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

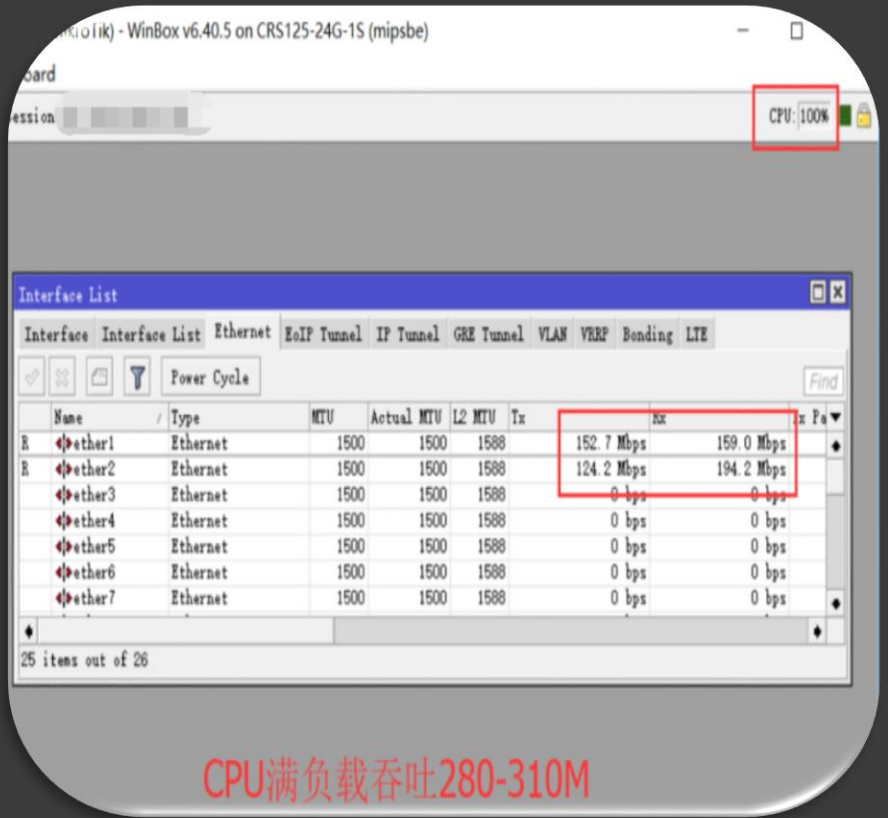
CRS125-24G-1S-IN

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

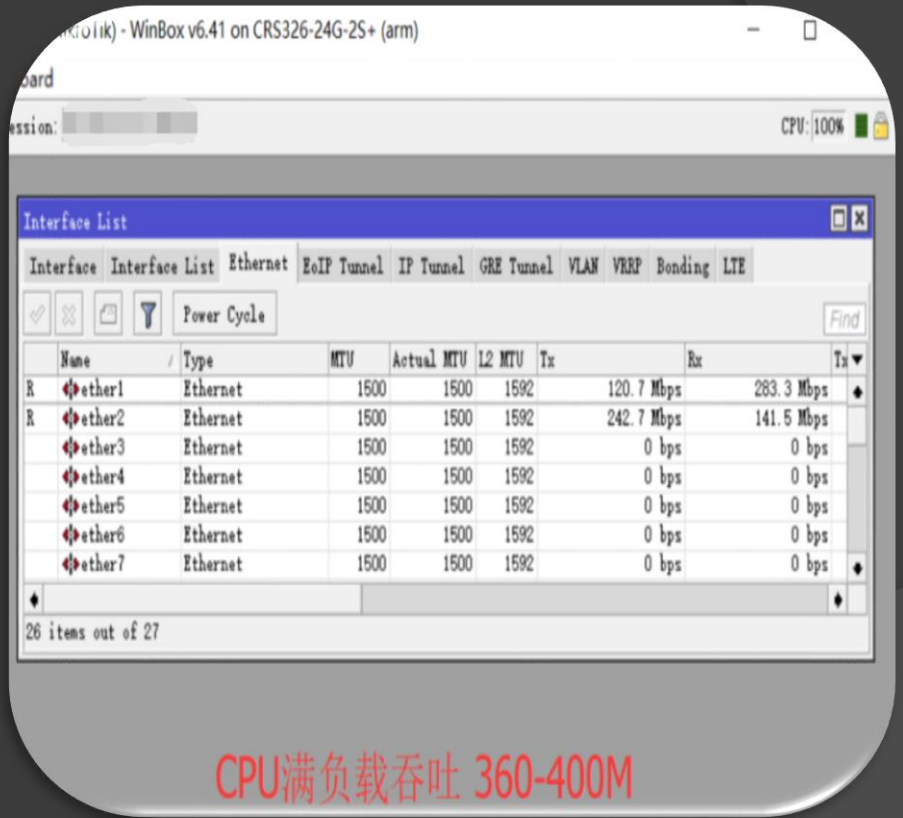
CSS326-24G-2S+RM

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

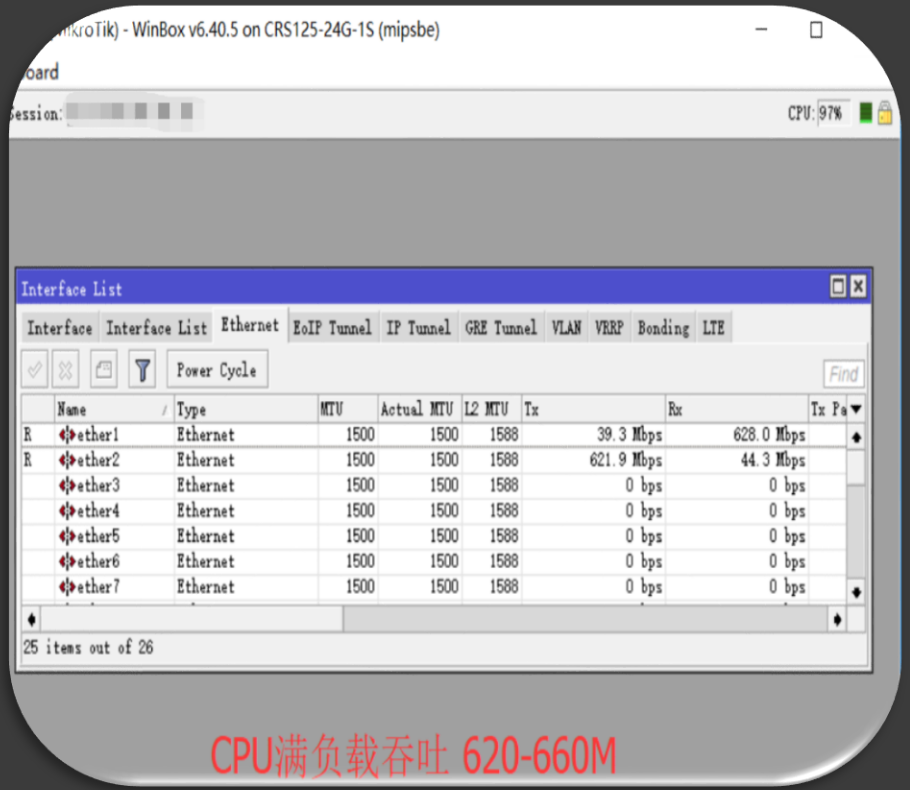


CPU满负载吞吐280-310M

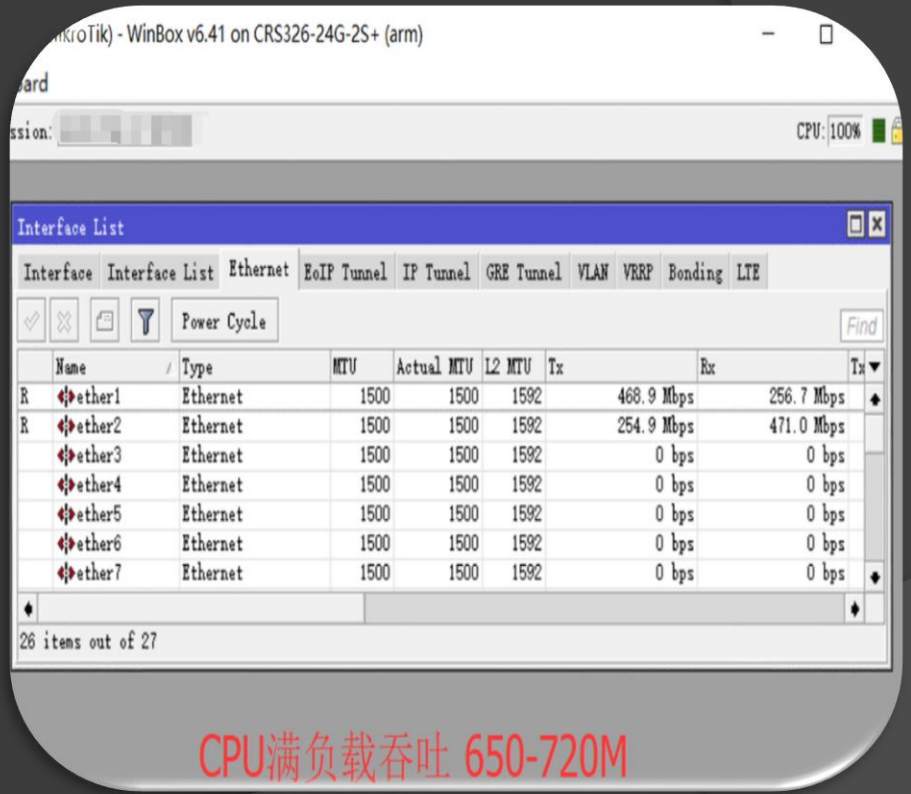


CPU满负载吞吐 360-400M

CRS125与CRS326 非NAT测试对比

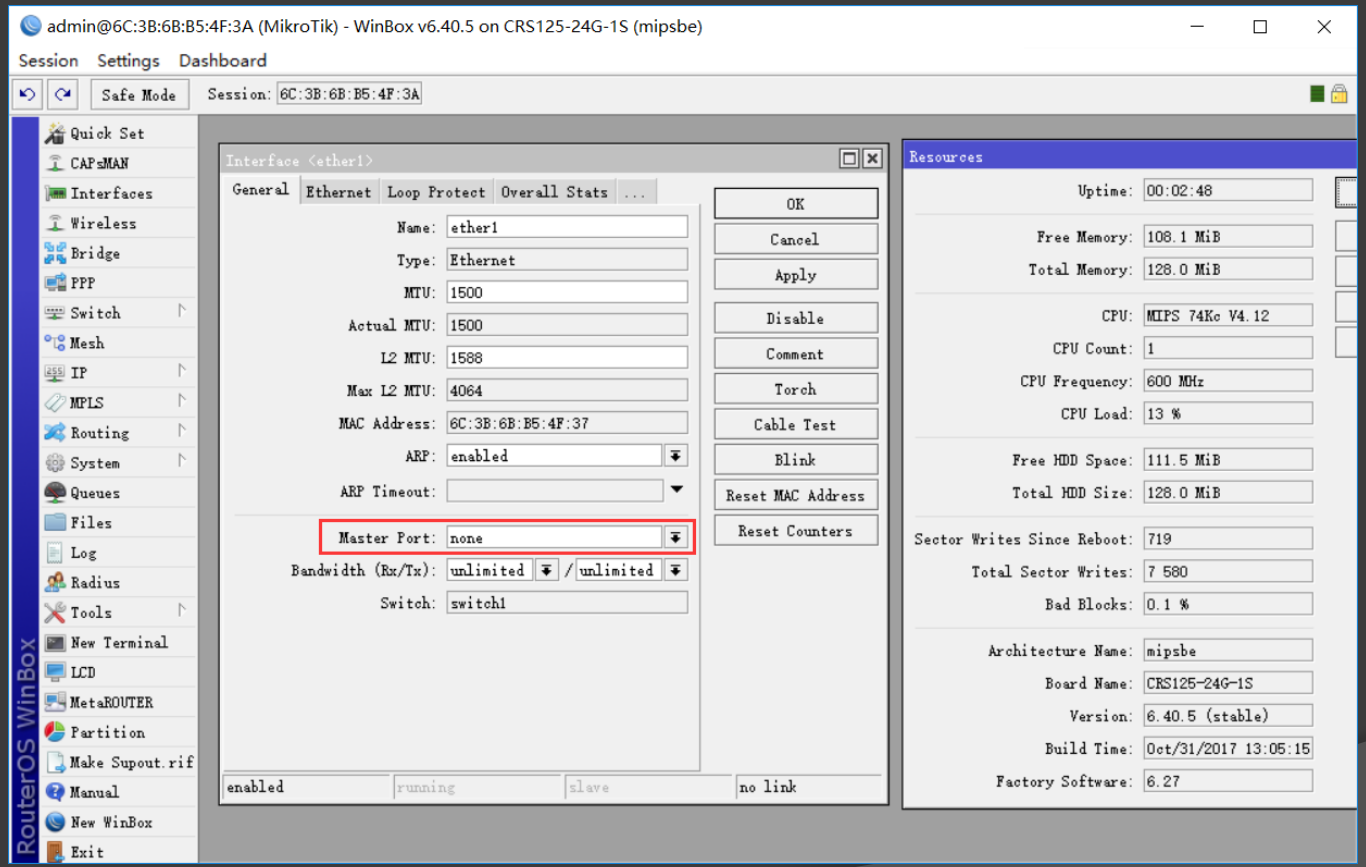


CPU满负载吞吐 620-660M

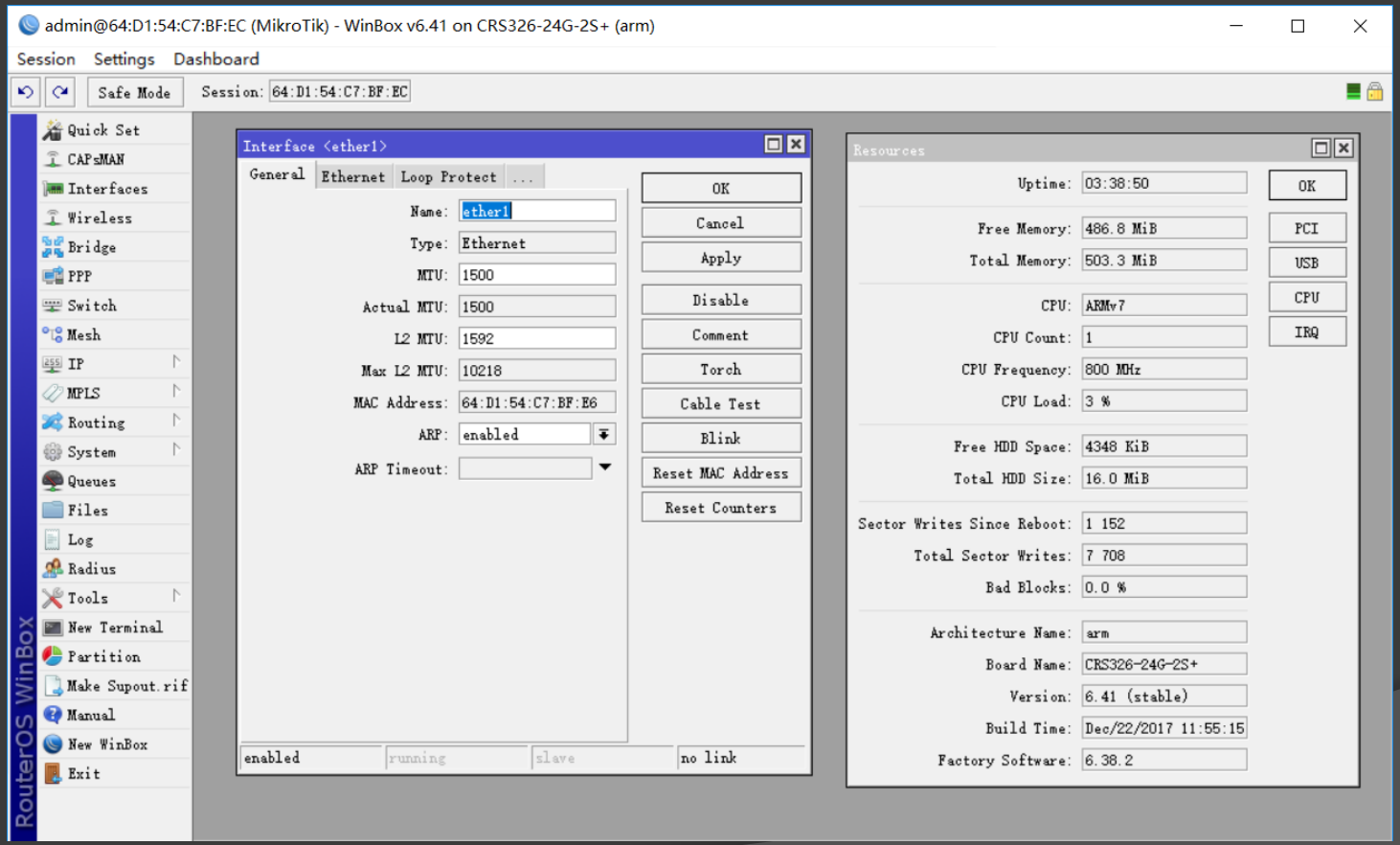


CPU满负载吞吐 650-720M

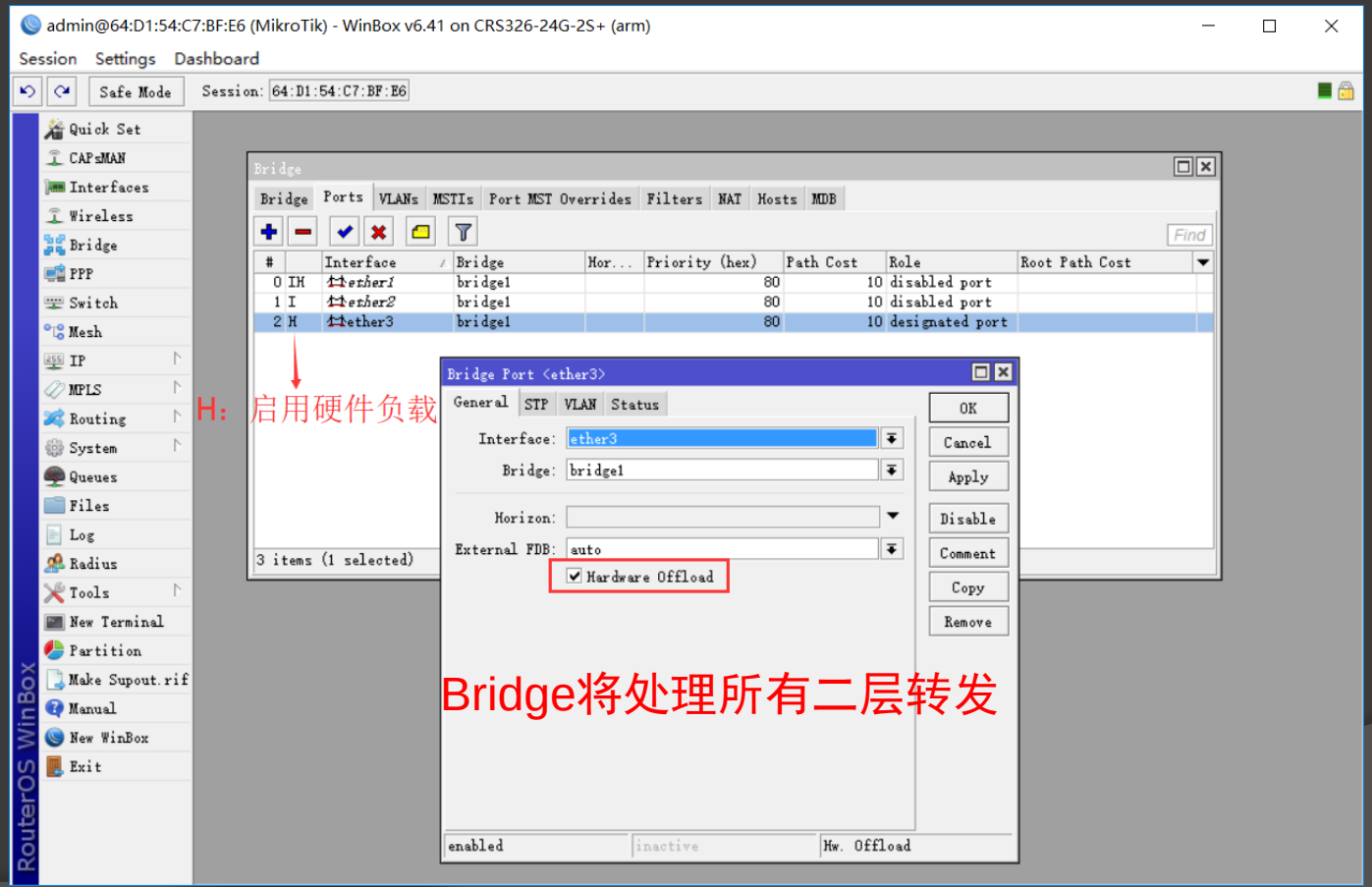
ROS 6.41前后交换芯片桥接设置变更



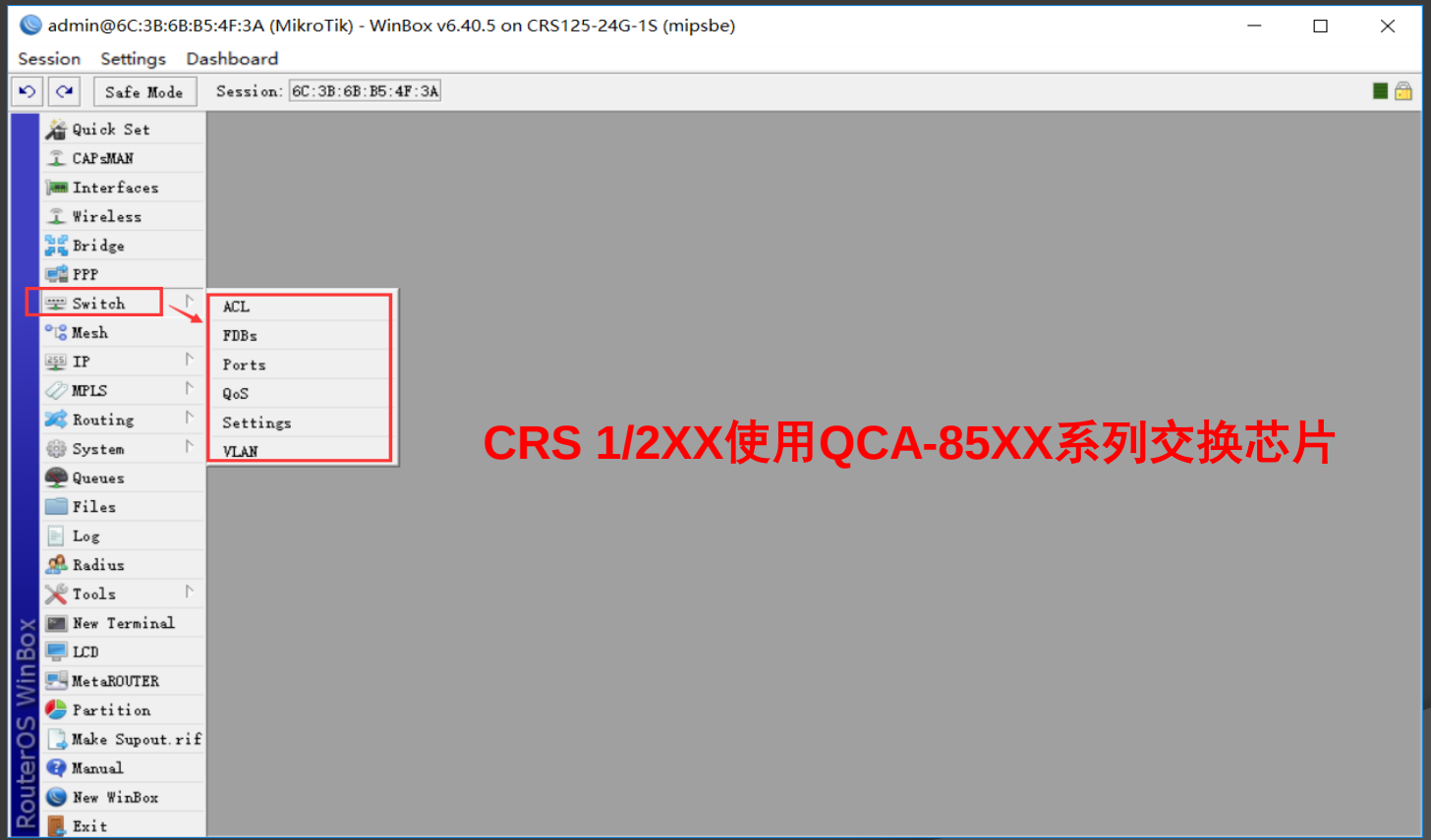
ROS 6.41前后交换芯片桥接设置变更



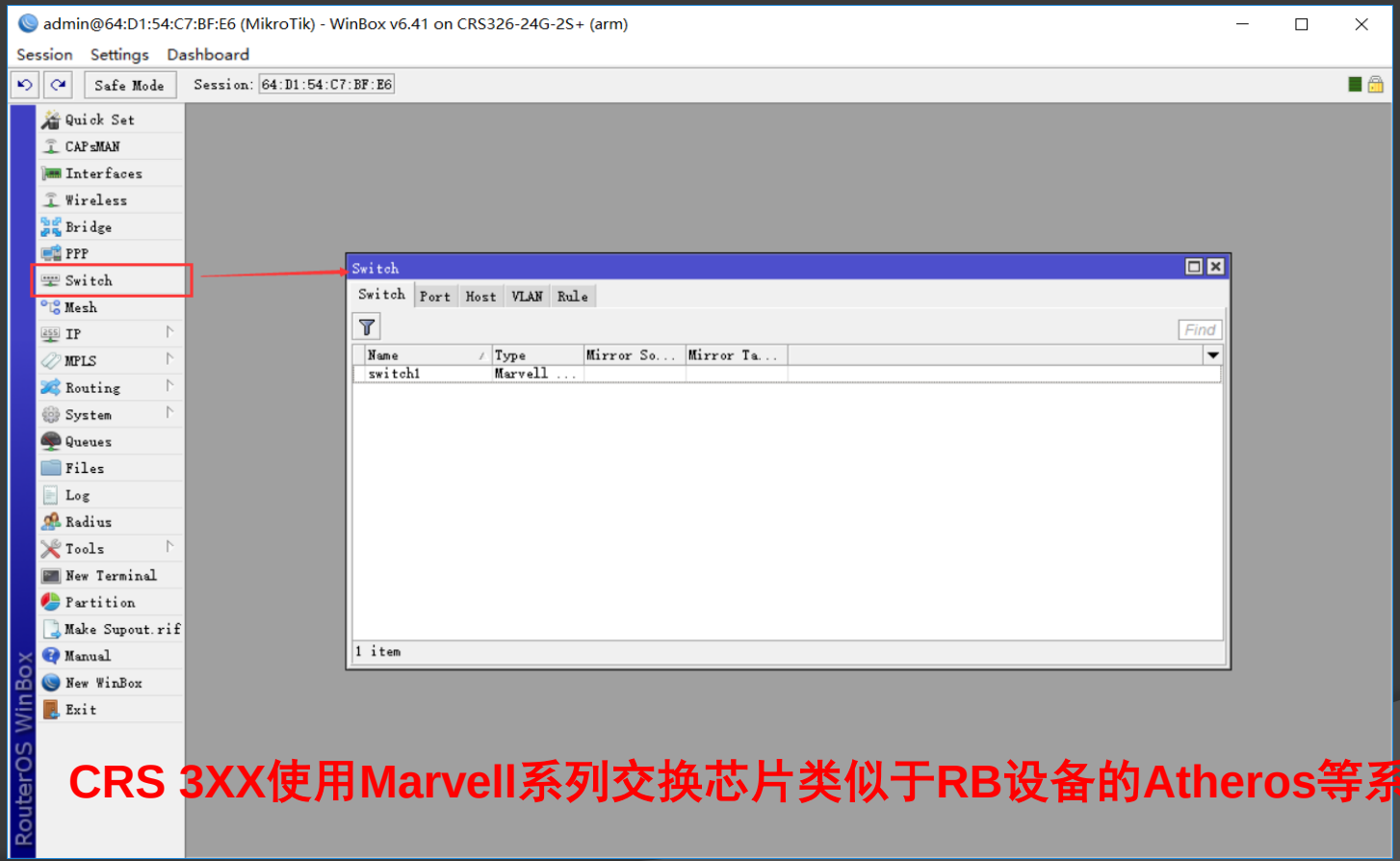
ROS 6.41前后交换芯片桥接设置变更



CRS1XX/2XX与CRS326 swich菜单区别

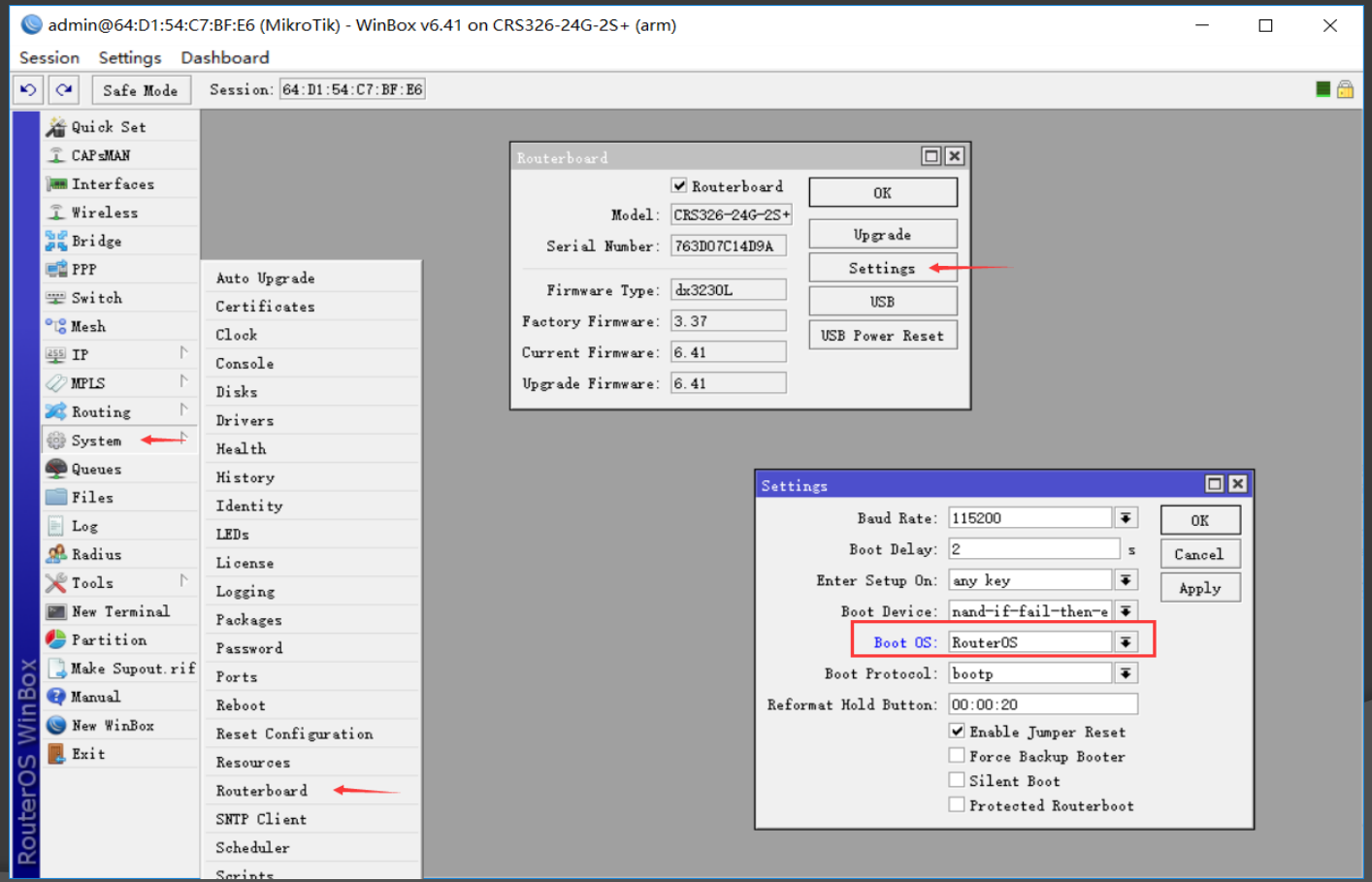


CRS1XX/2XX与CRS326 swich菜单区别

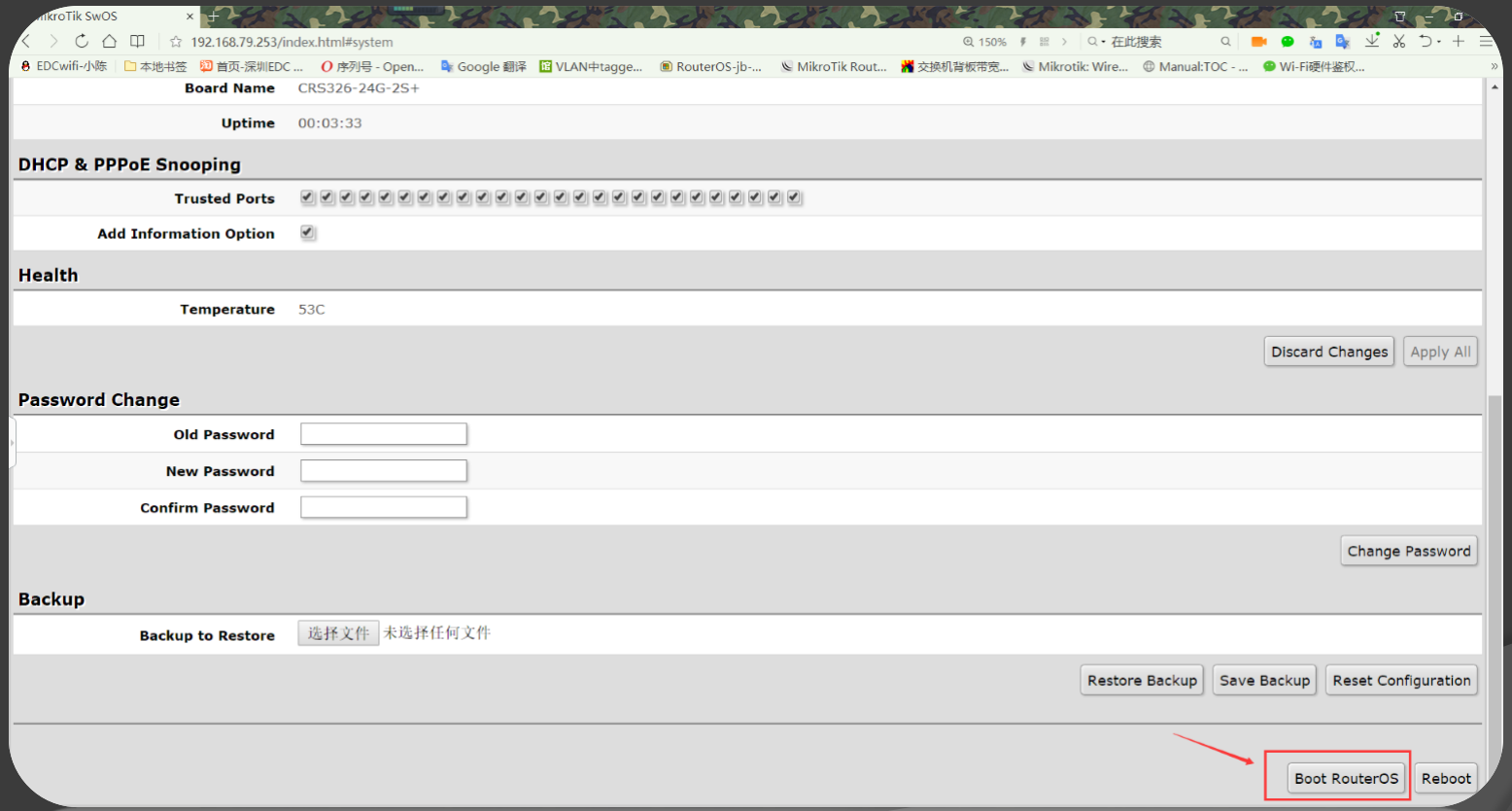


CRS 3XX使用Marvell系列交换芯片类似于RB设备的Atheros等系列芯片

CRS326双系统特性： RouterOS



CRS326双系统特性： SwOS

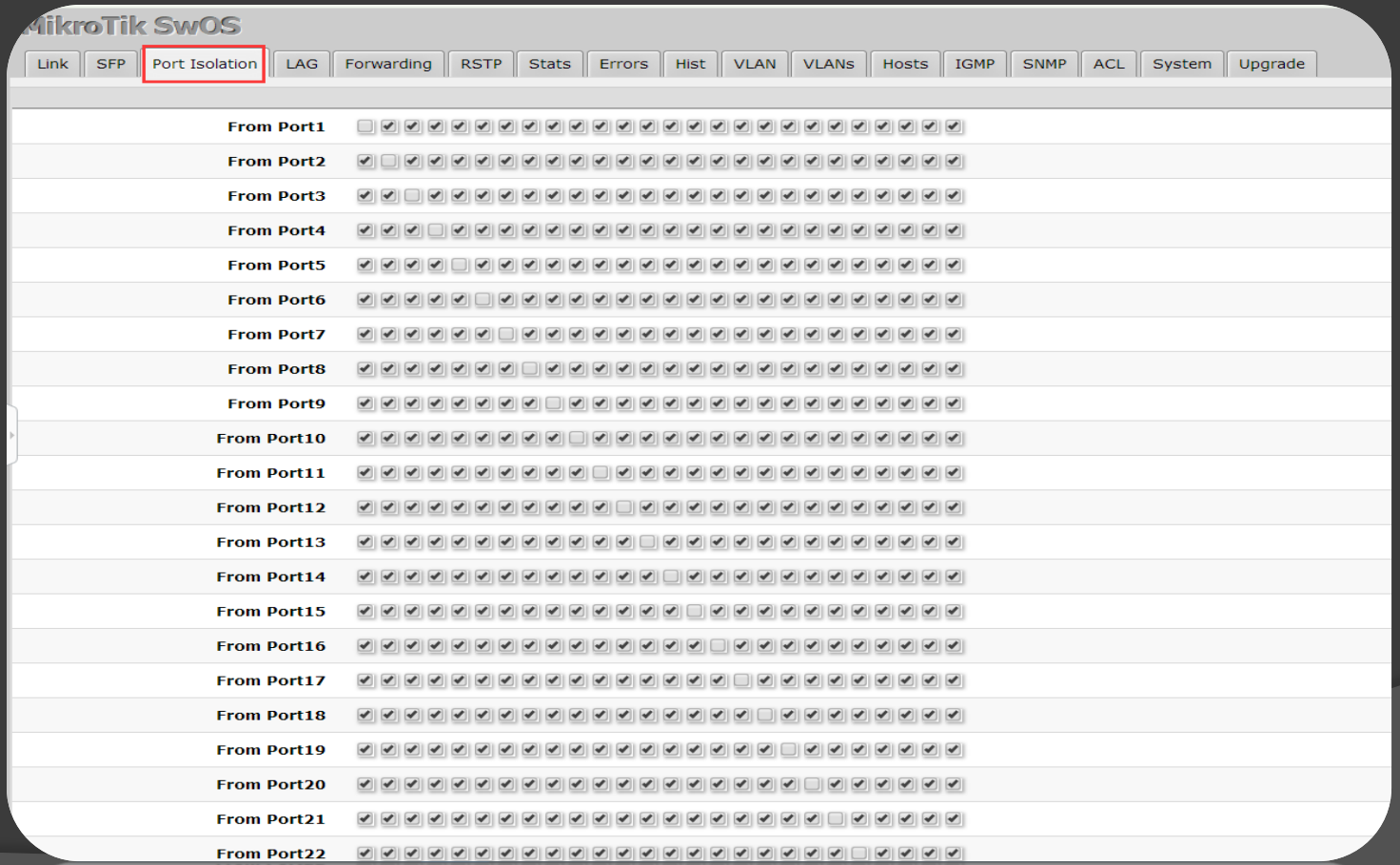


SwOS简介

- 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）

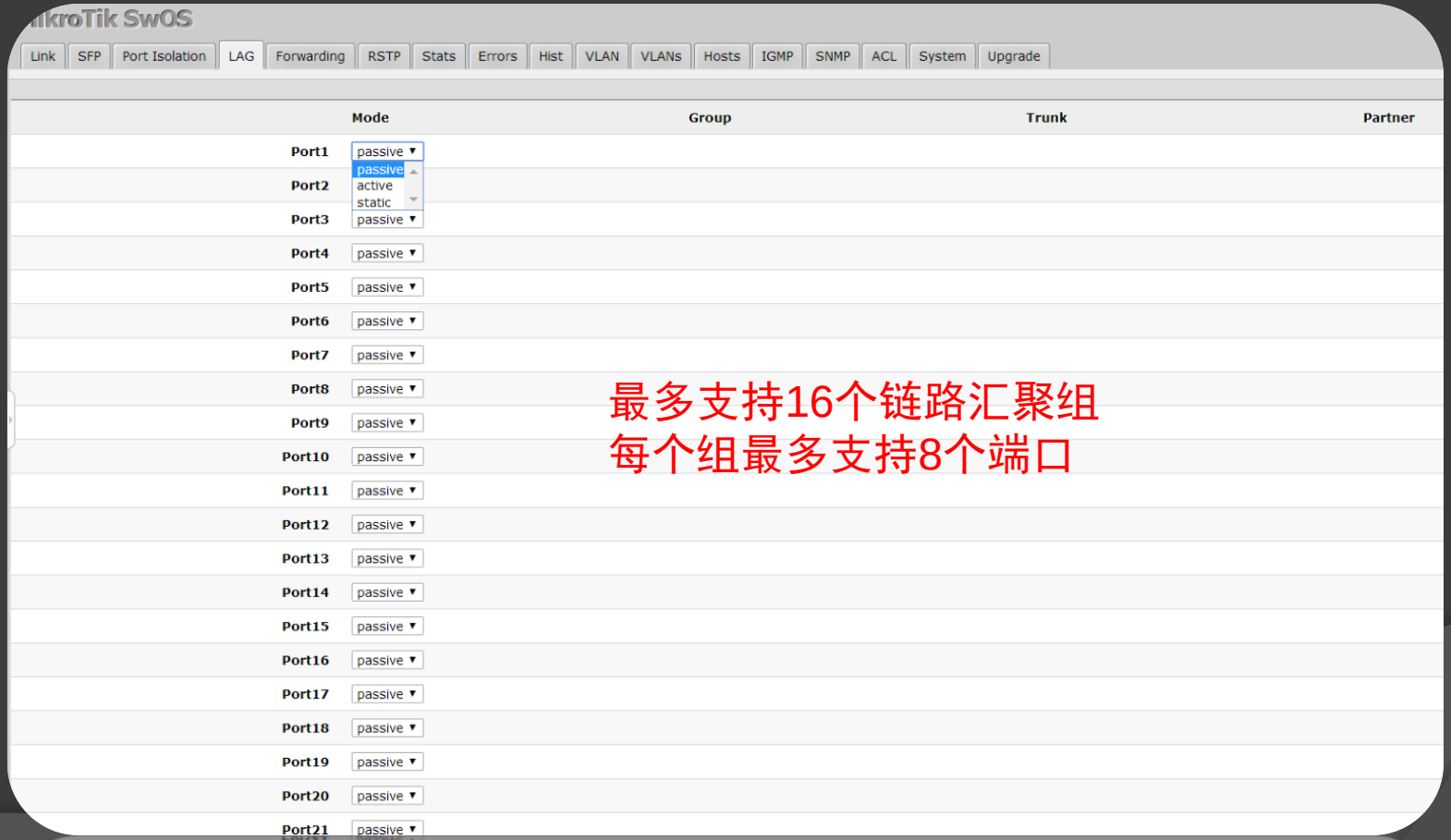
端口隔离表允许或限制特定端口之间的流量转发

SwOS——端口隔离



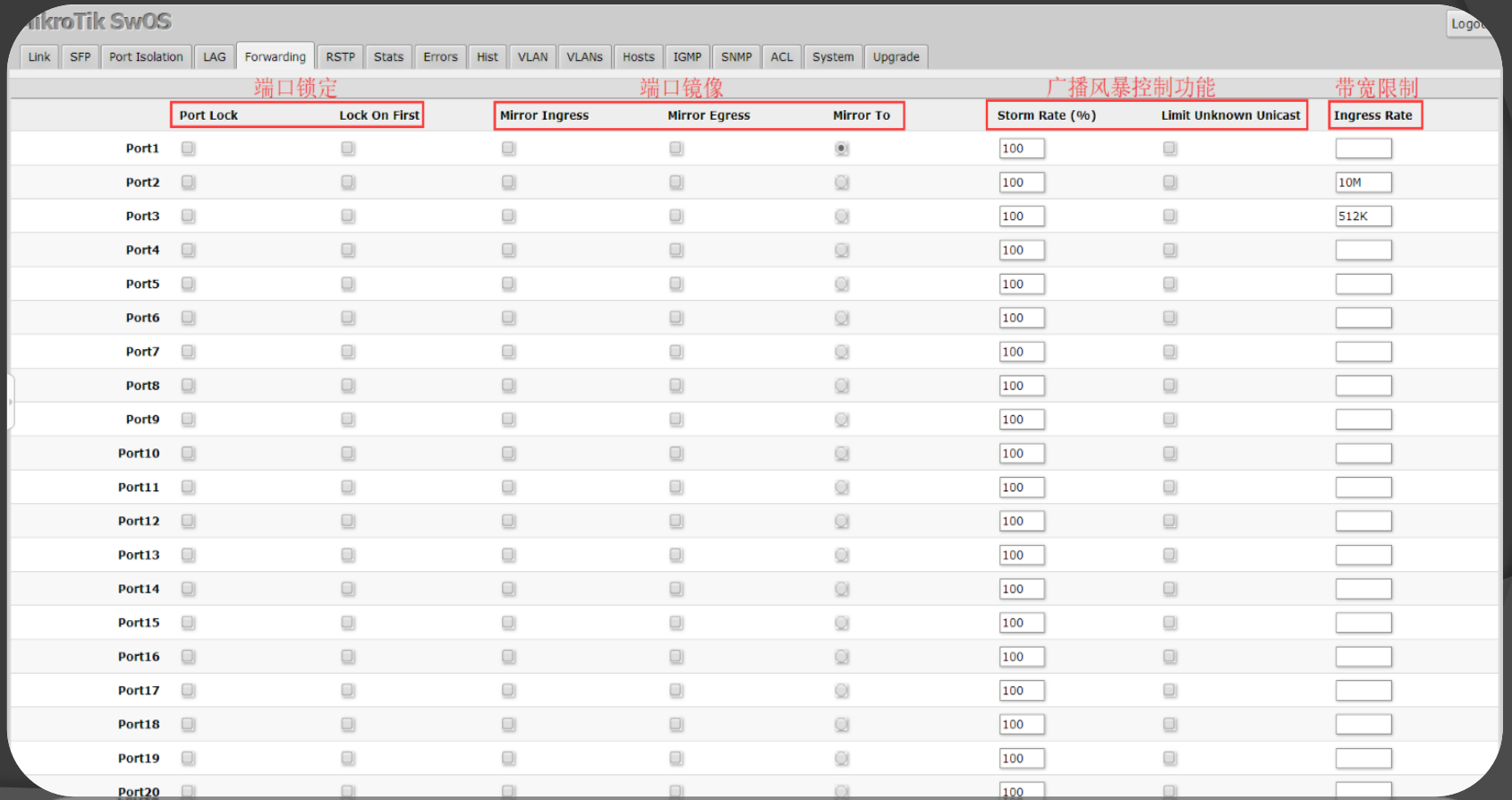
802.3ad（LACP）兼容链路聚合以及静态链路聚合

SwOS——链路聚合

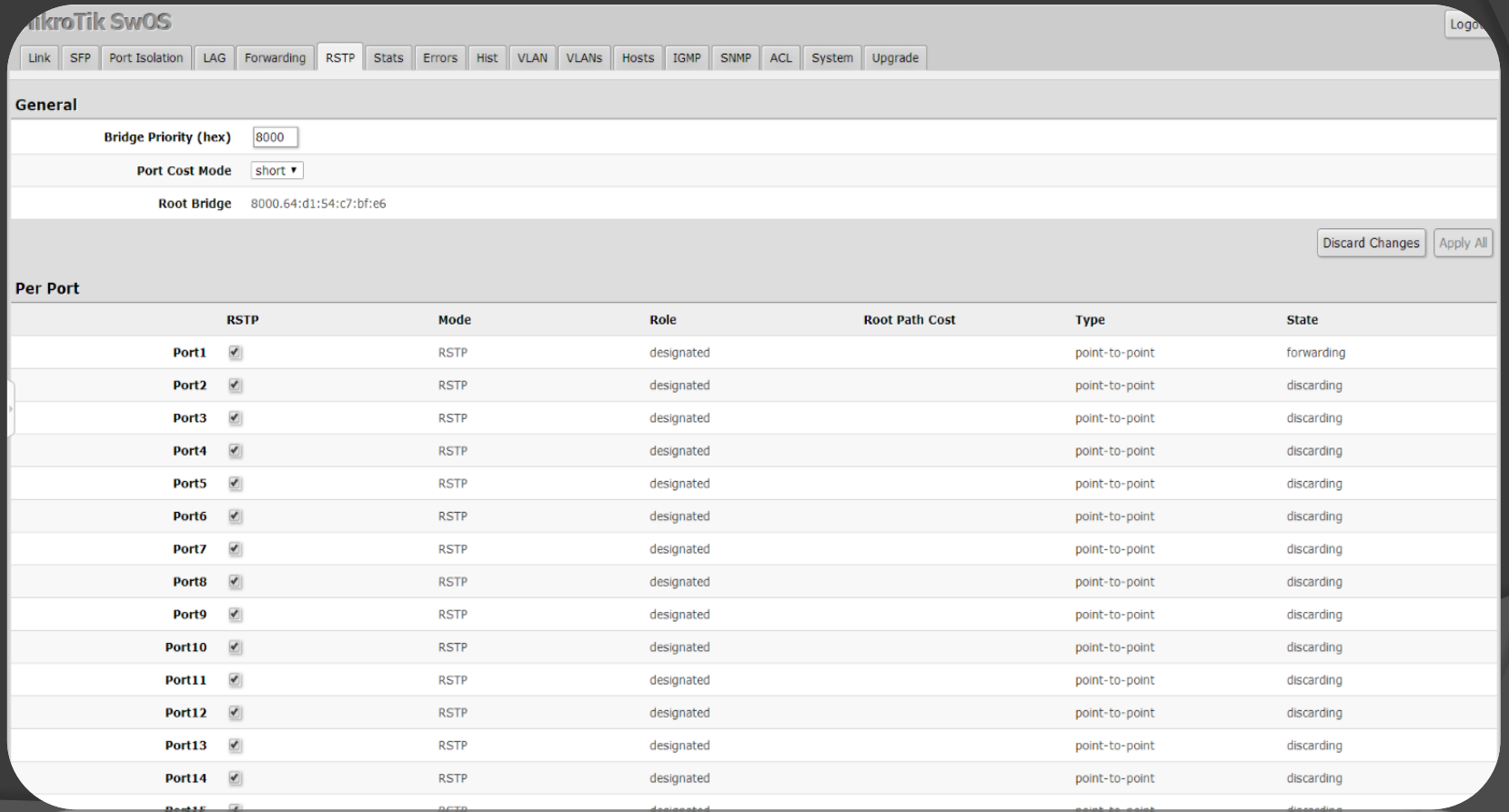


最多支持16个链路汇聚组
每个组最多支持8个端口

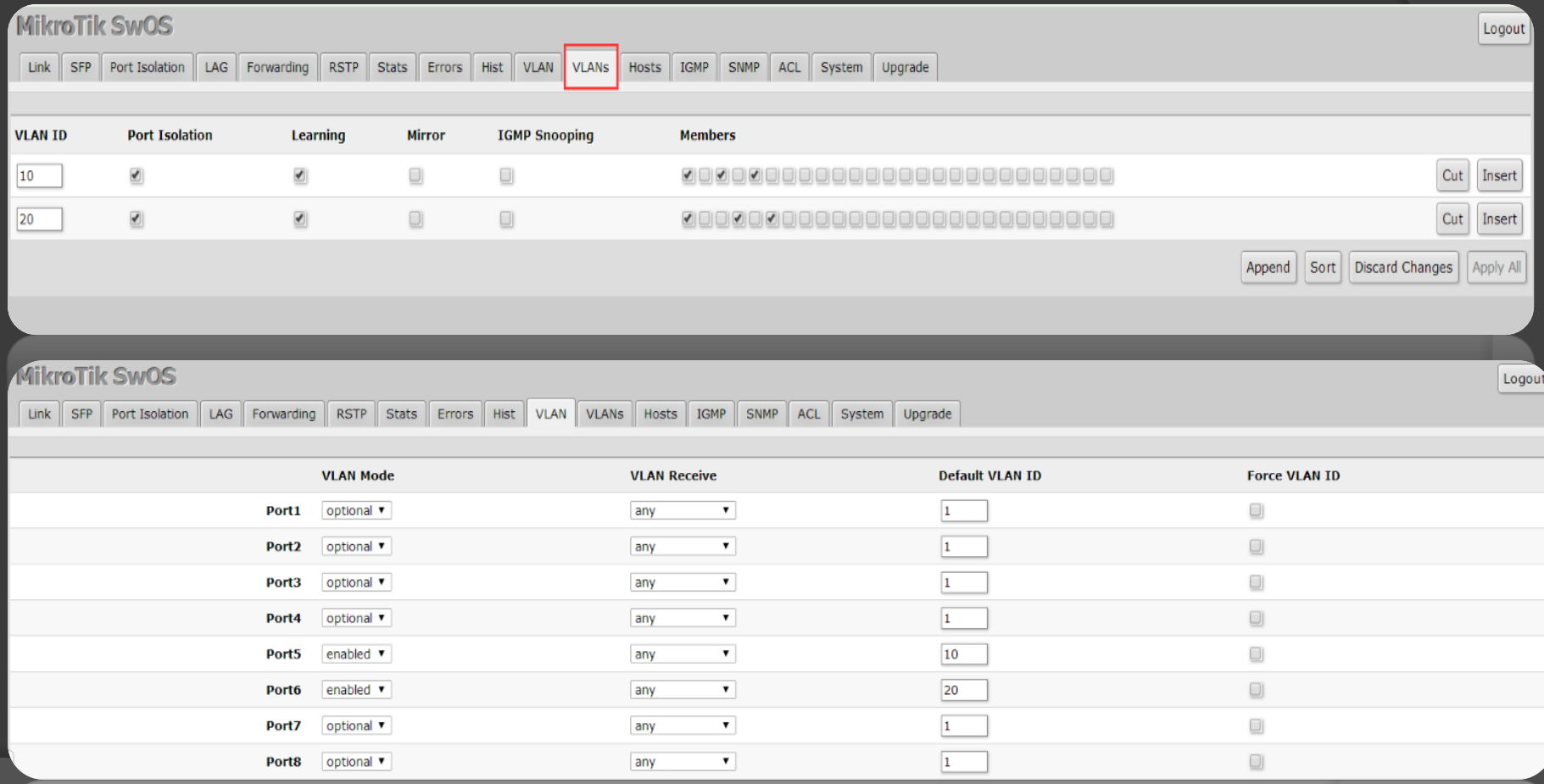
SwOS——转发菜单


MikroTik SwOS
Logout
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 100
Port2 100 10M
Port3 100 512K
Port4 100
Port5 100
Port6 100
Port7 100
Port8 100
Port9 100
Port10 100
Port11 100
Port12 100
Port13 100
Port14 100
Port15 100
Port16 100
Port17 100
Port18 100
Port19 100
Port20 100

SwOS——RSTP


ikroTik SwOS
Logo
Link
SFP
Port Isolation
LAG
Forwarding
RSTP
Stats
Errors
Hist
VLAN
VLANs
Hosts
IGMP
SNMP
ACL
System
Upgrade
General
Bridge Priority (hex)
8000
Port Cost Mode
short
Root Bridge
8000.64:d1:54:c7:bf:e6
Discard Changes
Apply All
Per Port
RSTP
Mode
Role
Root Path Cost
Type
State
Port1 RSTP designated point-to-point forwarding
Port2 RSTP designated point-to-point discarding
Port3 RSTP designated point-to-point discarding
Port4 RSTP designated point-to-point discarding
Port5 RSTP designated point-to-point discarding
Port6 RSTP designated point-to-point discarding
Port7 RSTP designated point-to-point discarding
Port8 RSTP designated point-to-point discarding
Port9 RSTP designated point-to-point discarding
Port10 RSTP designated point-to-point discarding
Port11 RSTP designated point-to-point discarding
Port12 RSTP designated point-to-point discarding
Port13 RSTP designated point-to-point discarding
Port14 RSTP designated point-to-point discarding

SwOS——VLAN和VLANs



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。

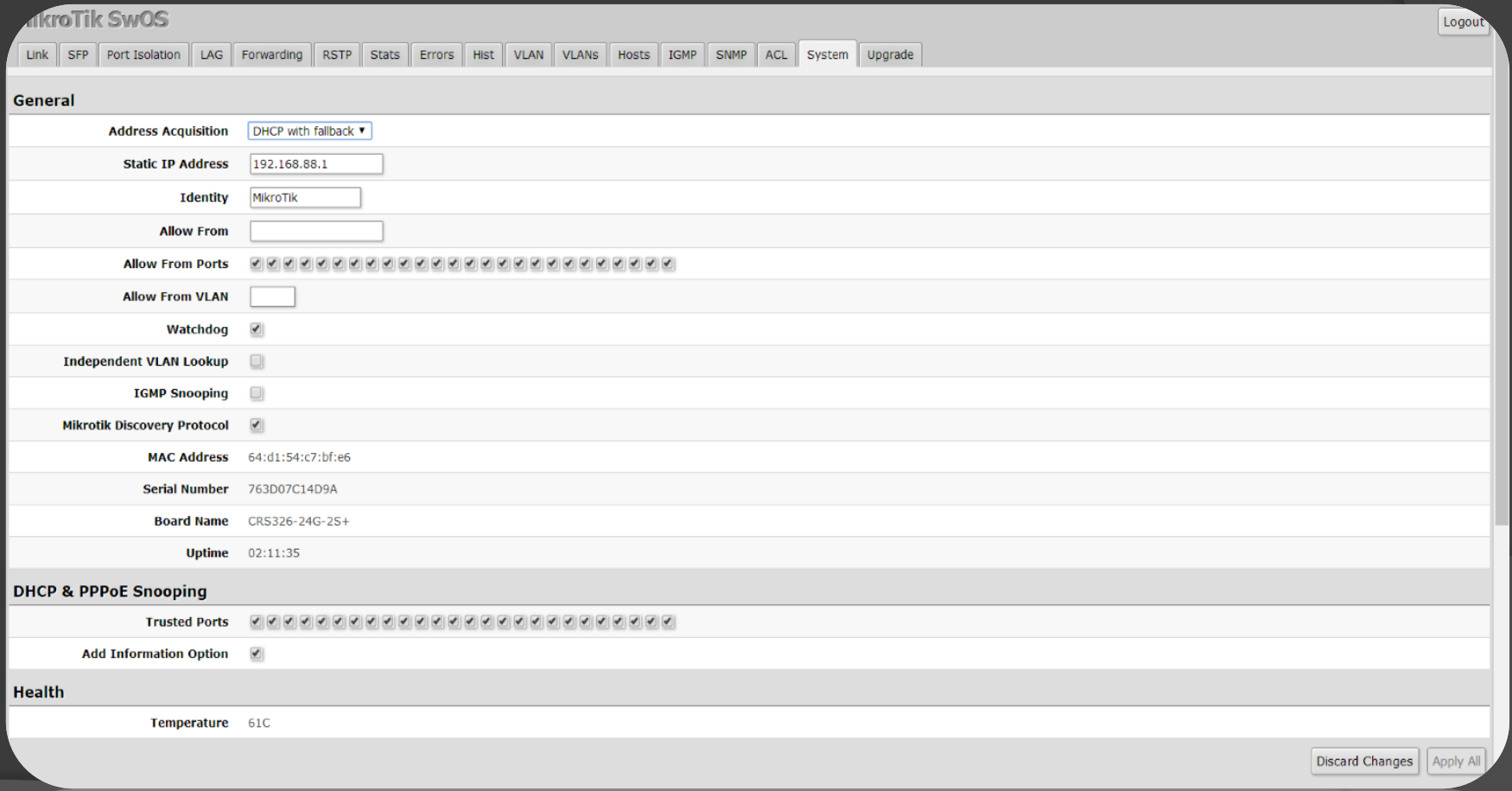
SwOS——主机列表

最多支持16K条目

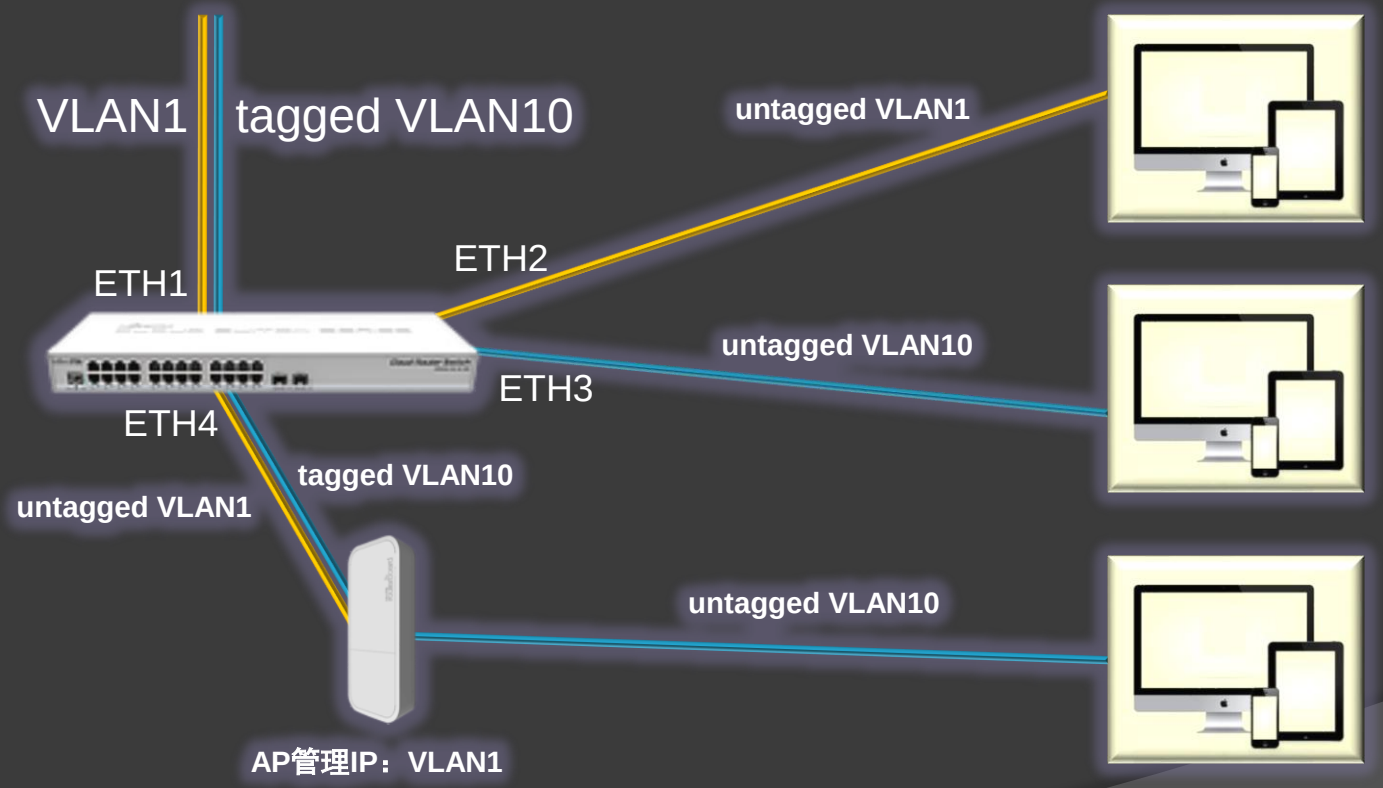
SwOS——ACL菜单

基于L2，L3协议报头字段条件的线速包过滤，转发和VLAN标记

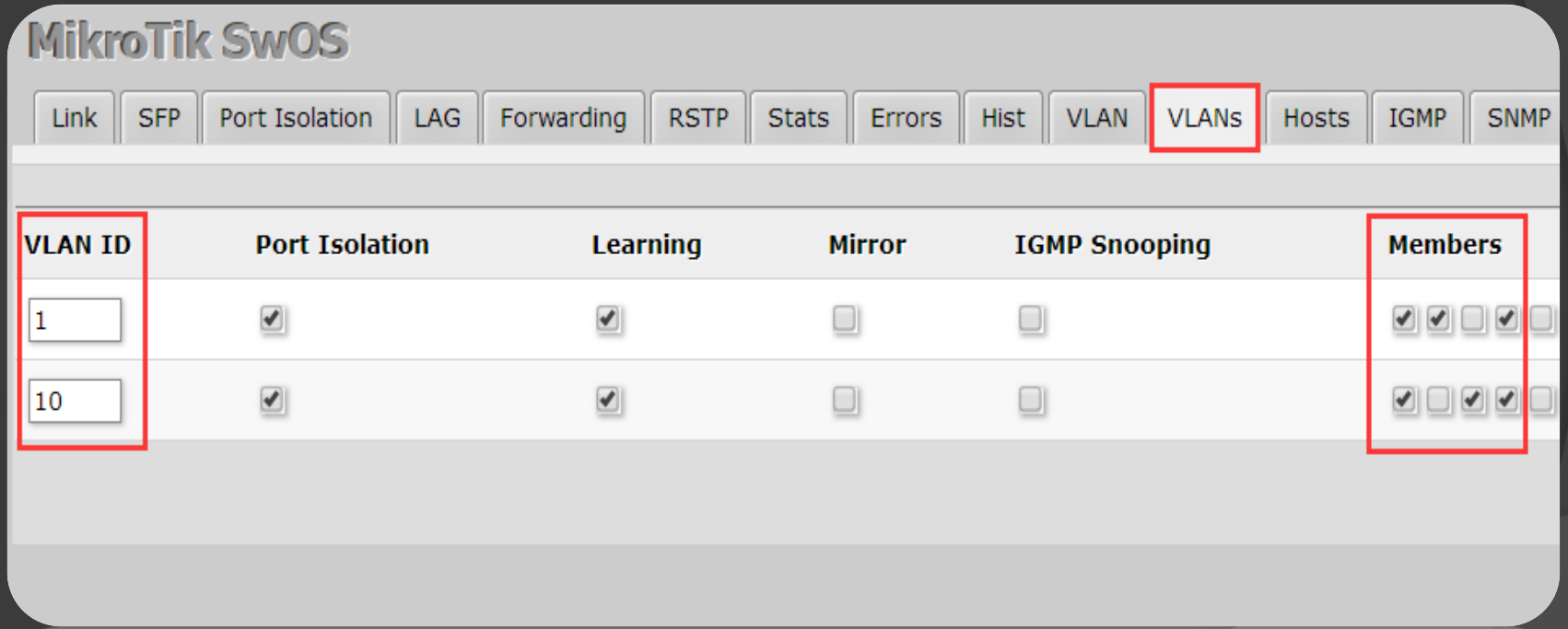
SwOS——系统列表


MikroTik SwOS
Logout
Link
SFP
Port Isolation
LAG
Forwarding
RSTP
Stats
Errors
Hist
VLAN
VLANs
Hosts
IGMP
SNMP
ACL
System
Upgrade
General
Address Acquisition
DHCP with fallback
Static IP Address
192.168.88.1
Identity
MikroTik
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
02:11:35
DHCP & PPPoE Snooping
Trusted Ports
Add Information Option
Health
Temperature
61C
Discard Changes
Apply All

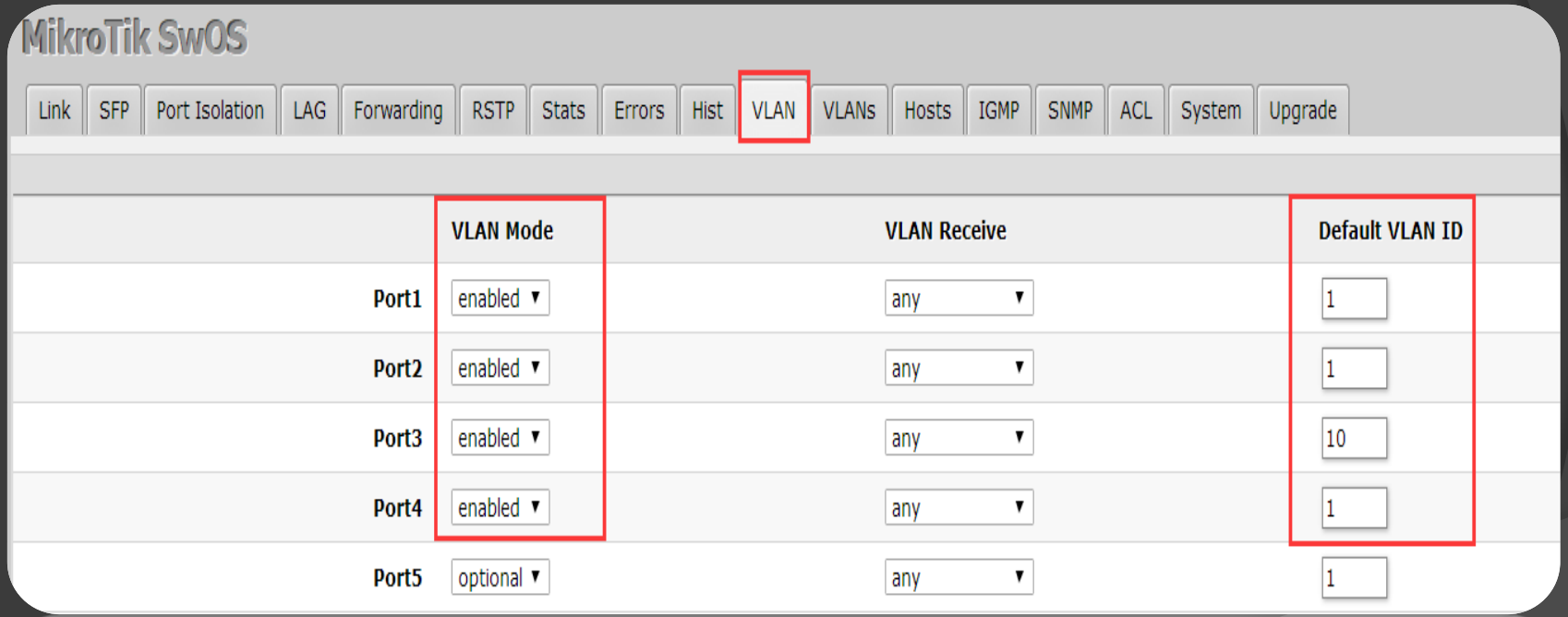
VLAN案例


VLAN1
tagged VLAN10
ETH1
ETH2
ETH3
ETH4
untagged VLAN1
untagged VLAN10
tagged VLAN10
untagged VLAN1
untagged VLAN10
AP管理IP：VLAN1

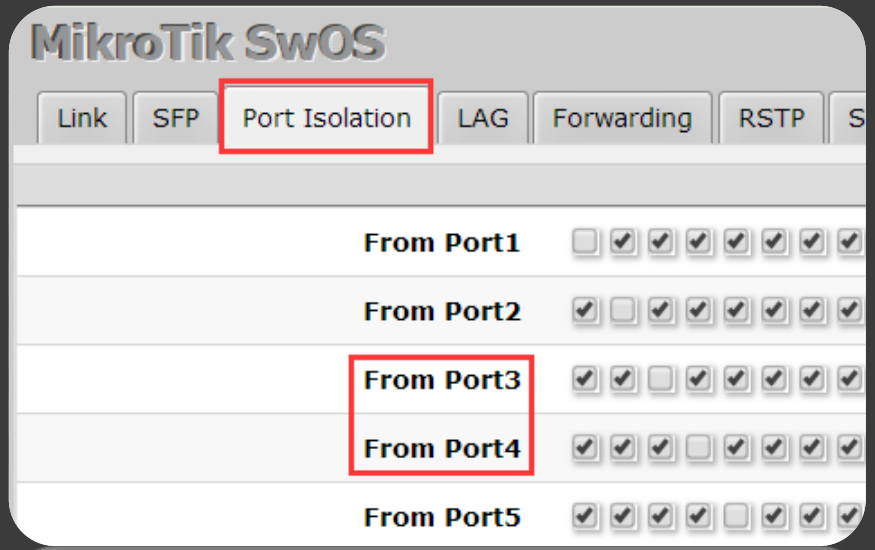
VLAN案例

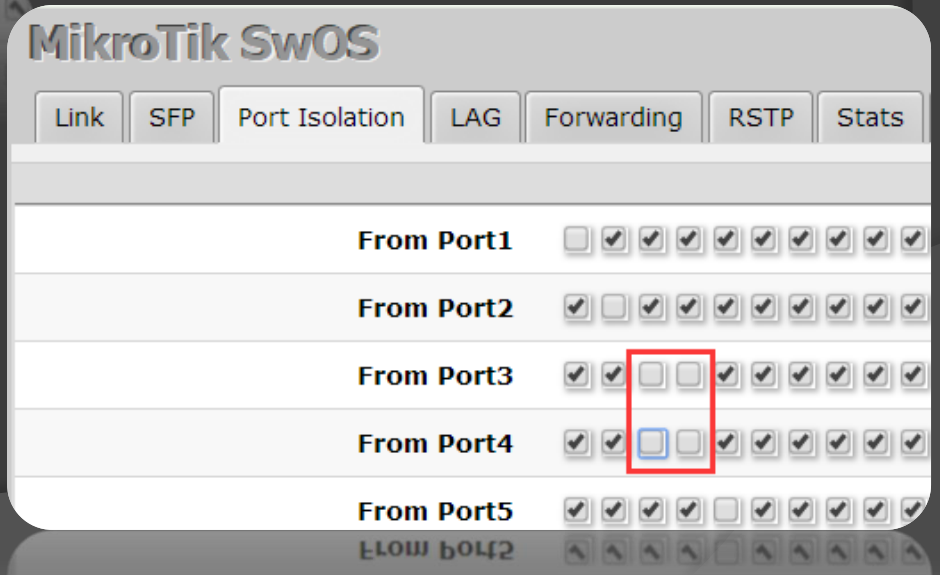

MikroTik SwOS
Link
SFP
Port Isolation
LAG
Forwarding
RSTP
Stats
Errors
Hist
VLAN
VLANs
Hosts
IGMP
SNMP
VLAN ID
Port Isolation
Learning
Mirror
IGMP Snooping
Members
1
10

VLAN案例

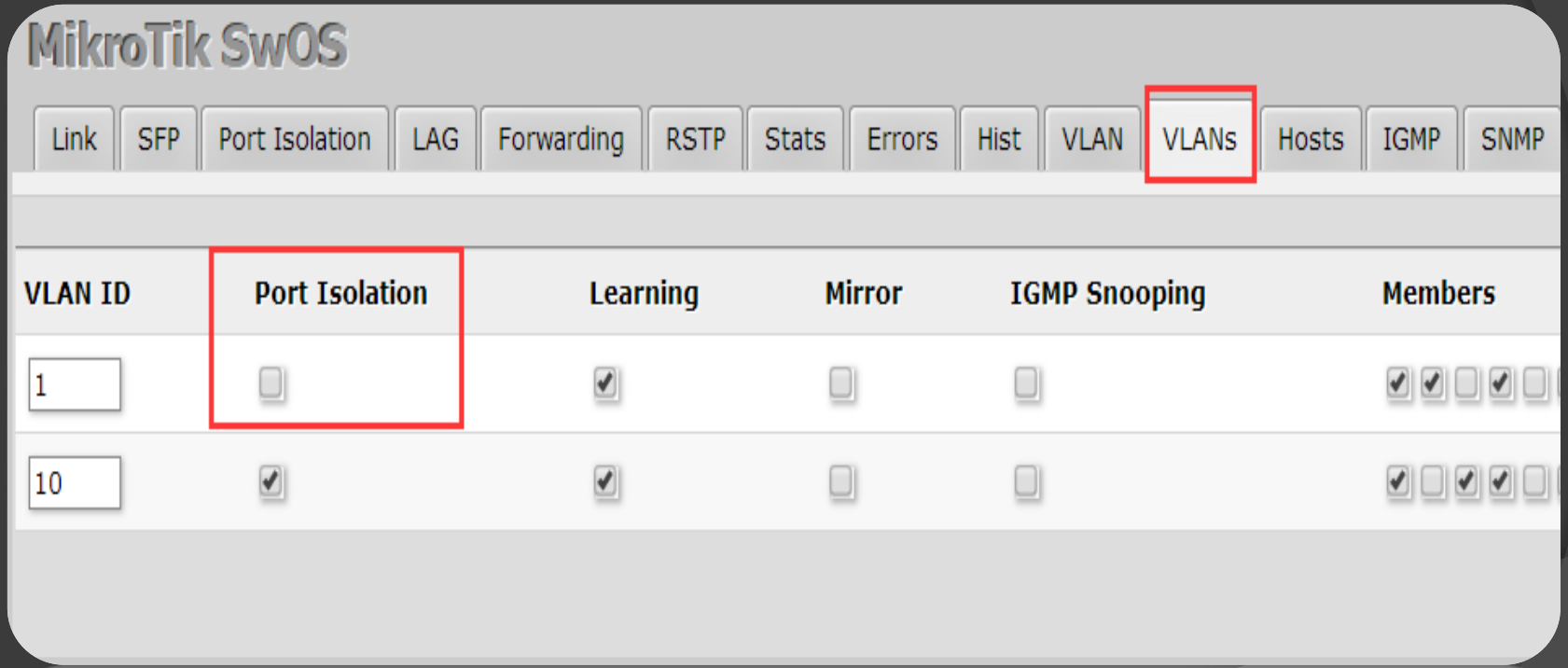

MikroTik SwOS
Link
SFP
Port Isolation
LAG
Forwarding
RSTP
Stats
Errors
Hist
VLAN
VLANs
Hosts
IGMP
SNMP
ACL
System
Upgrade
VLAN Mode
VLAN Receive
Default VLAN ID
Port1
enabled
any
1
Port2
enabled
any
1
Port3
enabled
any
10
Port4
enabled
any
1
Port5
optional
any
1

VLAN案例

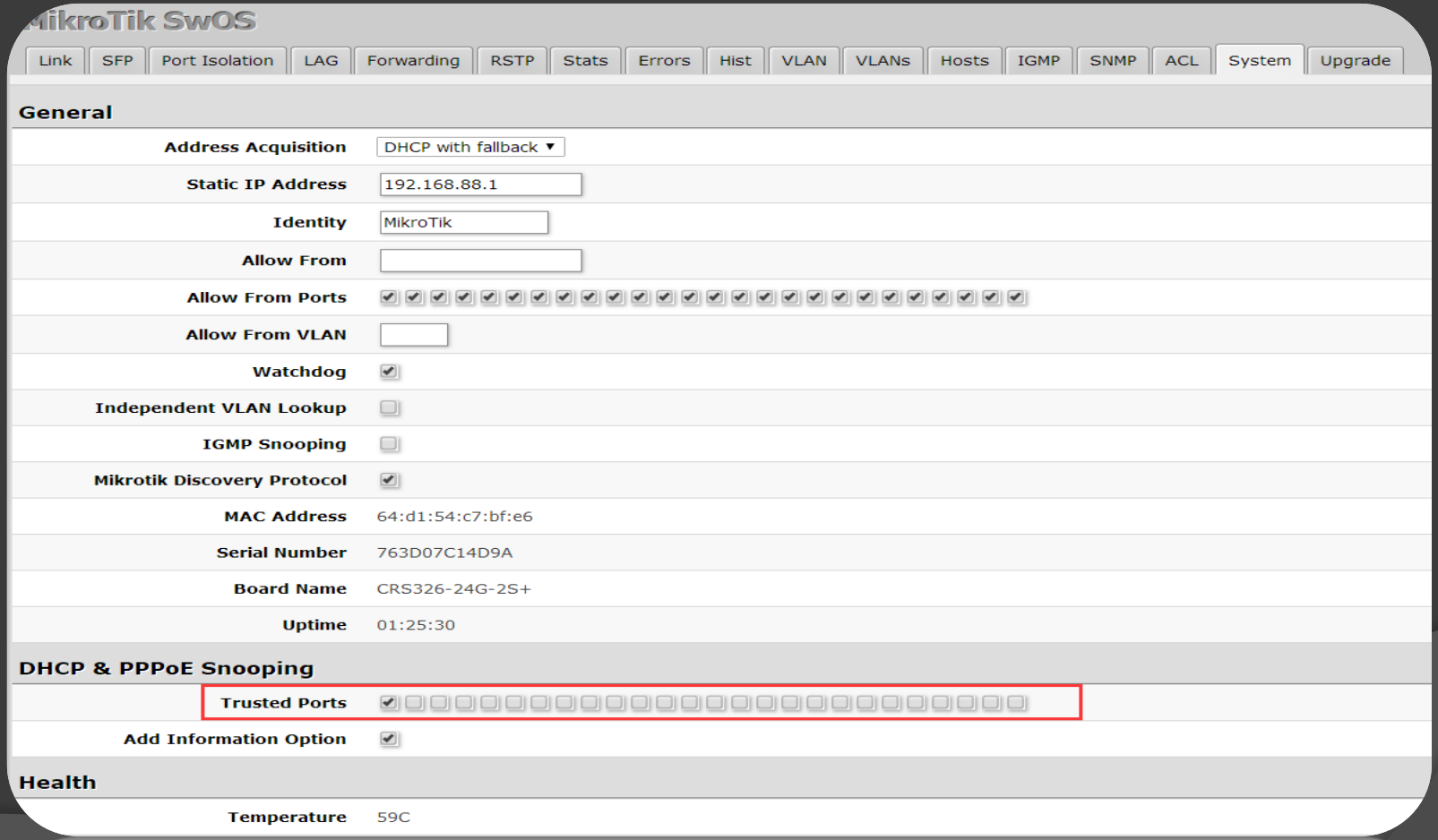

MikroTik SwOS
Link
SFP
Port Isolation
LAG
Forwarding
RSTP
From Port1
From Port2
From Port3
From Port4
From Port5


MikroTik SwOS
Link
SFP
Port Isolation
LAG
Forwarding
RSTP
Stats
From Port1
From Port2
From Port3
From Port4
From Port5

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
10

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
DHCP with fallback
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192.168.88.1
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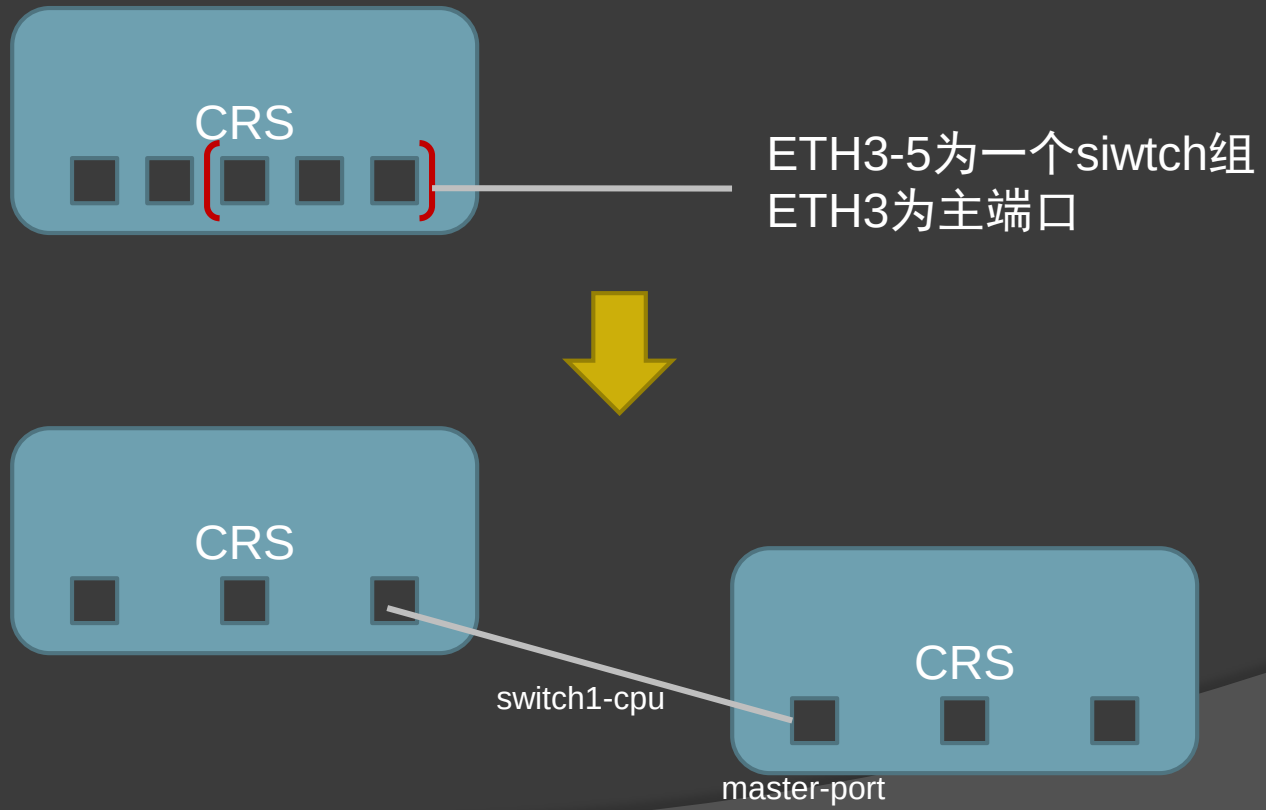
Watchdog
Independent VLAN Lookup
IGMP Snooping
Mikrotik Discovery Protocol
MAC Address
64:d1:54:c7:bf:e6
Serial Number
763D07C14D9A
Board Name
CRS326-24G-2S+
Uptime
01:25:30
DHCP & PPPoE Snooping
Trusted Ports
Add Information Option
Health
Temperature
59C

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

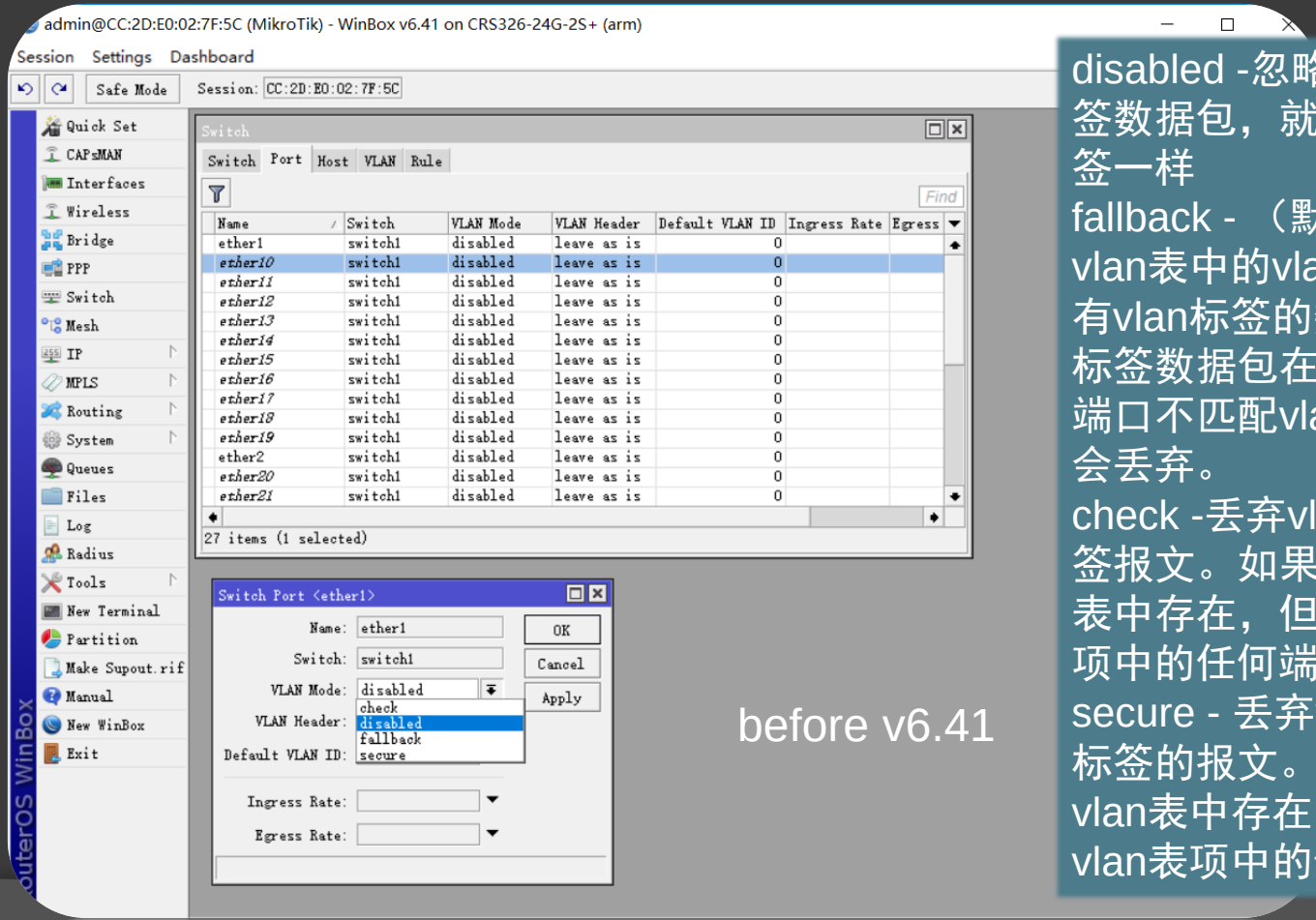
RouterOS——交换芯片组



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



before v6.41

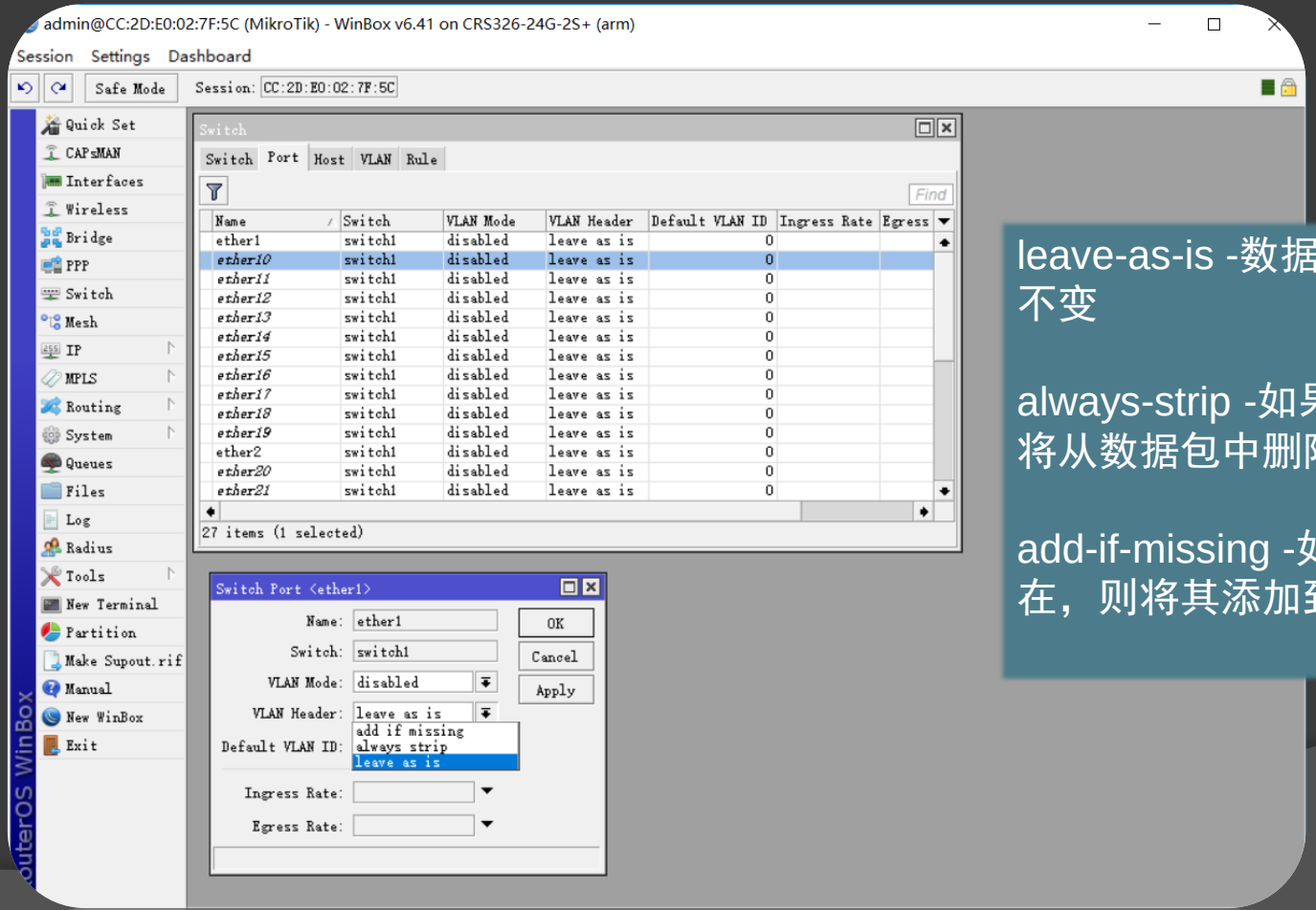
disabled -忽略vlan表，处理vlan标签数据包，就好像它们不包含vlan标签一样

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

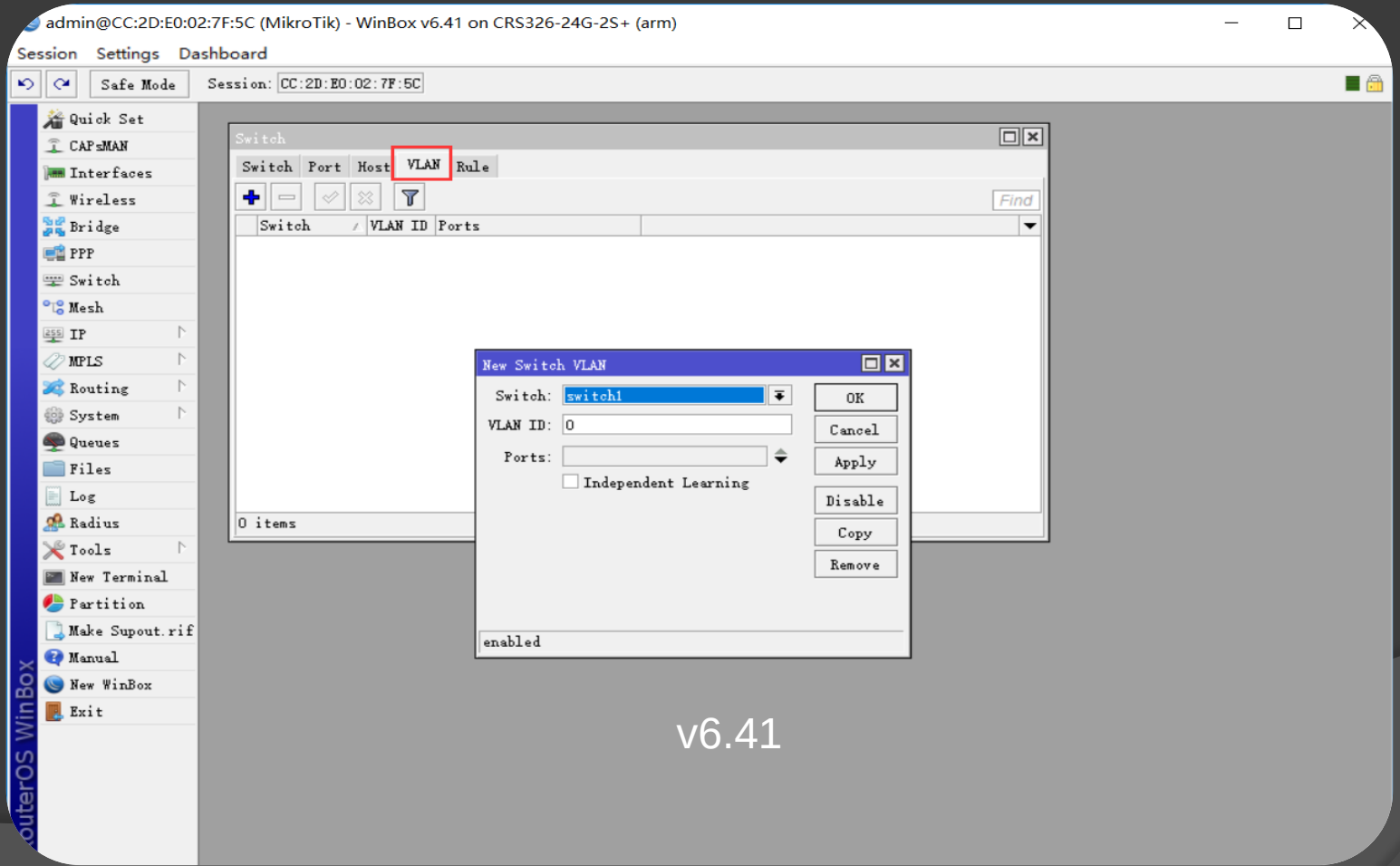


leave-as-is -数据包在出口端口保持不变

always-strip -如果VLAN头存在，它将从数据包中删除

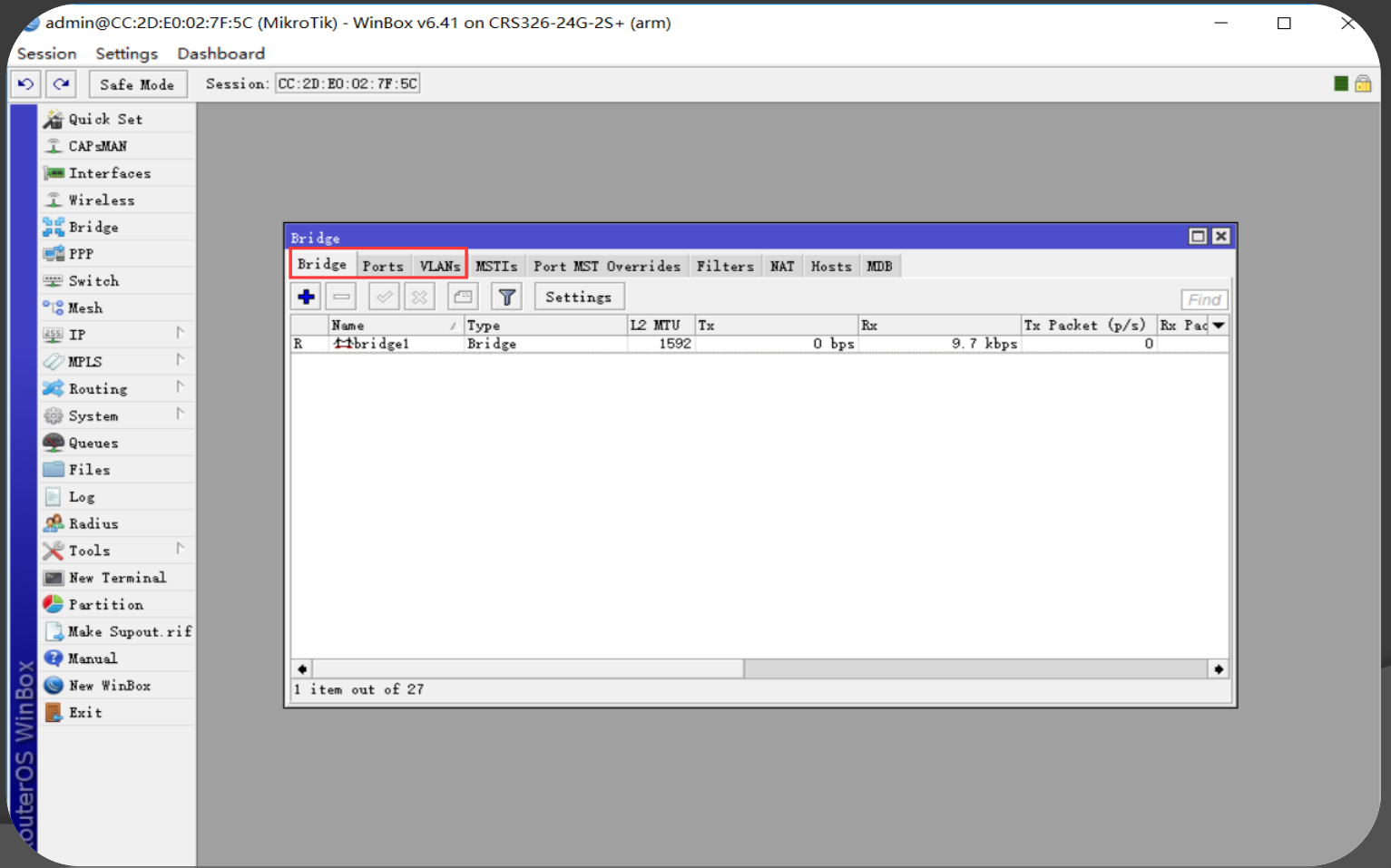
add-if-missing -如果VLAN报头不存在，则将其添加到数据包

RouterOS—— VLAN案例

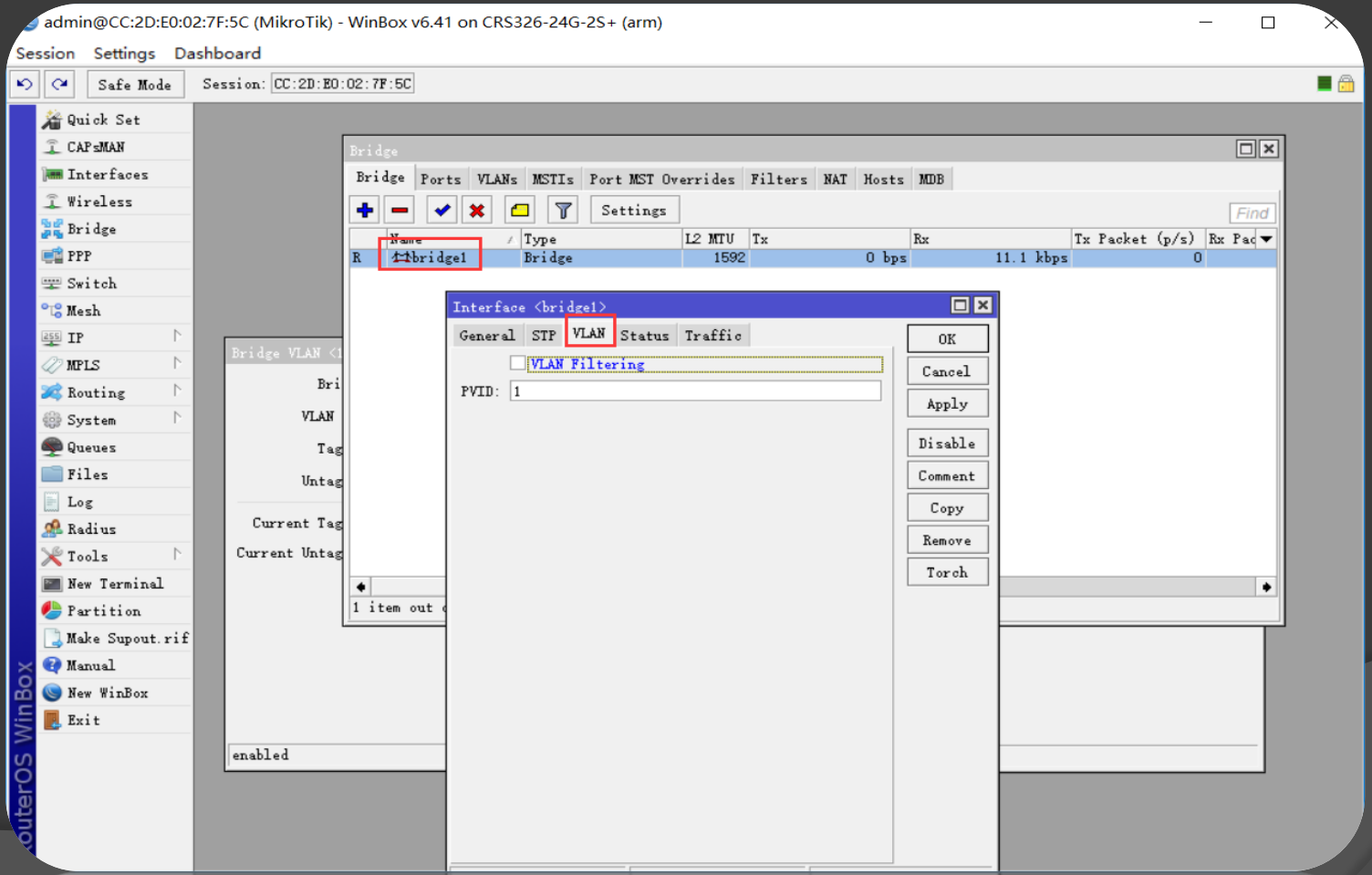


v6.41

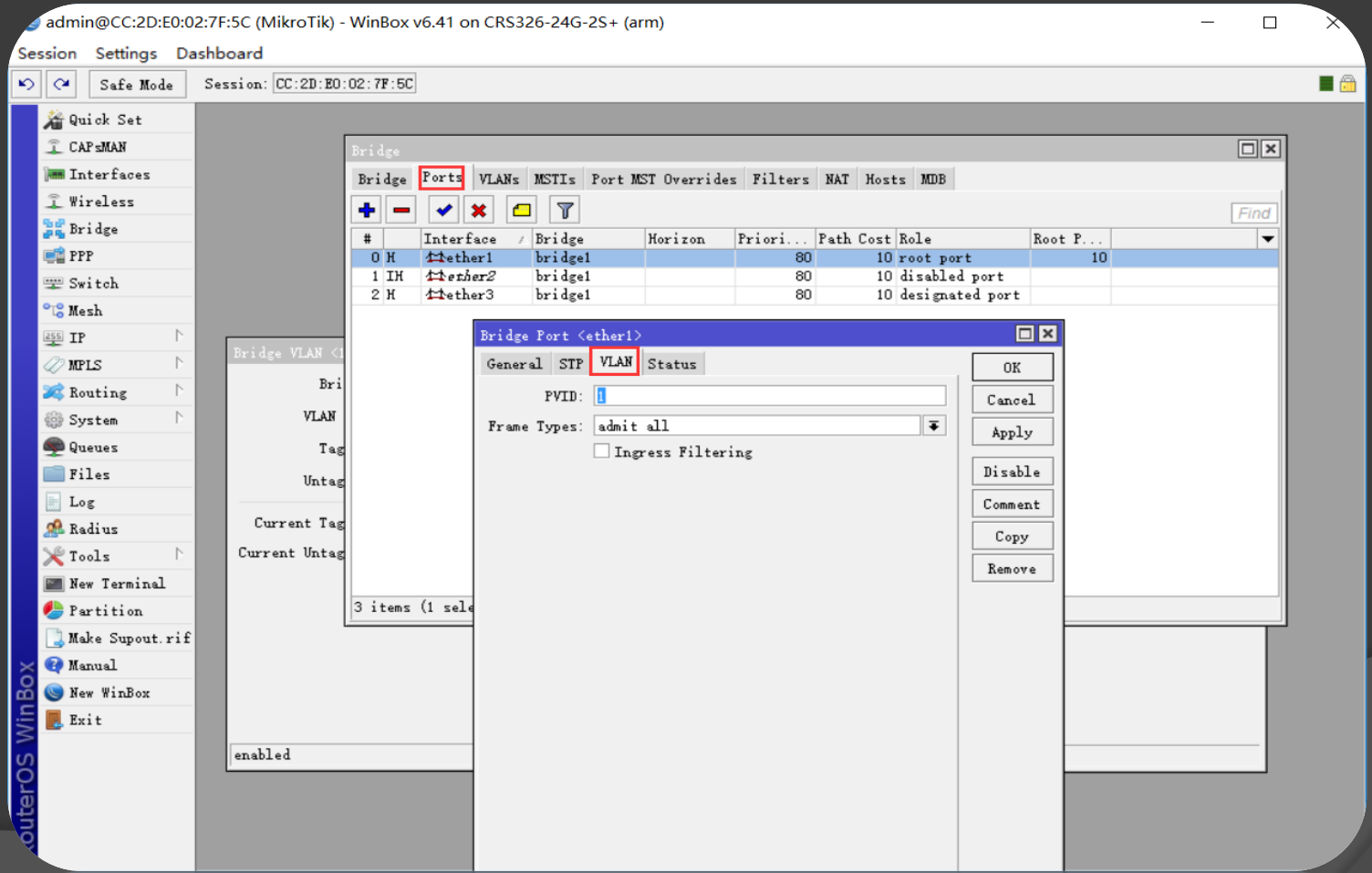
RouterOS—— VLAN案例



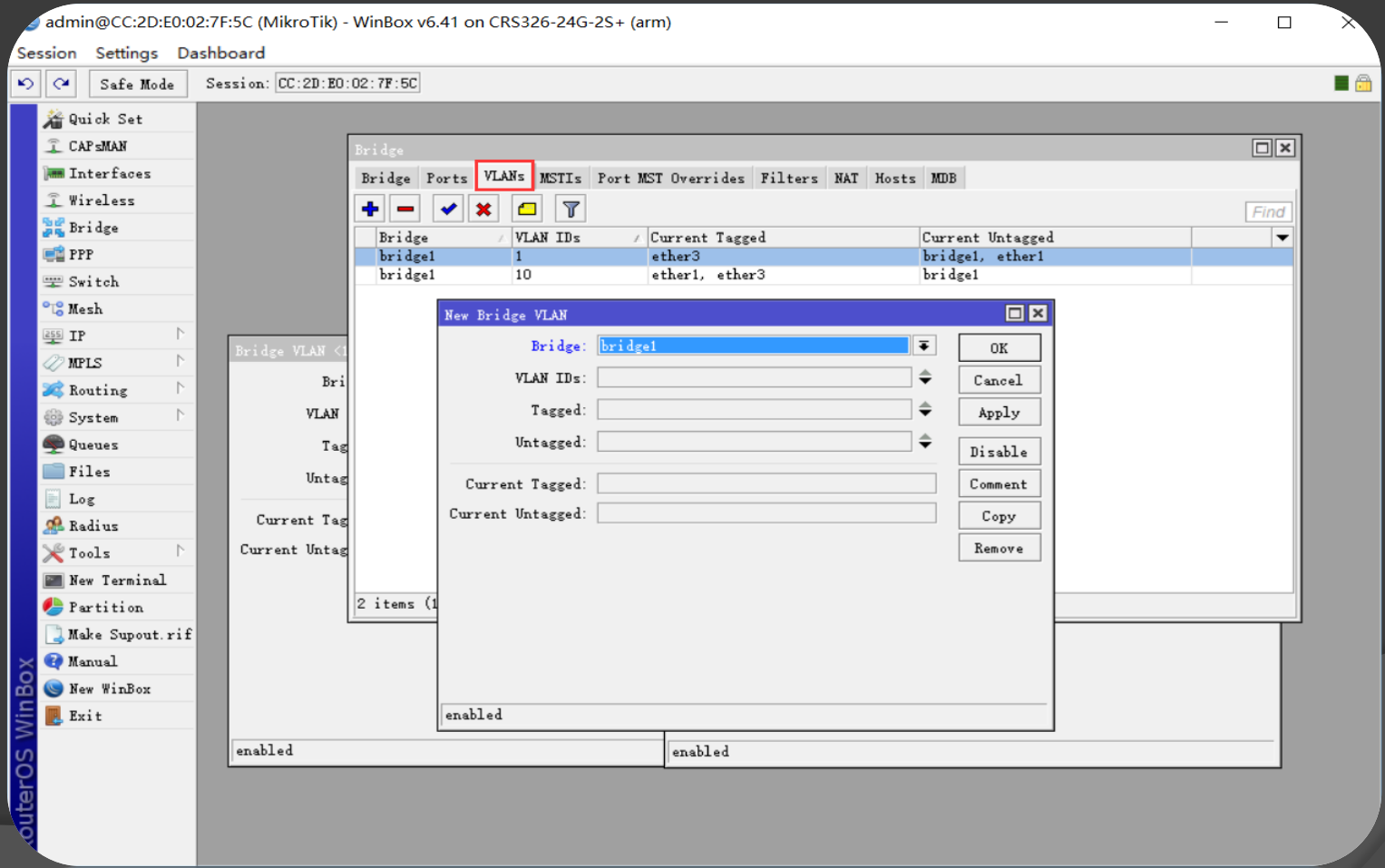
RouterOS—— VLAN案例



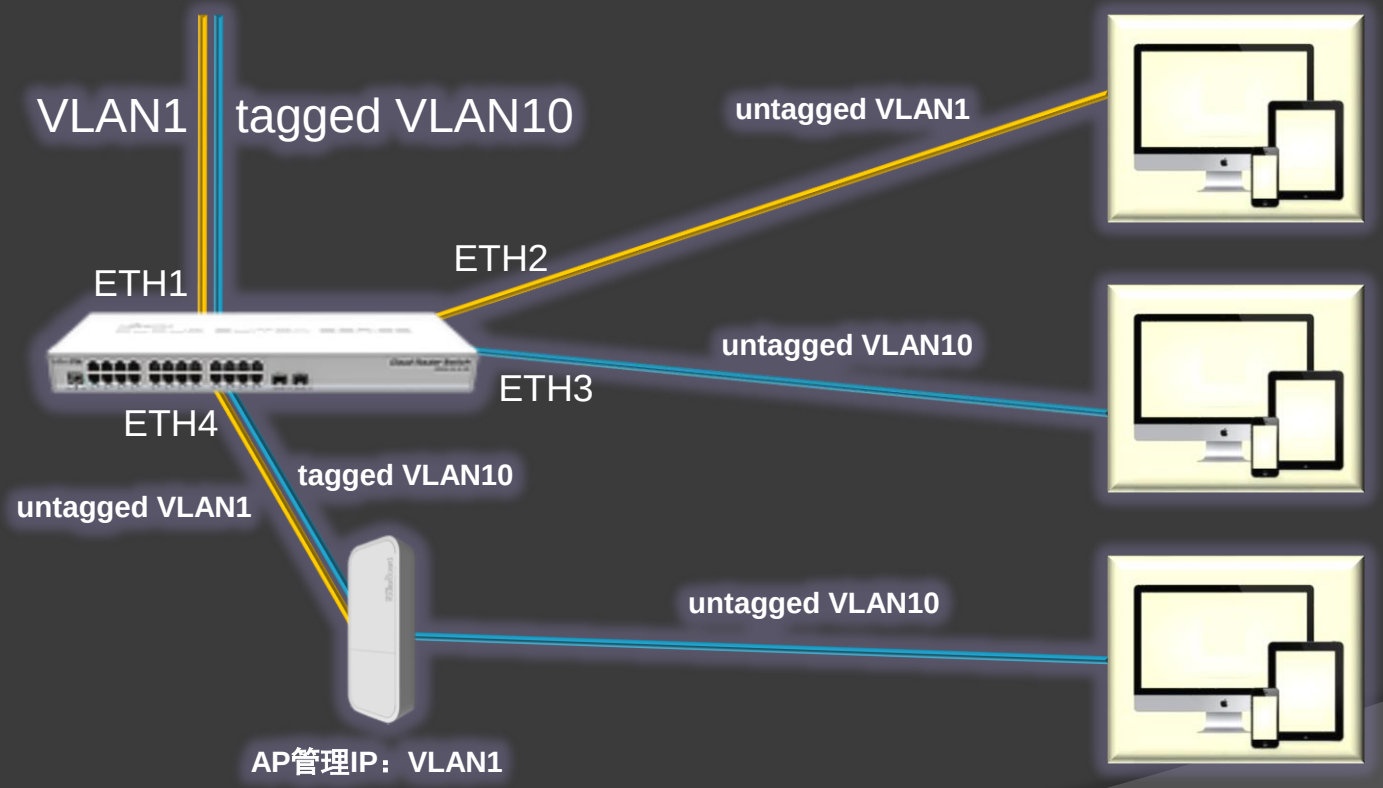
RouterOS—— VLAN案例



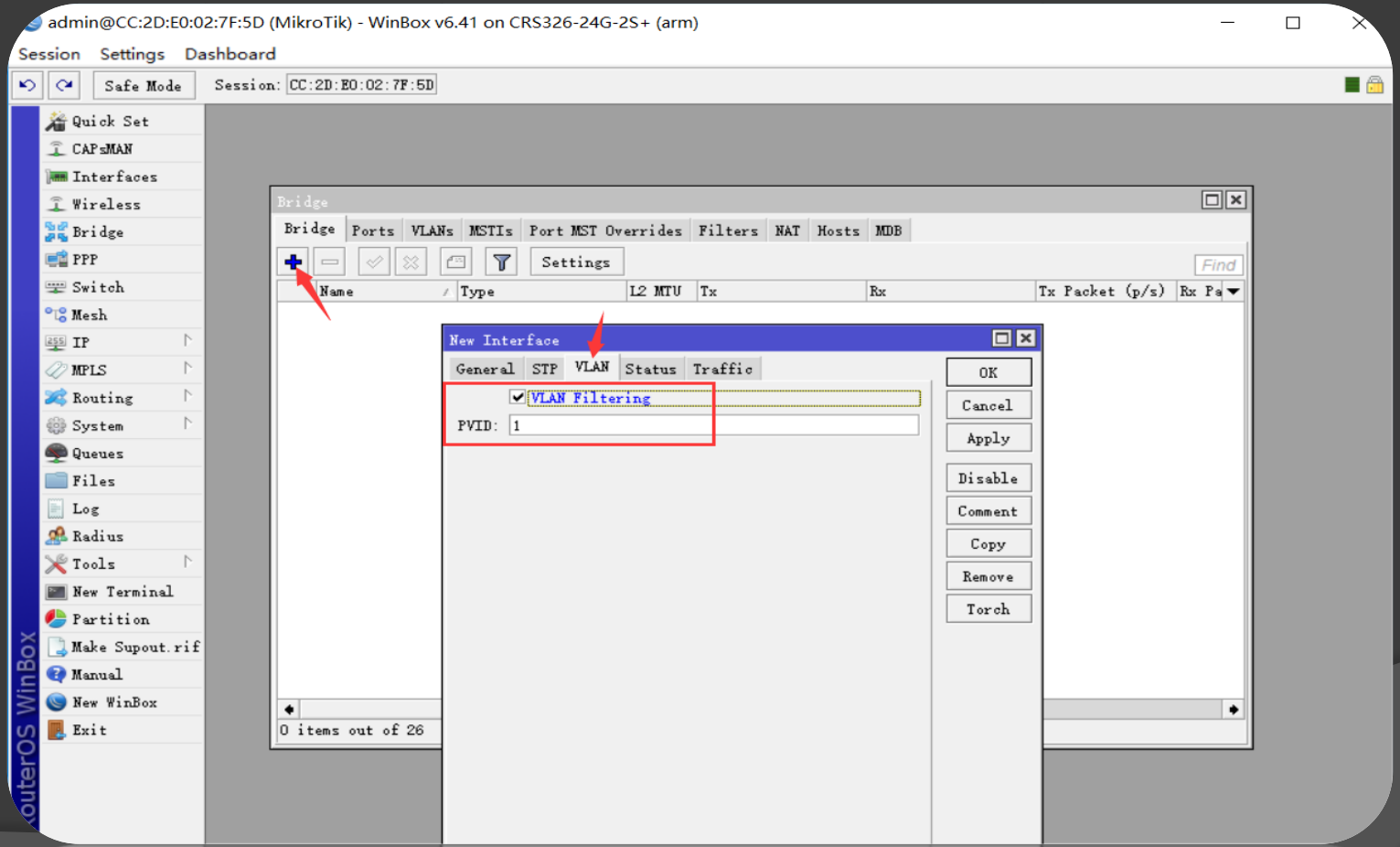
RouterOS—— VLAN案例



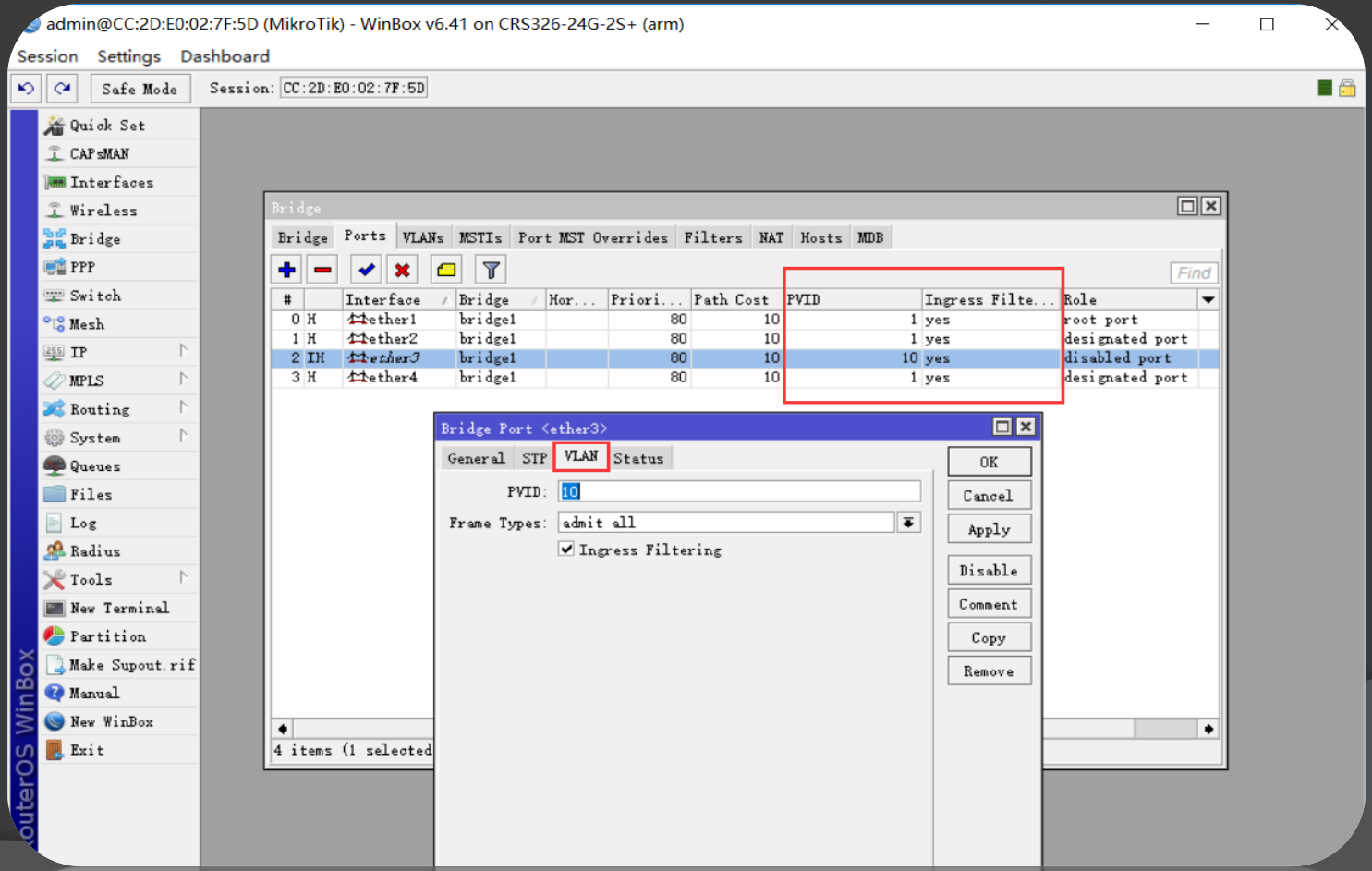
RouterOS—— VLAN案例



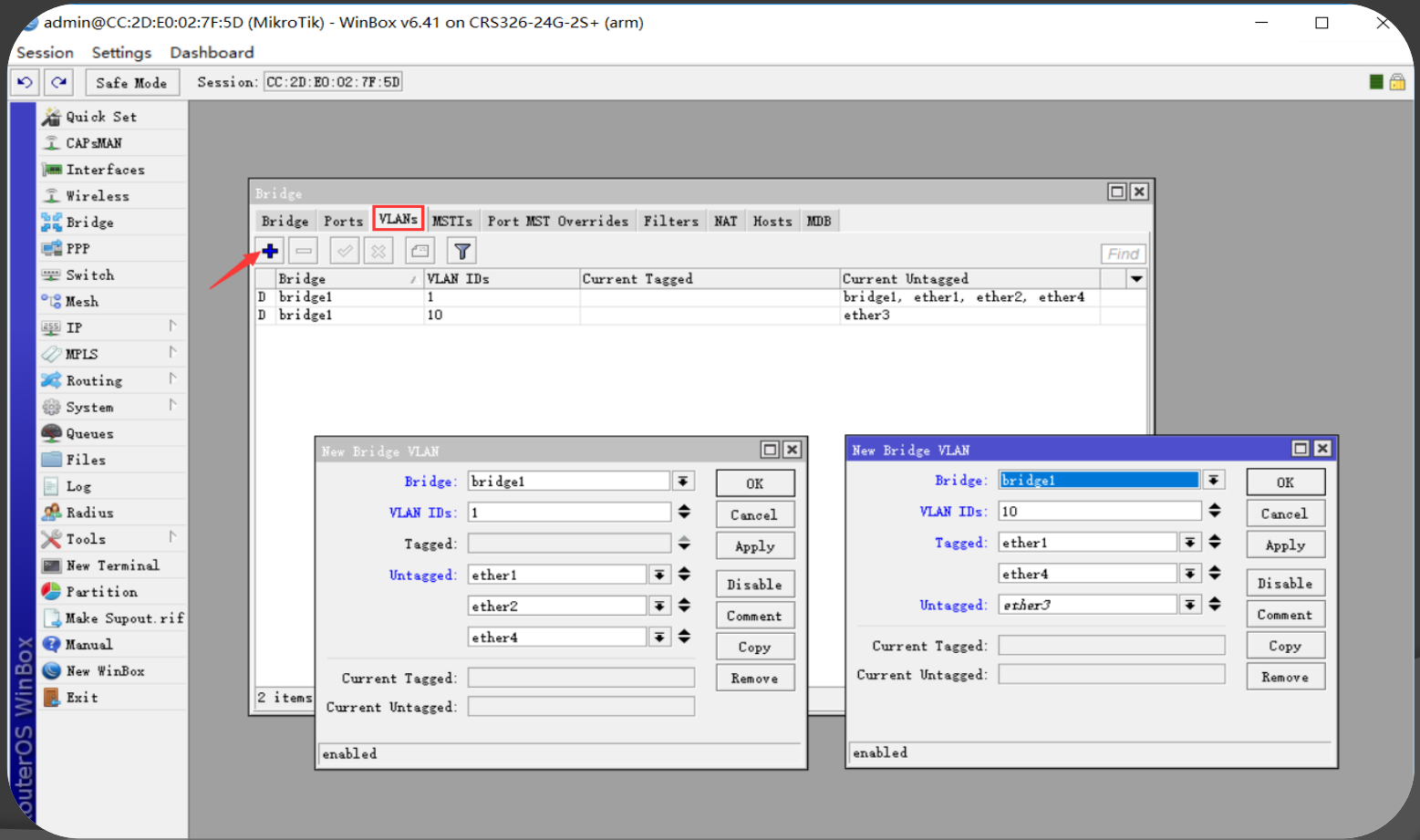
RouterOS—— VLAN案例



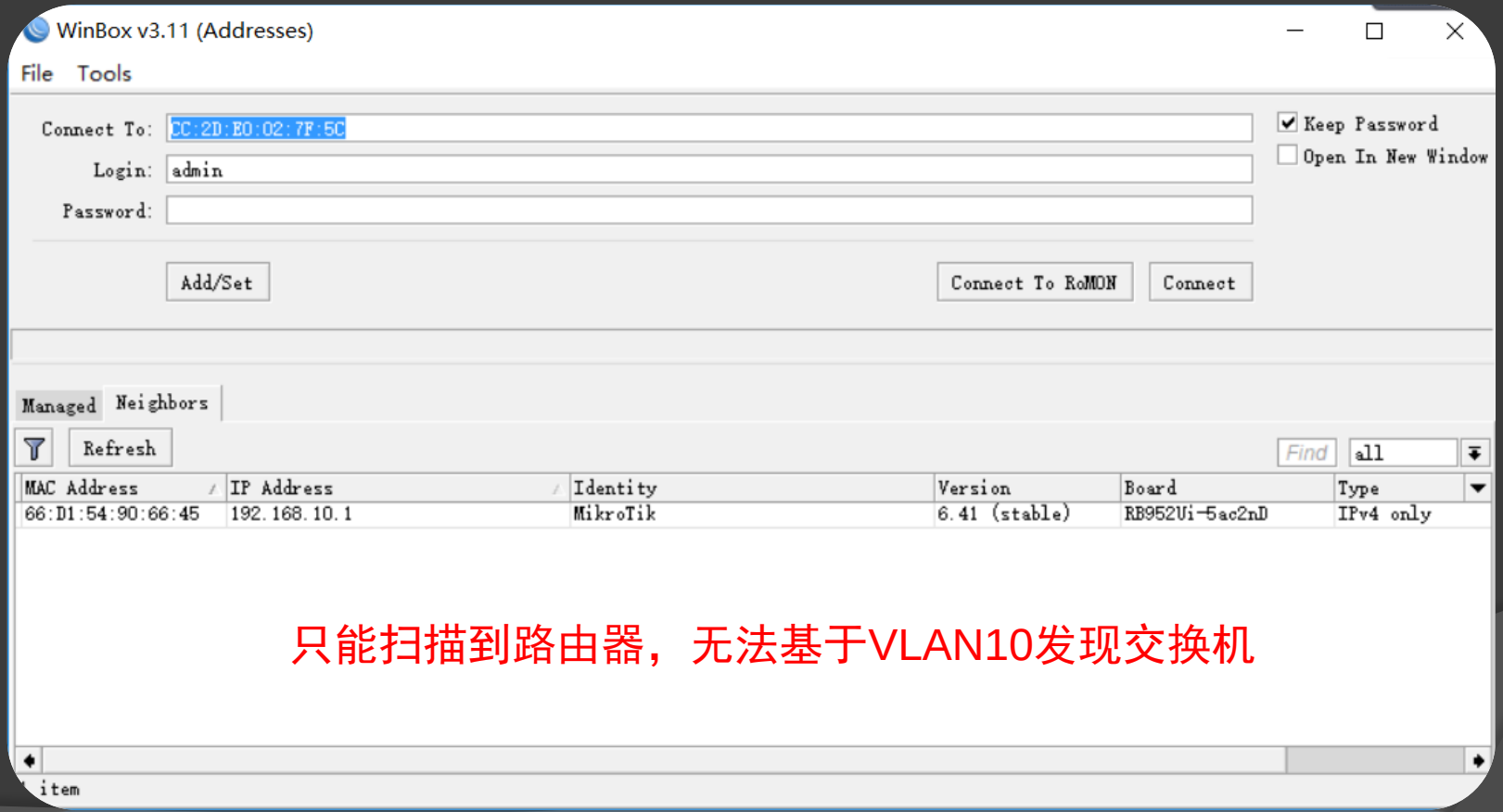
RouterOS—— VLAN案例



RouterOS—— VLAN案例

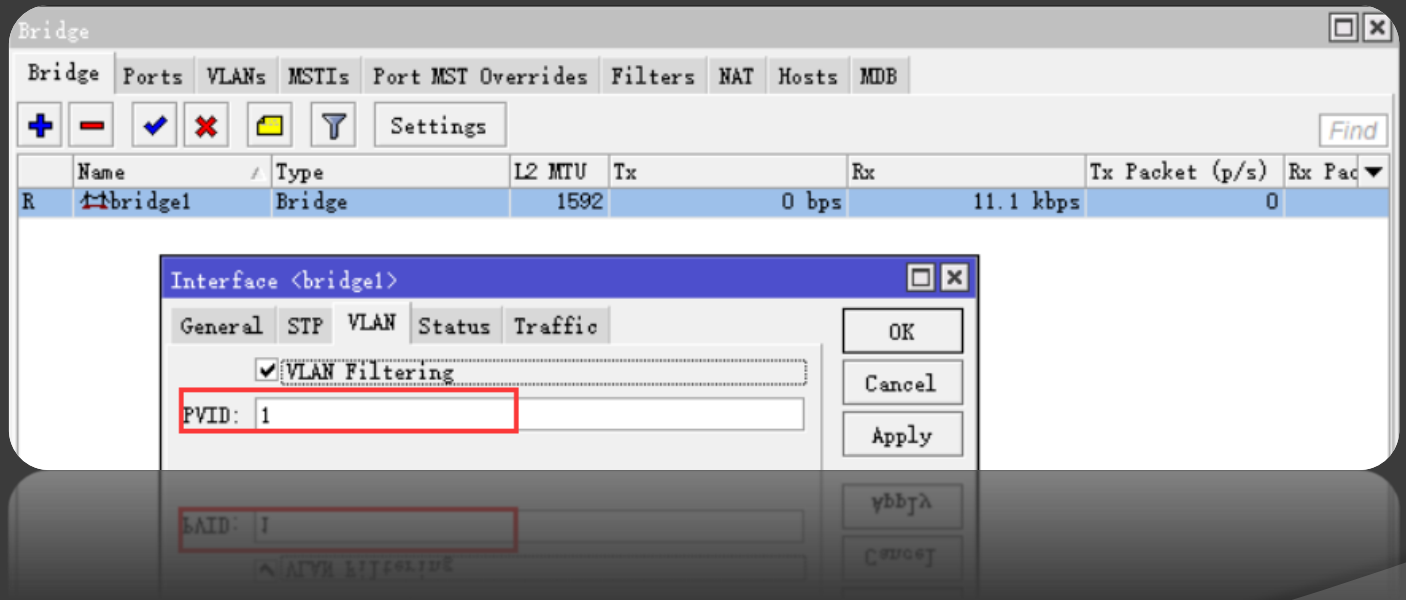


RouterOS—— 管理VLAN设置

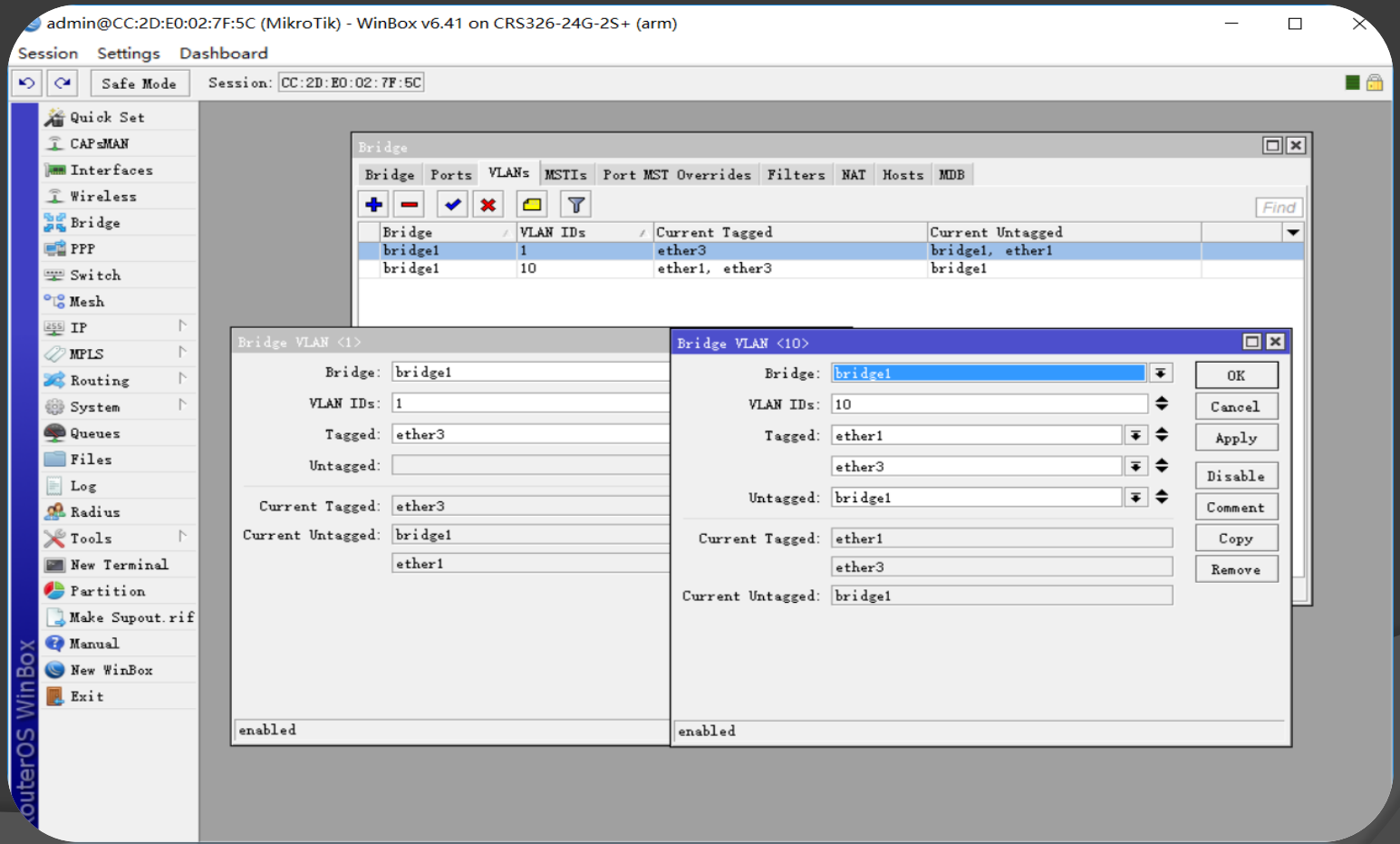


只能扫描到路由器，无法基于VLAN10发现交换机

RouterOS—— 管理VLAN设置



RouterOS—— 管理VLAN设置



谢谢观赏

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