

深圳捷联讯通科技有限公司——陈树远

CRS浅析与实施研讨

关于CRS

- ◎ 网管型交换机与路由器的结合
- ◎ 支持三层交换
- ◎ 强大的二层处理能力
- ◎ 丰富的数据包处理功能
- ◎ 具备相同CPU架构RouterOS的所有功能，
且具备独立Switch功能菜单

关于CRS

- ◎ CRS 1XX/2XX使用高性能MIPS CPU
- ◎ CRS 3XX使用高性能ARM CPU
- ◎ CRS 2XX基本被CRS 3XX替代
- ◎ CRS 3XX性能均高于前两代CRS产品
- ◎ CPU变动：ARM CPU设备性价比高于MIPS CPU设备，ARM架构或许将于后一代交换机中普及
- ◎ 性能提升，价格降低（CRS226售价1900RMB，CRS326售价1400RMB）

CRS226与CRS326数据对比

CRS226-24G-2S+RM

QCA8519 Max possible throughput test

Mode	Configuration	1518 byte		512 byte		64 byte	
		kpps	Mbps	kpps	Mbps	kpps	Mbps
Bridging	none (fast path)	26.7	324.2	28.6	117.1	24.5	12.5
Bridging	25 bridge filter rules	21.4	259.9	22.4	91.8	22.2	11.4
Routing	none (fast path)	23.0	279.3	23.5	96.3	24.5	12.5
Routing	25 simple queues	19.6	238.0	22.4	91.8	21.0	10.8
Routing	25 ip filter rules	7.9	95.9	10.4	42.6	10.8	5.5

CRS326-24G-2S+RM

98DX3236A1 all port test

Mode	Configuration	1518 byte		512 byte		64 byte	
		kpps	Mbps	kpps	Mbps	kpps	Mbps
Bridging	none (fast path)	81.3	987.3	235	962.6	296	151.6
Bridging	25 bridge filter rules	81.3	987.3	90.7	371.5	90.9	46.5
Routing	none (fast path)	81.3	987.3	235	962.6	261.9	134.1
Routing	25 simple queues	81.3	987.3	112.6	461.2	111.5	57.1
Routing	25 ip filter rules	59.8	726.2	61.4	251.5	59.5	30.5

CRS125与CRS326数据对比

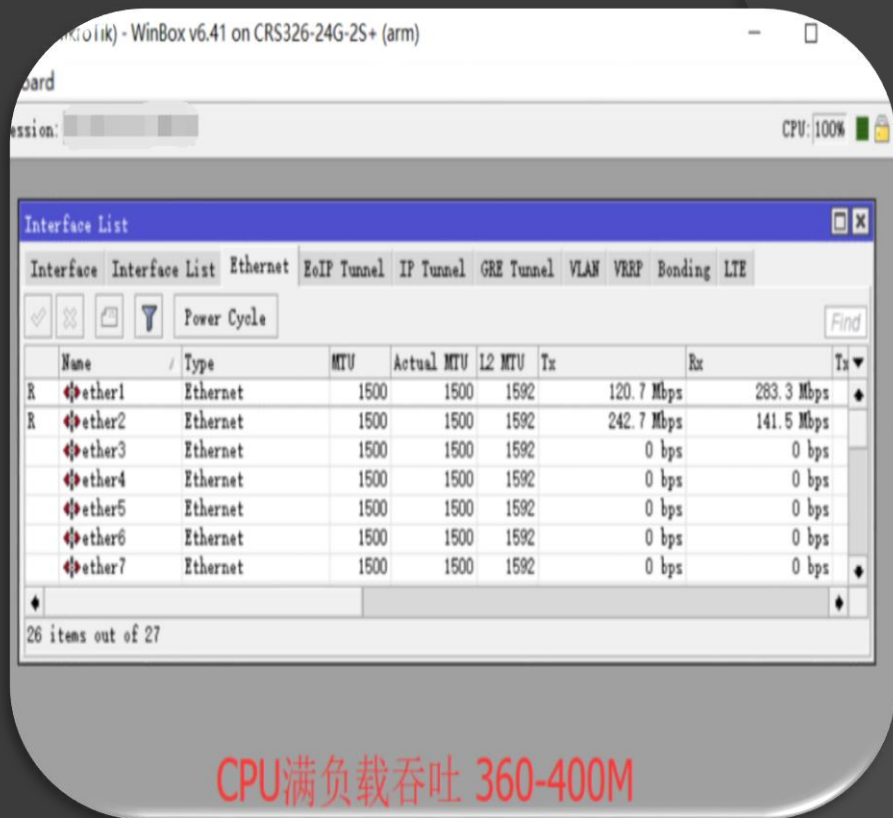
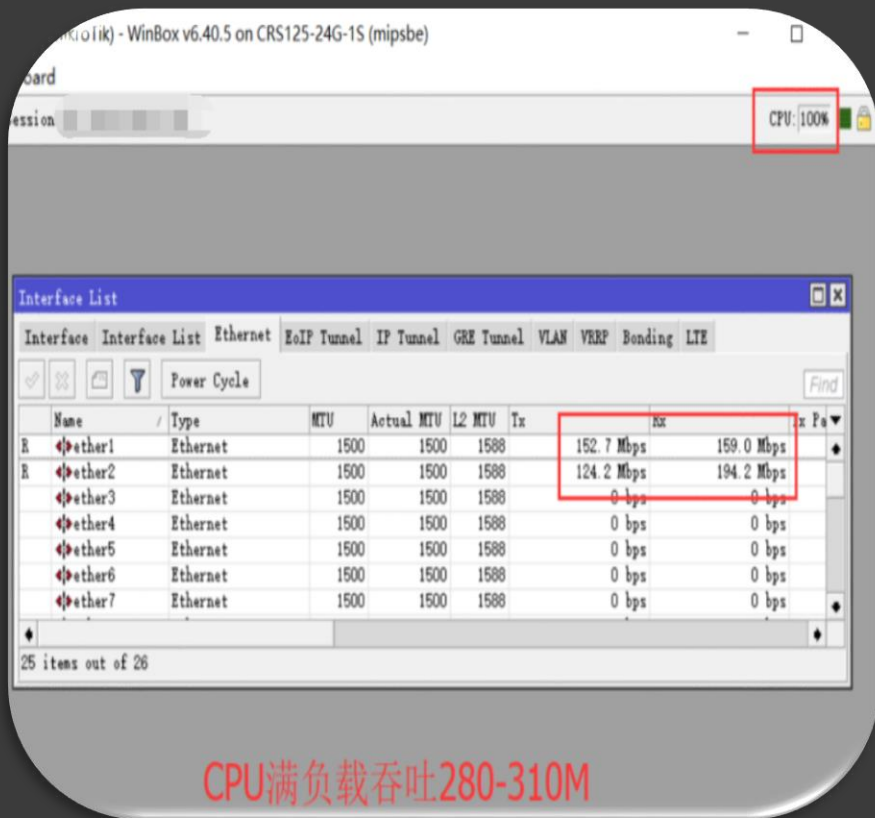
CRS125-24G-1S-IN

Mode	Configuration	64 byte		512 byte		1518 byte	
		kpps	Mbps	kpps	Mbps	kpps	Mbps
Switching	Non blocking Layer 2 throughput	37,202.4	19,047.6	5,874.1	24,060.2	2,031.9	24,674.9
Switching	Non blocking Layer 2 capacity	37,202.4	38,095.2	5,874.1	48,120.3	2,031.9	49,349.8
Switching	Non blocking Layer 1 throughput	37,202.4	25,000.0	5,874.1	25,000.0	2,031.9	25,000.0
Switching	Non blocking Layer 1 capacity	37,202.4	50,000.0	5,874.1	50,000.0	2,031.9	50,000.0

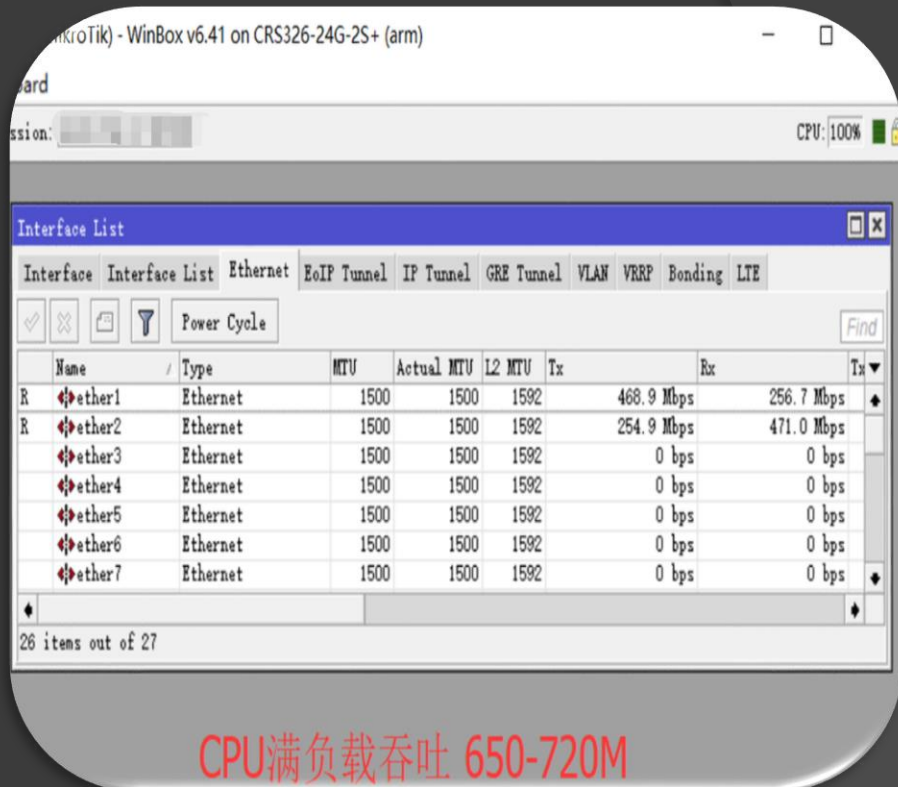
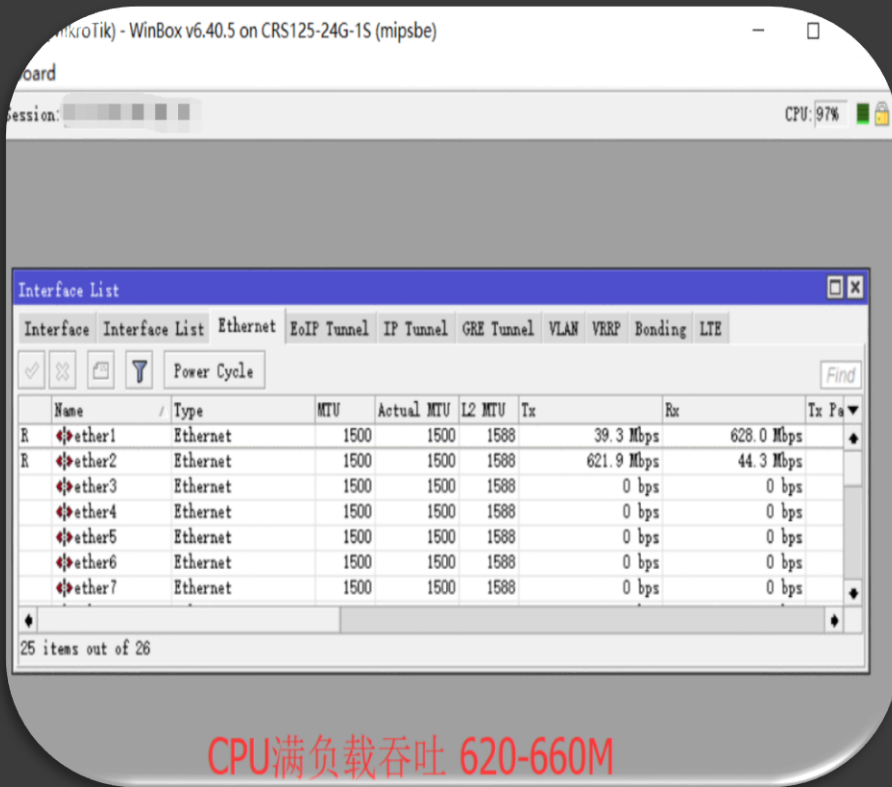
CSS326-24G-2S+RM

Mode	Configuration	64 byte		512 byte		1518 byte	
		kpps	Mbps	kpps	Mbps	kpps	Mbps
Switching	Non blocking Layer 2 throughput	65,476.2	33,523.8	10,338.3	42,345.9	3,576.1	43,427.8
Switching	Non blocking Layer 2 capacity	65,476.2	67,047.6	10,338.3	84,691.7	3,576.1	86,855.7
Switching	Non blocking Layer 1 throughput	65,476.2	44,000.0	10,338.3	44,000.0	3,576.1	44,000.0
Switching	Non blocking Layer 1 capacity	65,476.2	88,000.0	10,338.3	88,000.0	3,576.1	88,000.0

CRS125与CRS326 NAT测试对比



CRS125与CRS326 非NAT测试对比



ROS 6.41前后交换芯片桥接设置变更

The screenshot displays the Mikrotik WinBox interface for configuring the 'ether1' interface. The 'Master Port' dropdown menu is highlighted with a red box and is currently set to 'none'. The 'Resources' panel on the right provides system status information.

Interface Configuration (ether1):

- Name: ether1
- Type: Ethernet
- MTU: 1500
- Actual MTU: 1500
- L2 MTU: 1588
- Max L2 MTU: 4064
- MAC Address: 6C:3B:6B:B5:4F:37
- ARP: enabled
- ARP Timeout: [empty]
- Master Port: none
- Bandwidth (Rx/Tx): unlimited / unlimited
- Switch: switch1

Resources:

- Uptime: 00:02:48
- Free Memory: 108.1 MiB
- Total Memory: 128.0 MiB
- CPU: MIPS 74Kc V4.12
- CPU Count: 1
- CPU Frequency: 600 MHz
- CPU Load: 13 %
- Free HDD Space: 111.5 MiB
- Total HDD Size: 128.0 MiB
- Sector Writes Since Reboot: 719
- Total Sector Writes: 7 580
- Bad Blocks: 0.1 %
- Architecture Name: mipsbe
- Board Name: CRS125-24G-1S
- Version: 6.40.5 (stable)
- Build Time: Oct/31/2017 13:05:15
- Factory Software: 6.27

ROS 6.41前后交换芯片桥接设置变更

The screenshot displays the Mikrotik WinBox v6.41 interface. The title bar reads "admin@64:D1:54:C7:BF:EC (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)". The main window is divided into several sections:

- Left Sidebar:** A vertical menu with icons and labels for various system functions: Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Partition, Make Supout.rif, Manual, New WinBox, and Exit.
- Top Bar:** Includes "Session Settings Dashboard", navigation arrows, "Safe Mode", and "Session: 64:D1:54:C7:BF:EC".
- Interface Configuration (ether1):** A dialog box with tabs for "General", "Ethernet", and "Loop Protect". The "General" tab is active, showing fields for Name (ether1), Type (Ethernet), MTU (1500), Actual MTU (1500), L2 MTU (1592), Max L2 MTU (10218), MAC Address (64:D1:54:C7:BF:E6), ARP (enabled), and ARP Timeout. A status bar at the bottom shows "enabled", "running", "slave", and "no link".
- Resources:** A panel displaying system statistics: Uptime (03:38:50), Free Memory (486.8 MiB), Total Memory (503.3 MiB), CPU (ARMv7), CPU Count (1), CPU Frequency (800 MHz), CPU Load (3%), Free HDD Space (4348 KiB), Total HDD Size (16.0 MiB), Sector Writes Since Reboot (1 152), Total Sector Writes (7 708), Bad Blocks (0.0%), Architecture Name (arm), Board Name (CRS326-24G-2S+), Version (6.41 (stable)), Build Time (Dec/22/2017 11:55:15), and Factory Software (6.38.2).

ROS 6.41前后交换芯片桥接设置变更

The screenshot shows the Mikrotik WinBox v6.41 interface. The main window displays the Bridge configuration page with a table of bridge ports. A red arrow points to the 'H' column header, which is annotated with the text 'H: 启用硬件负载' (H: Enable hardware load). Below this, a 'Bridge Port <ether3>' dialog box is open, showing the 'Hardware Offload' checkbox checked and highlighted with a red box. At the bottom of the dialog, the text 'Bridge将处理所有二层转发' (Bridge will handle all Layer 2 forwarding) is written in red.

admin@64:D1:54:C7:BF:E6 (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: 64:D1:54:C7:BF:E6

Bridge

#	Interface	Bridge	Hor...	Priority (hex)	Path Cost	Role	Root Path Cost
0	IH ether1	bridgel			80	10 disabled port	
1	I ether2	bridgel			80	10 disabled port	
2	H ether3	bridgel			80	10 designated port	

3 items (1 selected)

Bridge Port <ether3>

General STP VLAN Status

Interface: ether3

Bridge: bridgel

Horizon:

External FDB: auto

Hardware Offload

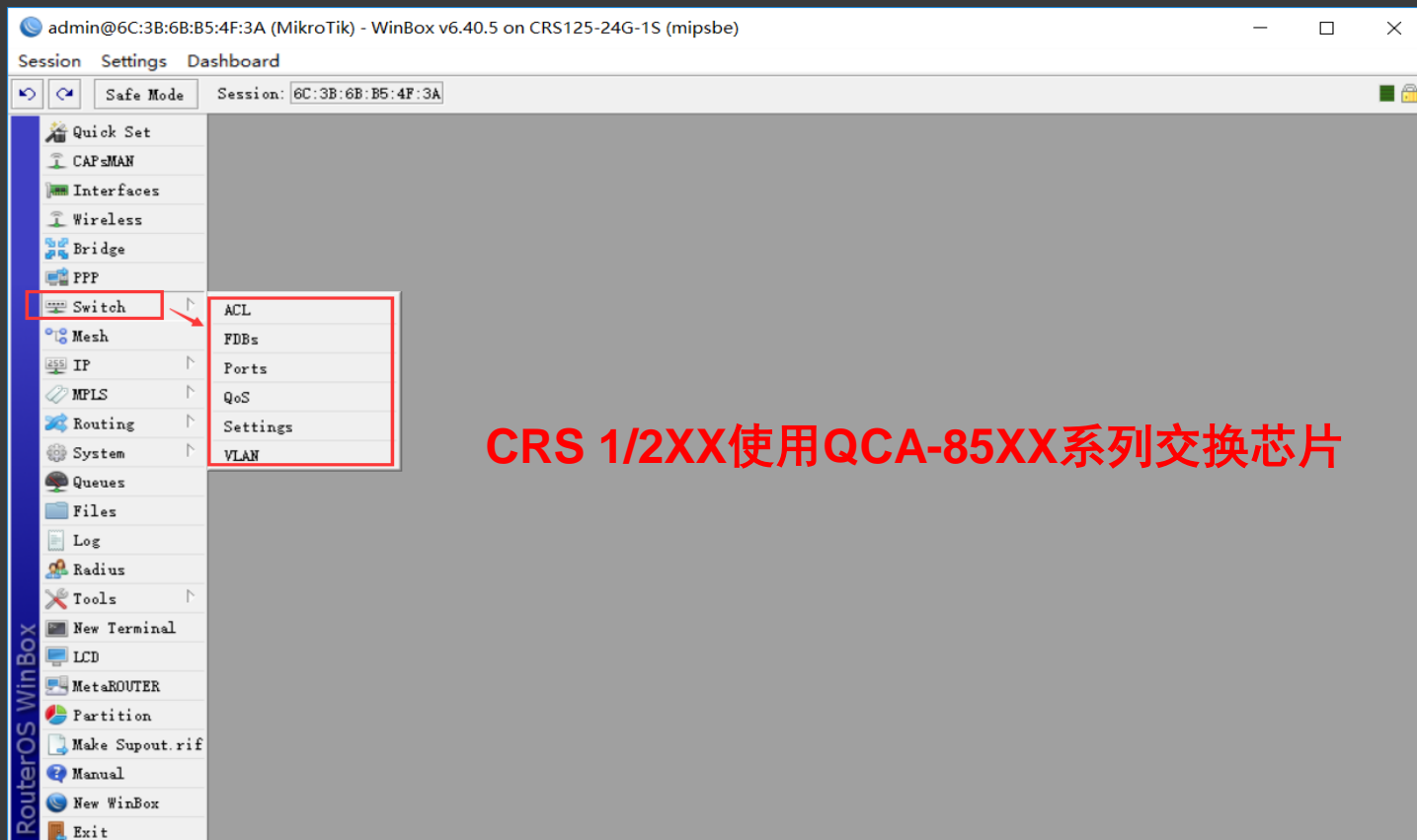
OK Cancel Apply Disable Comment Copy Remove

enabled inactive Hw. Offload

H: 启用硬件负载

Bridge将处理所有二层转发

CRS1XX/2XX与CRS326 swich菜单区别



CRS1XX/2XX与CRS326 swich菜单区别

The screenshot shows the Mikrotik WinBox interface. The left sidebar contains a menu with the 'Switch' option highlighted by a red box. A red arrow points from this menu item to a 'Switch' configuration window. This window displays a table with columns for Name, Type, Mirror So..., and Mirror Ta... The table contains one entry: 'switch1' with a 'Marvell...' type. The status '1 item' is shown at the bottom of the table.

Name	Type	Mirror So...	Mirror Ta...
switch1	Marvell ...		

1 item

CRS 3XX使用Marvell系列交换芯片类似于RB设备的Atheros等系列芯片

CRS326双系统特性: RouterOS

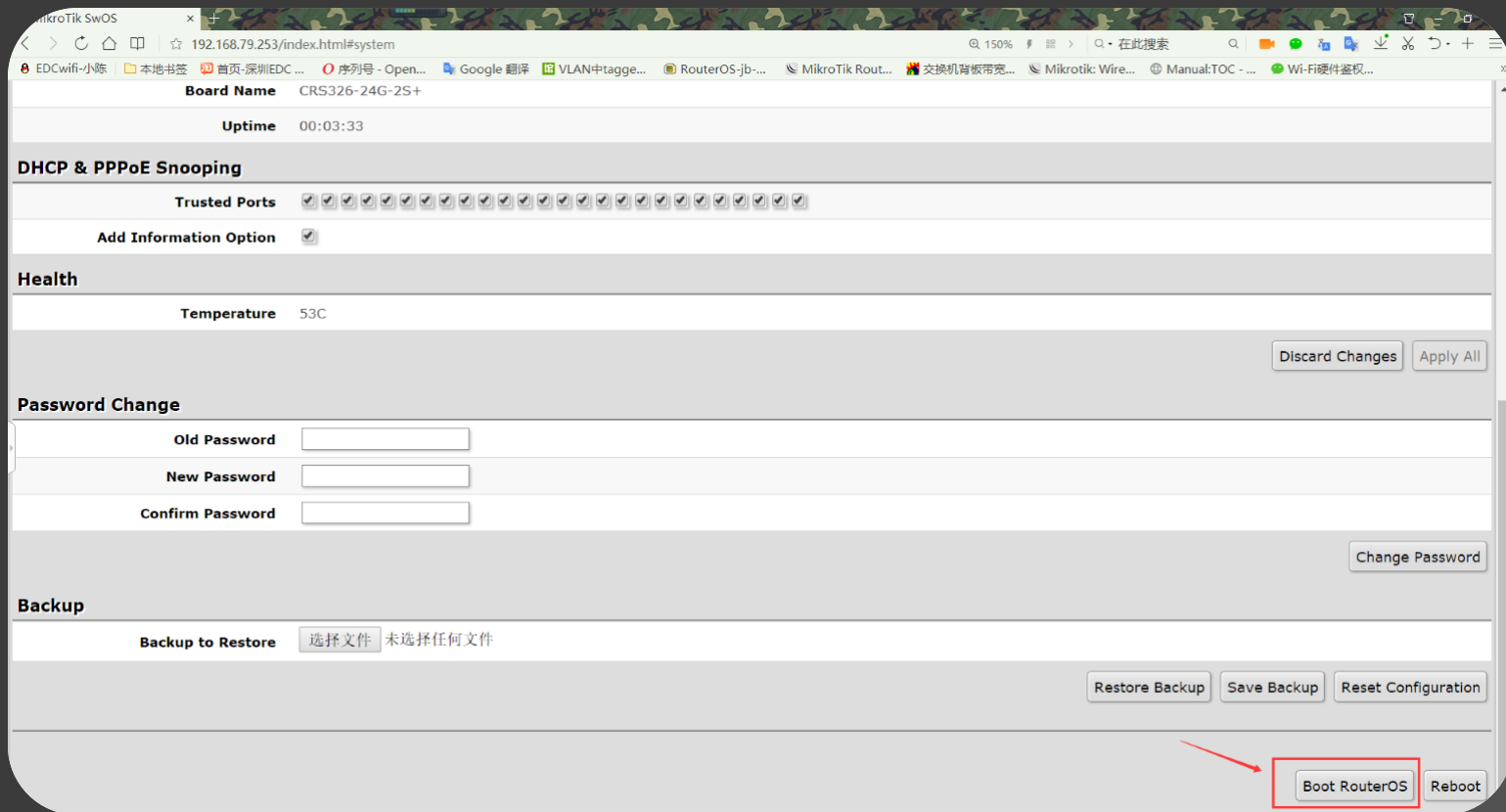
The screenshot displays the Mikrotik WinBox interface for a CRS326-24G-2S+ (arm) device. The main window shows the 'Routerboard' settings dialog, which is open over the 'System' menu. The 'Routerboard' dialog includes fields for Model (CRS326-24G-2S+), Serial Number (763D07C14D9A), Firmware Type (dx3230L), Factory Firmware (3.37), Current Firmware (6.41), and Upgrade Firmware (6.41). The 'Settings' button in this dialog is highlighted with a red arrow.

The 'System' menu is also visible, with the 'Routerboard' option highlighted by a red arrow. The 'Settings' dialog is open, showing various boot configuration options:

- Baud Rate: 115200
- Boot Delay: 2 s
- Enter Setup On: any key
- Boot Device: nand-if-fail-then-e
- Boot OS: RouterOS** (highlighted with a red box)
- Boot Protocol: bootp
- Reformat Hold Button: 00:00:20
- Enable Jumper Reset:
- Force Backup Booter:
- Silent Boot:
- Protected Routerboot:

The interface also shows a sidebar with various system management options like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PFP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Partition, Make Supout.rif, Manual, New WinBox, and Exit.

CRS326双系统特性: SwOS

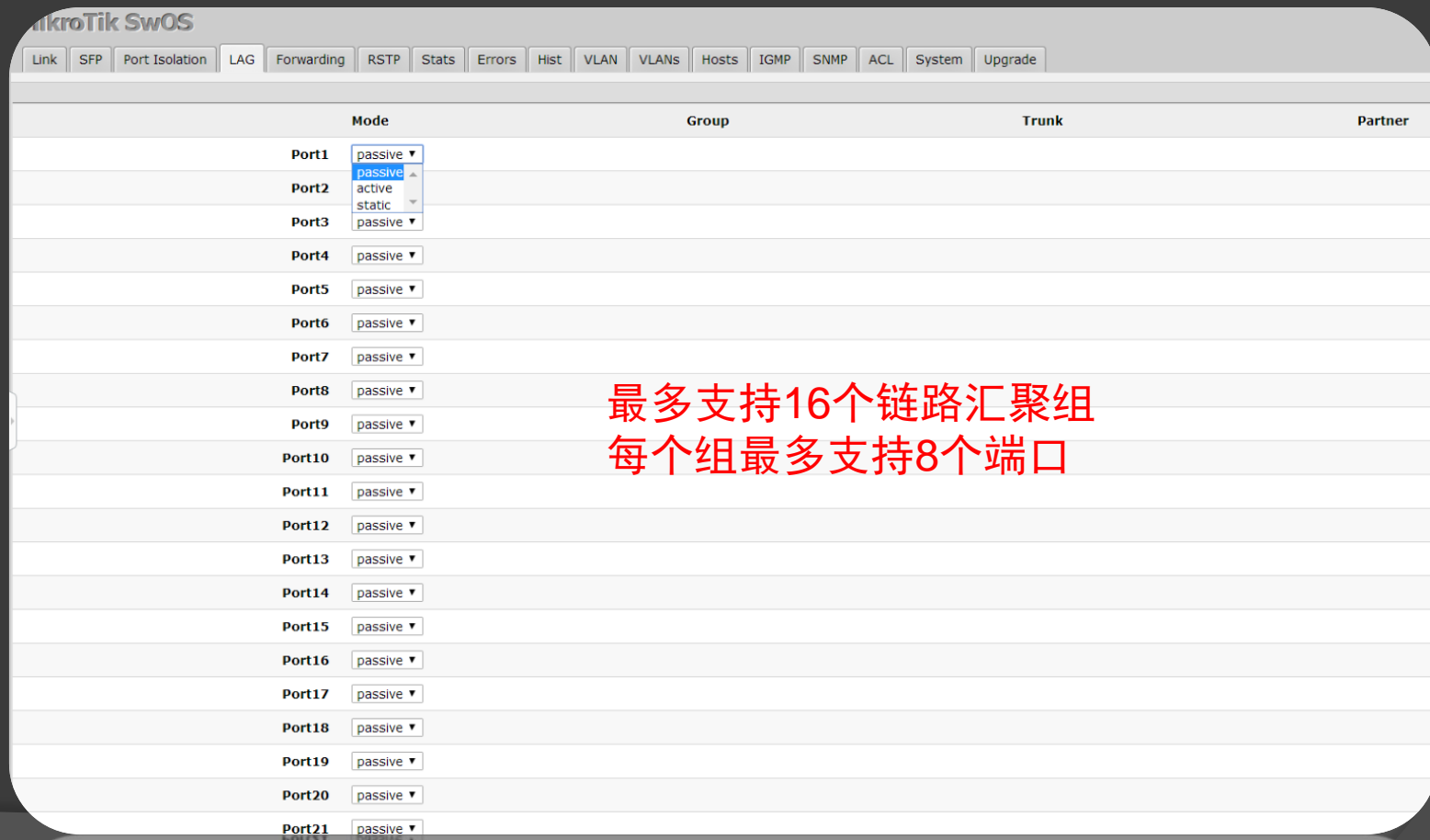


SwOS简介

- Mikrotik二层交换机专用系统
- 基于WEB方式登录，不支持winbox登录
- 支持 MikroTik Neighbor Discovery
- 常用功能：端口隔离，链路聚合，高级转发（端口锁定，端口镜像，带宽限制和广播风暴控制功能），RSTP，VLAN，SNMP，访问控制列表（ACL）

802.3ad (LACP) 兼容链路聚合以及静态链路聚合

SwOS——链路聚合



The screenshot shows the MikroTik SwOS configuration interface for Link Aggregation Groups (LAG). The top navigation bar includes tabs for Link, SFP, Port Isolation, LAG, Forwarding, RSTP, Stats, Errors, Hist, VLAN, VLANs, Hosts, IGMP, SNMP, ACL, System, and Upgrade. The main configuration area is a table with columns for Mode, Group, Trunk, and Partner. The Mode column contains dropdown menus for each port from Port1 to Port21. Port1's dropdown is open, showing options: passive, active, and static. The other ports are set to 'passive'.

Port	Mode	Group	Trunk	Partner
Port1	passive			
Port2	passive			
Port3	passive			
Port4	passive			
Port5	passive			
Port6	passive			
Port7	passive			
Port8	passive			
Port9	passive			
Port10	passive			
Port11	passive			
Port12	passive			
Port13	passive			
Port14	passive			
Port15	passive			
Port16	passive			
Port17	passive			
Port18	passive			
Port19	passive			
Port20	passive			
Port21	passive			

最多支持16个链路汇聚组
每个组最多支持8个端口

SwOS——转发菜单

MikroTik SwOS

Link SFP Port Isolation LAG Forwarding RSTP Stats Errors Hist VLAN VLANS Hosts IGMP SNMP ACL System Upgrade

端口锁定		端口镜像			广播风暴控制功能		带宽限制
Port Lock	Lock On First	Mirror Ingress	Mirror Egress	Mirror To	Storm Rate (%)	Limit Unknown Unicast	Ingress Rate
Port1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text" value="10M"/>
Port3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text" value="512K"/>
Port4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>
Port20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="text"/>

SwOS—RSTP

MikroTik SwOS Login

Link SFP Port Isolation LAG Forwarding **RSTP** Stats Errors Hist VLAN VLANs Hosts IGMP SNMP ACL System Upgrade

General

Bridge Priority (hex)

Port Cost Mode

Root Bridge 8000.64:d1:54:c7:bf:e6

Per Port

	RSTP	Mode	Role	Root Path Cost	Type	State
Port1	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	forwarding
Port2	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port3	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port4	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port5	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port6	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port7	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port8	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port9	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port10	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port11	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port12	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port13	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port14	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port15	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding
Port16	<input checked="" type="checkbox"/>	RSTP	designated		point-to-point	discarding

SwOS—VLAN和VLANs

VLAN mode for ingress port:

- ◎ **disabled** -忽略vlan表，处理vlan标签数据包，就好像它们不包含vlan标签一样。
- ◎ **optional** -处理不在vlan表中的vlan标签数据包，就像没有vlan标签的数据包一样。
- ◎ **enabled** -丢弃VLAN表中不存在VLAN标签数据包。没有VLAN标签的数据包被视为带有Default VLAN ID。如果vlan标签数据包在vlan表中存在，但进入端口不匹配vlan表项中的任何端口将丢弃。

SwOS——主机列表

MikroTik SwOS Logout

Link SFP Port Isolation LAG Forwarding RSTP Stats Errors Hist VLAN VLANs **Hosts** IGMP SNMP ACL System Upgrade

Static Hosts

Port	MAC	VLAN ID	Drop	Mirror	
Port1 ▼	<input type="text" value="80:fa:5b:39:c7:09"/>	<input type="text" value="1"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="Cut"/> <input type="button" value="Insert"/>
Port3 ▼	<input type="text" value="80:fa:5b:39:c7:09"/>	<input type="text" value="1"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="Cut"/> <input type="button" value="Insert"/>

Pending changes

Port	MAC	VLAN ID
Port5	d4:ca:6d:3a:d7:3f	1
Port3	80:fa:5b:39:c7:09	1

最多支持16K条目

SwOS——系统列表

MikroTik SwOS

Logout

Link SFP Port Isolation LAG Forwarding RSTP Stats Errors Hist VLAN VLANS Hosts IGMP SNMP ACL System Upgrade

General

Address Acquisition	<input type="text" value="DHCP with fallback"/>
Static IP Address	<input type="text" value="192.168.88.1"/>
Identity	<input type="text" value="MikroTik"/>
Allow From	<input type="text"/>
Allow From Ports	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Allow From VLAN	<input type="text"/>
Watchdog	<input checked="" type="checkbox"/>
Independent VLAN Lookup	<input type="checkbox"/>
IGMP Snooping	<input type="checkbox"/>
Mikrotik Discovery Protocol	<input checked="" type="checkbox"/>
MAC Address	64:d1:54:c7:bf:e6
Serial Number	763D07C14D9A
Board Name	CRS326-24G-2S+
Uptime	02:11:35

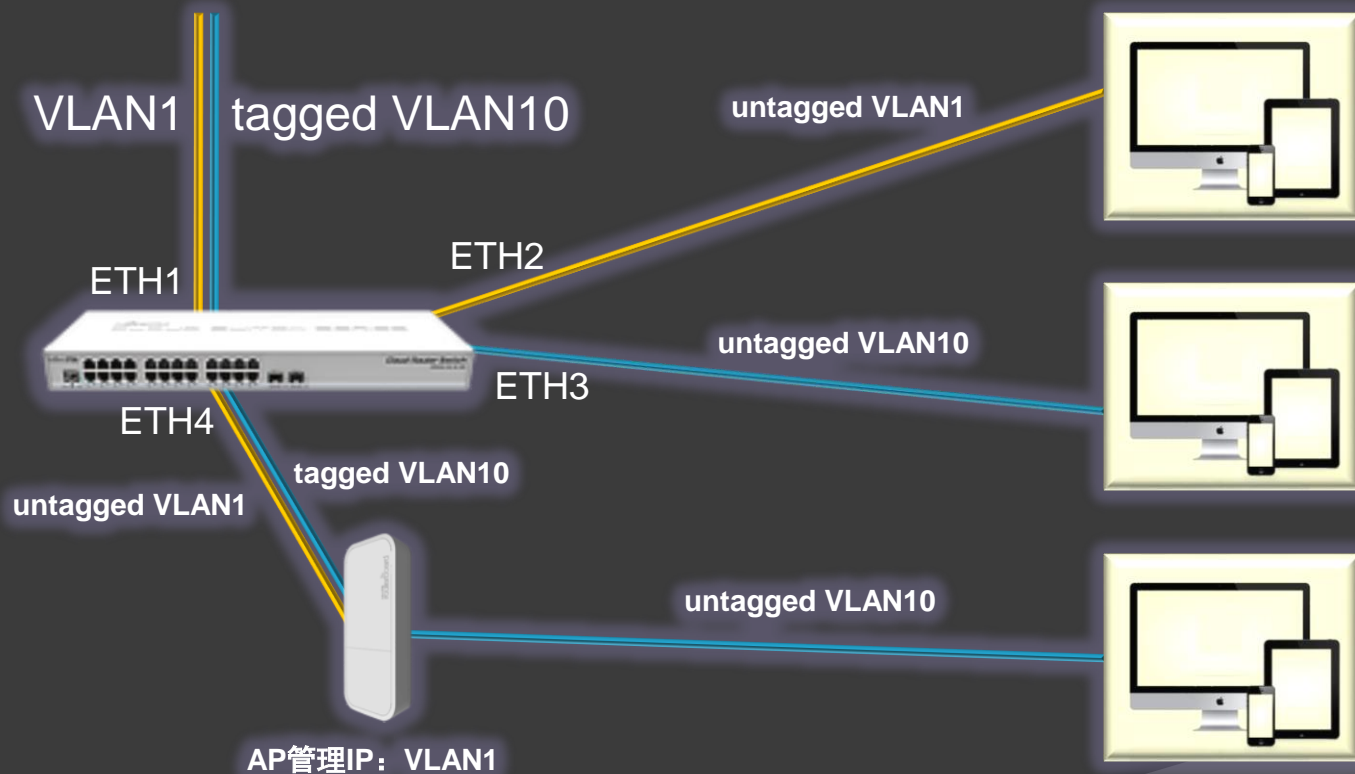
DHCP & PPPoE Snooping

Trusted Ports	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Add Information Option	<input checked="" type="checkbox"/>

Health

Temperature	61C
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VLAN案例



VLAN案例

MikroTik SwOS

Link SFP Port Isolation LAG Forwarding RSTP Stats Errors Hist VLAN **VLANs** Hosts IGMP SNMP

VLAN ID	Port Isolation	Learning	Mirror	IGMP Snooping	Members
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>

VLAN案例

MikroTik SwOS

Link SFP Port Isolation LAG Forwarding RSTP Stats Errors Hist **VLAN** VLANs Hosts IGMP SNMP ACL System Upgrade

	VLAN Mode	VLAN Receive	Default VLAN ID
Port1	enabled ▼	any ▼	1
Port2	enabled ▼	any ▼	1
Port3	enabled ▼	any ▼	10
Port4	enabled ▼	any ▼	1
Port5	optional ▼	any ▼	1

MikroTik SwOS

Link SFP **Port Isolation** LAG Forwarding RSTP S

From Port1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
From Port2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
From Port3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
From Port4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
From Port5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

VLAN案例



MikroTik SwOS

Link SFP Port Isolation LAG Forwarding RSTP Stats

From Port1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
From Port2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
From Port3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
From Port4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
From Port5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

VLAN案例

MikroTik SwOS

Link SFP Port Isolation LAG Forwarding RSTP Stats Errors Hist VLAN **VLANs** Hosts IGMP SNMP

VLAN ID	Port Isolation	Learning	Mirror	IGMP Snooping	Members
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>

VLAN案例

MikroTik SwOS

[Link](#) [SFP](#) [Port Isolation](#) [LAG](#) [Forwarding](#) [RSTP](#) [Stats](#) [Errors](#) [Hist](#) [VLAN](#) [VLANs](#) [Hosts](#) [IGMP](#) [SNMP](#) [ACL](#) [System](#) [Upgrade](#)

General

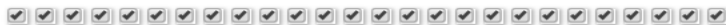
Address Acquisition

Static IP Address

Identity

Allow From

Allow From Ports



Allow From VLAN

Watchdog



Independent VLAN Lookup



IGMP Snooping



Mikrotik Discovery Protocol



MAC Address 64:d1:54:c7:bf:e6

Serial Number 763D07C14D9A

Board Name CRS326-24G-2S+

Uptime 01:25:30

DHCP & PPPoE Snooping

Trusted Ports

Add Information Option



Health

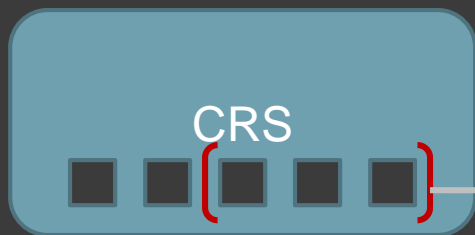
Temperature 59C

Temperature 28C

RouterOS——主端口

- 通过主端口区分线速转发组
- RouterOS通过主端口与交换芯片组成员端口进行通讯。
- 若交换芯片组端口成员无需与RouterOS通讯，则不需要任何CPU资源
- 主端口被禁用，不影响交换芯片组端口之间的通讯，但无法访问RouterOS

RouterOS——交换芯片组



ETH3-5为一个switch组
ETH3为主端口



switch1-cpu



master-port

RouterOS—CRS功能性对比

	CRS 1XX/2XX	CRS 3XX
主端口配置	支持多个主端口	只支持一个主端口
转发	转发数据库都支持IVL和SVL等	转发数据库基于IVL工作
镜像	基于端口的镜像、基于VLAN的镜像、基于MAC的镜像等	基于端口的镜像
VLAN	完全兼容IEEE802.1Q和IEEE802.1ad VLAN、基于端口的VLAN、基于协议的VLAN、基于MAC的VLAN等	完全兼容IEEE802.1Q 基于端口的VLAN
访问控制列表	入口和出口ACL表	入口ACL表
端口隔离和泄漏	支持	不支持
Qos	支持	不支持
Trunking汇聚	支持	不支持

RouterOS—VLAN案例

admin@CC:2D:E0:02:7F:5C (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5C

Switch

Name	Switch	VLAN Mode	VLAN Header	Default VLAN ID	Ingress Rate	Egress
ether1	switch1	disabled	leave as is	0		
ether10	switch1	disabled	leave as is	0		
ether11	switch1	disabled	leave as is	0		
ether12	switch1	disabled	leave as is	0		
ether13	switch1	disabled	leave as is	0		
ether14	switch1	disabled	leave as is	0		
ether15	switch1	disabled	leave as is	0		
ether16	switch1	disabled	leave as is	0		
ether17	switch1	disabled	leave as is	0		
ether18	switch1	disabled	leave as is	0		
ether19	switch1	disabled	leave as is	0		
ether2	switch1	disabled	leave as is	0		
ether20	switch1	disabled	leave as is	0		
ether21	switch1	disabled	leave as is	0		

27 items (1 selected)

Switch Port <ether1>

Name: ether1

Switch: switch1

VLAN Mode: disabled

VLAN Header: check
disabled
fallback
secure

Default VLAN ID:

Ingress Rate:

Egress Rate:

before v6.41

disabled -忽略vlan表，处理vlan标签数据包，就好像它们不包含vlan标签一样

fallback -（默认模式）处理不在vlan表中的vlan标签数据包，就像没有vlan标签的数据包一样。如果vlan标签数据包在vlan表中存在，但进入端口不匹配vlan表项中的任何端口不会丢弃。

check -丢弃vlan表中不存在的vlan标签报文。如果vlan标签数据包在vlan表中存在，但进入端口不匹配vlan表项中的任何端口将不会丢弃。

secure - 丢弃vlan表中不存在的vlan标签的报文。如果vlan标签数据包在vlan表中存在，但进入端口不匹配vlan表项中的任何端口将丢弃。

RouterOS— VLAN案例

admin@CC:2D:E0:02:7F:5C (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5C

Switch

Name	Switch	VLAN Mode	VLAN Header	Default VLAN ID	Ingress Rate	Egress
ether1	switch1	disabled	leave as is	0		
ether10	switch1	disabled	leave as is	0		
ether11	switch1	disabled	leave as is	0		
ether12	switch1	disabled	leave as is	0		
ether13	switch1	disabled	leave as is	0		
ether14	switch1	disabled	leave as is	0		
ether15	switch1	disabled	leave as is	0		
ether16	switch1	disabled	leave as is	0		
ether17	switch1	disabled	leave as is	0		
ether18	switch1	disabled	leave as is	0		
ether19	switch1	disabled	leave as is	0		
ether2	switch1	disabled	leave as is	0		
ether20	switch1	disabled	leave as is	0		
ether21	switch1	disabled	leave as is	0		

27 items (1 selected)

Switch Port <ether1>

Name: ether1 OK

Switch: switch1 Cancel

VLAN Mode: disabled Apply

VLAN Header: leave as is

Default VLAN ID: add if missing
always strip
leave as is

Ingress Rate: Egress Rate:

leave-as-is -数据包在出口端口保持不变

always-strip -如果VLAN头存在，它将从数据包中删除

add-if-missing -如果VLAN报头不存在，则将其添加到数据包

RouterOS— VLAN案例

admin@CC:2D:E0:02:7F:5C (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5C

Switch

Switch Port Host **VLAN** Rule

Find

Switch	VLAN ID	Ports
0 items		

New Switch VLAN

Switch: switch1

VLAN ID: 0

Ports:

Independent Learning

OK

Cancel

Apply

Disable

Copy

Remove

enabled

v6.41

RouterOS—VLAN案例

admin@CC:2D:E0:02:7F:5C (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5C

- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP
- MPLS
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- Partition
- Make Supout.rif
- Manual
- New WinBox
- Exit

Bridge

Bridge Ports VLANs MSTIs Port MST Overrides Filters NAT Hosts MDB

+ - ✓ ✕ [] [] Settings Find

	Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Pac
R	bridge1	Bridge	1592	0 bps	9.7 kbps	0	

1 item out of 27

RouterOS—VLAN案例

admin@CC:2D:E0:02:7F:5C (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5C

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Partition
Make Supout.rif
Manual
New WinBox
Exit

Bridge

Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Pac
bridge1	Bridge	1592	0 bps	11.1 kbps	0	

Bridge VLAN <

Bri
VLAN
Tag
Untag
Current Tag
Current Untag

1 item out of

enabled

Bridge

Bridge Ports VLANs MSTIs Port MST Overrides Filters NAT Hosts MDB

+ - ✓ ✗ Settings Find

Interface <bridge1>

General STP VLAN Status Traffic

VLAN Filtering

PVID: 1

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Torch

RouterOS—VLAN案例

admin@CC:2D:E0:02:7F:5C (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5C

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Partition
Make Supout.rif
Manual
New WinBox
Exit

Bridge

Bridge Ports VLANs MSTIs Port MST Overrides Filters NAT Hosts MDB

#	Interface	Bridge	Horizon	Priori...	Path Cost	Role	Root P...
0 H	ether1	bridgel		80	10	root port	10
1 IH	ether2	bridgel		80	10	disabled port	
2 H	ether3	bridgel		80	10	designated port	

Bridge Port <ether1>

General STP **VLAN** Status

PVID:

Frame Types: admit all

Ingress Filtering

OK
Cancel
Apply
Disable
Comment
Copy
Remove

3 items (1 sele

enabled

routerOS WinBox

RouterOS—VLAN案例

admin@CC:2D:E0:02:7F:5C (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5C

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Partition
Make Supout.rif
Manual
New WinBox
Exit

Bridge

Bridge Ports VLANs MSTIs Port MST Overrides Filters NAT Hosts MDB

Bridge	VLAN IDs	Current Tagged	Current Untagged
bridgel	1	ether3	bridgel, ether1
bridgel	10	ether1, ether3	bridgel

New Bridge VLAN

Bridge: bridgel

VLAN IDs:

Tagged:

Untagged:

Current Tagged:

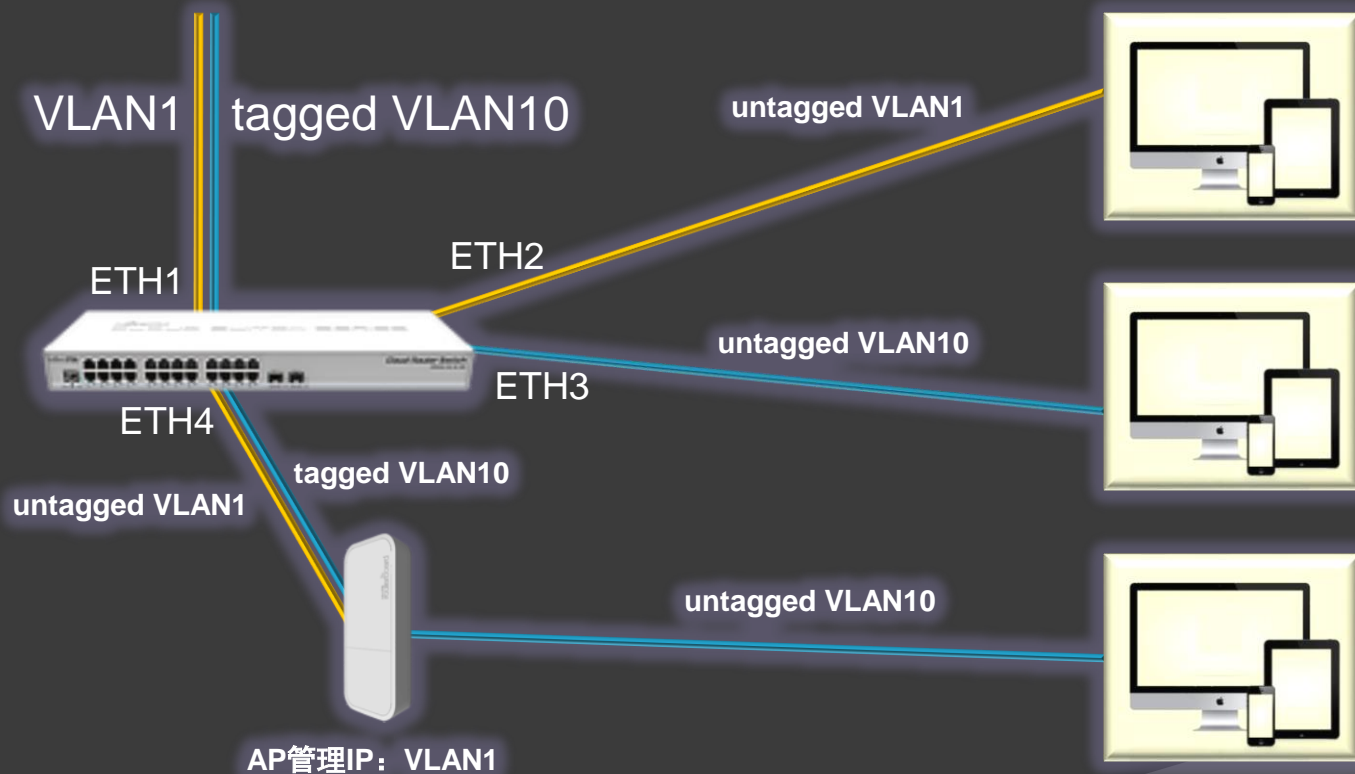
Current Untagged:

enabled

enabled

enabled

RouterOS— VLAN案例



RouterOS— VLAN案例

admin@CC:2D:E0:02:7F:5D (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5D

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Partition
Make Supout.rif
Manual
New WinBox
Exit

Bridge

Ports VLANs MSTIs Port MST Overrides Filters NAT Hosts MDB

+ - ✓ ✕ [Settings] Find

Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Pa
------	------	--------	----	----	-----------------	-------

New Interface

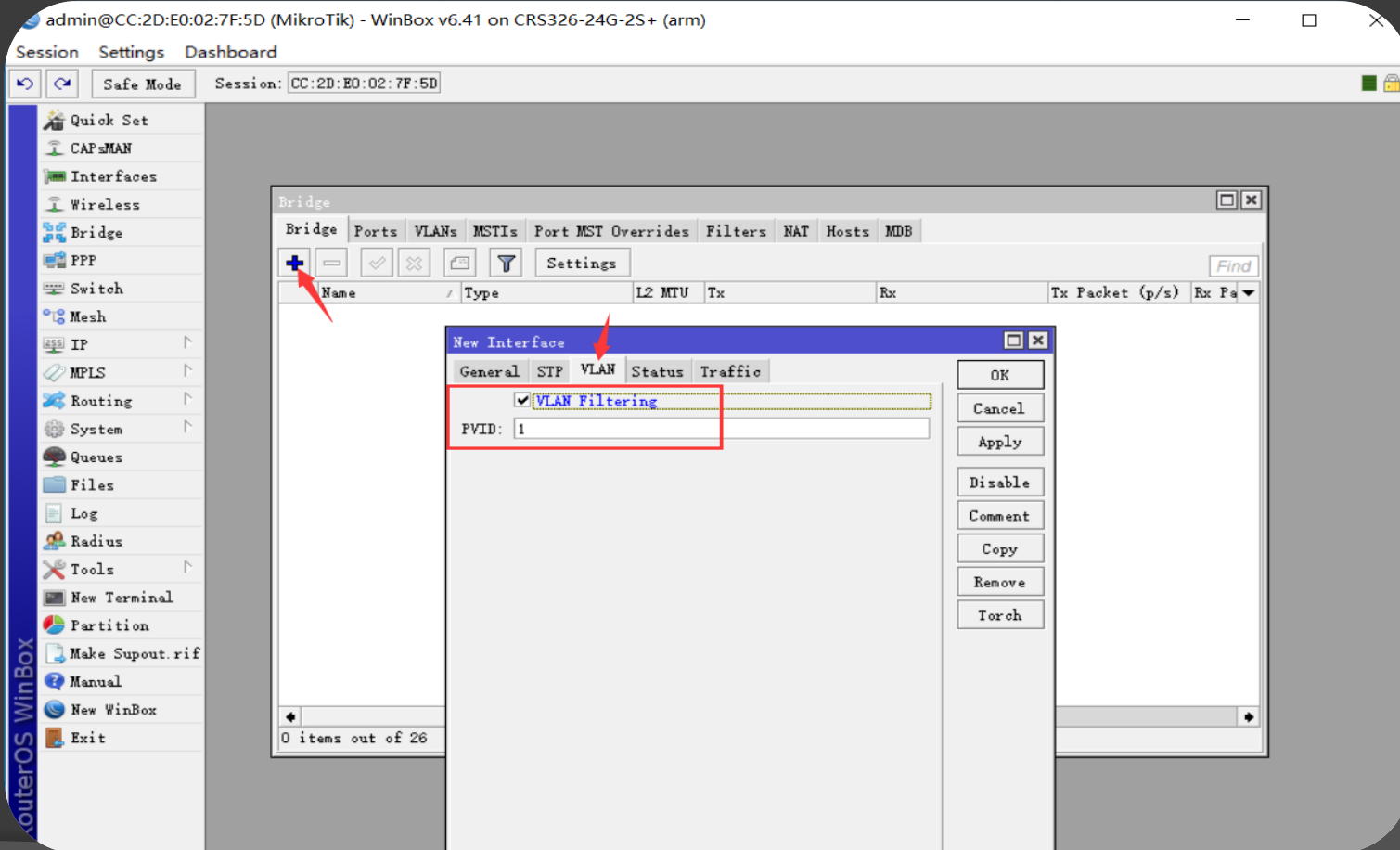
General STP VLAN Status Traffic

VLAN Filtering

PVID: 1

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Torch

0 items out of 26



RouterOS—VLAN案例

admin@CC:2D:E0:02:7F:5D (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5D

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Partition
Make Supout.rif
Manual
New WinBox
Exit

Bridge

Bridge Ports VLANs MSTIs Port MST Overrides Filters NAT Hosts MDB

#	Interface	Bridge	Hor...	Priori...	Path Cost	PVID	Ingress Filte...	Role
0	H ether1	bridg1		80	10	1	yes	root port
1	H ether2	bridg1		80	10	1	yes	designated port
2	IH ether3	bridg1		80	10	10	yes	disabled port
3	H ether4	bridg1		80	10	1	yes	designated port

Bridge Port <ether3>

General STP **VLAN** Status

PVID: 10

Frame Types: admit all

Ingress Filtering

OK
Cancel
Apply
Disable
Comment
Copy
Remove

4 items (1 selected)

RouterOS—VLAN案例

admin@CC:2D:E0:02:7F:5D (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5D

Bridge

Bridge Ports **VLANs** MSTIs Port MST Overrides Filters NAT Hosts MDB

Bridge

Bridge	VLAN IDs	Current Tagged	Current Untagged
bridge1	1		bridge1, ether1, ether2, ether4
bridge1	10		ether3

New Bridge VLAN

Bridge: bridge1

VLAN IDs: 1

Tagged:

Untagged: ether1, ether2, ether4

Current Tagged:

Current Untagged:

enabled

New Bridge VLAN

Bridge: bridge1

VLAN IDs: 10

Tagged: ether1, ether4

Untagged: ether3

Current Tagged:

Current Untagged:

enabled

2 items

routerOS WinBox

RouterOS——管理VLAN设置

The screenshot shows the WinBox v3.11 (Addresses) interface. The 'Connect To' field is set to 'EC:2D:E0:02:7F:5C'. The 'Login' field is 'admin'. The 'Password' field is empty. The 'Keep Password' checkbox is checked, and the 'Open In New Window' checkbox is unchecked. The 'Add/Set', 'Connect To RoMOn', and 'Connect' buttons are visible.

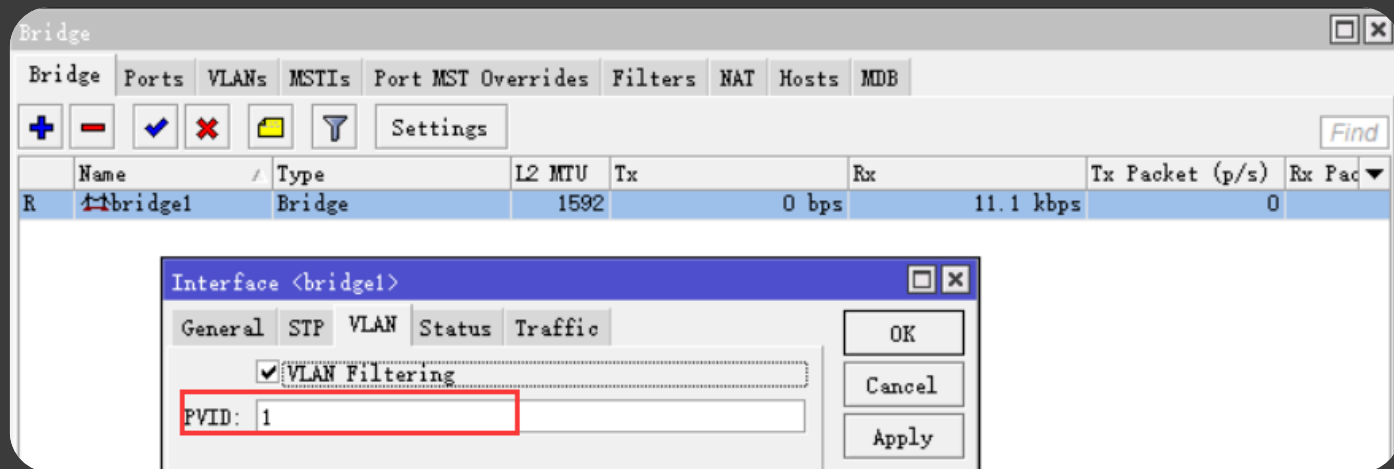
Below the connection fields, there are tabs for 'Managed' and 'Neighbors'. The 'Neighbors' tab is active, showing a table of discovered devices. The table has columns for MAC Address, IP Address, Identity, Version, Board, and Type. A 'Find' dropdown menu is set to 'all'.

MAC Address	IP Address	Identity	Version	Board	Type
66:D1:54:90:66:45	192.168.10.1	MikroTik	6.41 (stable)	RB952Ui-5ac2nD	IPv4 only

item

只能扫描到路由器，无法基于VLAN10发现交换机

RouterOS——管理VLAN设置



PVID: 1

RouterOS——管理VLAN设置

admin@CC:2D:E0:02:7F:5C (MikroTik) - WinBox v6.41 on CRS326-24G-2S+ (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:02:7F:5C

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Partition
Make Supout.rif
Manual
New WinBox
Exit

Bridge

Bridge	VLAN IDs	Current Tagged	Current Untagged
bridgel	1	ether3	bridgel, ether1
bridgel	10	ether1, ether3	bridgel

Bridge VLAN <1>

Bridge: bridgel
VLAN IDs: 1
Tagged: ether3
Untagged:
Current Tagged: ether3
Current Untagged: bridgel, ether1
enabled

Bridge VLAN <10>

Bridge: bridgel
VLAN IDs: 10
Tagged: ether1, ether3
Untagged: bridgel
Current Tagged: ether1, ether3
Current Untagged: bridgel
enabled

OK
Cancel
Apply
Disable
Comment
Copy
Remove

谢谢观赏

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