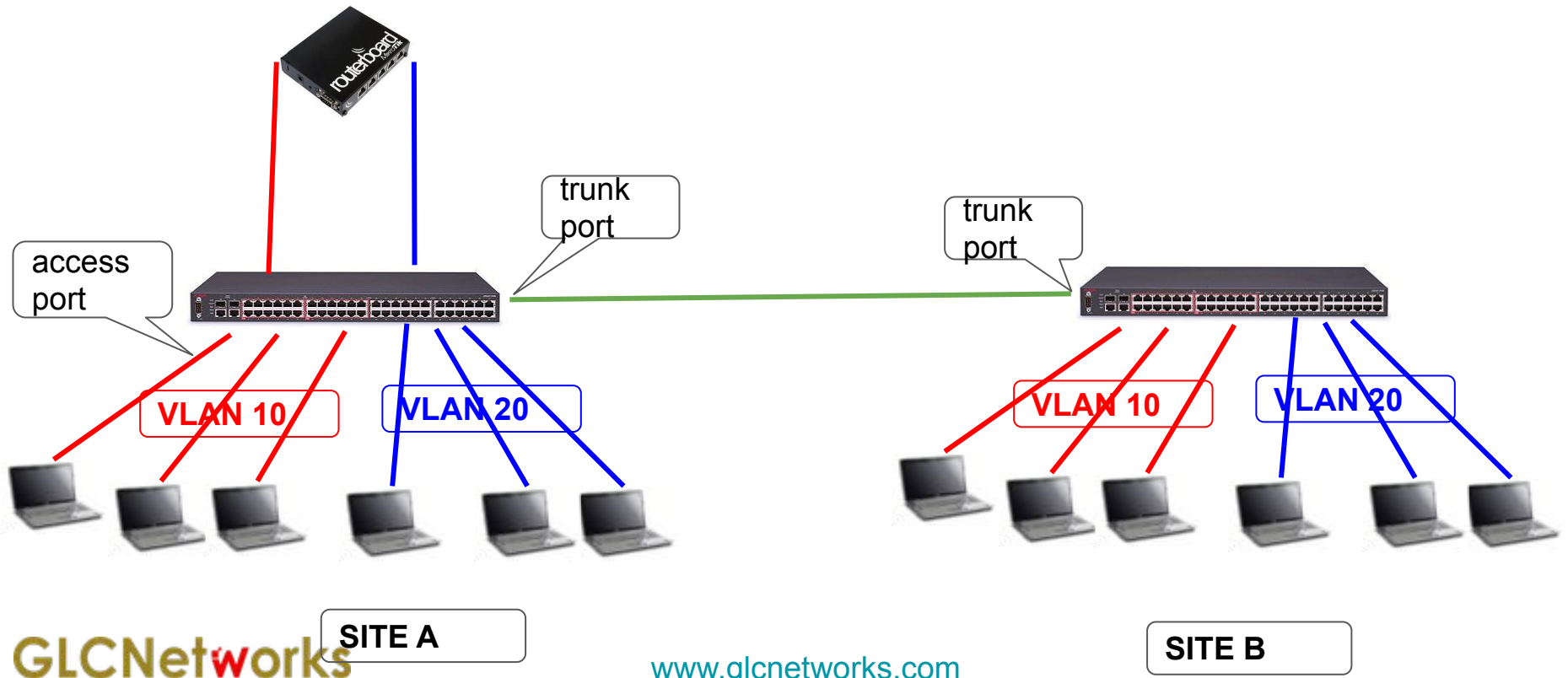
What if the switch is a layer-3 switch?

- 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)**



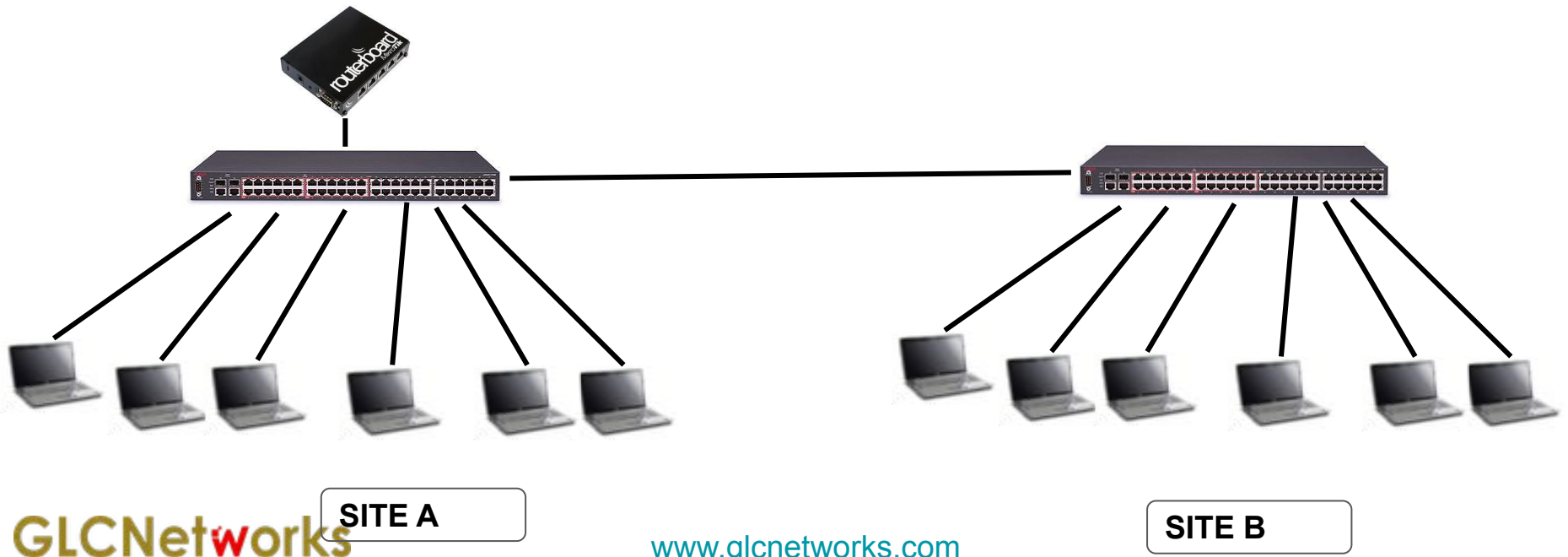
A (very funny) story (1)...

- 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)...

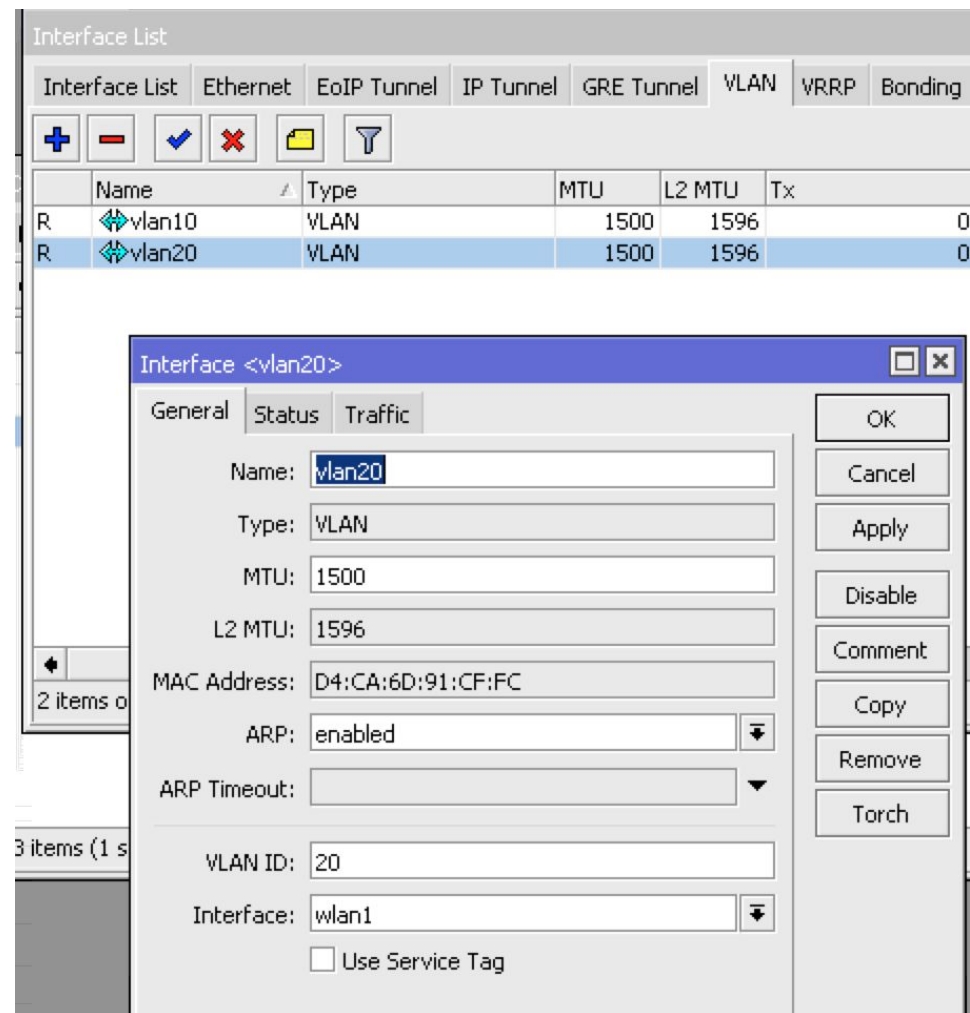
- A client has vlan running on their network
 - VLAN for wired connectivity
 - VLAN for wireless
 - VLAN for server, etc
- And then they plan to add a dedicated firewall on their network
- They cant figure out how their vlan works
- So they **remove ALL VLANs** and the it become a **FLAT network**



VLAN on Mikrotik

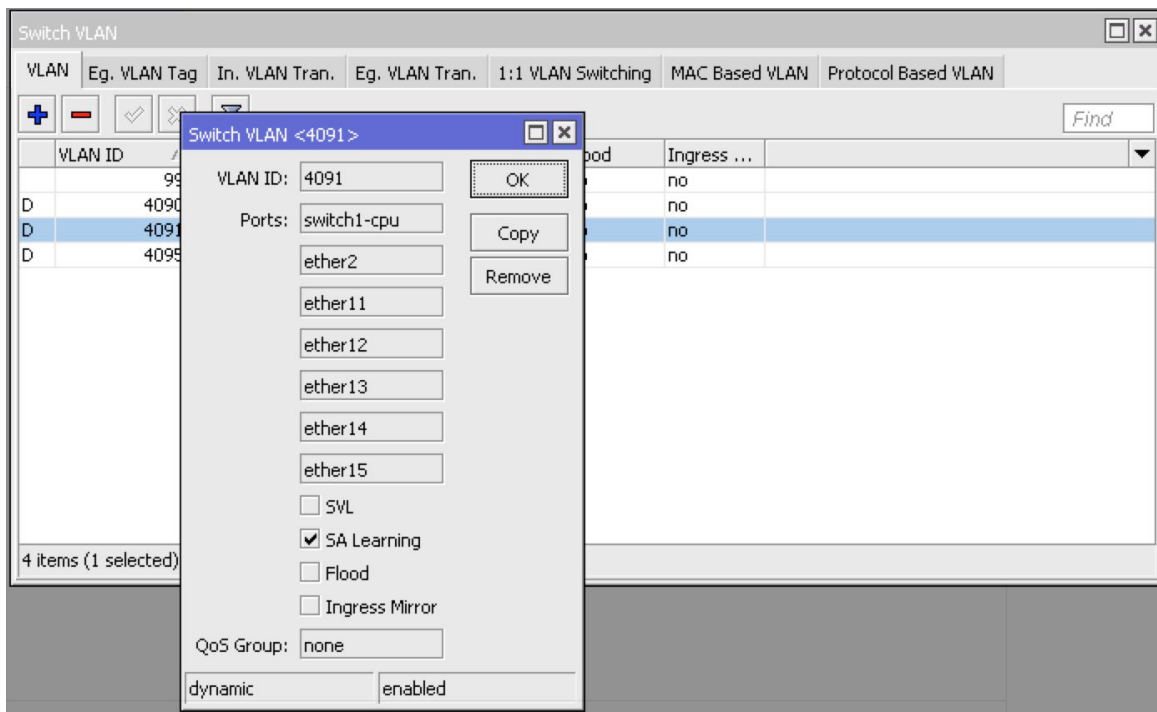
VLAN on Mikrotik router

- 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



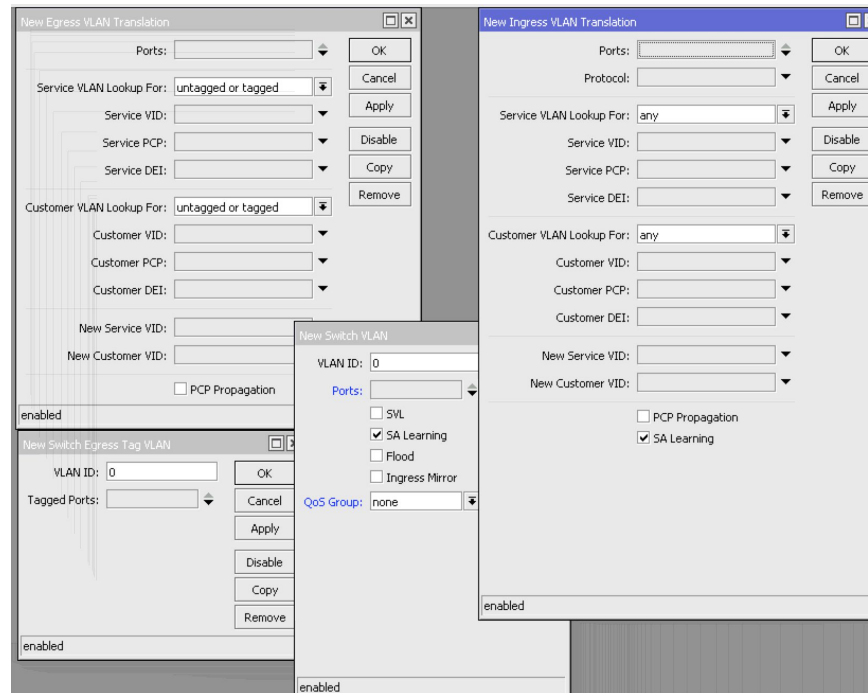
VLAN on Cloud Router Switch (CRS)

- 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



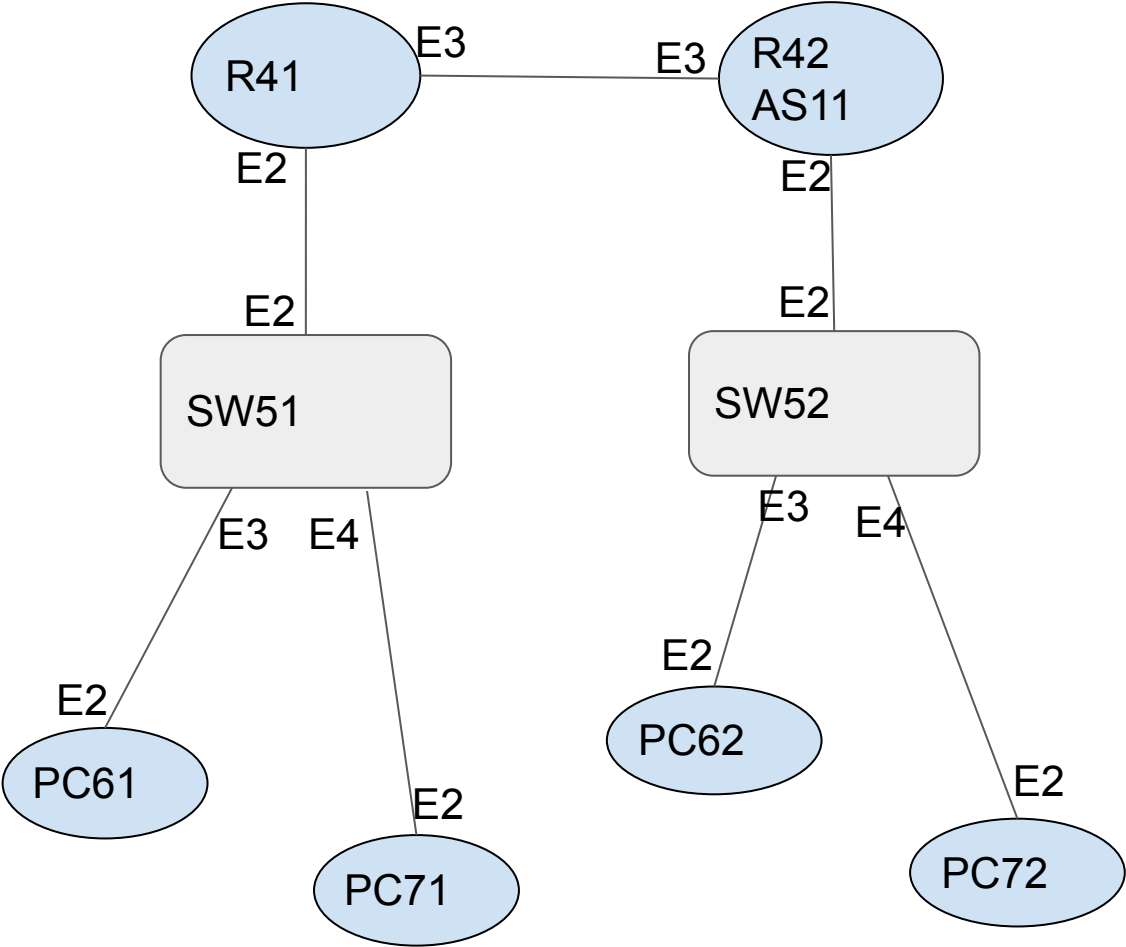
VLAN on CRS

- 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

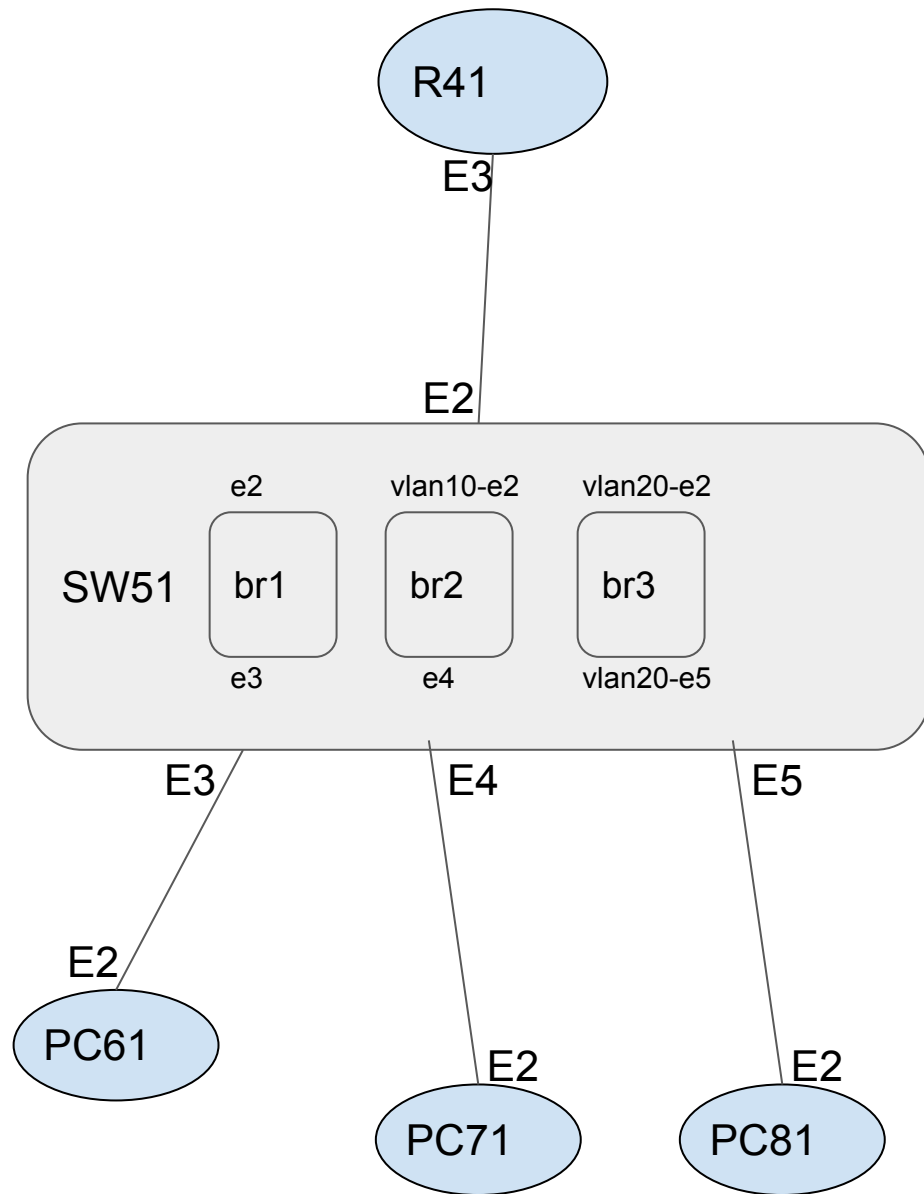


Demo

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`

Interface List

Interface

Interface List

Ethernet

EoIP Tunnel

IP Tunnel

GRE Tunnel

VLAN

VRRP

Bonding

LTE

Find

	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