

# 邻居服务及广播流量攻击与防御

## Neighbor and broadcast attack/defense

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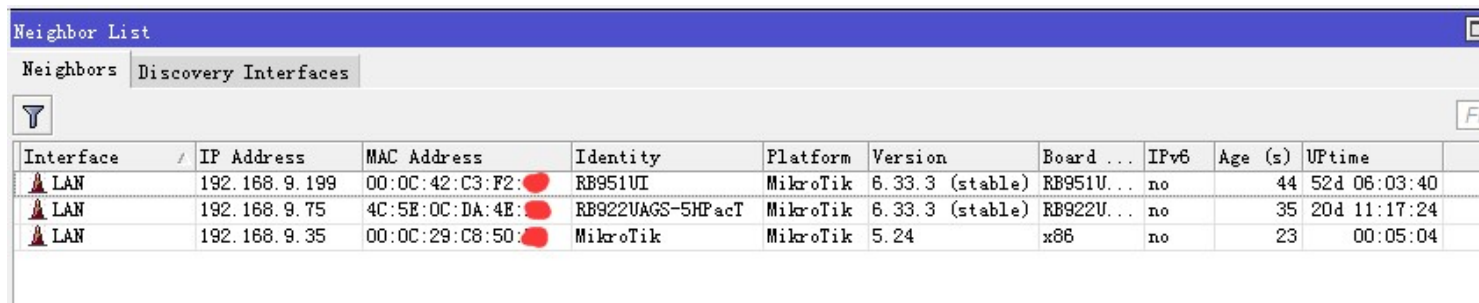
# 一. 邻居服务的简单介绍。

## What is Neighbor in mikrotik

- 1. MikroTik邻居发现协议（MNDP）允许发现同在第2层广播域的其他设备和兼容CDP设备（Cisco发现协议）。
- MikroTik neighbor discovery protocol (MNDP) allows discovery of other devices in the second layer broadcast domain and compatible with CDP devices (Cisco Discovery Protocol)
- 2.例如在同一个广播域中存在RB951， RB941， RB433， UBNT等设备。那么在RB951将可以在邻居菜单里看到RB941， RB433， UBNT等设备， 并且可以显示对应邻居的MAC， IP， 系统标识， 系统版本等信息。
- For example, in the same broadcast domain, there are RB951, RB941, RB433, UBNT, and other devices. Then in RB951 's neighbor menu will see RB941, RB433, UBNT and other devices, and can display the corresponding neighbor's IP, MAC, system identification, system version and other information.

在Mikrotik系统里邻居服务如下图所示。

Neighbor in Mikrotik system is shown in the figure.



The screenshot shows the 'Neighbor List' window in Mikrotik WinBox. It has two tabs: 'Neighbors' and 'Discovery Interfaces'. The 'Neighbors' tab is active, displaying a table of discovered neighbors. The table has columns for Interface, IP Address, MAC Address, Identity, Platform, Version, Board, IPv6, Age (s), and Uptime. There are three rows of data, each with a red status icon in the Identity column.

Interface	IP Address	MAC Address	Identity	Platform	Version	Board ...	IPv6	Age (s)	Uptime
LAN	192.168.9.199	00:0C:42:C3:F2	RB951UI	MikroTik	6.33.3 (stable)	RB951U...	no	44	52d 06:03:40
LAN	192.168.9.75	4C:5E:0C:DA:4E	RB922UAGS-5HPacT	MikroTik	6.33.3 (stable)	RB922U...	no	35	20d 11:17:24
LAN	192.168.9.35	00:0C:29:C8:50	MikroTik	MikroTik	5.24	x86	no	23	00:05:04

## 二. 如何使用该程序来攻击邻居服务。

### How to use the program to attack a neighbor.

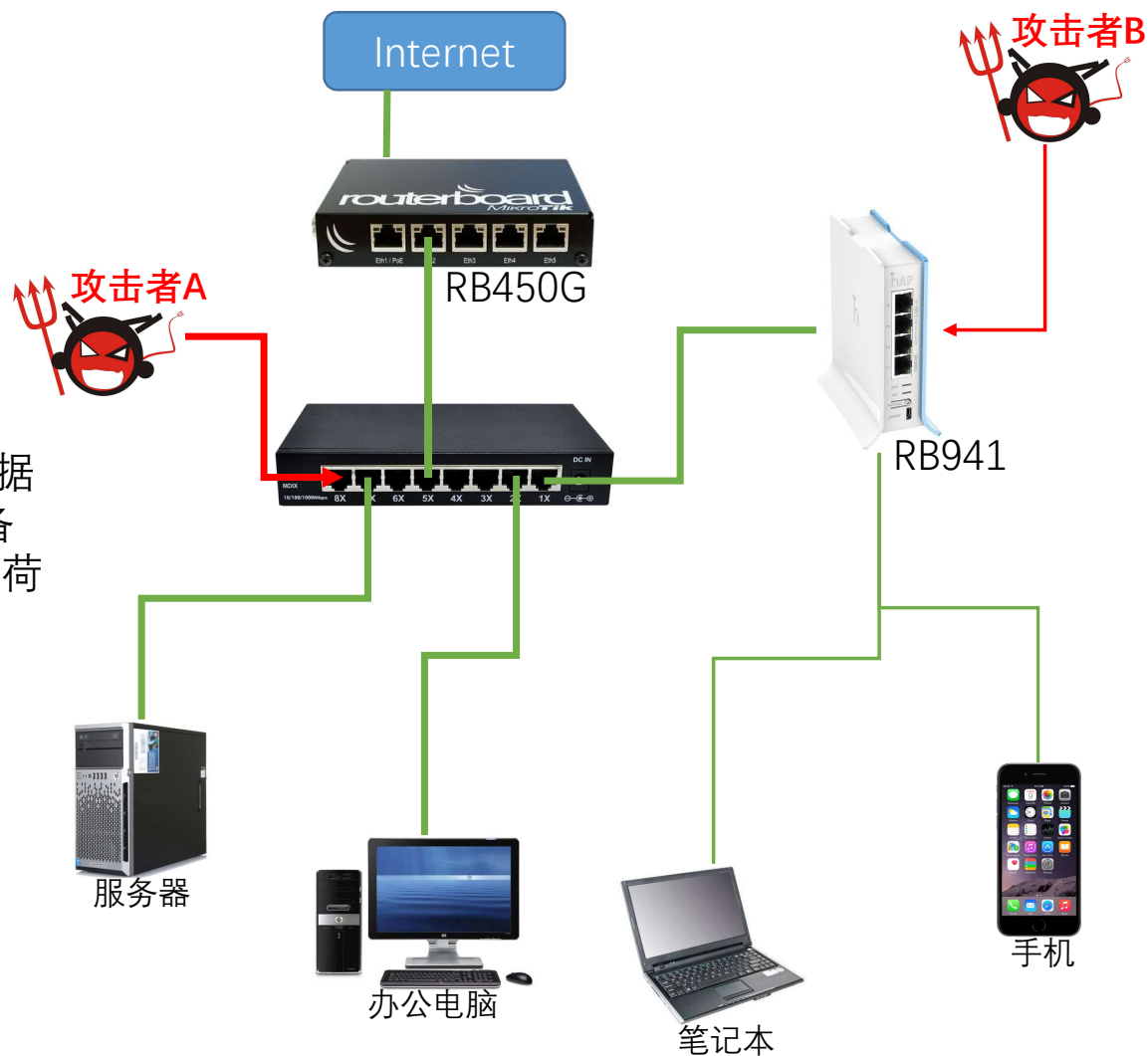
- 1.现在我们已经知道邻居服务的作用，那么假设在同一个广播域里有一个攻击者，模拟邻居服务发送数据包。这样所有的邻居设备都会收到这个数据包，并且记录显示在邻居菜单中。
- Now we know the function of neighbor, then suppose there is an attacker in the same broadcast domain, it is analog neighbor to send data packets. So that all the neighbors will receive the data package records and display in the neighbor menu.
- 2.我们知道，如果邻居服务收到邻居服务包会占用CPU去处理这些信息。那么这个占用量可以被放大到多大呢？
- We know that if a neighbor receives a neighbor's package, it will take CPU to process the information. So how big is the amount of this occupation?

- 3.攻击时除了邻居服务受影响，还会有什么服务受到影响？攻击威力将有多大？
- When a neighbor is attacked, what services will be affected too? Attack power will be how much?
- 4.邻居服务的攻击可以让CPU持续100%负载，同时还有广播包的流量攻击。实测同广播域里的所有RB均会在3秒内失去响应，x86平台的ROS也会CPU负荷极大，甚至将无法逃脱和RB同样结局。
- The neighbor's attack will keep the CPU100% to load, at the same time, there are traffic attacks on broadcast packets.The measured results show that all the RB in the same broadcast domain will lose response within 3 seconds. CPU load of ROS on X86 platform is very great, and will not be able to avoid the same ending like RB.

图中所展示的是一个很常见的单广播域网络。

当攻击者A发起攻击时，RB450G和AP将会迅速瘫痪，从而导致互联网断开。  
假设攻击者A的硬件足够强大，每秒发送足够多的数据包。所有网络所有设备都将瘫痪，包括PC。所有设备将收到大量的广播数据包，所有设备CPU将持续高负荷负载，硬件较差的设备将处于死机状态。

当攻击者B发起攻击时，由于是从无线连接的，所以攻击强度可能不足以瘫痪整个网络，但是也足以让当前网络质量大幅降低。

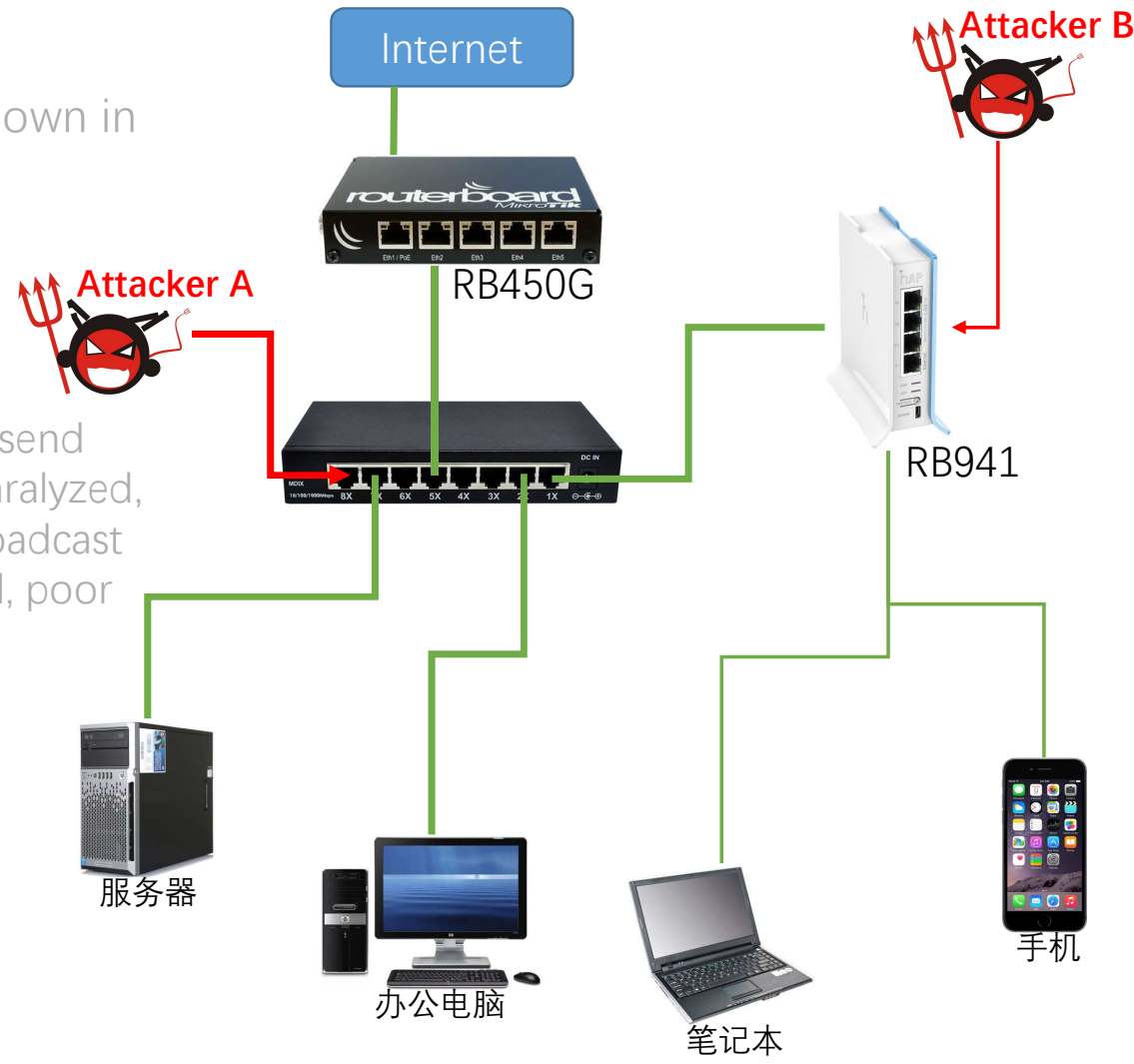


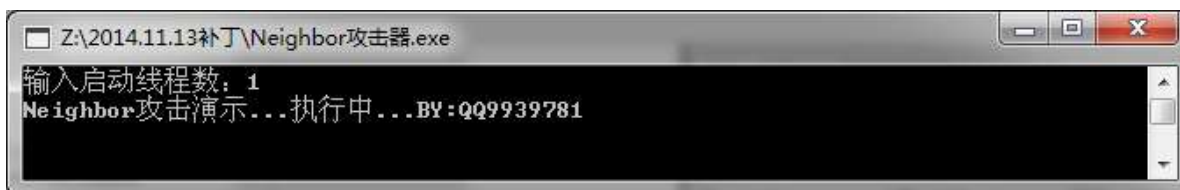
The common single broadcast domain network is shown in the picture.

When an attacker A attacks, RB450G and AP will quickly paralyzed, thus made the Internet to disconnect.

Assume that the attacker A hardware is strong enough to send enough packets per second. All network devices will be paralyzed, including PC. All devices will receive a large number of broadcast packets, all equipment CPU will continue to high load load, poor hardware equipment will be in a state of crash.

When an attacker B attacks, because it is from a wireless connection, so the strength of the attack may not be enough to disable the entire network, but it is enough to make the current network quality significantly reduced.





### Neighbor List

Neighbors | Discovery Interfaces

Find

Interface	IP Address	MAC Address	Identity	Platform	Version	Board ...	IPv6	Age (s)	Uptime
bridge-local	192.168.9.35	00:0C:29:C8:5...	MikroTik	MikroTik	5.24	x86	no	15	00:23:04
bridge-local	192.168.9.75	4C:5E:0C:DA:4...	RB922U...	MikroTik	6.33.3...	RB922U...	no	27	20d 11:35:24
bridge-local	192.168.9.1	00:0C:29:6F:A...	主路由	MikroTik	6.24	x86	no	43	4d 11:40:11
bridge-local	192.168.9.254	96:4D:83:95:7...	MikroTik	MikroTik	9.99	x64	no	1	09:46:05
bridge-local	192.168.9.254	7E:28:1A:2D:B...	MikroTik	MikroTik	9.99	x64	no	1	09:46:05
bridge-local	192.168.9.254	A8:1E:E2:08:4...	MikroTik	MikroTik	9.99	x64	no	3	09:46:05
bridge-local	192.168.9.254	24:46:2C:DE:2...	MikroTik	MikroTik	9.99	x64	no	1	09:46:05
bridge-local	192.168.9.254	BA:CE:52:16:5...	MikroTik	MikroTik	9.99	x64	no	3	09:46:05
bridge-local	192.168.9.254	93:53:E8:9E:8...	MikroTik	MikroTik	9.99	x64	no	2	09:46:05
bridge-local	192.168.9.254	86:80:C1:33:6...	MikroTik	MikroTik	9.99	x64	no	1	09:46:05
bridge-local	192.168.9.254	02:B7:0A:50:4...	MikroTik	MikroTik	9.99	x64	no	12	09:46:05
bridge-local	192.168.9.254	99:40:30:97:3...	MikroTik	MikroTik	9.99	x64	no	2	09:46:05
bridge-local	192.168.9.254	71:D4:1C:21:A...	MikroTik	MikroTik	9.99	x64	no	1	09:46:05
bridge-local	192.168.9.254	AB:01:E5:A5:3...	MikroTik	MikroTik	9.99	x64	no	3	09:46:05
bridge-local	192.168.9.254	D0:38:C8:9A:2...	MikroTik	MikroTik	9.99	x64	no	5	09:46:05
bridge-local	192.168.9.254	67:7A:54:18:4...	MikroTik	MikroTik	9.99	x64	no	1	09:46:05

3893 items out of 16968

Uptime: 52d 06:22:21

Free Memory: 95.7 MiB

Total Memory: 128.0 MiB

CPU: MIPS 74Kc V4.12

CPU Count: 1

CPU Frequency: 600 MHz

CPU Load: 100 %

Free HDD Space: 99.8 MiB

Total HDD Size: 128.0 MiB

tes Since Reboot: 22 318

al Sector Writes: 675 628

Bad Blocks: 0.0 %

### Interface List

Interface Ethernet | EoIP Tunnel | IP Tunnel | GRE Tunnel | VLAN | VRRP | Bonding | LTE

Power Cycle

Name	Type	MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	Master..
RS ether1	Ethernet	1500	1598	549.2 kbps	41.7 Mbps	52	38 713	none
S ether2	Ethernet	1500	1598	0 bps	0 bps	0	0	none
S ether3	Ethernet	1500	1598	0 bps	0 bps	0	0	none
S ether4	Ethernet	1500	1598	0 bps	0 bps	0	0	none
S ether5	Ethernet	1500	1598	0 bps	0 bps	0	0	none



- 5.以上图片充分展示了攻击威力之强大。
- These pictures fully demonstrate the power of attack is very powerful
- 6.同时被攻击的不止这一台RB951设备，而是整个广播域里的所有设备，包含非ROS系统的设备。（不具备邻居服务的设备会受到广播包流量攻击。具备邻居服务的设备会受到双重攻击。）
- At the same time it is attacked more than one RB951 device, but the entire broadcast domain of all equipment , and contain the device which not installed ROS system.( the equipment without neighbor will be attacked by broadcast packets. the equipment with neighbor will going to be double under attack.)
- 7.在普通网络环境中使用该程序进行攻击，和攻击者处于同一广播域的网络将极有可能瘫痪。
- In the common network environment to use the program to attack, the Internet with an attacker in the same broadcast domain is likely to be paralyzed.

### 三.邻居攻击数据包结构。

### Neighbor attack packet structure.

1.邻居数据包由MAC, 系统标识, 系统版本, 品牌, 序列号, 设备名, 广播接口名组成。neighbor data package comprise by MAC, system identity, system version, brand, serial number, device name, broadcast interface name 。

The image shows a Wireshark packet capture analysis of a Neighbor Discovery Protocol (NDP) packet. The packet list pane shows two UDP packets from 192.168.9.1 to 255.255.255.255. Packet 73 is selected, showing its details and raw bytes.

编号	绝对时间	源	目标	协议	大小	解码字段	概要
53	15:29:52.519968	192.168.9.1:5678	255.255.255.255:5678	UDP	130		源端口=5678;目标端口=5678;长度=92;检...
73	15:29:58.283384	192.168.9.199:55785	255.255.255.255:5678	UDP	160		源端口=55785;目标端口=5678;长度=122;...

UDP - 用户数据报协议 [UDP - User Datagram Protocol]:	[34/8]				
源端口 [Source port]:	55785	[34/2]	RB951UI	6.33.3(stable)	Mikrotik
目标端口 [Destination port]:	5678	[36/2]			
长度 [Length]:	000C42C3F26F	122	[38/2]	9JZU-X7JM	RB951UI-2HnD
校验和 [Checksum]:	000C42C3F26F	0x5941	(正确)	[40/2]	
额外数据 [Extra Data]:		[42/114]			
字节数 [Number of Bytes]:		114 bytes	[42/114]	bridge-local	
FCS - 帧校验序列 [FCS - Frame Check Sequence]:					

```
0000 FF FF FF FF FF 00 0C 42 C3 F2 6F 08 00 45 00 00 8E 00 00 40 00 40 11 6F F0 C0 A8 09 C7 FF FF FF FF D9 E9 16 2E 00 7A 59 41 00 00 03 BC 00 01
0030 00 06 00 0C 42 C3 F2 6F 00 05 00 07 52 42 39 35 31 55 49 00 07 00 0F 36 2E 33 33 2E 33 20 28 73 74 61 62 6C 65 29 00 08 00 08 4D 69 6B 72 6F 54
0060 69 6B 00 0A 00 04 A1 C9 45 00 00 0B 00 09 39 4A 5A 55 2D 58 37 4A 4D 00 0C 00 0C 52 42 39 35 31 55 69 2D 32 48 6E 44 00 0E 00 01 00 00 10 00 0C
0090 62 72 69 64 67 65 2D 6C 6F 63 61 6C
```

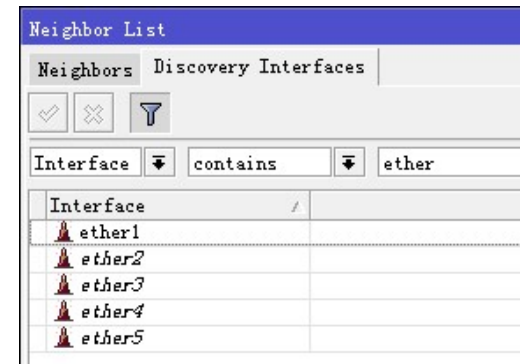
.....B.o.E.....@.o.....zYA.....  
.....B.o.....RB951UI.....6.33.3 (stable).....MikroT  
ik,.....E.....9JZU-X7JM.....RB951Ui-2HnD.....  
bridge-local

## 四. 如何防御邻居服务攻击。 How to defense Neighbor attack.

- 1.以下防范邻居服务攻击的方法
- The following is the way to guard against neighbor attacks.

Mikrotik邻居服务使用UDP 5678端口。我们可以关闭邻居服务里的所有接口。这样即使收到邻居服务的数据包也不会进行处理。(/ip neighbor discovery disable [find])

Mikrotik neighbor using UDP 5678 port. We can shut down all the interfaces of our neighbor's . Even if a packet is received from a neighbor, it will not be processed.



- 2.以下为防范广播流量攻击的方法
- The following is the way to preventing broadcast traffic attack

防御广播流量攻击需要使用交换机进行广播域隔离，或使用3层交换转发至路由。如果使用802.1Q VLAN到路由,流量将仍然会转发到上级设备。

- Defense broadcast traffic attacks require the use the switch for broadcast domain isolation, or use the 3 layer switch to forward to the routing. If use VLAN 802.1Q to the route, traffic will still be forwarded to the superior device.

对于目前只有普通交换机的环境里，如果改变现有网络结构大家一定觉得很不方便，并且会有一些连带的设备需要改变配置，工作量很大。

For the current environment of the common switch, if you change the existing network structure, we must find it very inconvenient, and there will be some of the equipment needs to change the configuration, add a lot of work.

大家一定想知道有没有更简单的防御方法，当然有！

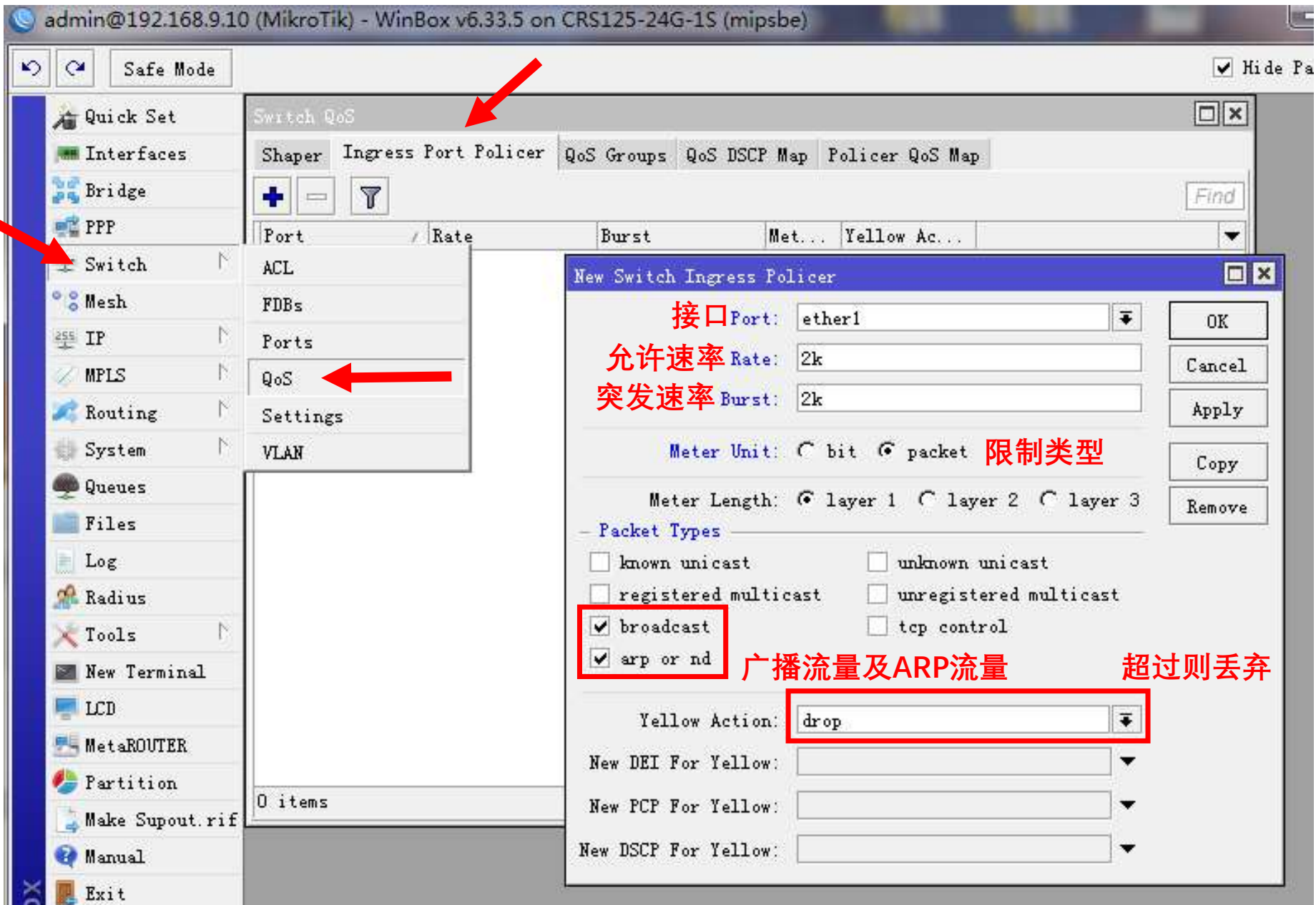
We all want to know that there is no more simple way to defend this, of course!

现在只需要将普通交换机更换为CRS就可以轻松防御这种广播攻击。有多轻松呢？3秒完工！

Now only need to replace the common switch to CRS can easily defend against such a broadcast attack. How easy is it? 3 seconds to complete!

我们先来看看CRS是如何防御这类攻击的。

Let's take a look at how CRS's defense against this type of attack.



说好的3秒完工的方式如下

Following that the completion of the way of 3 seconds

运行以下脚本就可轻松实现全接口防御广播流量攻击

Run the script can easily achieve full interface radio traffic attack defense

```
:foreach interid in=[/interface ethernet find ] do={  
:global interna [/interface ethernet get $interid name]  
/interface ethernet switch ingress-port-policer add burst=2k meter-  
unit=packet packet-types=arp-or-nd,broadcast port=$interna rate=2k}
```

## 五. 公开编译好的程序及程序源码。

make public the compiled program and the program source code.

- 1.程序采用VB.NET编写，支持并发启动多个攻击线程。启动的攻击线程越多，造成的攻击效果越大。（公开的源码仅支持单线程。）
- Program using VB.NET constructed, Supports the simultaneous launch of 1 to 4 attack threads. The more attacking thread is started, the bigger the attack effect is. ( Open source only supports single thread )
- 2.发送的数据包内容由伪造MAC地址加系统名称等固定信息。
- The content of the data packet is composed of the forged MAC address and the system name.



- 3.将伪造好的数据包发送到255.255.255.255完成最后攻击步骤。
- The forged packets are sent to 255.255.255.255 to complete the final attack step.
  
- 由于幻灯片不便展示过长的源码内容及编译好的程序，有需要的观众可以与我联系获取。
- Due to the inconvenience of showing too long the source content and compile the program, there is a need for the audience can contact me to get.

谢谢观看！

Thanks for watching !