

Router on a Stick y su Aplicación para un ISP

Ing. Amilcar Cruz
ASINETWORK

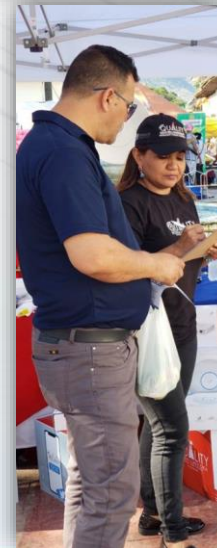
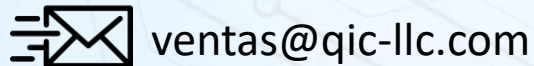
Presentación Personal

- **Nombre:** Amilcar Antonio Cruz Sequeira
- **Profesión:** Ing. en Telecomunicaciones
Especialista de Ingenieria, **ASINETWORK**
- Experiencia con **RouterOS** – 2015
- Certificaciones
Mikrotik: MTCNA / MTCTCE / MTCRE /
MTCINE/ MTCIPv6E / MTCSE





- Equipos
- Asesoría Técnica
- **Certificaciones Mikrotik**
- Soluciones Wireless



Objetivos

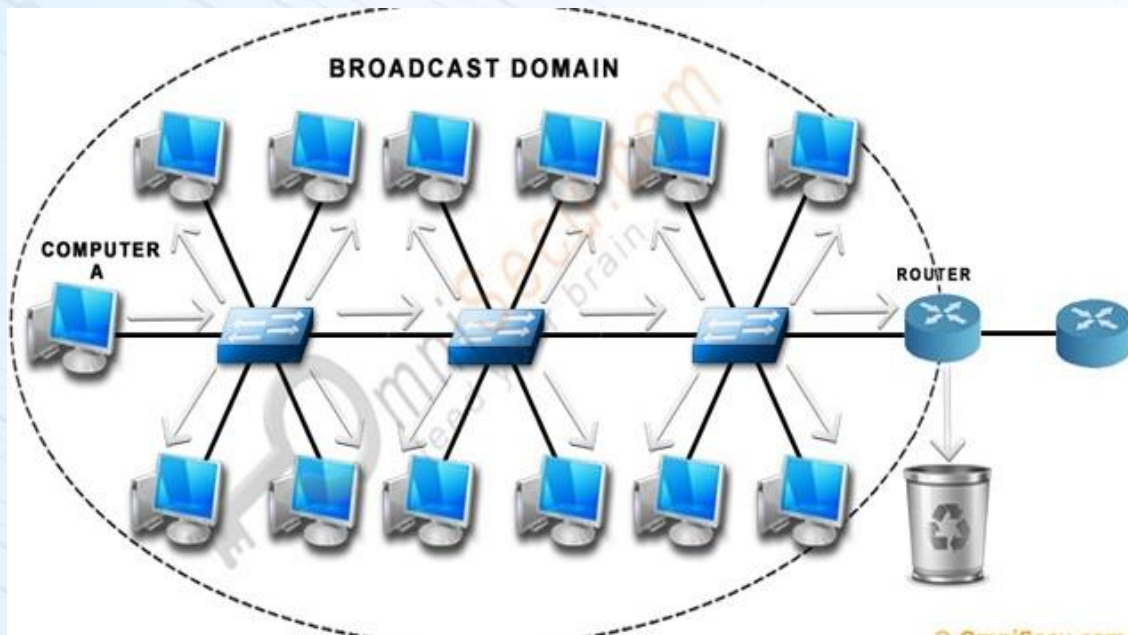
- Definir el Dominio de Broadcast en la Red y porque se debe reducir.
- Definir el concepto Router on a Stick.
- Aplicar este concepto a un entorno WISP.

Conceptos

Dominio de Broadcast:

Es una división lógica de equipos conectados en red que todos pueden ser alcanzados a nivel de datos también se le conoce como L2.





Se utilizan
equipos
denominados
Switches para
ampliar la zona
de conexión.

Varios equipos en Torre o Nodo Y Multiples clientes sobre una misma interfaz crean un gran entorno de broadcast.

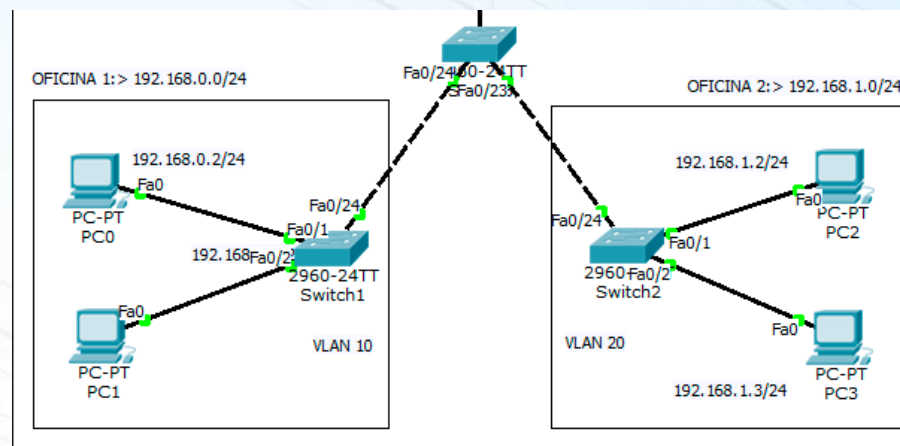


Neighbor List						
Discovery Settings						
Interface	IP Address	MAC Address	Identity	Platform	Version	
bridge	192.168.5.224	78.8A.20.AC.54.37	PowerBeam 5AC 500 ISO	PowerBeam 5AC 500 ISO	XC v6.0	
bridge	192.168.5.245	44.D9.E7.AA.35.9A	apoptoprenales	ArGrid M5 HP	XW v5.6	
bridge	192.168.5.137	78.8A.20.9C.F4.9F	Eugenio	LiteBeam M5	XW v6.1	
bridge	192.168.5.235	B4.FB.E4.64.20.99	oceptoprenalesrecibe	LiteBeam M5	XW v6.1	
bridge	192.168.5.243	80.2A.A8.E4.11.66	salesanfelpe	ArGrid M5 HP	XW v6.0	
bridge	192.168.5.214	B4.FB.E4.DE.CE.CF	salebrvis	LiteBeam M5	XW v6.1	
bridge	192.168.5.59	78.8A.20.1A.C0.A1	Linto	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.57	78.8A.20.1A.CF.CA	RobertoDiaztx	NanoStation loco M2	XW v6.1	
bridge	192.168.5.174	68.72.51.46.1A.8A	Marcos Aguilar	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.33	68.72.51.56.E1.6A	chai	NanoStation loco M2	XW v6.1	
bridge	192.168.5.26	FC.EC.DA.52.D7.72	apoptoprenales	LiteBeam M5	XW v6.1	
bridge	192.168.5.83	04.18.D6.60.88.E9	chai	NanoStation M5	XW v6.1	
bridge	192.168.5.101	FC.EC.DAC.67.1.F6	Erlinda_Perdono-	LiteBeam M5	XW v6.0	
bridge	192.168.5.205	68.72.51.5C.3E.49	afnan	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.229	FC.EC.DA.08.9F.E8	sanfrancisco	PowerBeam M5 400	XW v6.1	
bridge	192.168.5.77	68.72.51.76.38.09	ReneAlonsoMontes-1303.	NanoStation loco M2	XW v6.1	
bridge	192.168.5.223	78.8A.20.1A.3C.52	pinco	NanoStation loco M2	XW v6.1	
bridge	192.168.5.246	FC.EC.DA.0A.F3.85	Recibe arenales	LiteBeam M5	XW v6.0	
bridge	192.168.5.212	FC.EC.DA.52.97.F0	Cosagual clientes	NanoStation loco M2	XW v6.1	
bridge	192.168.5.210	B4.FB.E4.DE.B1.05	apoptos	LiteBeam M5	XW v6.1	
bridge	192.168.5.219	78.8A.20.90.E8.77	Malink	LiteBeam M5	XW v6.0	
bridge	192.168.5.62	18.E8.29.D0.05.D9	salecos	LiteBeam M5	XW v6.1	
bridge	192.168.5.102	18.E8.29.D0.08.E4	Recepcion Erlinda	LiteBeam M5	XW v6.1	
bridge	192.168.5.197	24.A4.3C.F4.A0.95	Felipe-Rivera_20	LM2	XW v5.5	
bridge	192.168.5.211	FC.EC.DAC.67.D9.A9	cosagual	LiteBeam M5	XW v6.0	
bridge	192.168.5.234	78.8A.20.1A.CB.ED	joc	NanoStation loco M2	XW v6.1	
bridge	192.168.5.159	78.8A.20.1A.38.0E	Maria Mejia	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.92	78.8A.20.1A.CE.12	Malin Aleman San ant	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.150	78.8A.20.1A.CF.BB	JuanaMejia	NanoStation loco M2	XW v6.0	
bridge	192.168.5.28	78.8A.20.9C.F4.EF	recibeand	LiteBeam M5	XW v6.0	
bridge	192.168.5.10	DC.9F.DB.2A.16.88	Artesano	NanoStation M5	XW v6.1	
bridge	192.168.5.244	04.18.D6.EE.AE.27	recibeandfel	ArGrid M5 HP	XW v6.0	
bridge	192.168.5.118	DC.9F.DB.2A.16.8F	chai	NanoStation M5	XW v6.1	
bridge	192.168.5.90	68.72.51.26.DC.3F	Santiago_Gmenez_Slor...	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.155	68.72.51.46.1A.9A	Laura cruz 7 dic	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.129	78.8A.20.1A.B7.47	nancy	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.218	68.72.51.5C.50.28	centimoras	NanoStation loco M2	XW v6.1	
bridge	192.168.5.237	78.8A.20.90.11.84	chai	LiteBeam M5	XW v6.1	
bridge	192.168.5.252	68.72.51.28.EE.86	cruz	NanoStation loco M2	XW v6.1	
bridge	192.168.5.45	68.72.51.5C.62.EA	Ruth	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.127	78.8A.20.68.61.88	walter alvarado	NanoStation Loco M2	XW v6.0	
bridge	192.168.5.12	24.A4.3C.70.FB.C1	chai	NanoStation M5	XW v6.0	
bridge	10.156.254.22	DC.9F.DB.08.9E.08	Rocket M5	Rocket M5	XW v6.1	
bridge	192.168.5.248	78.8A.20.9C.F3.99	recibe_pirasa_centro	LiteBeam M5	XW v6.1	

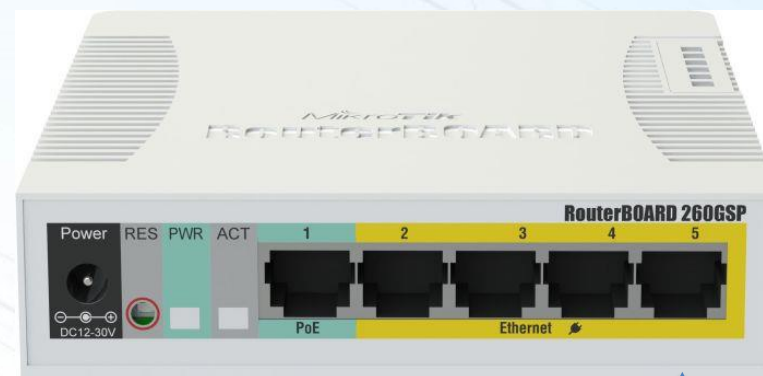
Vlans

Es un protocolo de encapsulamiento de trafico en determinada interfaz de red.

Se pueden crear redes virtuales dentro de un mismo switch fisico



Vlans en Nodo



Vlan30

Vlan40

Vlan50

Podemos asignar 1 puerto de cada dispositivo que tengas una vlan individual

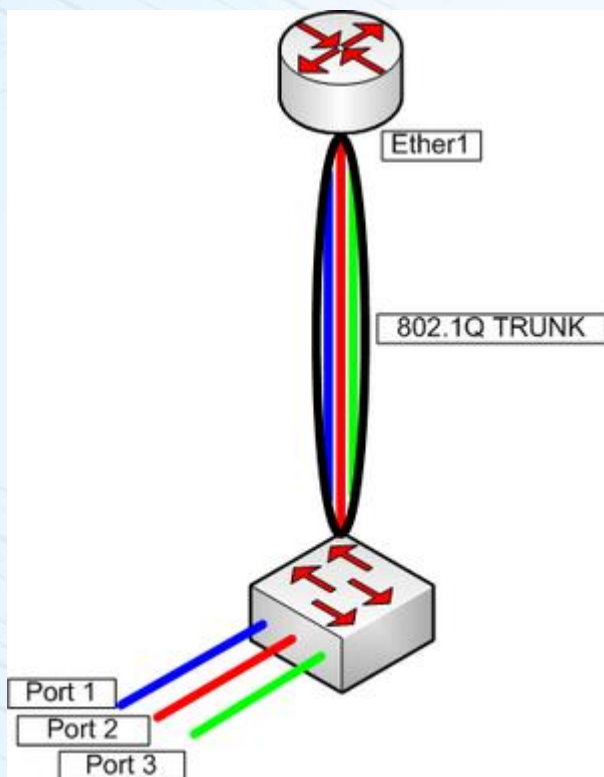
Router on a Stick

Enrutamiento InterVLAN:

Es un método que se utiliza para **intercomunicar vlans entre si** mediante el uso de un router donde se utiliza una sola interfaz para envío y recepción de los datos. Es fácil de implementar, solamente se necesita asignar las vlans a la interface Troncal.



Router on a Stick



Router on a Stick



Mikrotik RB260 GSP

- Switch Administrable via WEB
- Configuración de vlans
- Posee 1 Puerto SFP
- 4 puertos POE 24v
- Se energiza de 11 a 30v en la entrada (ojo **no** convierte a 24v en la salida.)
- Salida Máxima por puerto 1 A.
- Puede energizar un sistema max 2 A. 0.5 A. x cada puerto o 500 mA.



Configuración

MikroTik SwOS
Logout

Link
SFP
Forwarding
Statistics
VLAN
VLANs
Static Hosts
Hosts
SNMP
ACL
System

	Port1	Port2	Port3	Port4	Port5
Link					
Enabled	☒	☒	☒	☒	☒
Link Status	no link	link on	link on	link on	link on
Auto Negotiation	☒	☒	☒	☒	☒
Speed		1000	100	1000	1000
Full Duplex	no	yes	yes	yes	yes
Flow Control	☒	☒	☒	☒	☒
PoE					
PoE Out		on ▼	auto ▼	on ▼	on ▼
PoE Priority		1 ▼	2 ▼	3 ▼	4 ▼
PoE Status	disabled	powered on	powered on	powered on	powered on
PoE Current		247mA	138mA	278mA	271mA
PoE Power		6.189W	3.458W	6.966W	6.791W

Discard Changes
Apply All

Configuración

MikroTik SwOS
Logout

Link
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System

VLAN ID	Port1	Port2	Port3	Port4	Port5	SFP	
1	leave as is ▼	not a member ▼	not a member ▼	not a member ▼	not a member ▼	leave as is ▼	Cut Insert
22	leave as is ▼	leave as is ▼	not a member ▼	not a member ▼	not a member ▼	leave as is ▼	Cut Insert
23	leave as is ▼	not a member ▼	leave as is ▼	not a member ▼	not a member ▼	leave as is ▼	Cut Insert
24	leave as is ▼	not a member ▼	not a member ▼	leave as is ▼	not a member ▼	leave as is ▼	Cut Insert
25	leave as is ▼	not a member ▼	not a member ▼	not a member ▼	leave as is ▼	leave as is ▼	Cut Insert

Append
Cut
Discard Changes
Apply All

Configuración

MikroTik SwOS
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VLAN ID	Port1	Port2	Port3	Port4	Port5	SFP	
1	leave as is ▼	not a member ▼	not a member ▼	not a member ▼	not a member ▼	leave as is ▼	Cut Insert
22	leave as is ▼	leave as is ▼	not a member ▼	not a member ▼	not a member ▼	leave as is ▼	Cut Insert
23	leave as is ▼	not a member ▼	leave as is ▼	not a member ▼	not a member ▼	leave as is ▼	Cut Insert
24	leave as is ▼	not a member ▼	not a member ▼	leave as is ▼	not a member ▼	leave as is ▼	Cut Insert
25	leave as is ▼	not a member ▼	not a member ▼	not a member ▼	leave as is ▼	leave as is ▼	Cut Insert

Append
Cut
Discard Changes
Apply All

Configuración

MikroTik SwOS

Logout

Link SFP Forwarding Statistics VLAN VLANs Static Hosts Hosts SNMP ACL System

Port1

Port2

Port3

Port4

Port5

SFP

Ingress

VLAN Mode

enabled ▼

strict ▼

strict ▼

strict ▼

strict ▼

enabled ▼

VLAN Receive

any ▼

any ▼

any ▼

any ▼

any ▼

any ▼

Default VLAN ID

1

22

23

24

25

1

Force VLAN ID

☐
☐
☐
☐
☐
☐

Egress

VLAN Header

add if missing ▼

always strip ▼

always strip ▼

always strip ▼

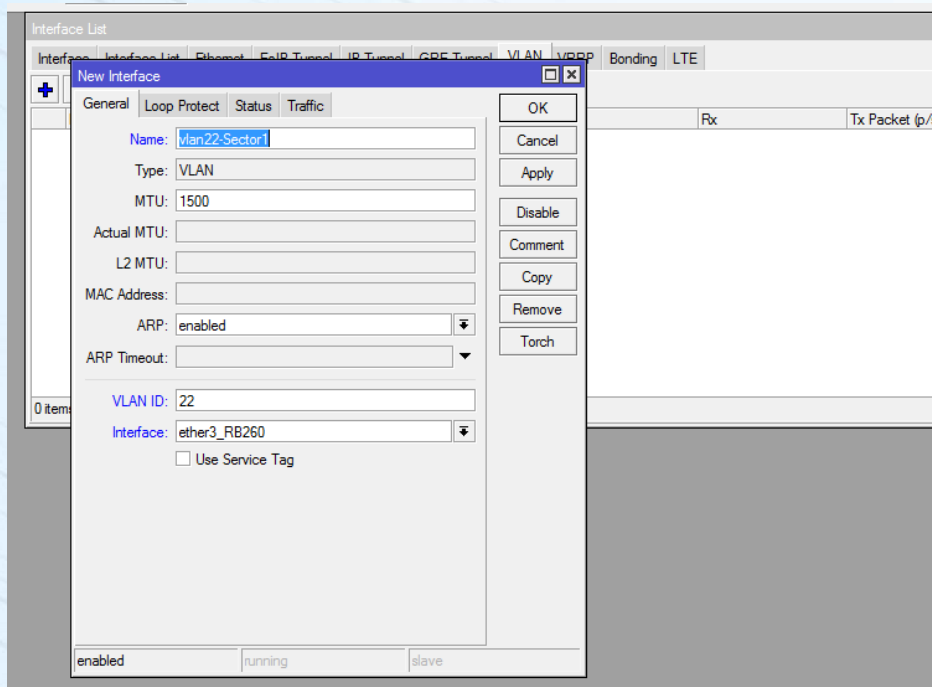
always strip ▼

add if missing ▼

Discard Changes

Apply All

Configuración

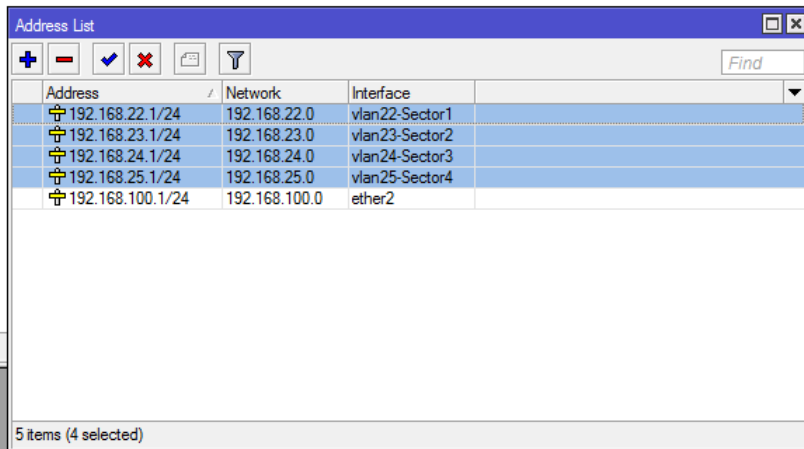


Interface List

Interface	Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
						Detect Internet			
	Name	Type	Actual MTU	L2 MTU	Tx				
R	bridge1	Bridge	1500	1580	1338.9 kbps				
R	ether1_WAN	Ethernet	1500	1580	40.0 kbps				
RS	ether2	Ethernet	1500	1580	706.3 kbps				
RS	ether3_RB260	Ethernet	1500	1580	8.0 kbps				
R	vlan22-Sector1	VLAN	1500	1576	0 bps				
R	vlan23-Sector2	VLAN	1500	1576	0 bps				
R	vlan24-Sector3	VLAN	1500	1576	0 bps				
R	vlan25-Sector4	VLAN	1500	1576	0 bps				
	ether4	Ethernet	1500	1580	0 bps				
	ether5	Ethernet	1500	1580	0 bps				
X	l2tp-out1	L2TP Client			0 bps				
X	ovpn-out1	OVPN Client			0 bps				

Se agregan todas las vlans en la interface troncal donde conectamos nuestro Switch.

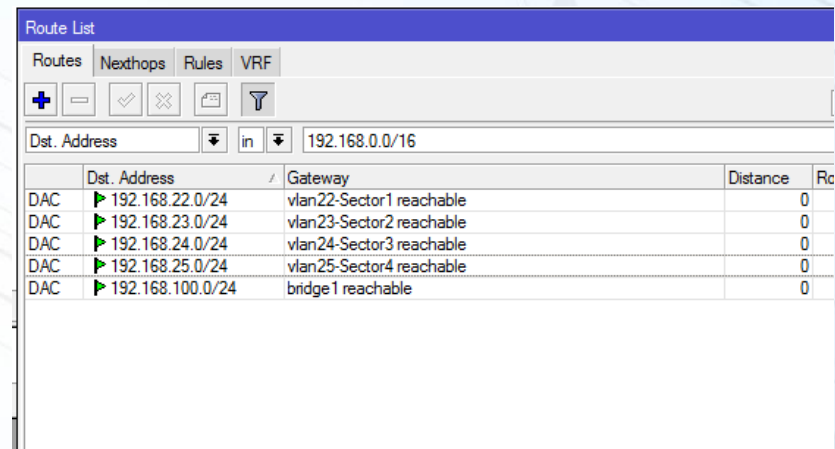
Configuración



Address List

Address	Network	Interface
192.168.22.1/24	192.168.22.0	vlan22-Sector1
192.168.23.1/24	192.168.23.0	vlan23-Sector2
192.168.24.1/24	192.168.24.0	vlan24-Sector3
192.168.25.1/24	192.168.25.0	vlan25-Sector4
192.168.100.1/24	192.168.100.0	ether2

5 items (4 selected)



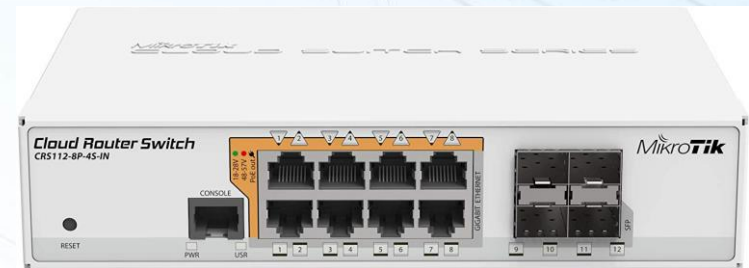
Route List

Routes	Next hops	Rules	VRF
Dst. Address: 192.168.0.0/16			
Dst. Address	Gateway	Distance	Reachability
DAC 192.168.22.0/24	vlan22-Sector1 reachable	0	
DAC 192.168.23.0/24	vlan23-Sector2 reachable	0	
DAC 192.168.24.0/24	vlan24-Sector3 reachable	0	
DAC 192.168.25.0/24	vlan25-Sector4 reachable	0	
DAC 192.168.100.0/24	bridge 1 reachable	0	

Las direcciones directamente conectadas se puede comunicar entre si, mediante el router.

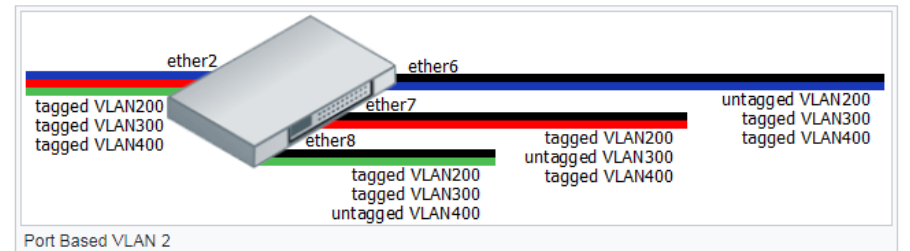
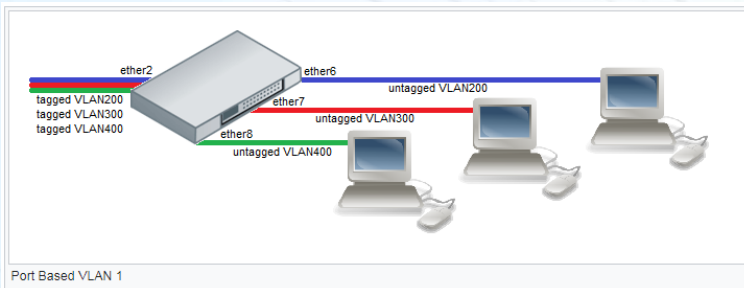
Mikrotik CRS112-8p-4s-in

- Posee 8 puertos POE pueden ser de 24v o 48v
- Utiliza RouterOS
- Capacidad Maxima 1 A. x puerto **en 24v.**
- Puede energizar un sistema max 2.8 A o 0.35 A (350mA) repartido en cada puerto **en 24v.**



Referencia de Configuración

https://wiki.mikrotik.com/wiki/Manual:CRS1xx/2xx_series_switches_examples



Conclusiones

- Se definió el concepto del broadcast y porque nos ayuda este tipo de configuración para disminuirla
- El router on Stick es un modelo apropiado para que algún WISP lo implemente en su Red Actual, no necesita realizar mucha inversión
- Tendrá mejor control, troubleshooting de menor tiempo al mantener su red seccionada.



Preguntas ?

Muchas Gracias por su atención

Ing. Amilcar Cruz

