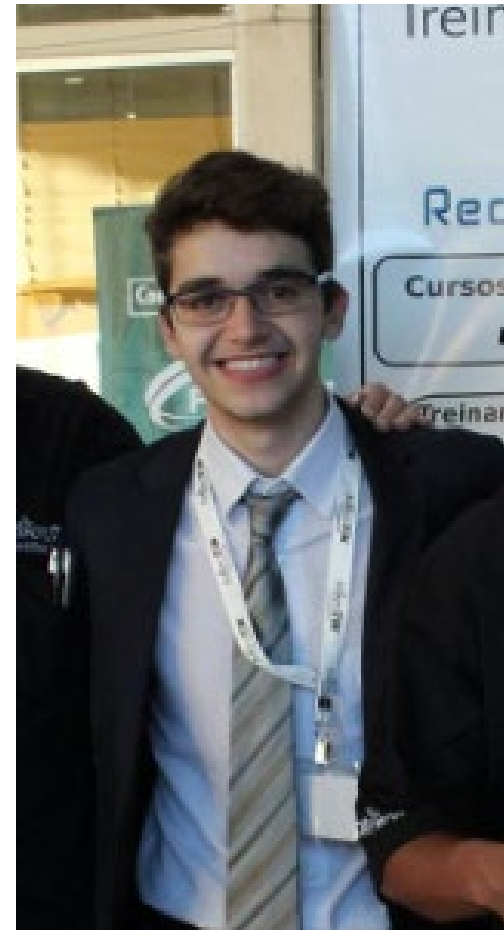


CRS - Exemplos Básicos para Configurar seu Switch Mikrotik

Quem sou eu:

- Wissam Melhem Quemel
- Especialista em ajudar donos de provedores e técnicos de rede a obter o máximo proveito do seu Mikrotik sem precisar perder mais tempo ou dinheiro no processo.
- [Youtube.com/WissamQuemel](https://www.youtube.com/WissamQuemel)
- [Facebook.com/WissamQuemelOficial](https://www.facebook.com/WissamQuemelOficial)
- Instagram: [@wissamquemel](https://www.instagram.com/wissamquemel)



Agenda

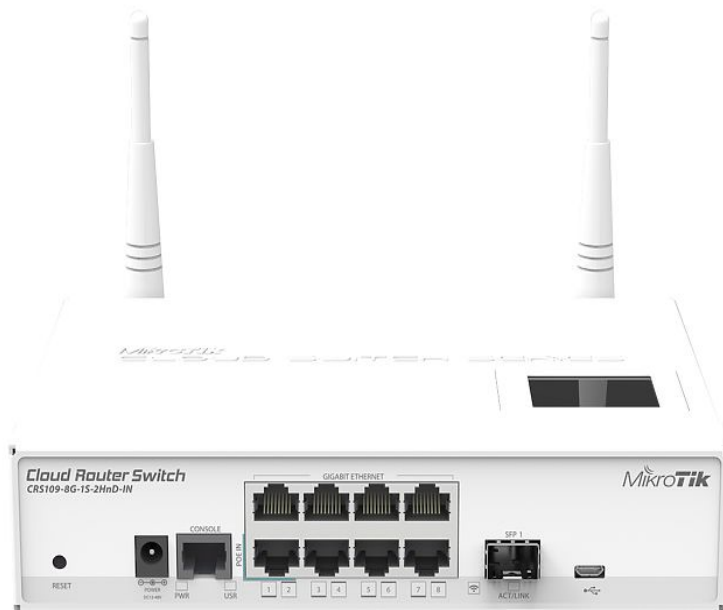
- O que é CRS
- CCR x CRS x CSS
- Diferença entre Bridge e Switch
- Bridge Hardware Offloading
- O que é VLAN
- Exemplo de Configuração

O que é CRS?

- Cloud Router Switch

CRS109-8G-1S-2HnD-IN

CRS317-1G-16S+RM



CCR X CRS

Recursos	Cloud Core Router	Cloud Router Switch
Modelo:	CCR1072-1G-8S+	CRS317-1G-16S+RM
CPU:	72 Core 1Ghz Tile	2 Core 800Mhz Arm
Layer 2 Throughput	79,000 Mbps	159,000 Mbps
Layer 3 Throughput	79,000 Mbps	3,000 Mbps
Preço	\$3050	\$399

CCR X CRS

Testes com CCR:

Ethernet test results

CCR1072-1G-8S+		Tile 72 Core (1200Mhz, DDR1333) Max possible throughput					
Mode	Configuration	1518 byte		512 byte		64 byte	
		kpps	Mbps	kpps	Mbps	kpps	Mbps
Bridging	none (fast path)	6,502.0	78,960.3	18,790.0	76,963.8	119,047.6	60,952.4
Bridging	25 bridge filter rules	6,130.5	74,448.8	8,192.7	33,557.3	10,339.5	5,293.8
Routing	none (fast path)	6,502.0	78,960.3	18,790.0	76,963.8	86,507.0	44,291.6
Routing	25 simple queues	6,502.0	78,960.3	12,370.4	50,669.2	13,474.2	6,898.8
Routing	25 ip filter rules	4,667.6	56,683.3	5,985.1	24,515.0	5,873.8	3,007.4

CCR X CRS

Testes com CRS:

Switching results

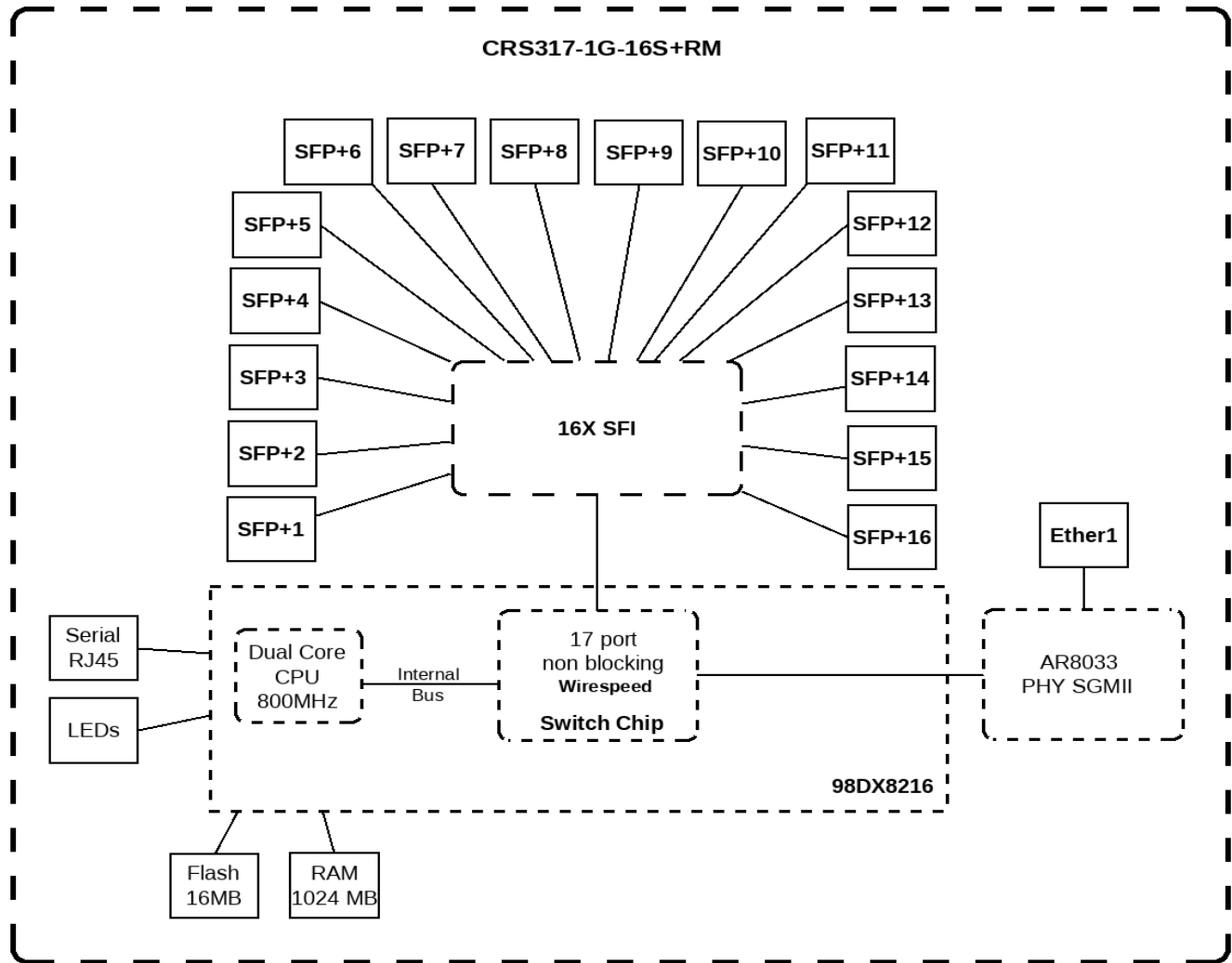
CRS317-1G-16S+RM							
Mode	Configuration	64 byte		512 byte		1518 byte	
		kpps	Mbps	kpps	Mbps	kpps	Mbps
Switching	Non blocking Layer 2 throughput	239,583.3	122,666.7	37,828.9	154,947.4	13,085.2	158,906.4
Switching	Non blocking Layer 2 capacity	239,583.3	245,333.3	37,828.9	309,894.7	13,085.2	317,812.7
Switching	Non blocking Layer 1 throughput	239,583.3	161,000.0	37,828.9	161,000.0	13,085.2	161,000.0
Switching	Non blocking Layer 1 capacity	239,583.3	322,000.0	37,828.9	322,000.0	13,085.2	322,000.0

Ethernet test results

CRS317-1G-16S+RM		98DX8216B0 all port test					
Mode	Configuration	1518 byte		512 byte		64 byte	
		kpps	Mbps	kpps	Mbps	kpps	Mbps
Bridging	none (fast path)	268.3	3258.2	361.2	1479.5	355.2	181.9
Bridging	25 bridge filter rules	98.4	1195.0	98.6	403.9	98	50.2
Routing	none (fast path)	254.4	3089.4	309.8	1268.9	315.4	161.5
Routing	25 simple queues	104.6	1270.3	104.4	427.6	104.6	53.6
Routing	25 ip filter rules	104.6	1270.3	103.4	423.5	103.9	53.2

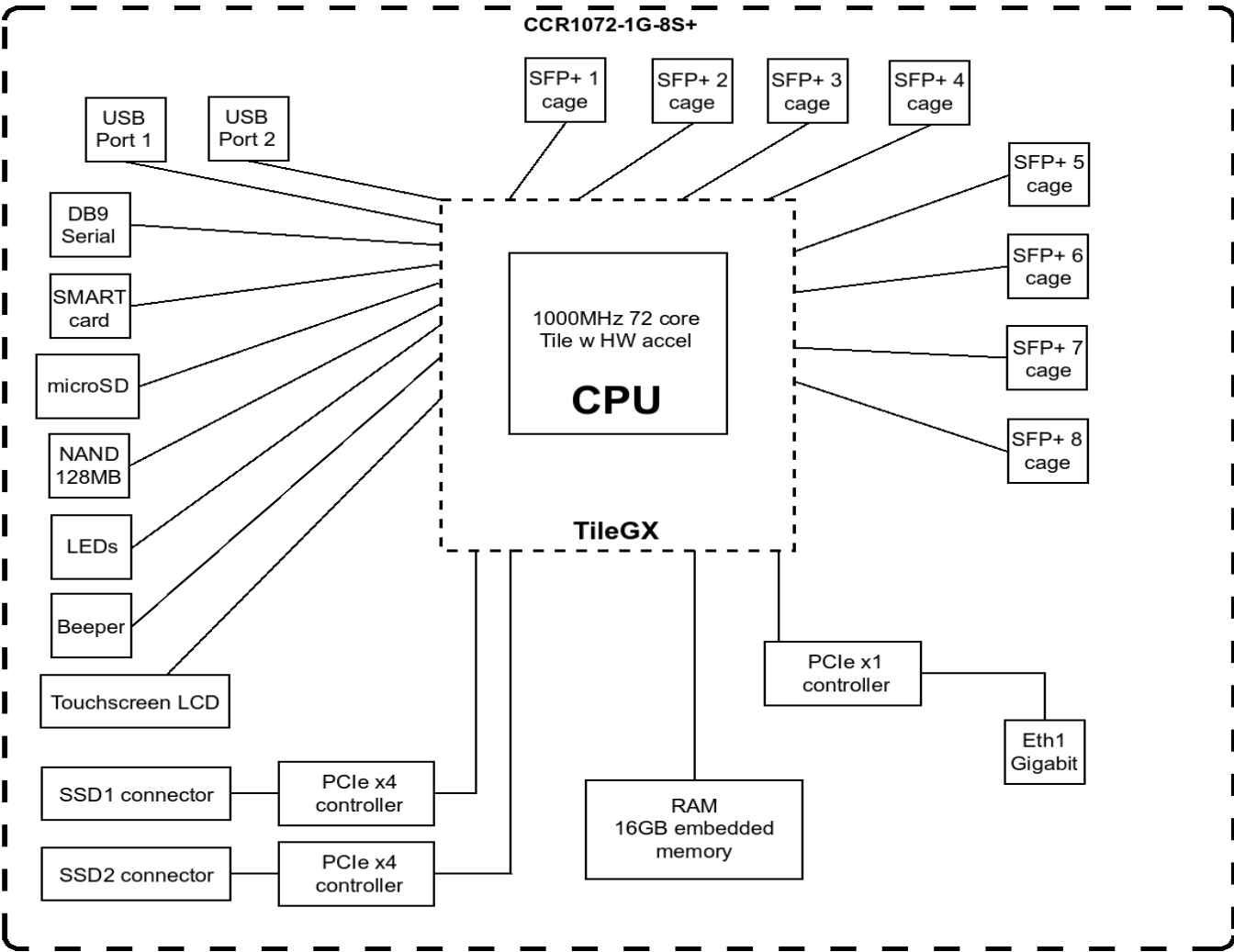
CCR X CRS

Diagrama de Bloco CRS:



CCR X CRS

Diagrama de Bloco CCR:



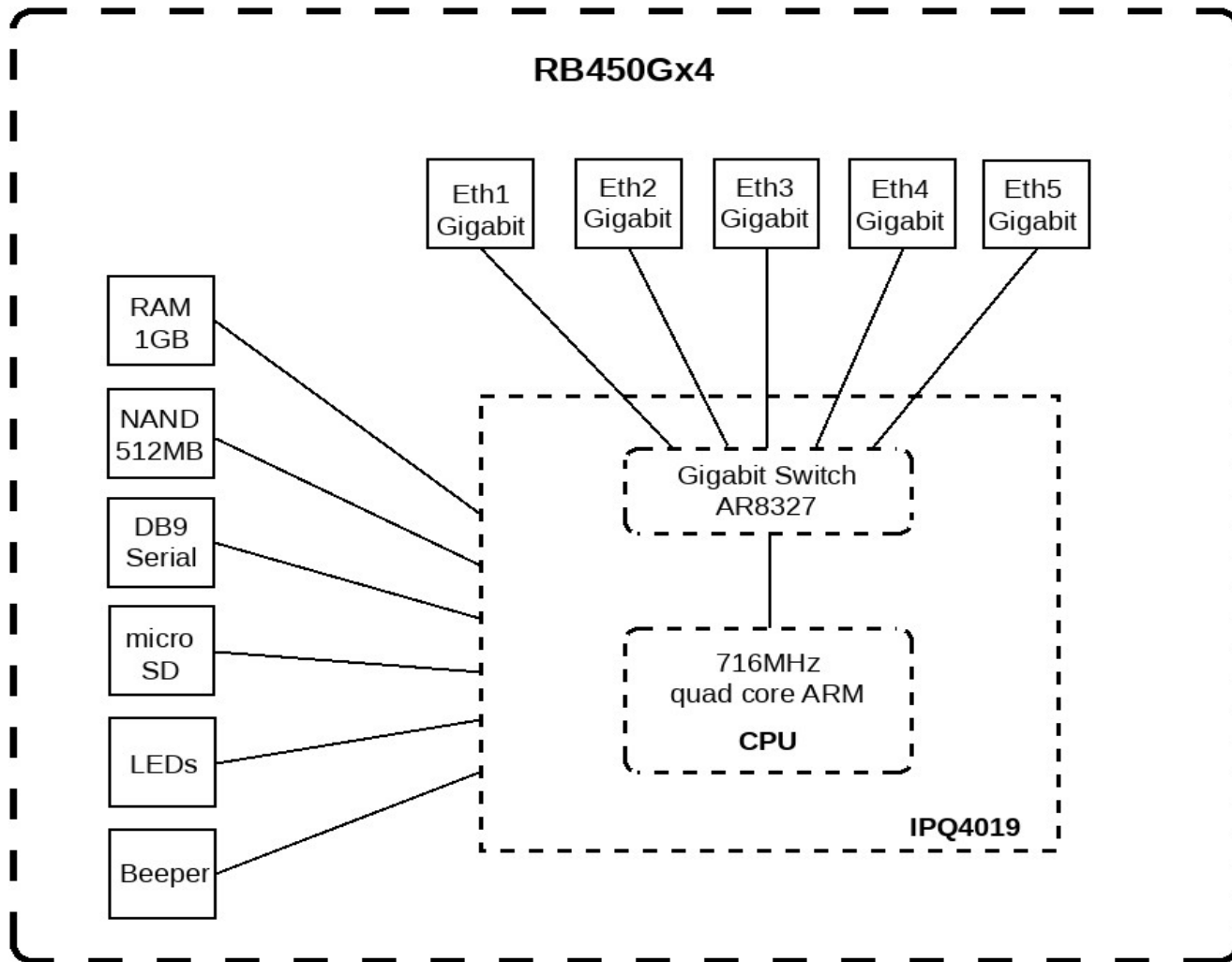
CRS X CSS

Funcionalidades	CRS326-24G-2S+RM	CSS326-24G-2S+RM
RouterOS	Sim	Não
SwitchOS	Sim	Sim
Preço	\$199	\$139

Diferença entre Bridge x Switch

Funções	Bridge	Switch
Interligar Tecnologias	Sim	Não
Comutação em Software	Sim	Não
Comutação em Hardware	Não*	Sim
Wire Speed	Não*	Sim

Diferença entre Bridge x Switch



Bridge Hardware Offloading (6.41+)

- A partir da versão 6.41, a configuração master-port foi convertida para dentro da bridge.
- A bridge agora negocia todo o encaminhamento Layer2 e usa o chip de switch
- O Hw-Offload vai ser ativado automaticamente se o cenário por propício

Bridge Hardware Offloading (6.41+)

- Antes da 6.41 (master-port):

The screenshot shows a network configuration window titled "Interface <ether1>". The window has several tabs: "General", "Ethernet", "Loop Protect", "Overall Stats", "Rx Stats", "Tx Stats", "Status", and "Traffic". The "General" tab is selected. The configuration fields are as follows:

- Name: ether1
- Type: Ethernet
- MTU: 1500
- Actual MTU: 1500
- L2 MTU: 1598
- Max L2 MTU: 2028
- MAC Address: 6C:3B:6B:26:5E:5D
- ARP: enabled
- ARP Timeout: (empty)
- Master Port: none
- Bandwidth (Rx/Tx): (empty)
- Switch: ether1, ether2, ether3, ether4, none

A dropdown menu is open for the "Master Port" field, showing the following options: ether1, ether2, ether3, ether4, and none. The "ether2" option is currently selected and highlighted in blue. The window also features a "PC" label in the bottom right corner and a vertical column of buttons on the right side: OK, Cancel, Apply, Disable, Comment, Torch, Cable Test, Blink, Reset MAC Address, and Reset Counters.

Bridge Hardware Offloading (6.41+)

- 6.41 e acima (hw-offload):

The screenshot displays a network configuration window titled "Bridge". It features a tabbed interface with "Ports" selected. Below the tabs is a toolbar with icons for adding, deleting, and filtering. A table lists the bridge's ports:

#	Interface	Bridge	Horizon	Priority (h...)	Path Cost	Role	Root Pat...
0	H ether1	bridge1		80	10	designated port	
1	H ether2	bridge1		80	10	designated port	

A "New Bridge Port" dialog box is open, showing configuration options for a new port:

- Interface: ether3
- Bridge: bridge1
- Horizon: (empty)
- Learn: auto
- Unknown Unicast Flood
- Unknown Multicast Flood
- Broadcast Flood
- Hardware Offload

Buttons on the right include OK, Cancel, Apply, Disable, Comment, Copy, and Remove. At the bottom, there are status indicators for "enabled", "inactive", and "Hw. Offload".

Bridge Hardware Offloading (6.41+)

- Enabling this feature maintains hw-offload: +
- Enabling this feature turns off hw-offload: -

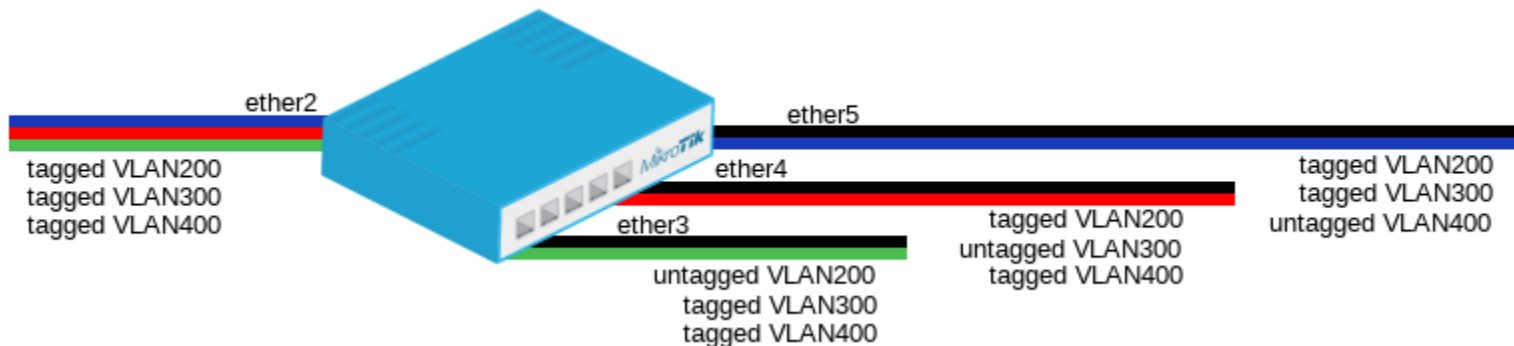
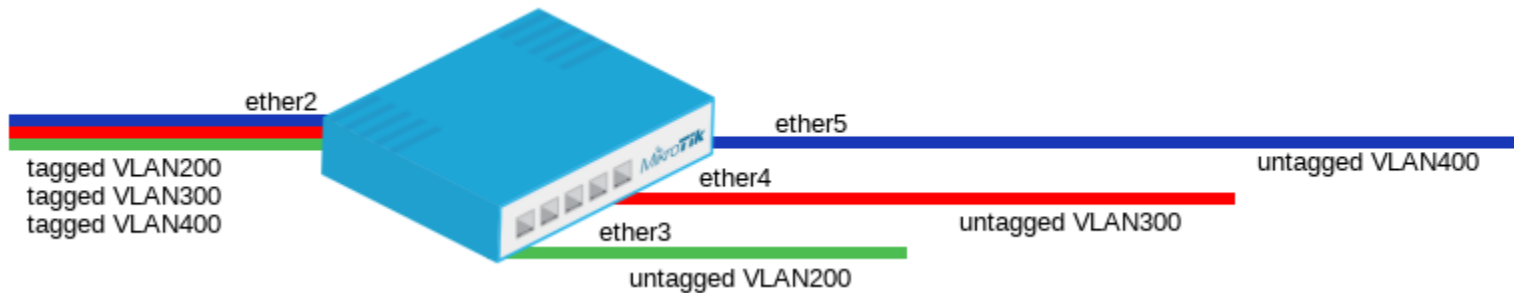
<u>RouterBoard/[Switch Chip] Model</u>	Features in Switch menu	Bridge STP/RSTP	Bridge MSTP	Bridge IGMP Snooping	Bridge DHCP Snooping	Bridge VLAN Filtering	Bonding
CRS3xx series	+	+	+	+	+	+	+
CRS1xx/CRS2xx series	+	+	-	+	-	-	-
[QCA8337]	+	+	-	-	-	-	-
[AR8327]	+	+	-	-	-	-	-
[AR8227]	+	+	-	-	-	-	-
[AR8316]	+	+	-	-	-	-	-
[AR7240]	+	+	-	-	-	-	-
[MT7621]	+	-	-	-	-	-	-
[RTL8367]	+	-	-	-	-	-	-
[ICPlus175D]	+	-	-	-	-	-	-

O que é VLAN?

- Uma rede local virtual, normalmente denominada de VLAN, é uma rede logicamente independente.
- É um método que permite múltiplas LANs Virtuais em uma mesma interface física, dando a habilidade de segregar as LANs eficientemente

O que é VLAN?

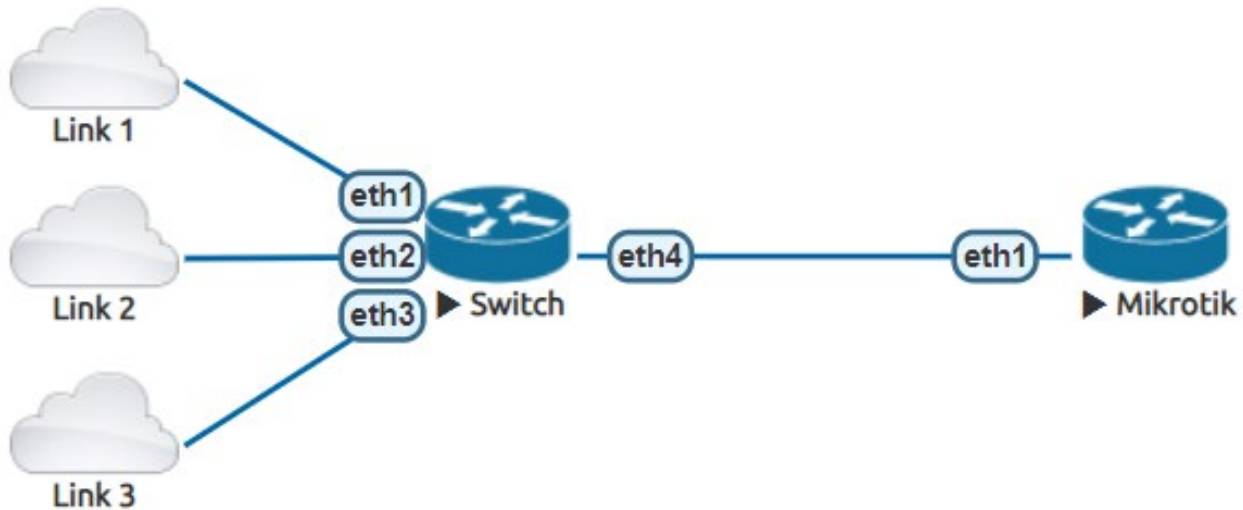
Tag x Untagged // Trunk x Access x Hybrid



Use RoMON e Safe Mode

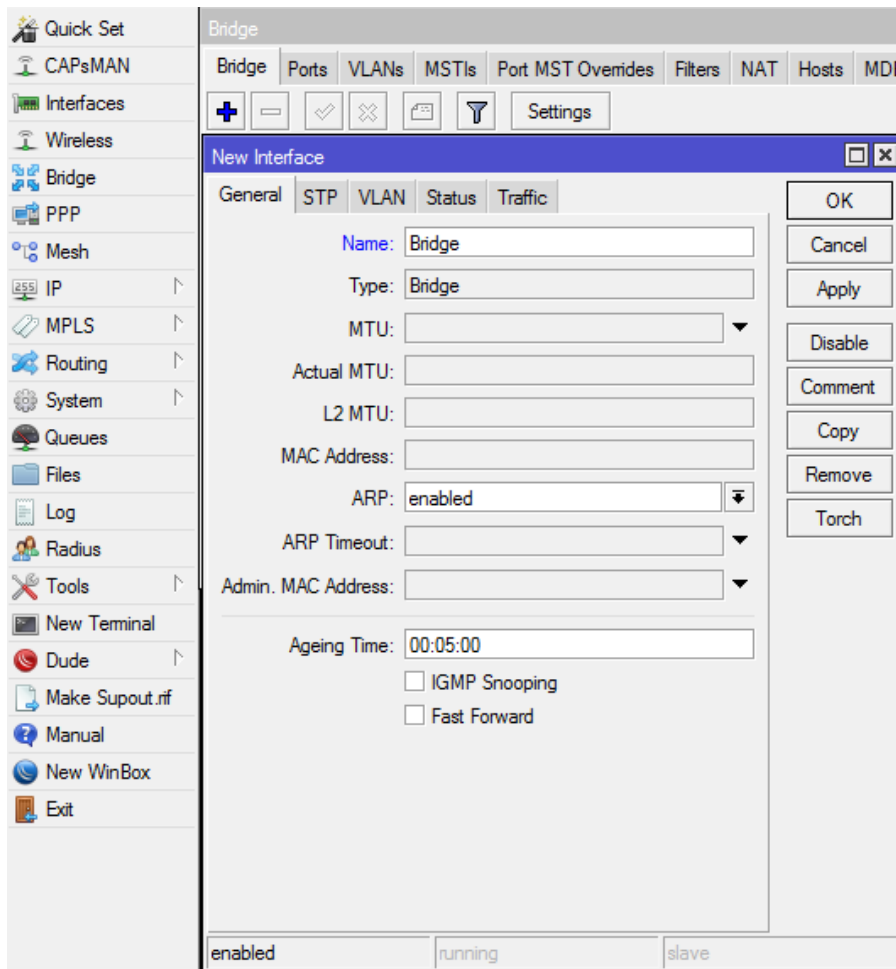
- RoMON: bit.ly/mkromon
- Safe Mode: bit.ly/mksafemode

Portas Trunk e Acesso

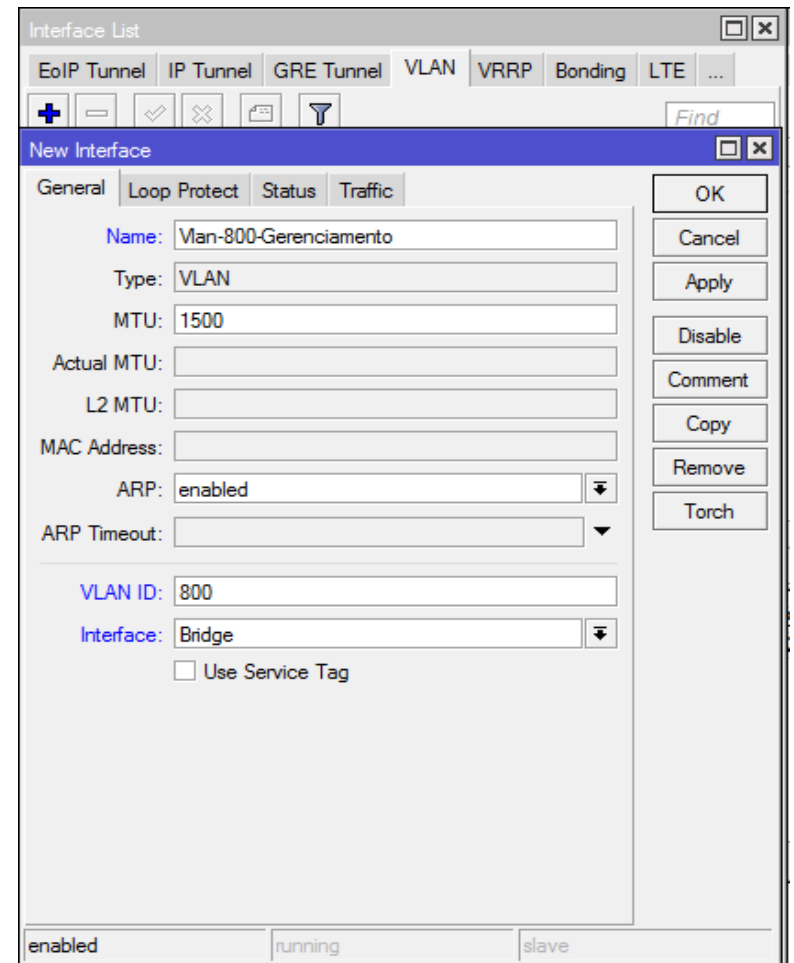


VLAN de Gerenciamento - Switch

1 – Criar a Bridge



2 – Criar a VLAN



VLAN de Gerenciamento - Switch

3 – Colocar IP/Rota

Address List

Address / Network Int

New Address

Address: 10.80.80.1/30

Network:

Interface: Man-800-Gerenciamento

OK

Cancel

Apply

Disable

Comment

Route List

Routes Nexthops Rules VRF

Dst. Address / Gateway

DAC 10.80.80.0/30 Man-800-Gerenciamento reachable

New Route

General Attributes

Dst. Address: 0.0.0.0/0

Gateway: 10.80.80.2

4 – Permissão VLAN

Bridge

Bridge Ports VLANs MSTIs Port MST Overrides Filters NAT H

Bridge VLAN IDs Current Tagged

New Bridge VLAN

Bridge: Bridge

VLAN IDs: 800

Tagged: Bridge

ether4

Untagged:

Current Tagged:

Current Untagged:

enabled

OK

Cancel

Apply

Disable

Comment

Copy

Remove

VLAN de Gerenciamento - Roteador

4 – Criar VLAN

Interface List

EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE ...

+ - ✓ ✗ 📄 🔍 Find

New Interface

General Loop Protect Status Traffic

OK Cancel Apply Disable Comment Copy Remove Torch

Name: Man-800-Gerenciamento

Type: VLAN

MTU: 1500

Actual MTU:

L2 MTU:

MAC Address:

ARP: enabled

ARP Timeout:

VLAN ID: 800

Interface: ether1

Use Service Tag

5 – Colocar IP

Address List

+ - ✓ ✗ 📄 🔍 Find

Address	Network	Interface
---------	---------	-----------

New Address

OK Cancel Apply Disable Comment Copy Remove

Address: 10.80.80.2/30

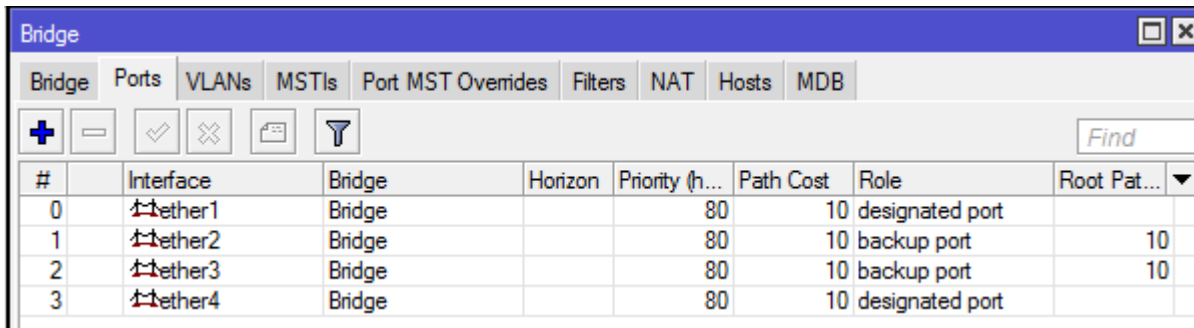
Network:

Interface: Man-800-Gerenciamento

enabled

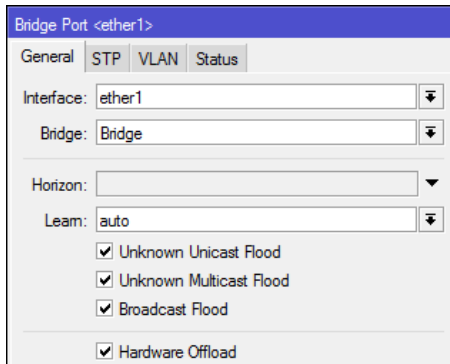
Portas Trunk e Acesso

- 6 – Adicionar as portas na Bridge



The screenshot shows the 'Bridge' configuration window with the 'Ports' tab selected. Below the tabs are several icons and a 'Find' search box. The main area contains a table with the following data:

#	Interface	Bridge	Horizon	Priority (h...)	Path Cost	Role	Root Pat...
0	ether1	Bridge		80	10	designated port	
1	ether2	Bridge		80	10	backup port	10
2	ether3	Bridge		80	10	backup port	10
3	ether4	Bridge		80	10	designated port	



Bridge Port <ether1>

General | STP | VLAN | Status

Interface: ether1

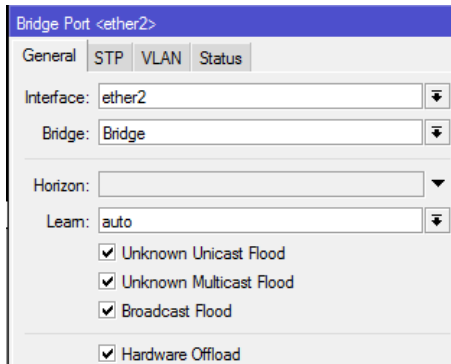
Bridge: Bridge

Horizon: [dropdown]

Learn: auto

- Unknown Unicast Flood
- Unknown Multicast Flood
- Broadcast Flood

Hardware Offload



Bridge Port <ether2>

General | STP | VLAN | Status

Interface: ether2

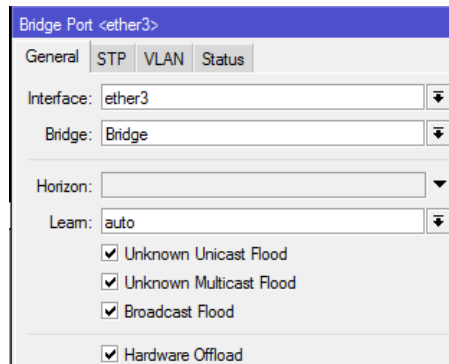
Bridge: Bridge

Horizon: [dropdown]

Learn: auto

- Unknown Unicast Flood
- Unknown Multicast Flood
- Broadcast Flood

Hardware Offload



Bridge Port <ether3>

General | STP | VLAN | Status

Interface: ether3

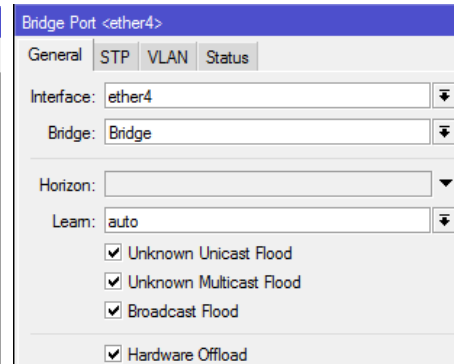
Bridge: Bridge

Horizon: [dropdown]

Learn: auto

- Unknown Unicast Flood
- Unknown Multicast Flood
- Broadcast Flood

Hardware Offload



Bridge Port <ether4>

General | STP | VLAN | Status

Interface: ether4

Bridge: Bridge

Horizon: [dropdown]

Learn: auto

- Unknown Unicast Flood
- Unknown Multicast Flood
- Broadcast Flood

Hardware Offload

Portas Trunk e Acesso

- 7-8 – Tag nas Ethernets/Política-VLAN

Bridge Port <ether1>

General STP VLAN Status

PVID: 100

Frame Types: admit all

Ingress Filtering

Bridge VLAN <100>

Bridge: Bridge

VLAN IDs: 100

Tagged: ether4

Untagged: ether1

Bridge

Bridge Ports VLANs MSTIs Port MST Override

Bridge	VLAN IDs	Tagged	Untagged
Bridge	800	Bridge, ether4	
Bridge	100	ether4	ether1
Bridge	200	ether4	ether2
Bridge	300	ether4	ether3

Bridge Port <ether2>

General STP VLAN Status

PVID: 200

Frame Types: admit all

Ingress Filtering

Bridge VLAN <200>

Bridge: Bridge

VLAN IDs: 200

Tagged: ether4

Untagged: ether2

Bridge Port <ether3>

General STP VLAN Status

PVID: 300

Frame Types: admit all

Ingress Filtering

Bridge VLAN <300>

Bridge: Bridge

VLAN IDs: 300

Tagged: ether4

Untagged: ether3

Portas Trunk e Acesso

- 9 – Criação de VLANs no Roteador

Interface <Man-100-Link1>

General | Loop Protect | Status | Traffic

Name: Man-100-Link1

Type: VLAN

MTU: 1500

Actual MTU: 1500

L2 MTU:

MAC Address: 50:00:00:02:00:00

ARP: enabled

ARP Timeout:

VLAN ID: 100

Interface: ether1

Use Service Tag

Interface <Man-200-Link2>

General | Loop Protect | Status | Traffic

Name: Man-200-Link2

Type: VLAN

MTU: 1500

Actual MTU: 1500

L2 MTU:

MAC Address: 50:00:00:02:00:00

ARP: enabled

ARP Timeout:

VLAN ID: 200

Interface: ether1

Use Service Tag

Interface <Man-300-Link3>

General | Loop Protect | Status | Traffic

Name: Man-300-Link3

Type: VLAN

MTU: 1500

Actual MTU: 1500

L2 MTU:

MAC Address: 50:00:00:02:00:00

ARP: enabled

ARP Timeout:

VLAN ID: 300

Interface: ether1

Use Service Tag

Interface List

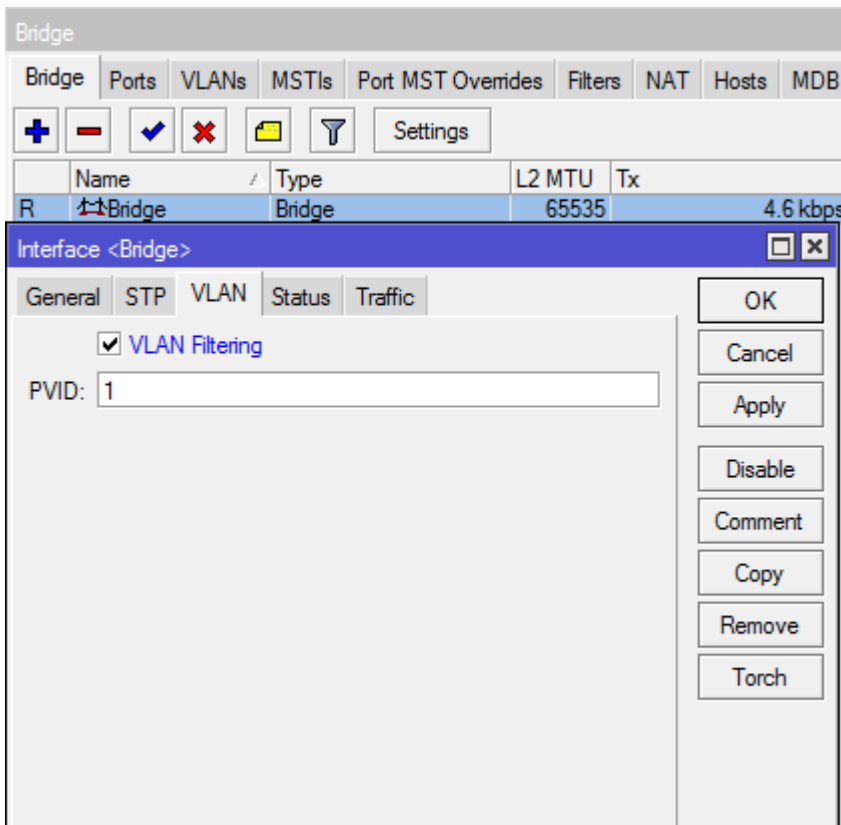
Interface | Interface List | Ethernet | EoIP Tunnel | IP Tunnel | GRE Tunnel | VLAN

+ - ✓ ✗ 📄 🔍

	Name	Type	VLAN ID	Interface	
R	Man-100-Link1	VLAN	100	ether1	
R	Man-200-Link2	VLAN	200	ether1	
R	Man-300-Link3	VLAN	300	ether1	
R	Man-800-Gerenciamento	VLAN	800	ether1	

Portas Trunk e Acesso

- 10 – Ativar a Filtragem de VLAN no Switch



Portas Trunk e Acesso

Script do Switch:

```
/tool romon
set enabled=yes
/interface bridge
add fast-forward=no name=Bridge
/interface vlan
add interface=Bridge name=Vlan-800-Gerenciamento vlan-id=800
/interface bridge port
add bridge=Bridge interface=ether1
add bridge=Bridge interface=ether2
add bridge=Bridge interface=ether3
add bridge=Bridge interface=ether4
/interface bridge vlan
add bridge=Bridge tagged=Bridge,ether4 vlan-ids=800
add bridge=Bridge tagged=ether4 untagged=ether1 vlan-ids=100
add bridge=Bridge tagged=ether4 untagged=ether2 vlan-ids=200
add bridge=Bridge tagged=ether4 untagged=ether3 vlan-ids=300
/ip address
add address=10.80.80.1/30 interface=Vlan-800-Gerenciamento network=10.80.80.0
/ip route
add distance=1 gateway=10.80.80.2
/interface bridge set Bridge vlan-filtering=yes
```

Portas Trunk e Acesso

Script do Roteador:

```
/tool romon
set enabled=yes
/interface vlan
add interface=ether1 name=Vlan-100-Link1 vlan-id=100
add interface=ether1 name=Vlan-200-Link2 vlan-id=200
add interface=ether1 name=Vlan-300-Link3 vlan-id=300
add interface=ether1 name=Vlan-800-Gerenciamento vlan-id=800
/ip address
add address=10.80.80.2/30 interface=Vlan-800-Gerenciamento network=10.80.80.0
```

Explore a Wiki!

- https://wiki.mikrotik.com/wiki/Manual:Switch_Chip_Features
- <https://wiki.mikrotik.com/wiki/Manual:Interface/Bridge>
- https://wiki.mikrotik.com/wiki/Manual:CRS1xx/2xx_series_switches_examples

Obrigado!

- [Youtube.com/WissamQuemel](https://www.youtube.com/WissamQuemel)
- [Facebook.com/WissamQuemelOficial](https://www.facebook.com/WissamQuemelOficial)
- Instagram: [@wissamquemel](https://www.instagram.com/wissamquemel)