多线路路由

电信网通双线
同ISP多线路
复合应用
VPN借线

NAT ALL 图大科技 www.mikrotik.com.cn

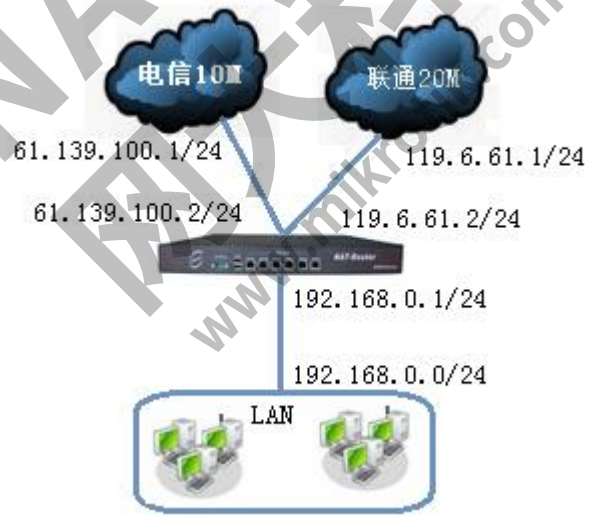
RouterOS的路由功能主要为：

基于源地址的路由
基于目标地址的路由
基于端口的路由
基于负载均衡的路由
基于端口的负载均衡

NATALL 朗大科技 www.mikrotik.com.cn

电信网通双线

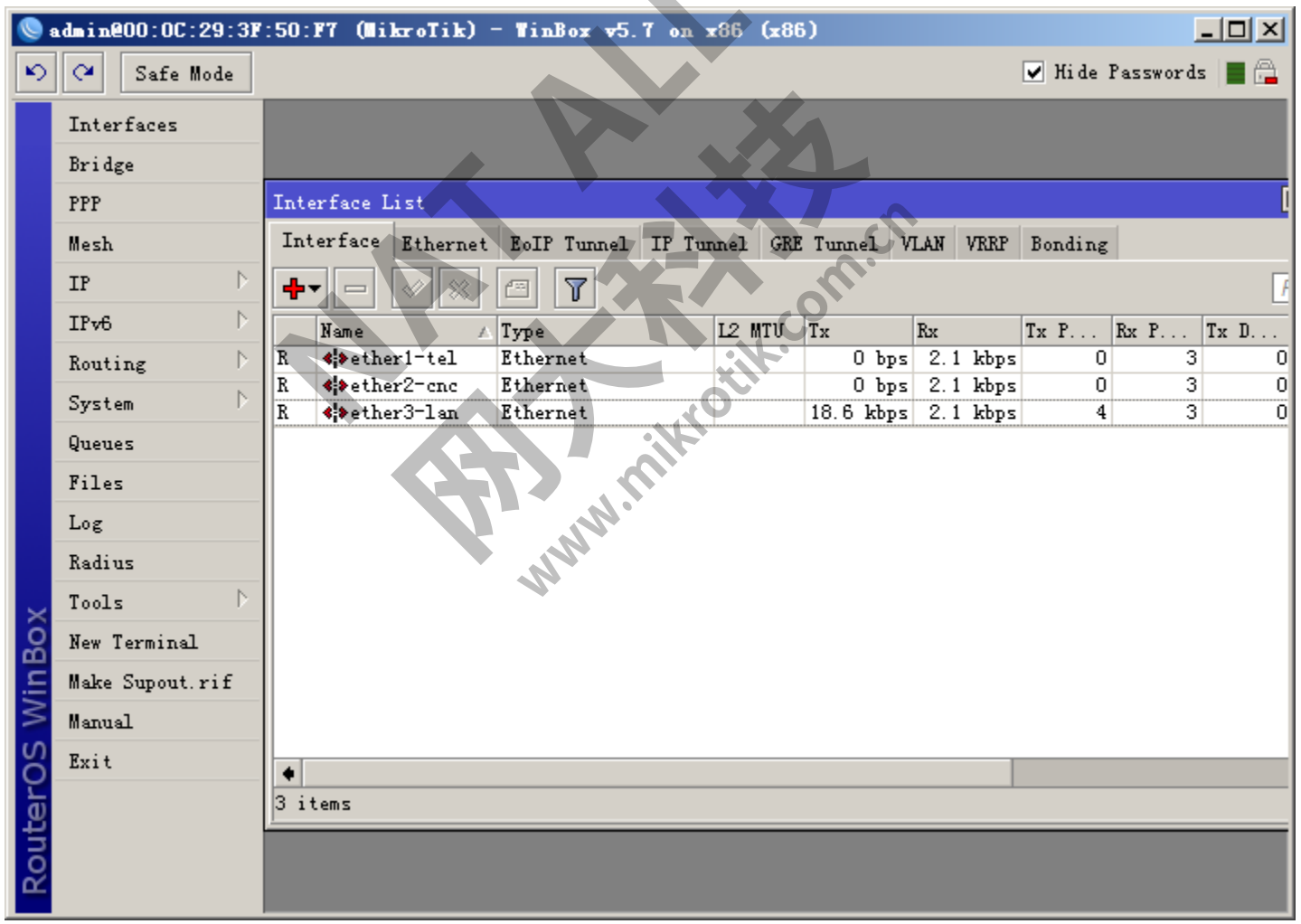
电信网通双线路一般选择带宽较大的线路做主线路，导入较小带宽类型的路由表，让数据根据目标地址来选择线路



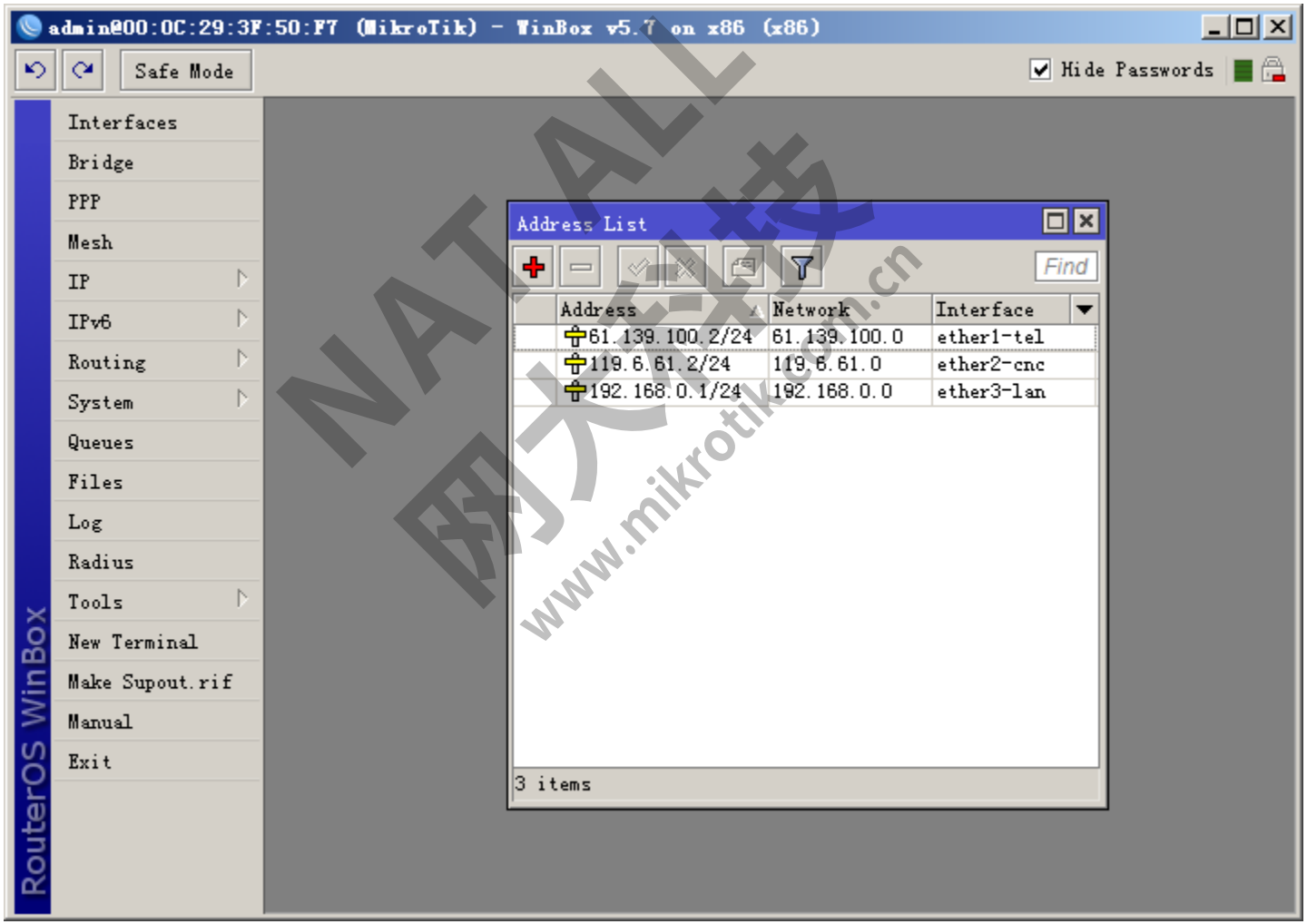
NAT ALL 网关科技 www.mikrotik.com.cn

基础网络设置

设置网卡

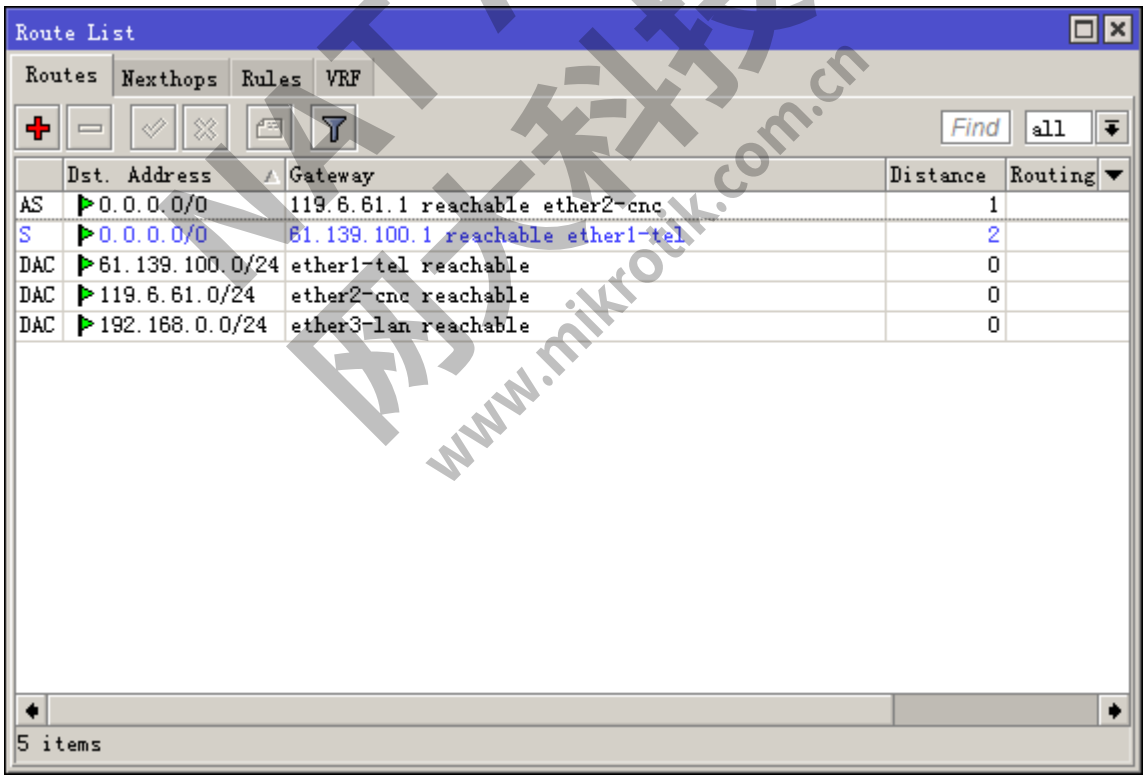

admin@00:0C:29:3F:50:F7 (MikroTik) - WinBox v5.7 on x86 (x86)
Safe Mode
Hide Passwords
Interfaces
Bridge
PPP
Mesh
IP
IPv6
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Make Supout.rif
Manual
Exit
RouterOS WinBox
Interface List
Interface
Ethernet
EoIP Tunnel
IP Tunnel
GRE Tunnel
VLAN
VRRP
Bonding
Name
Type
L2 MTU
Tx
Rx
Tx P...
Rx P...
Tx D...
R ether1-tel Ethernet 0 bps 2.1 kbps 0 3 0
R ether2-cnc Ethernet 0 bps 2.1 kbps 0 3 0
R ether3-lan Ethernet 18.6 kbps 2.1 kbps 4 3 0
3 items

设置IP地址


admin@00:0C:29:3F:50:F7 (MikroTik) - WinBox v5.7 on x86 (x86)
Safe Mode
Hide Passwords
Interfaces
Bridge
PPP
Mesh
IP
IPv6
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Make Supout.rif
Manual
Exit
RouterOS WinBox
Address List
Find
Address
Network
Interface
61.139.100.2/24
61.139.100.0
ether1-tel
119.6.61.2/24
119.6.61.0
ether2-cnc
192.168.0.1/24
192.168.0.0
ether3-lan
3 items

设置路由

先添加一条网关为联通的默认路由，distance=1，再添加一条网关为电信，distance=2的路由，这样当联通线路出现问题的时候，电信就会自动切换成默认路由。

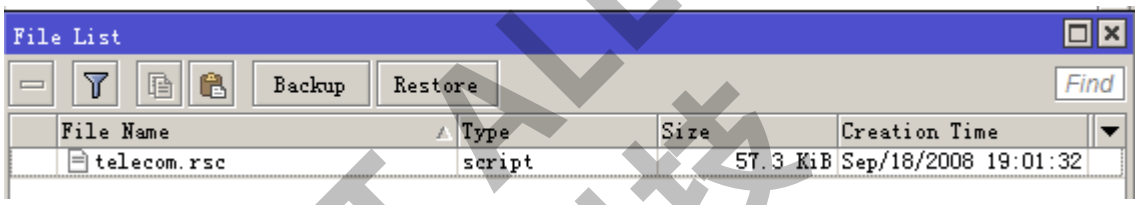


然后添加NAT规则

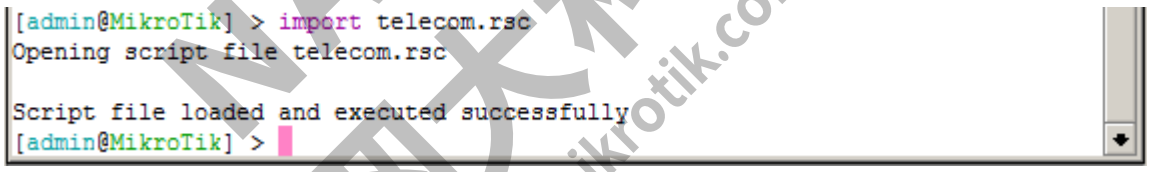
NAT ALL 网友科技 www.mikrotik.com.cn

导入路由表

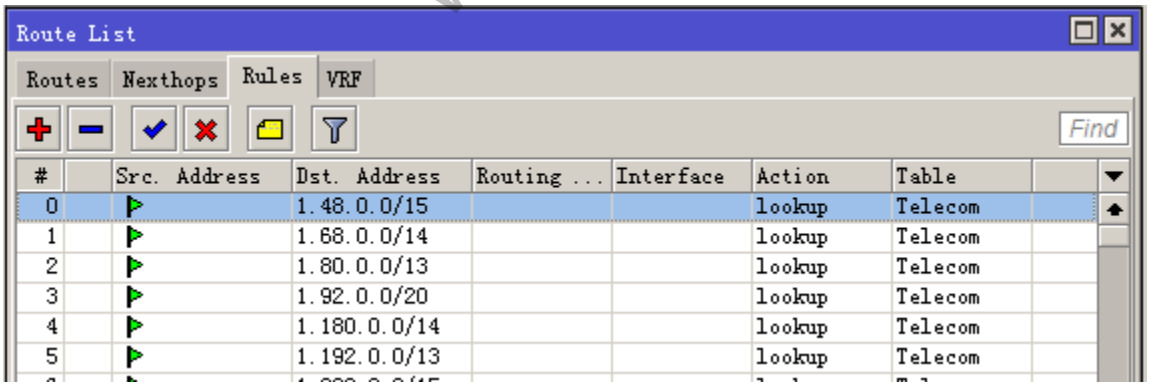
将路由表文件上传到Files目录



然后在命令行里执行import 文件名来导入路由表

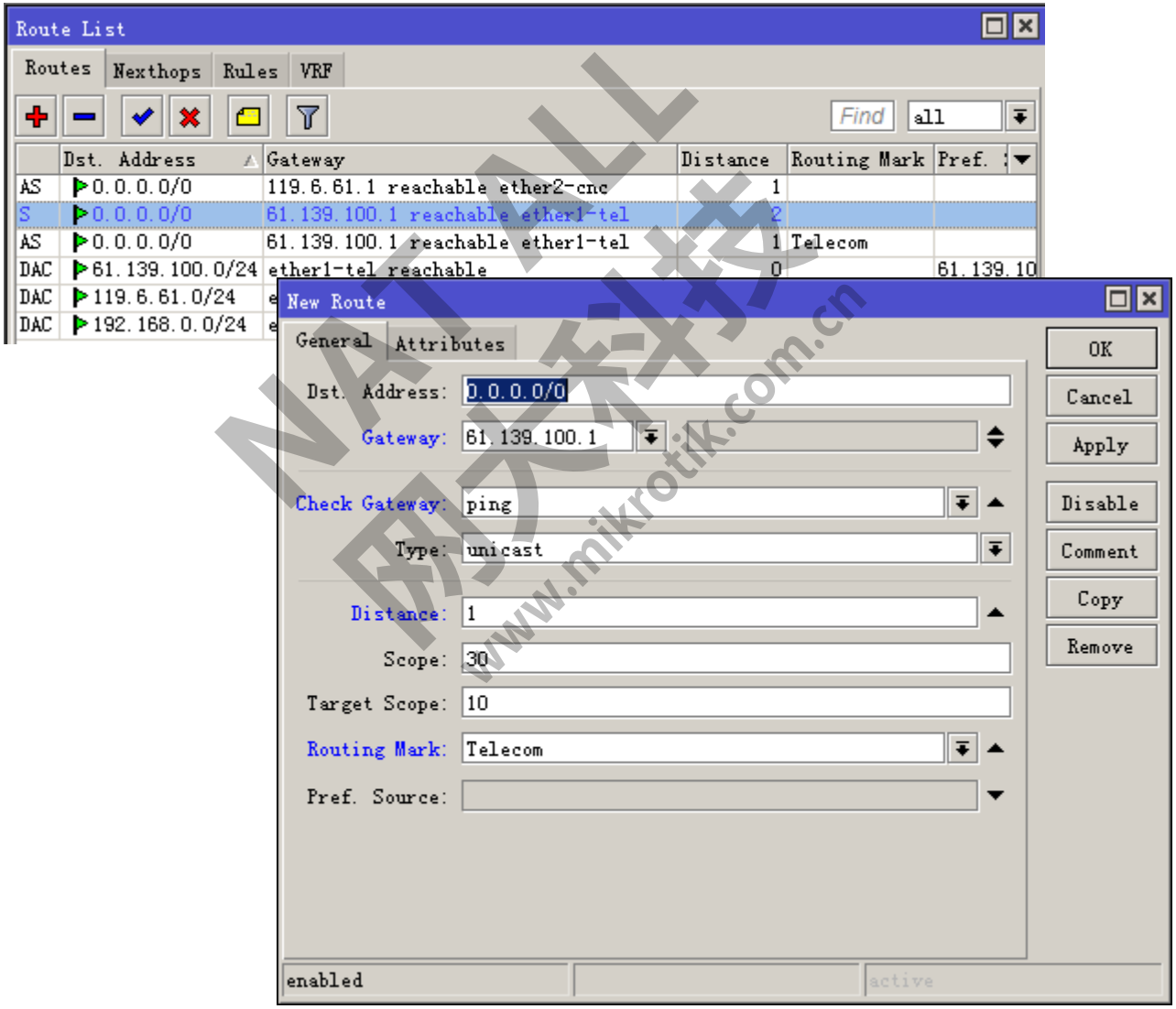


导入之后可以在ip rout rule目录下面看到路由表信息



NAT ALL 网大科技 www.mikrotik.com.cn

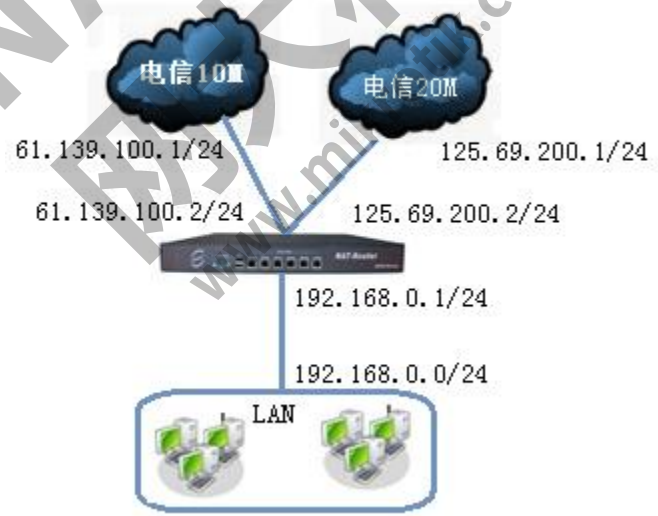
最后添加一条网关为电信，routing-mark为路由表标记Tlecom的路由



同ISP多线路

对于同类型ISP线路，将数据按带宽比例进行划分，让相应比例的数据走相应线路。

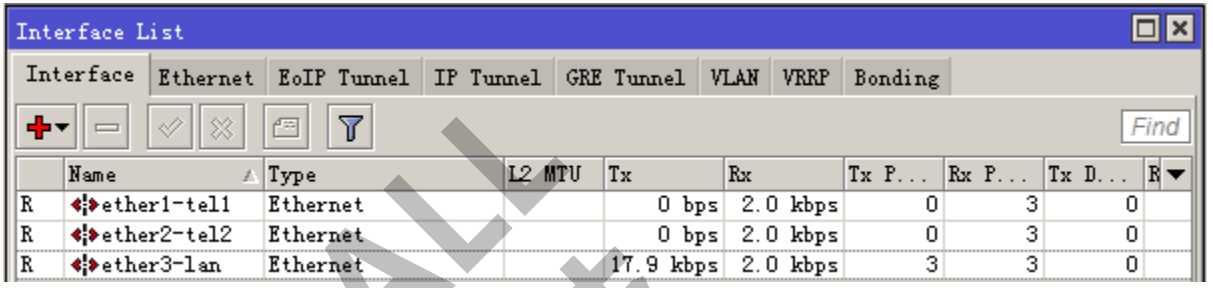
如下示例，我们将内网的访问连接按连接的源地址和目标地址分组(PCC)为3份，其中1/3走电信1,其余2/3走电信2。



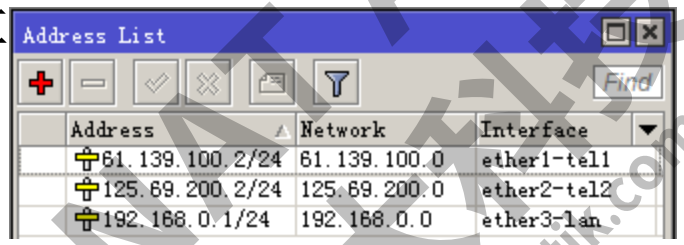
NATAL 防火科技 www.mi...com.cn

配置步骤

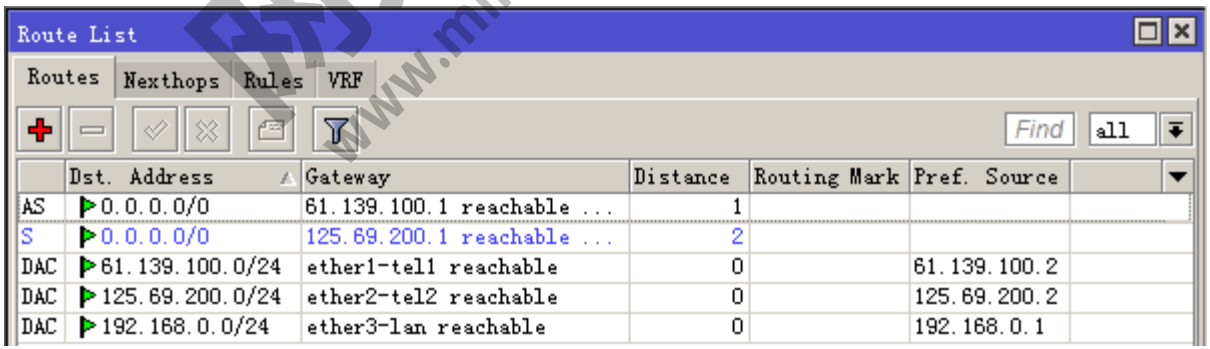
设置接口



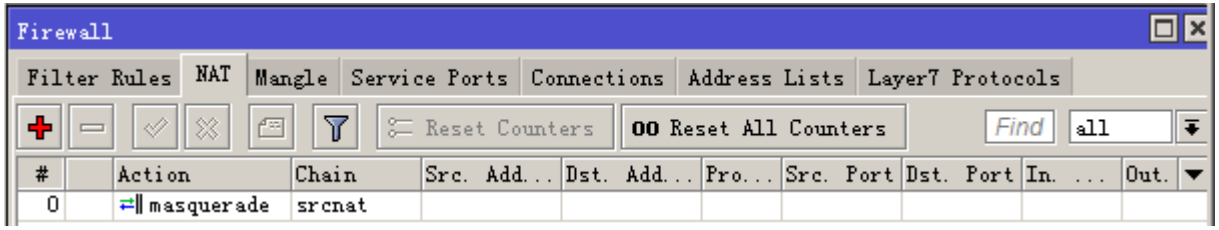
配置IP地址



配置路由,设置备份路由



配置NAT



ALL 网天科技 www.mikrotik.com.cn

PCC负载均衡

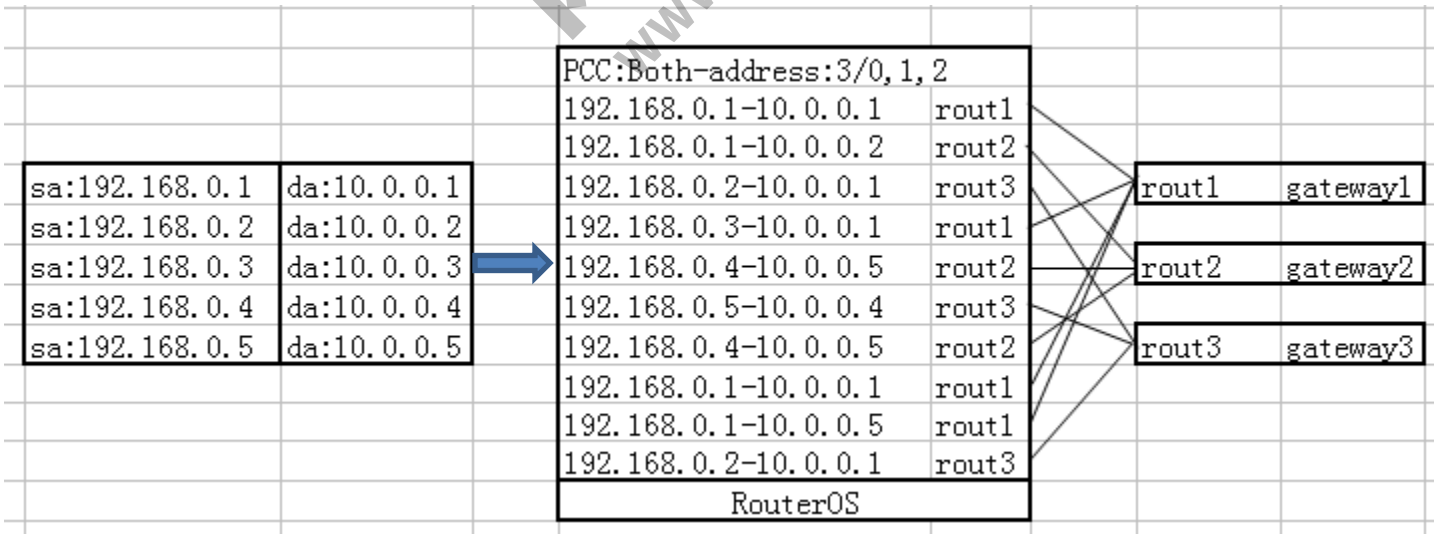
PCC 原理

PCC 匹配器将允许你分离传输流做到平衡流量的能力(你能指定这个设置选择 src-address, src-port, dst-address,dst-port)

PCC 从一定范围内分析选择 IP数据包头，通过哈西散列算法的帮助下，将选定的区域转换为 32bit 值。这个值除以指定 Denominator（分母），余数这时比较一个指定的（Remainder）余数。如果平等然后将捕获的数据包你可以从 IP 头选择 src-address, dst-address, src-port, dst-port使用此操作。

Both-address（源地址和目标地址）

将内网进入路由器的连接按照源地址和目标地址的连接标记连接和路由，已有的连接则保持不变。



PCC配置

Mangle 标记配置

/ip firewall mangle

add action=mark-connection chain=prerouting comment="" disabled=no \

in-interface=ether3-lan new-connection-mark=conn1 passthrough=yes \

per-connection-classifier=b-address-and-port:2/0

add action=mark-connection chain=prerouting comment="" disabled=no \

in-interface=ether3-lan new-connection-mark=conn2 passthrough=yes \

per-connection-classifier=src-address-and-port:2/1

将由内网接口进入的数据用PCC按both-address方式分别标记连接为conn1和conn2

add action=mark-routing chain=prerouting comment=“” connection-mark=conn1\

disabled=no in-interface=ether3-lan new-routing-mark=rout2 passthrough=yes

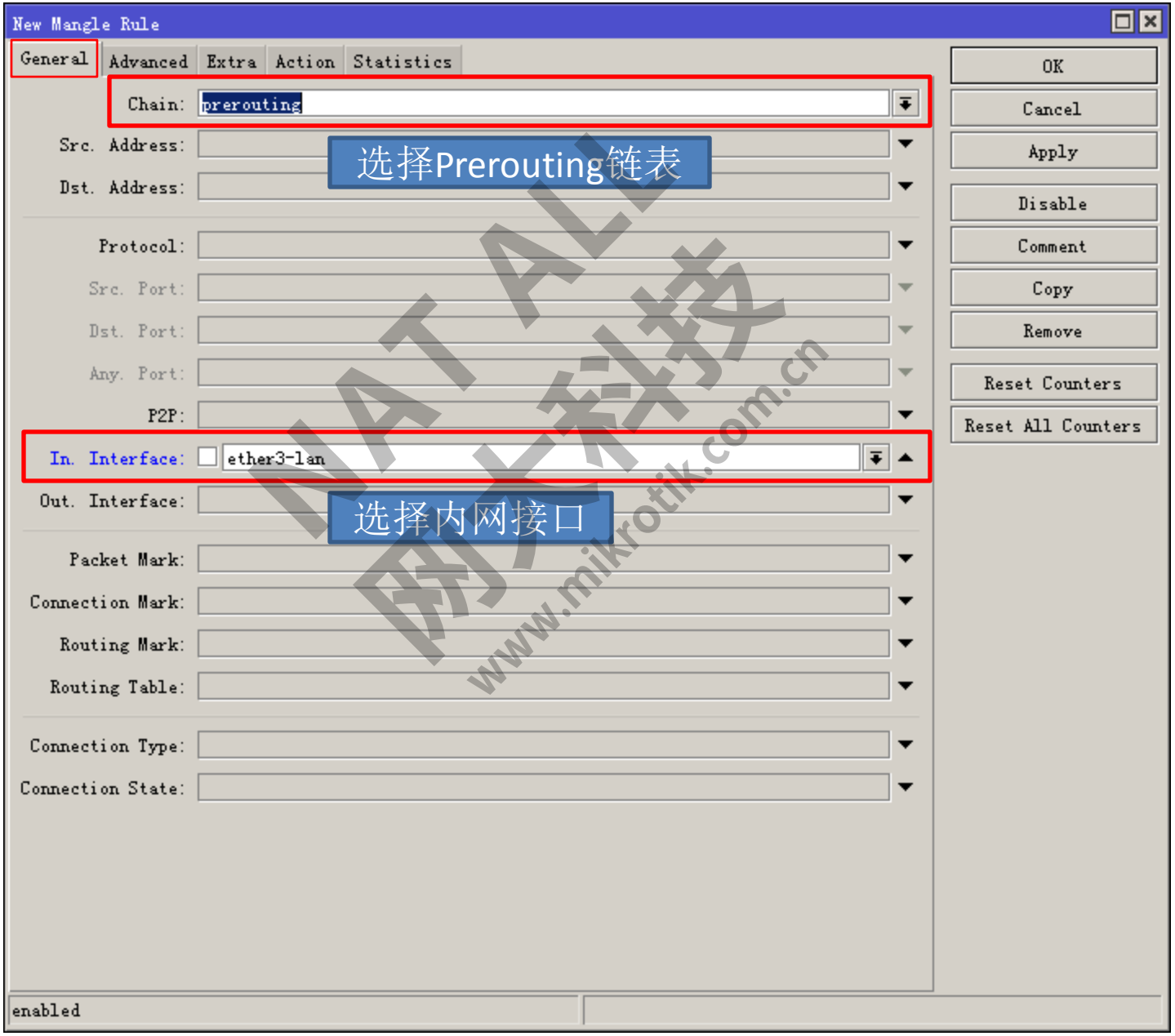
add action=mark-routing chain=prerouting comment="" connection-mark=conn2 \

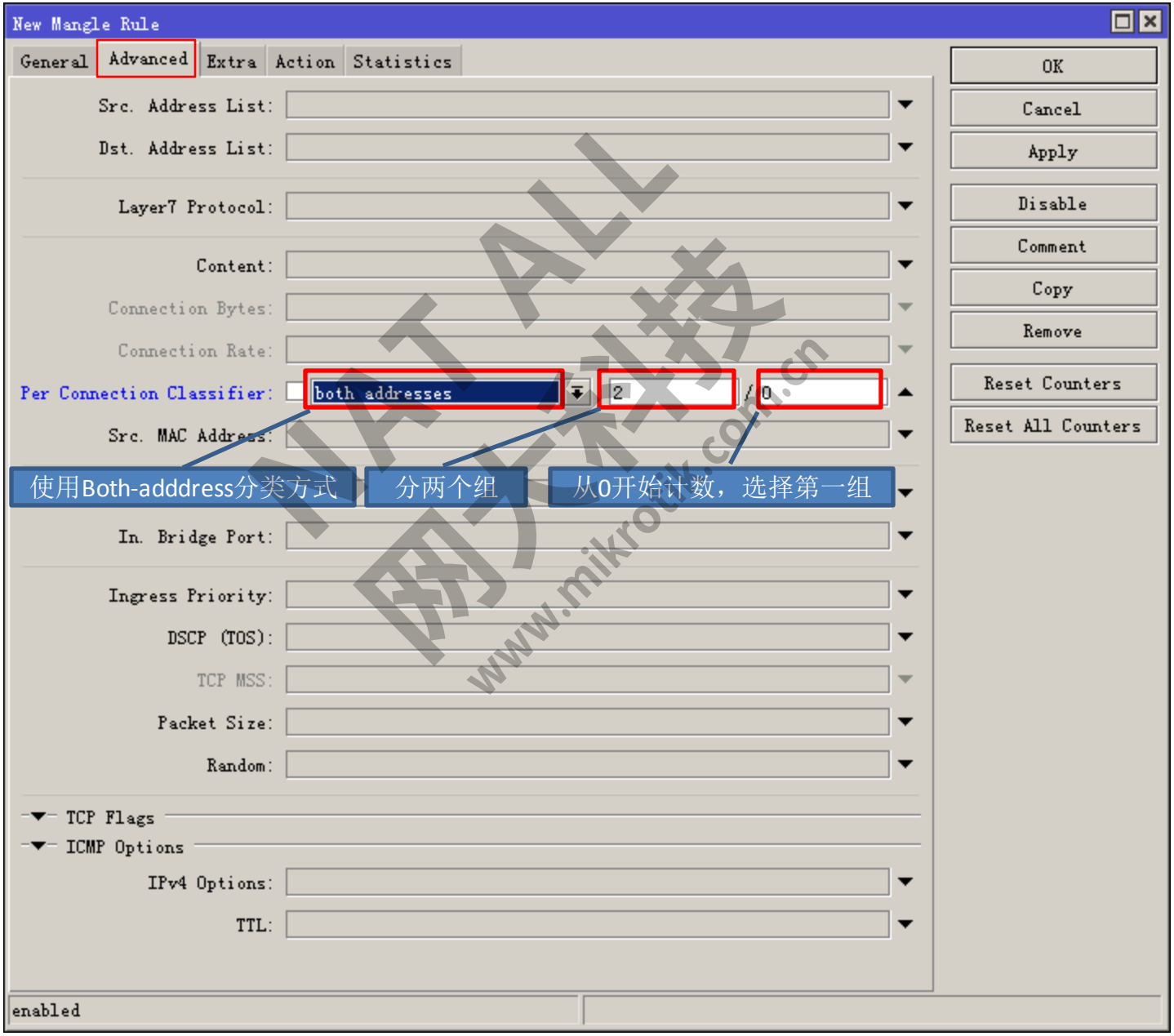
disabled=no in-interface=ether3-lan new-routing-mark=rout2 passthrough=yes

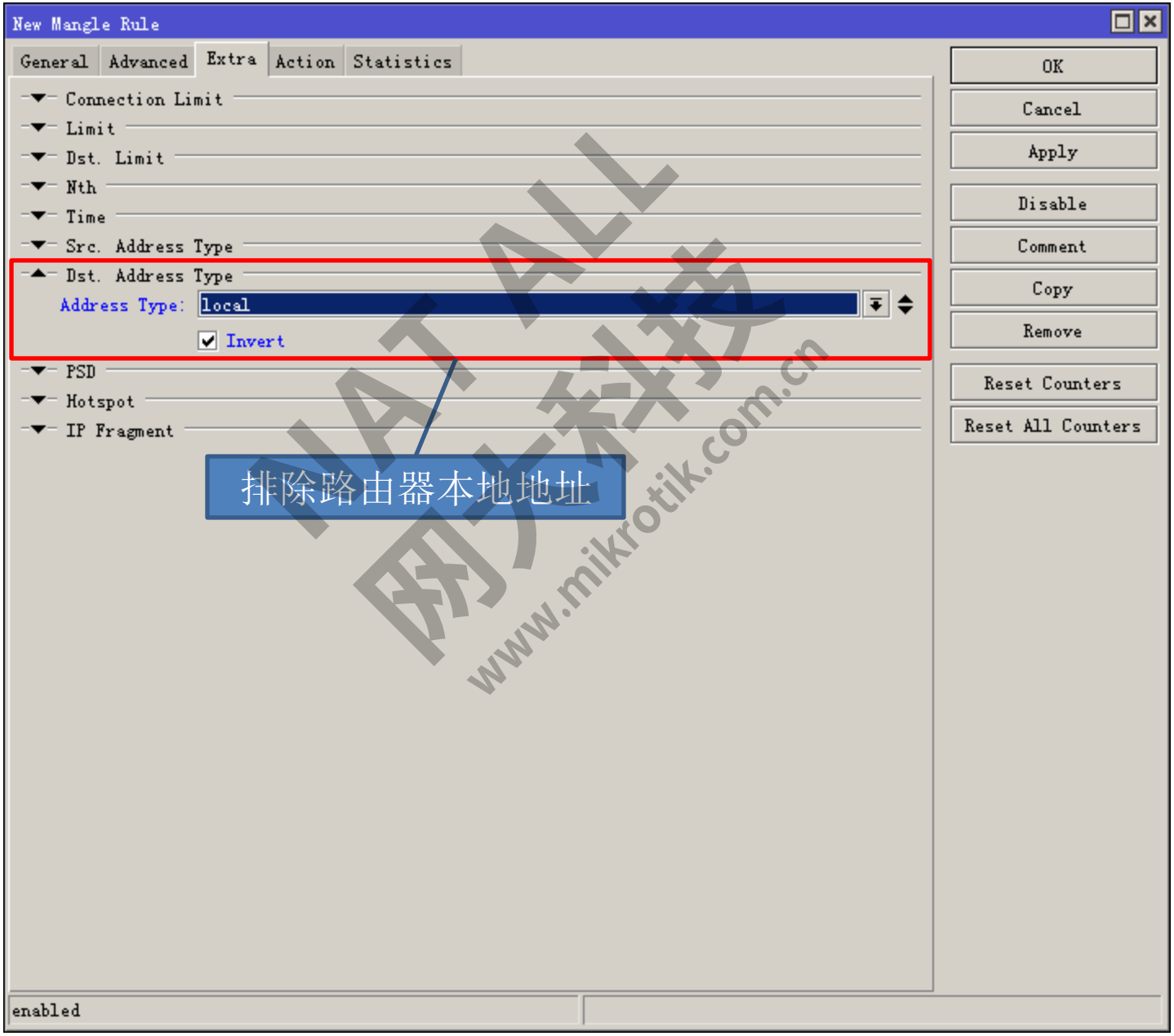
再将连接标记为conn1和conn2的分别标记路由为rout1和rout2

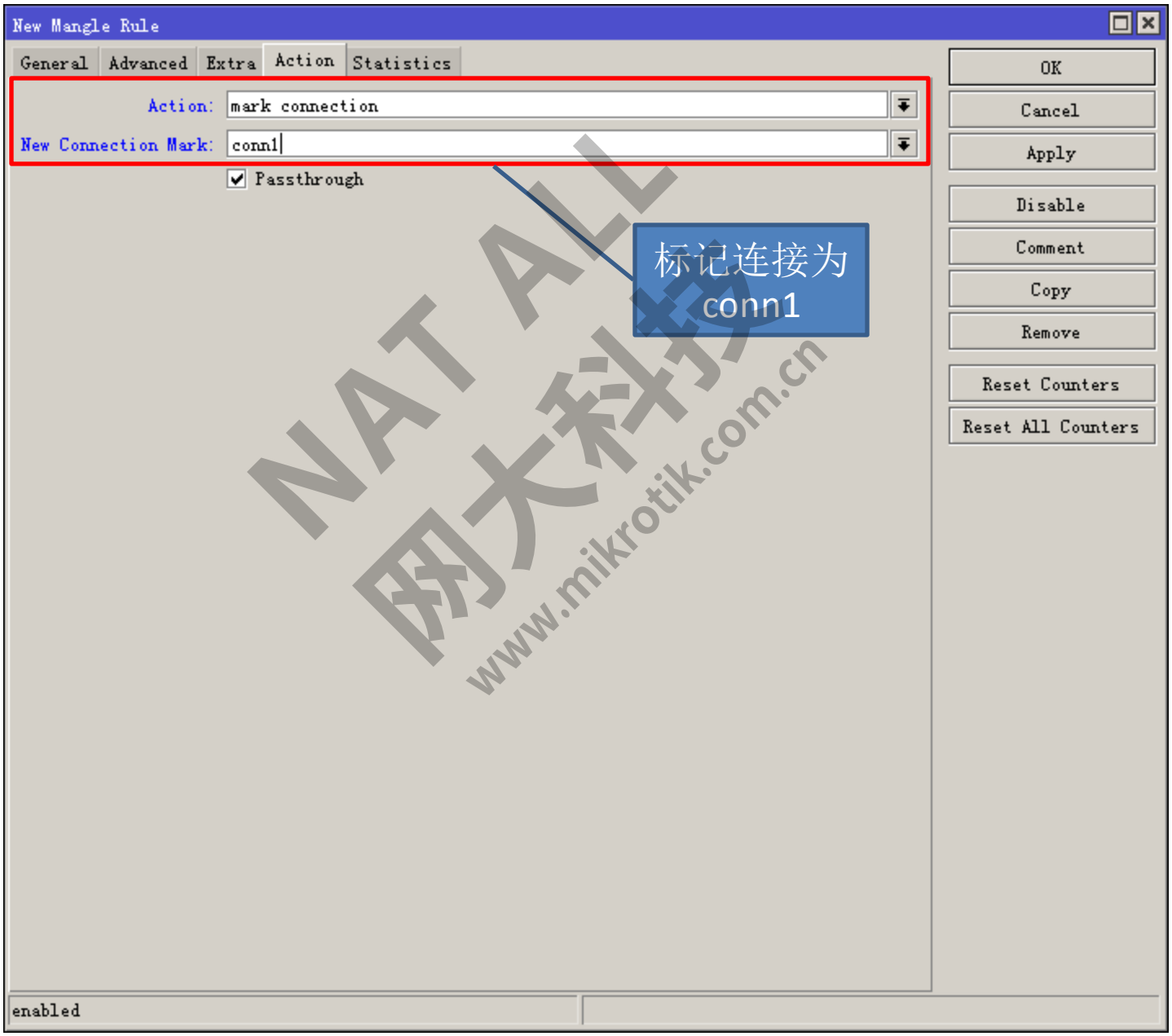
NAT ALL 网大科技 www.nikotin.com.cn

Winbox配置连接标记



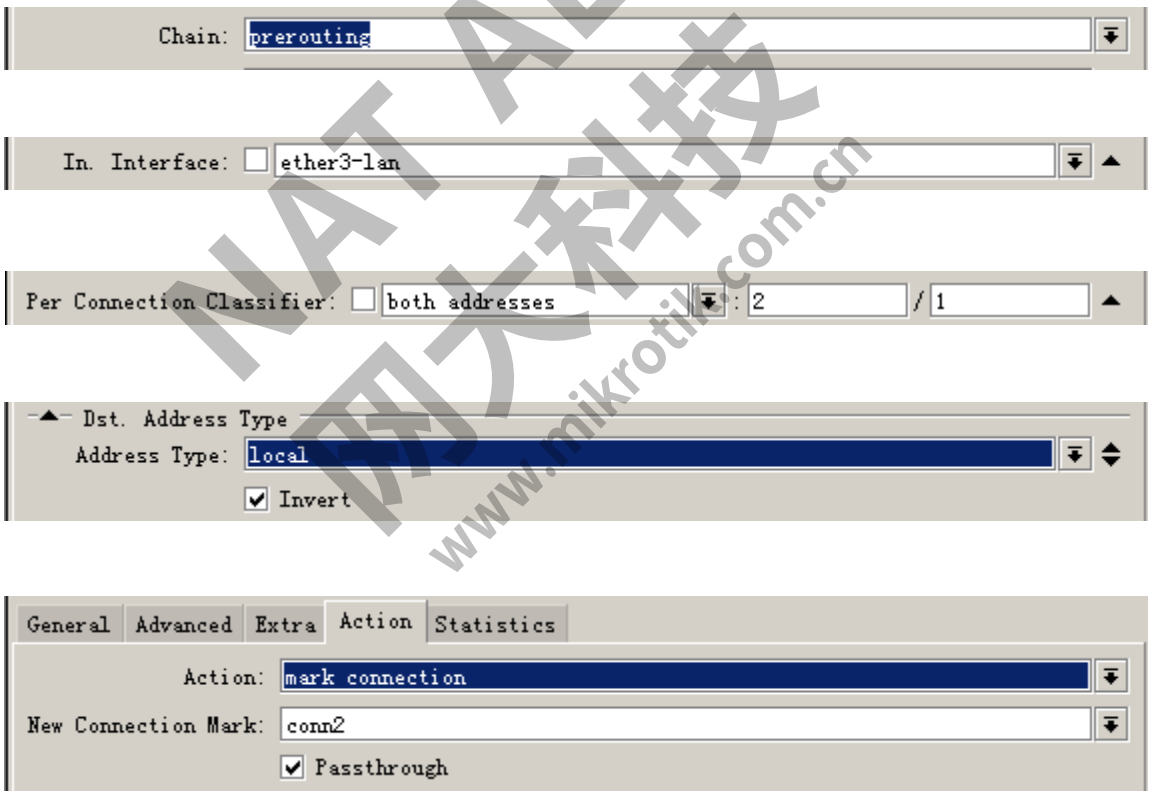

New Mangle Rule
General
Advanced
Extra
Action
Statistics
OK
Cancel
Apply
Disable
Comment
Copy
Remove
Reset Counters
Reset All Counters
Src. Address List:
Dst. Address List:
Layer7 Protocol:
Content:
Connection Bytes:
Connection Rate:
Per Connection Classifier:
both addresses
2
/0
Src. MAC Address:
In. Bridge Port:
Ingress Priority:
DSCP (TOS):
TCP MSS:
Packet Size:
Random:
TCP Flags
ICMP Options
IPv4 Options:
TTL:
enabled
使用Both-adddress分类方式
分两个组
从0开始计数，选择第一组


New Mangle Rule
General
Advanced
Extra
Action
Statistics
Connection Limit
Limit
Dst. Limit
Nth
Time
Src. Address Type
Dst. Address Type
Address Type:
local
Invert
PSD
Hotspot
IP Fragment
OK
Cancel
Apply
Disable
Comment
Copy
Remove
Reset Counters
Reset All Counters
enabled
排除路由器本地地址
NAT ALL
网大科技
www.mikrotik.com.cn


New Mangle Rule
General
Advanced
Extra
Action
Statistics
Action:
mark connection
New Connection Mark:
conn1
Passthrough
OK
Cancel
Apply
Disable
Comment
Copy
Remove
Reset Counters
Reset All Counters
enabled
标记连接为
conn1
NAT ALL
网大科技
www.mikrotik.com.cn

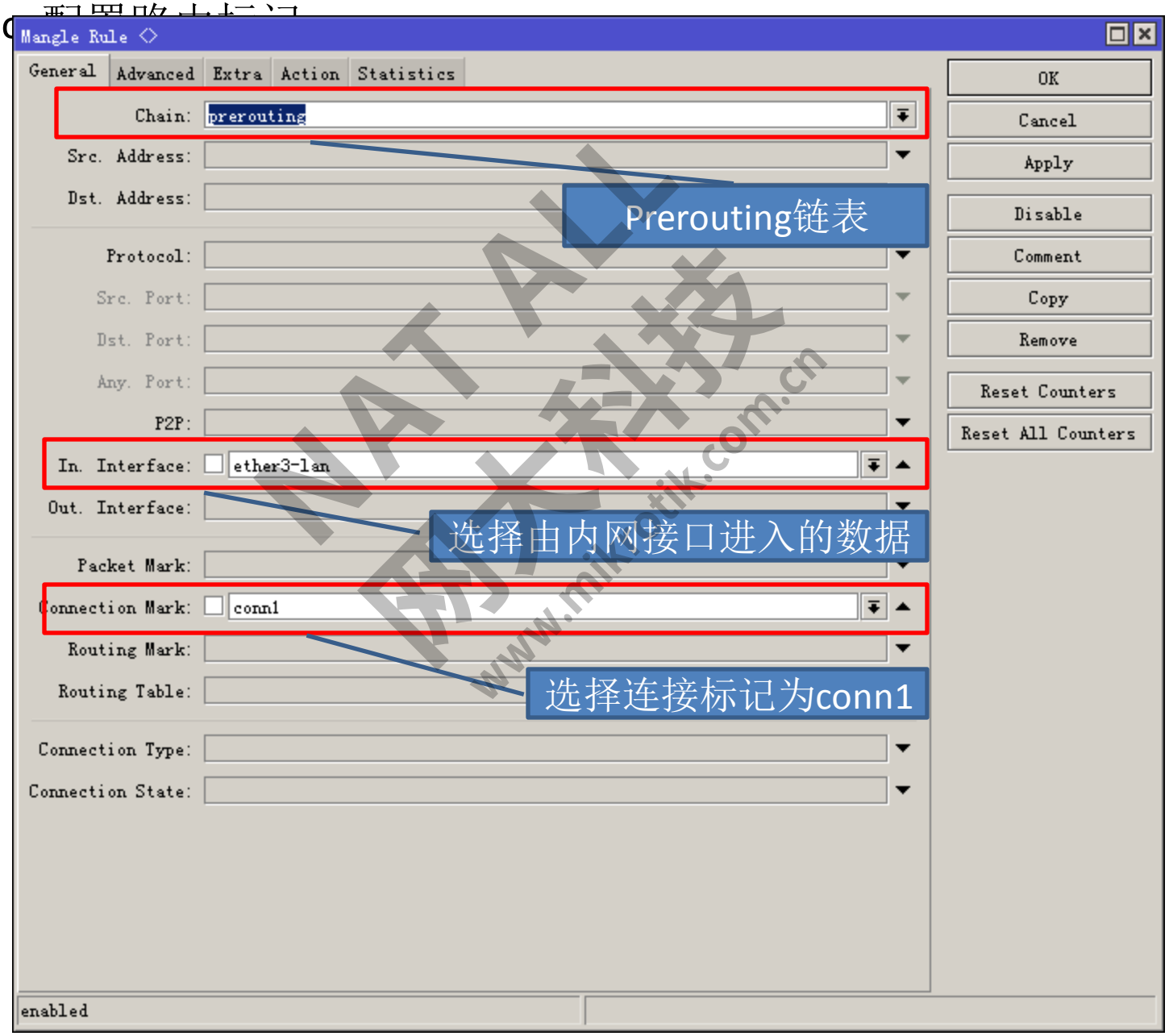
添加第二条连接标记规则

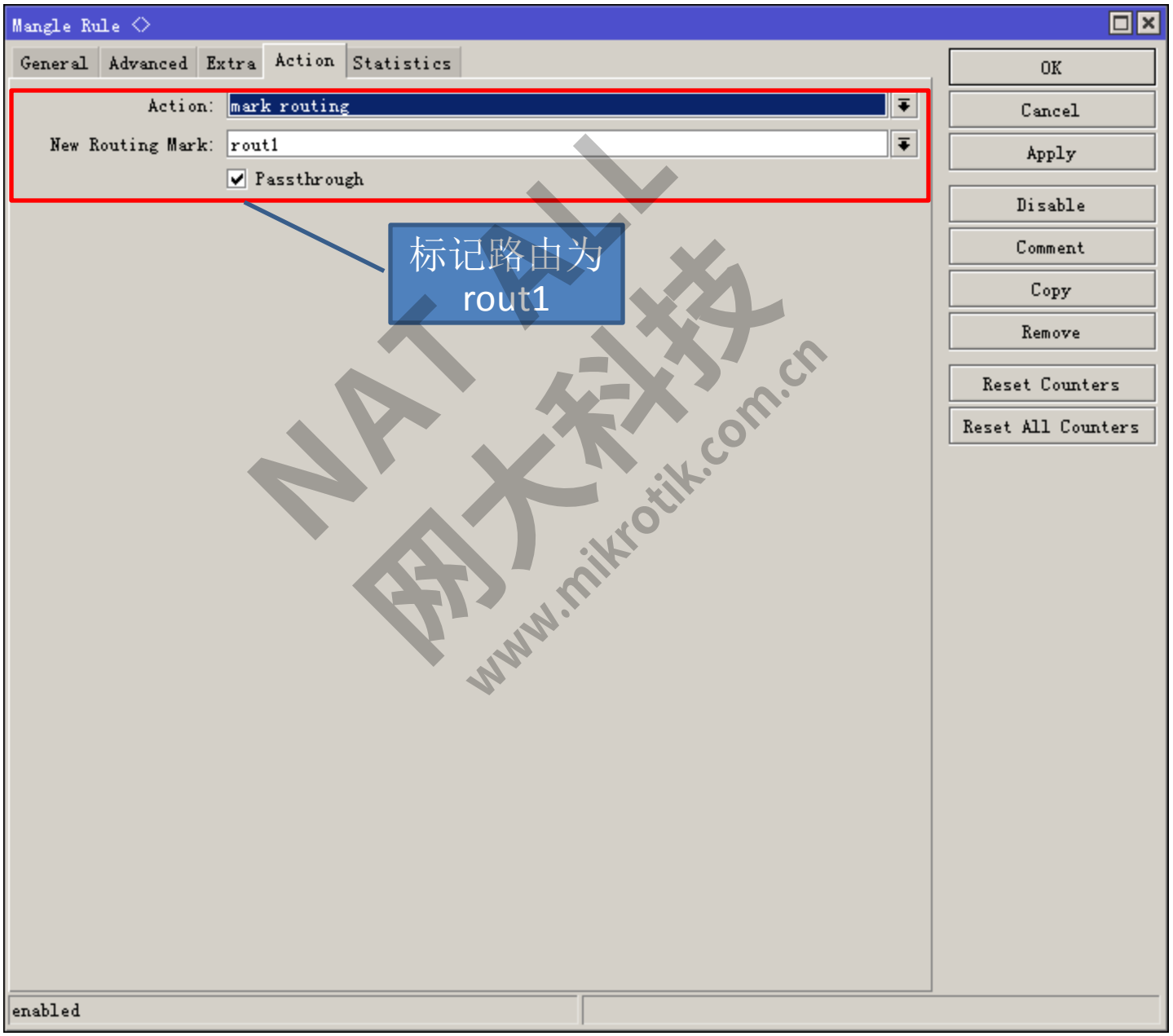
和第一条差区别只是PCC和标记连接部分



NAT ALG 网大科技 www.mikrotik.com.cn

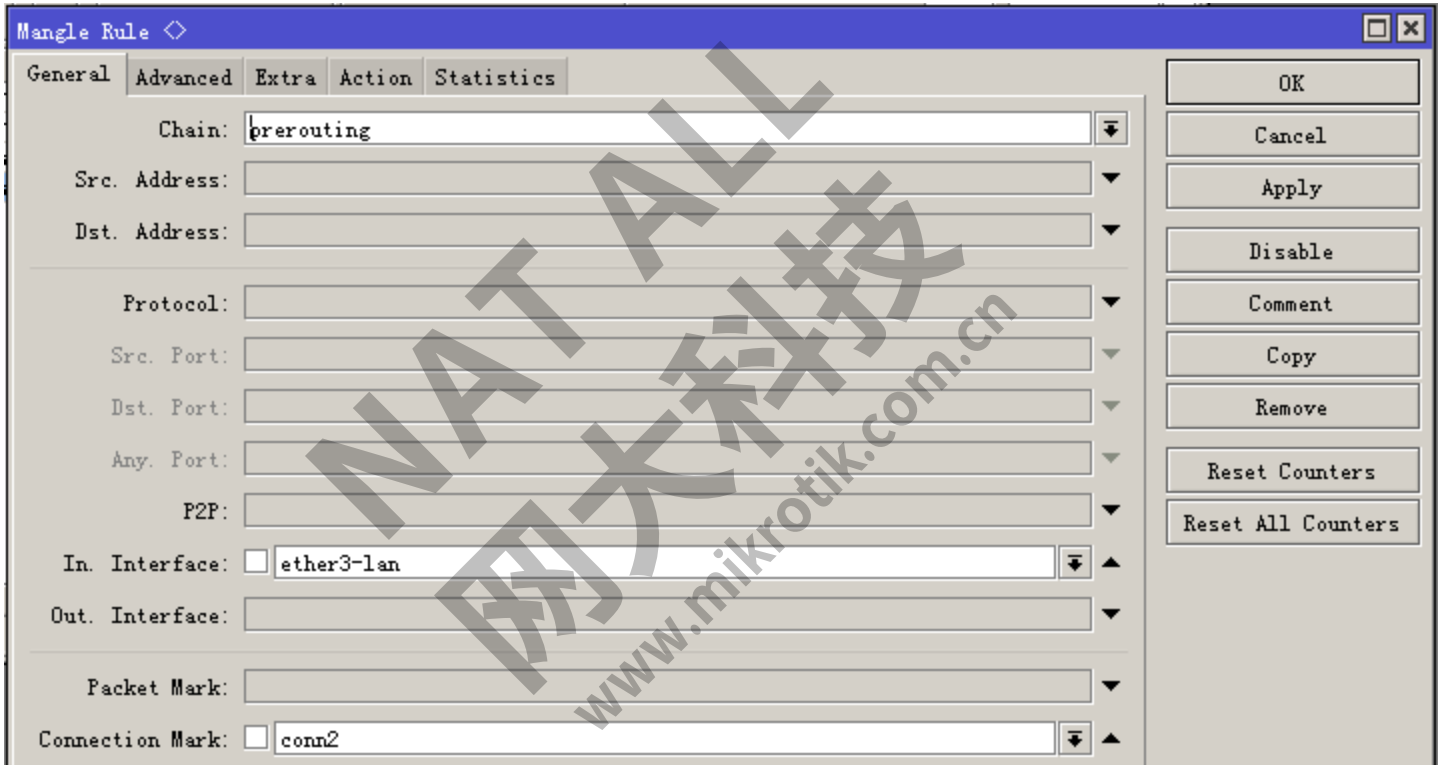
Winbo 配置路由标记

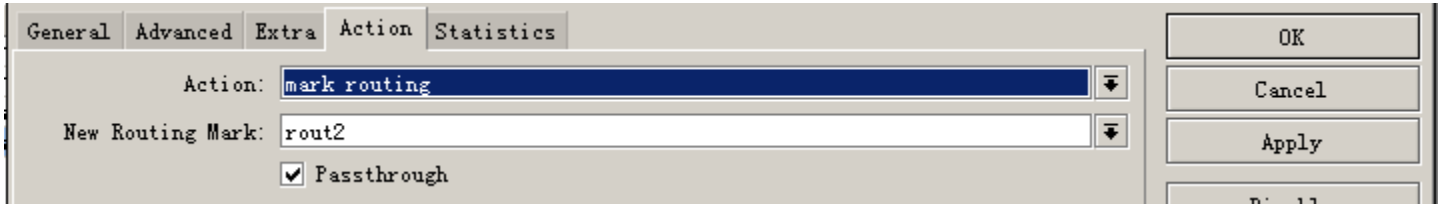




NAT ALL
网大科技
www.mikrotik.com.cn

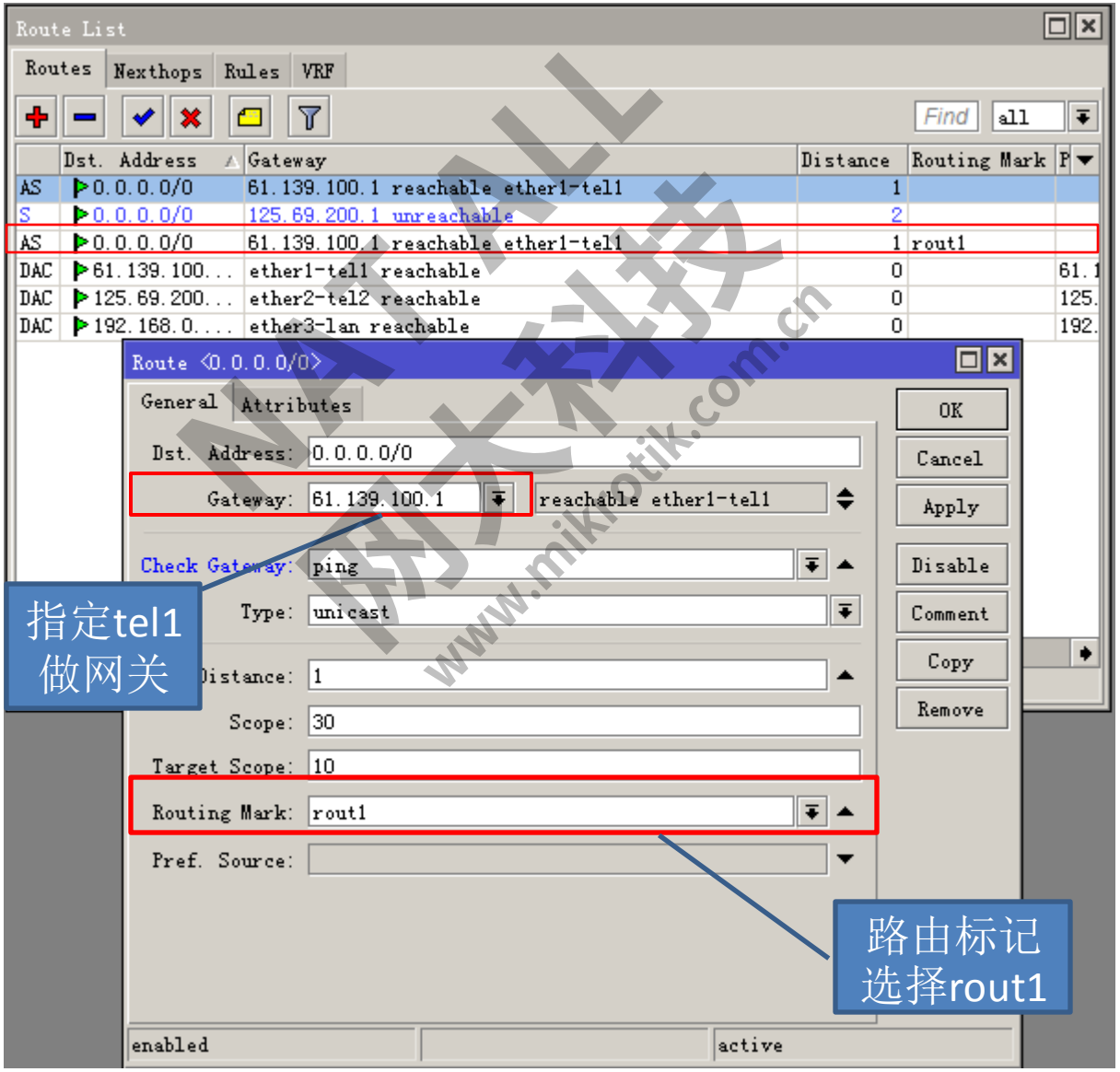
建立路由标记rout2



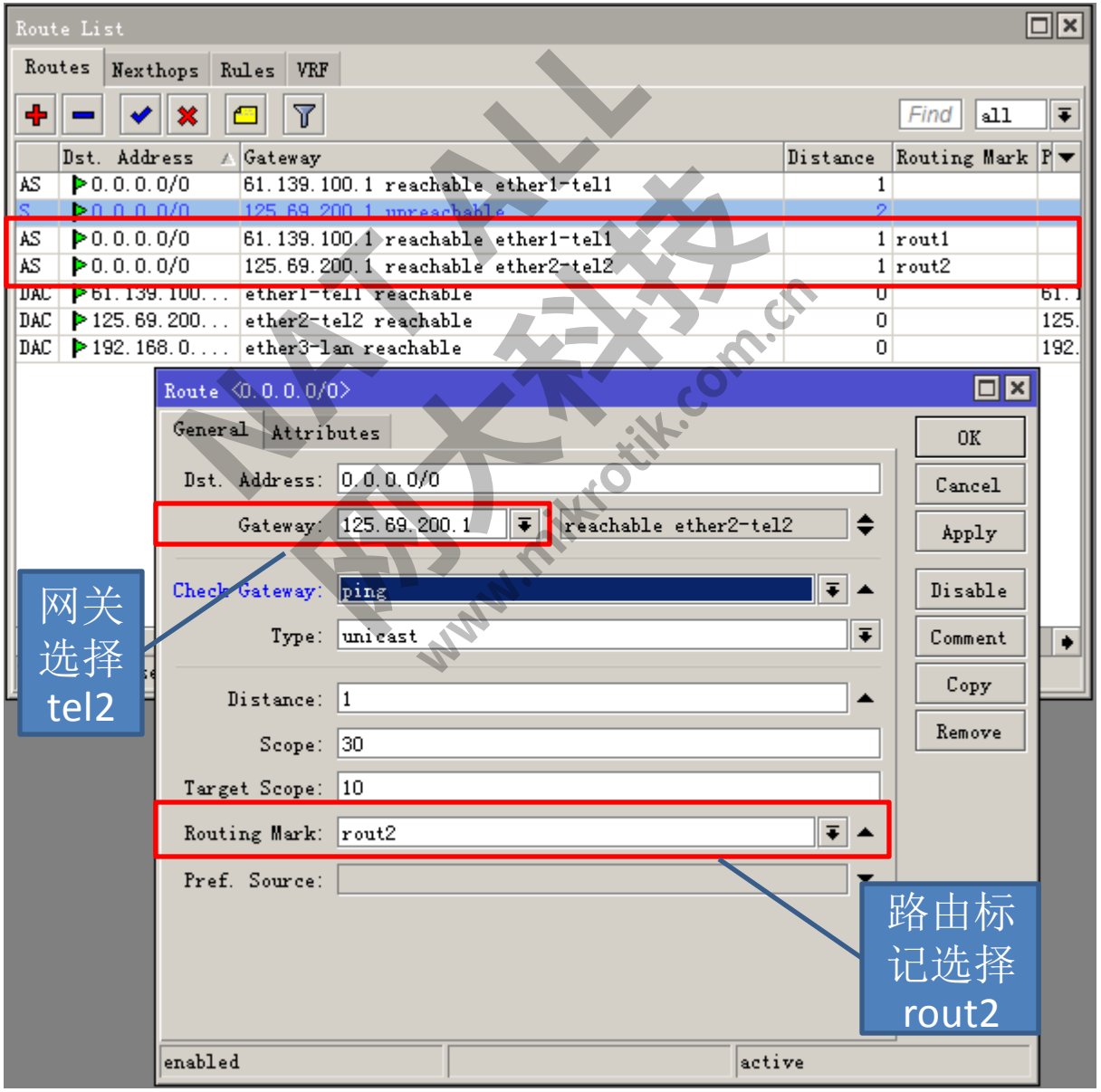


NAT ALL 网大科技 www.mikrotik.com.cn

路由指向


Route List
Routes
Nexthops
Rules
VRF
Find
all
Dst. Address
Gateway
Distance
Routing Mark
AS 0.0.0.0/0 61.139.100.1 reachable ether1-tel1 1
S 0.0.0.0/0 125.69.200.1 unreachable 2
AS 0.0.0.0/0 61.139.100.1 reachable ether1-tel1 1 rout1
DAC 61.139.100... ether1-tel1 reachable 0
DAC 125.69.200... ether2-tel2 reachable 0
DAC 192.168.0.... ether3-lan reachable 0
Route <0.0.0.0/0>
General
Attributes
OK
Cancel
Apply
Disable
Comment
Copy
Remove
Dst. Address: 0.0.0.0/0
Gateway: 61.139.100.1 reachable ether1-tel1
Check Gateway: ping
Type: unicast
Distance: 1
Scope: 30
Target Scope: 10
Routing Mark: rout1
Pref. Source:
enabled
active
指定tel1
做网关
路由标记
选择rout1

路由指向


Route List
Routes
Nexthops
Rules
VRF
Find
all
Dst. Address
Gateway
Distance
Routing Mark
AS 0.0.0.0/0 61.139.100.1 reachable ether1-tel1 1
AS 0.0.0.0/0 125.69.200.1 unreachable 2
AS 0.0.0.0/0 61.139.100.1 reachable ether1-tel1 1 rout1
AS 0.0.0.0/0 125.69.200.1 reachable ether2-tel2 1 rout2
DAC 61.139.100... ether1-tel1 reachable 0
DAC 125.69.200... ether2-tel2 reachable 0
DAC 192.168.0.... ether3-lan reachable 0
Route <0.0.0.0/0>
General
Attributes
OK
Cancel
Apply
Disable
Comment
Copy
Remove
Dst. Address: 0.0.0.0/0
Gateway: 125.69.200.1 reachable ether2-tel2
Check Gateway: ping
Type: unicast
Distance: 1
Scope: 30
Target Scope: 10
Routing Mark: rout2
Pref. Source:
enabled
active
网关选择tel2
路由标记选择rout2

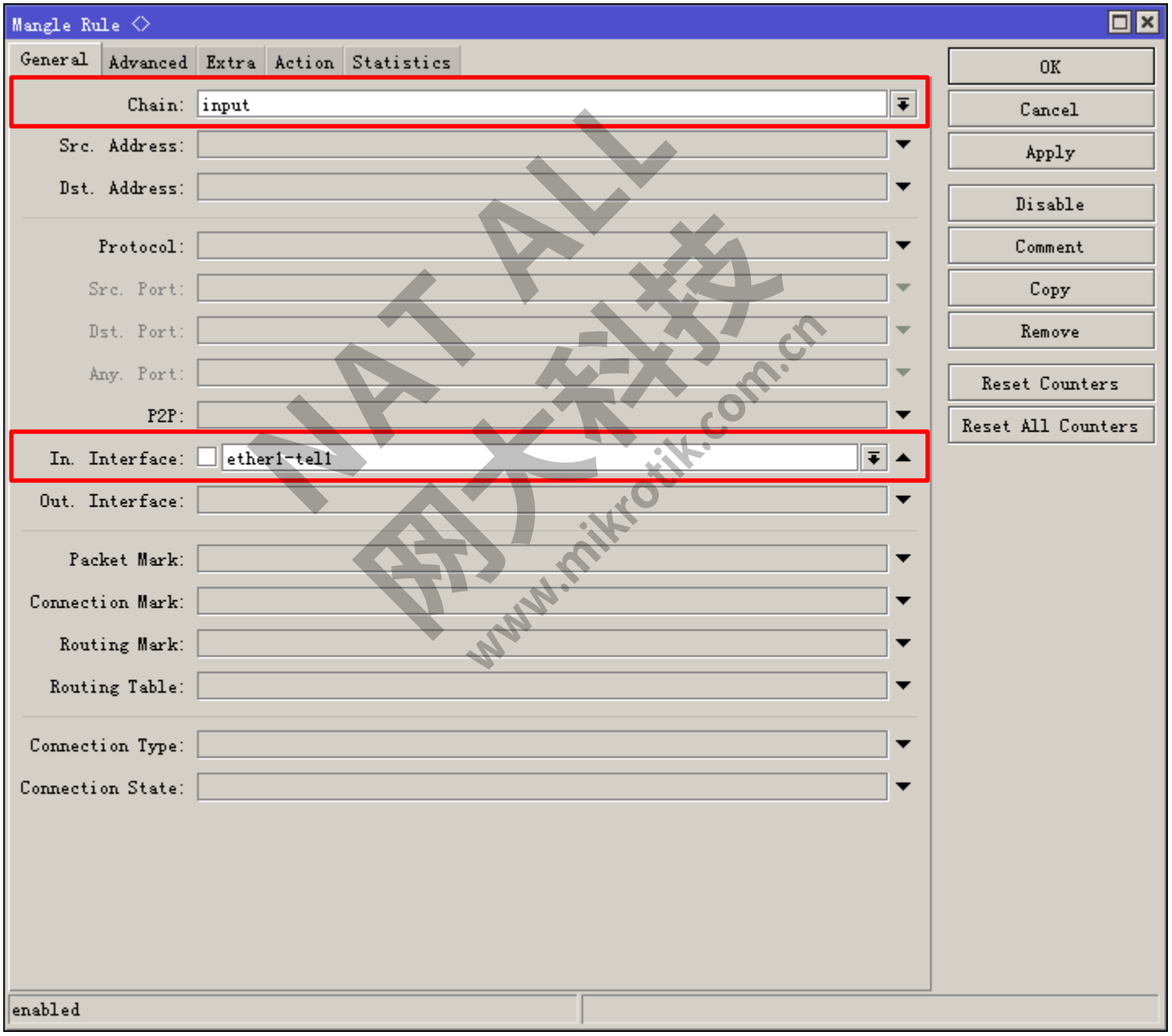
回程路由

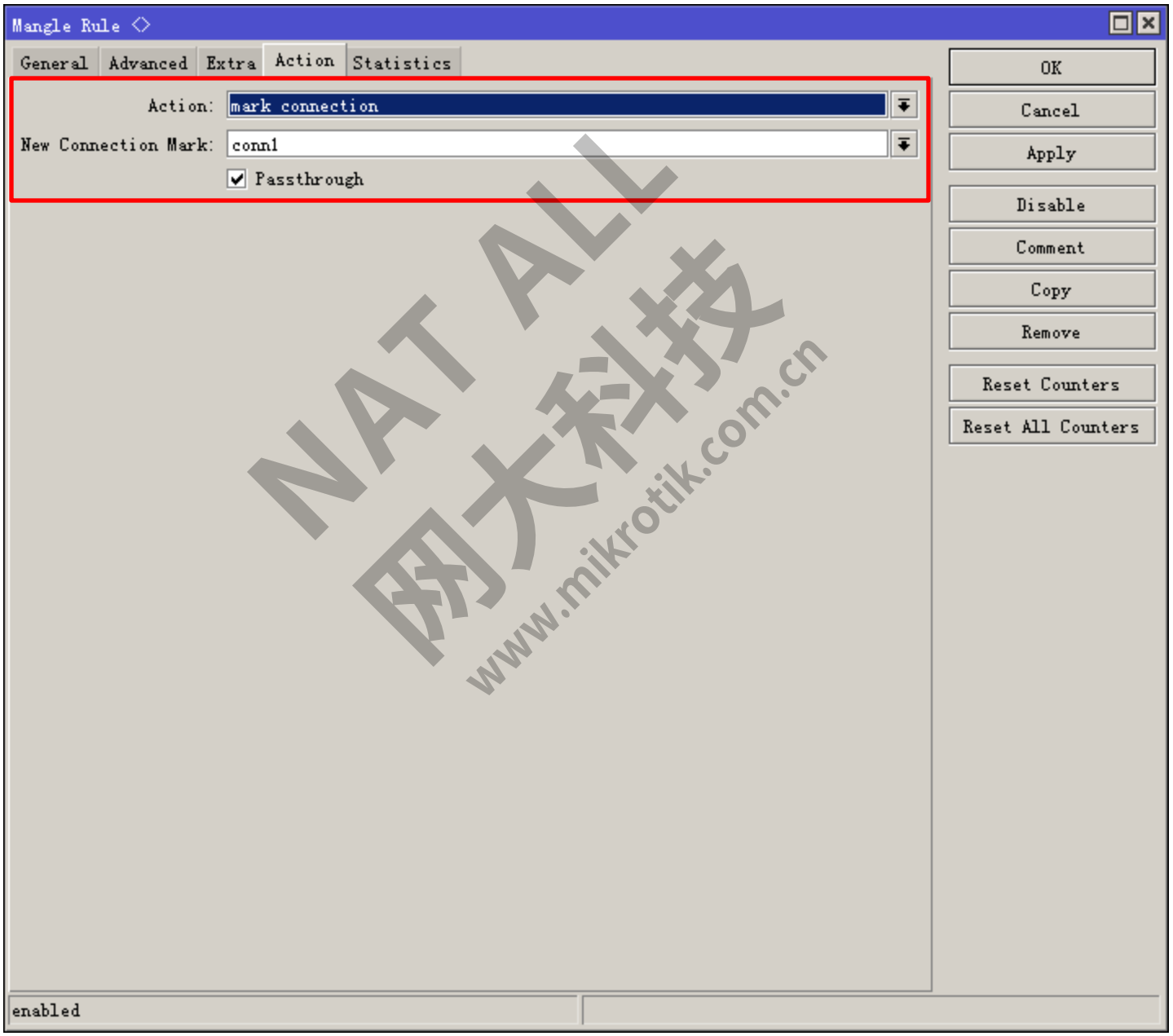
回程路由用于外网能从任意公网接口访问，其策略为在input链表标记从外网接口进入的连接，然后在output链表以之前标记的连接标记路由，并在路由里分别指向各自的网关。

```
/ip firewall mangle add chain=input in-interface=ether1-tel1\
action=mark-connection new-connection-mark=conn1
/ip firewall mangle add chain=input in-interface=ether2-tel2\
action=mark-connection new-connection-mark=conn2
/ip firewall mangle add chain=output connection-mark=conn1\
action=mark-routing new-routing-mark=rout1
/ip firewall mangle add chain=output connection-mark=conn2\
actitn=mark-routing new-routing-mark=rout2
```

NAT 网大科技 www.nkrotik.com.cn

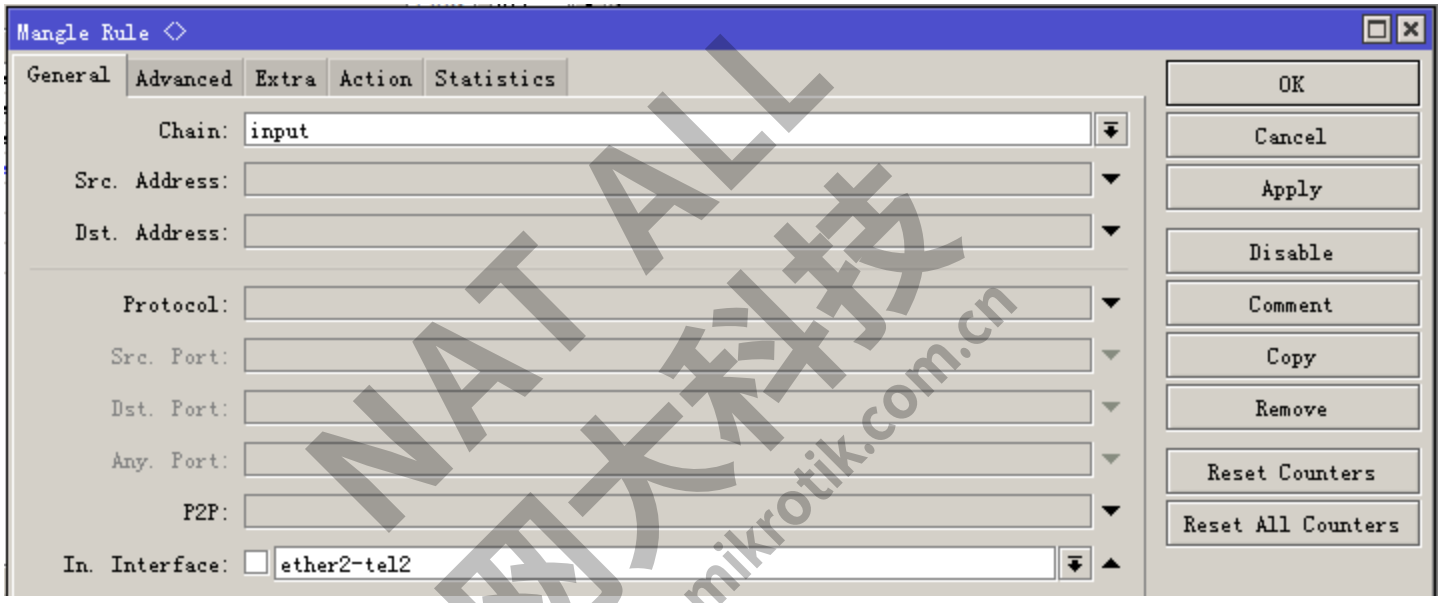
Winbox配置回程路由:标记由线路1进入的连接conn1

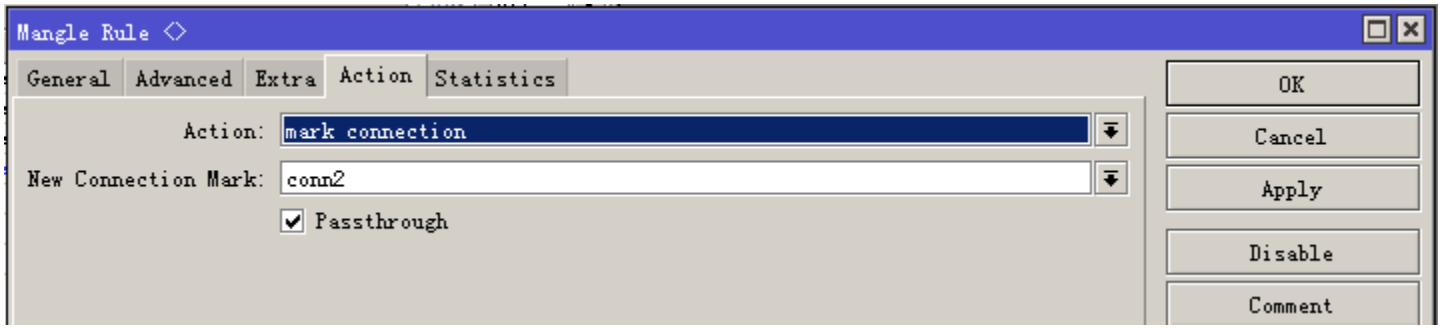




NAT ALL
网大科技
www.mikrotik.com.cn

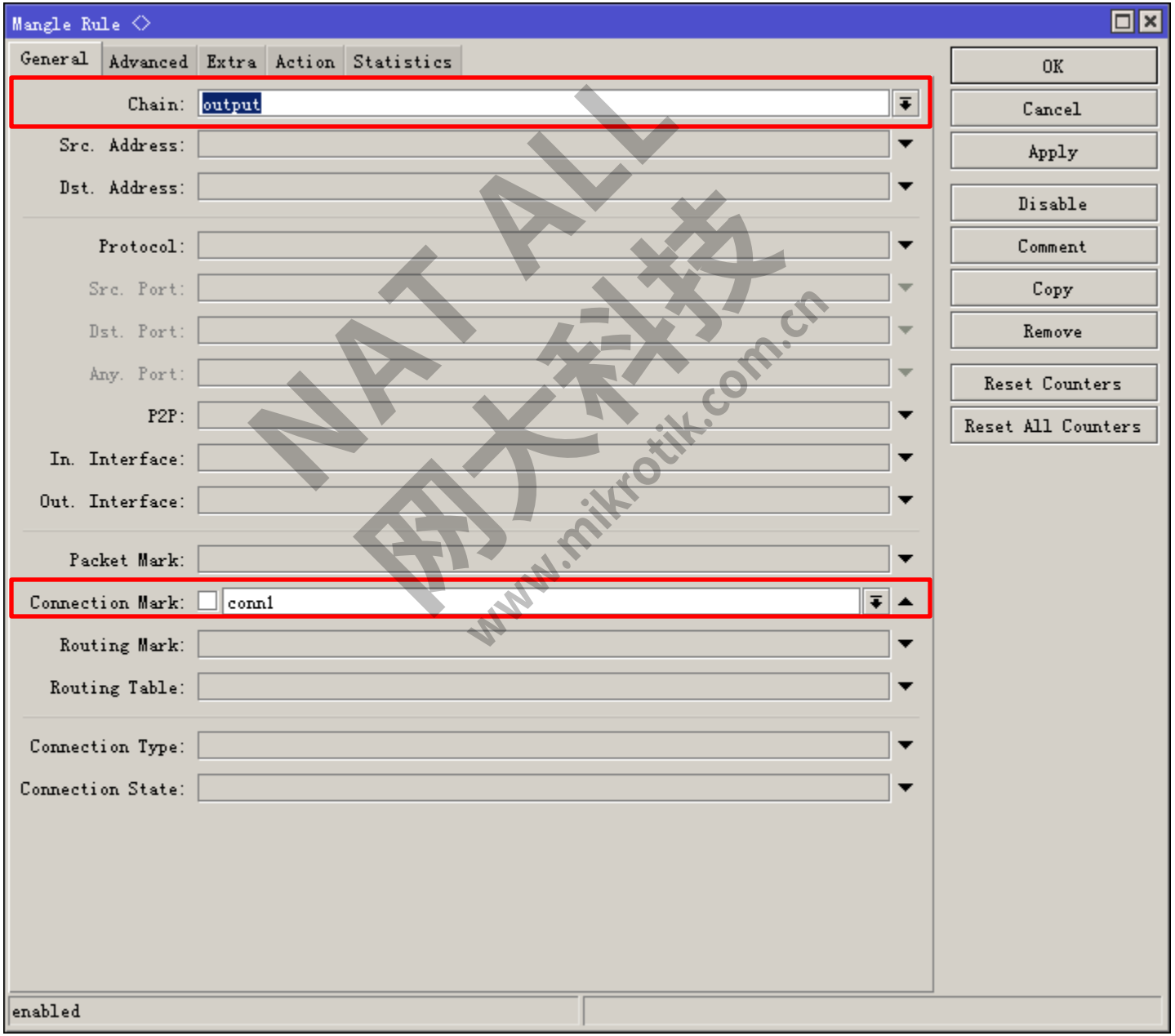
标记由第二条线路进入的连接为conn2

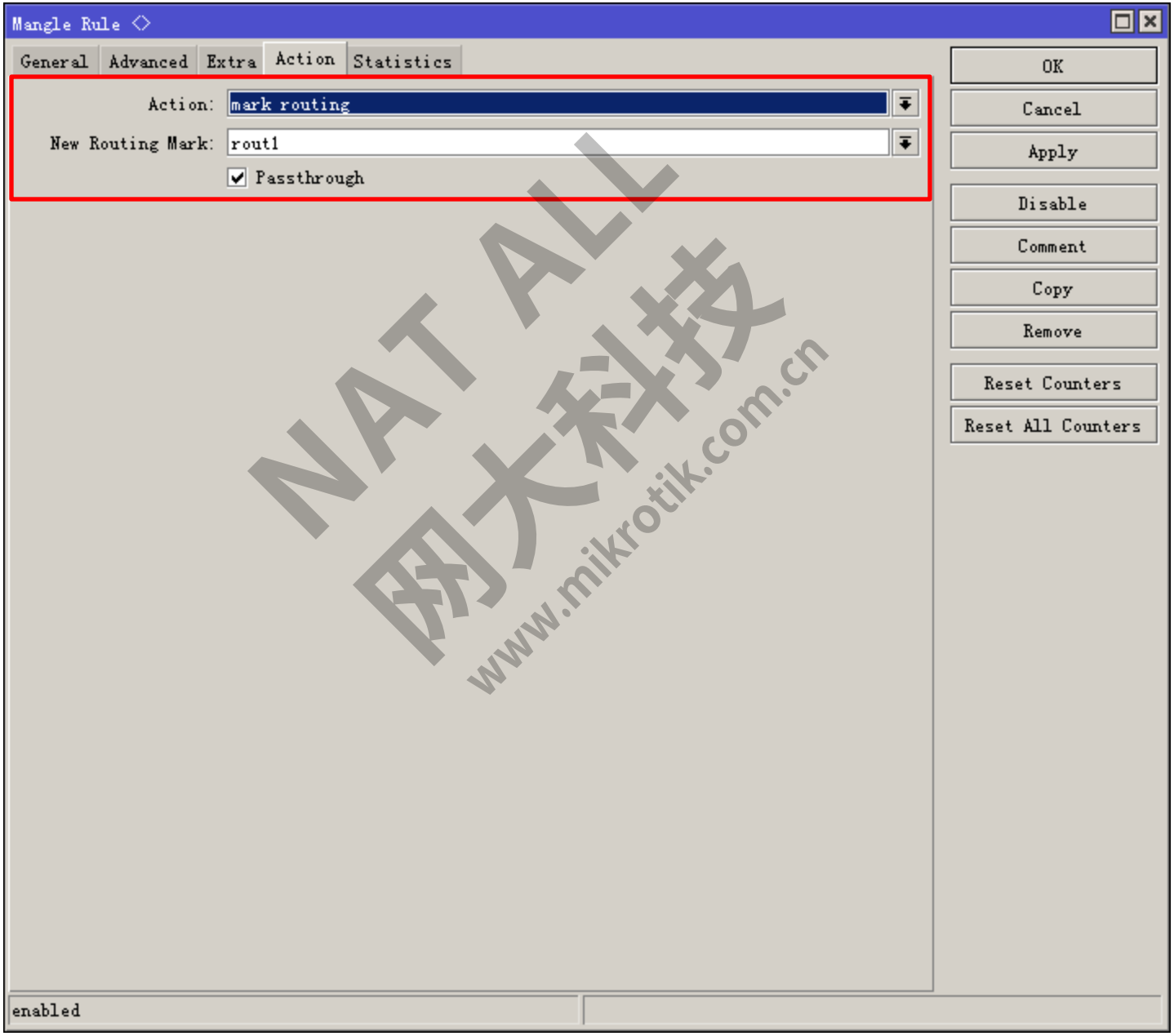




NAT ALL 网大科技 www.mikrotik.com.cn

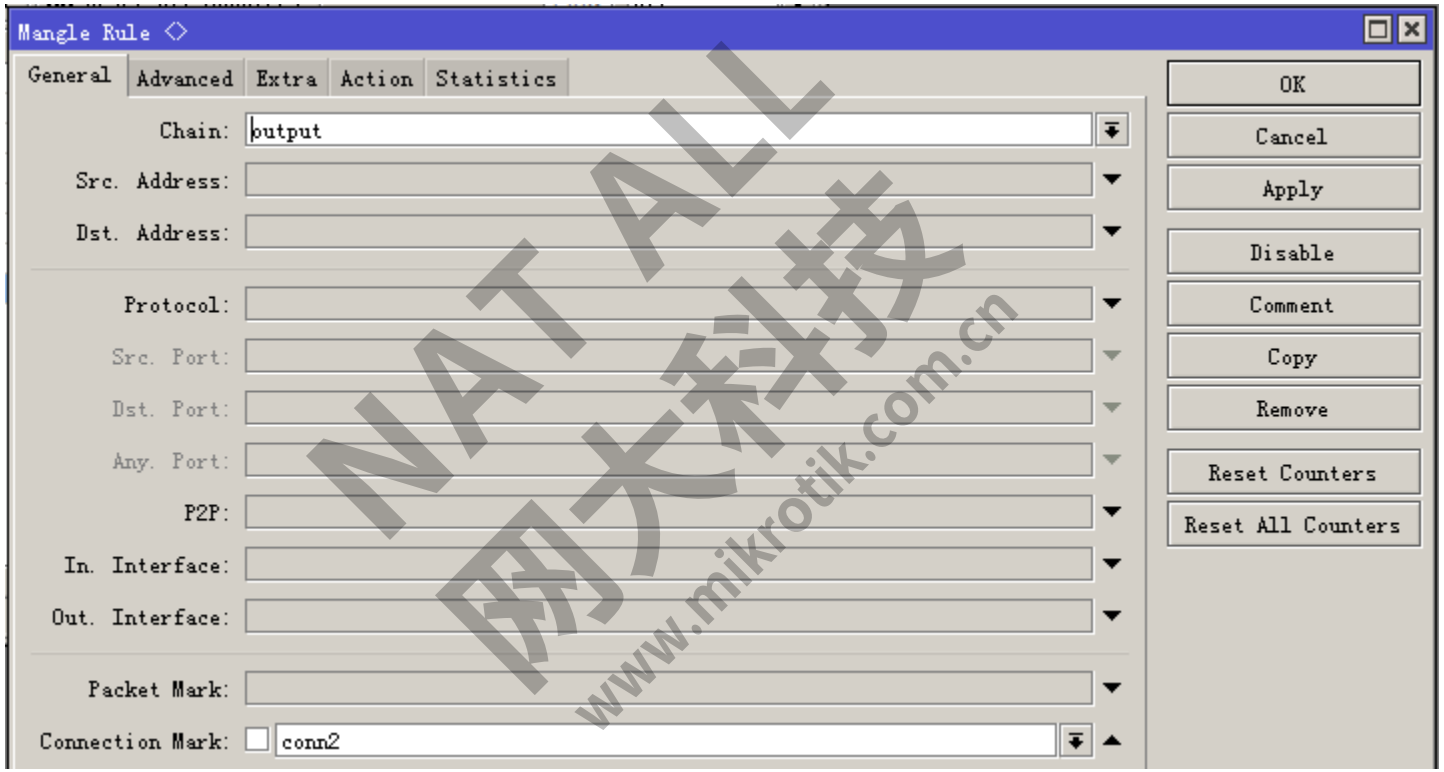
在Output链表中将连接标记为conn1的标记路由为rout1

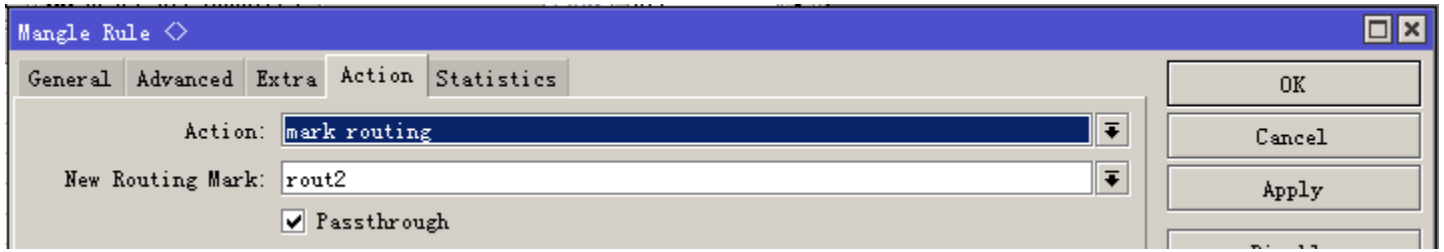




NAT ALL
网大科技
www.mikrotik.com.cn

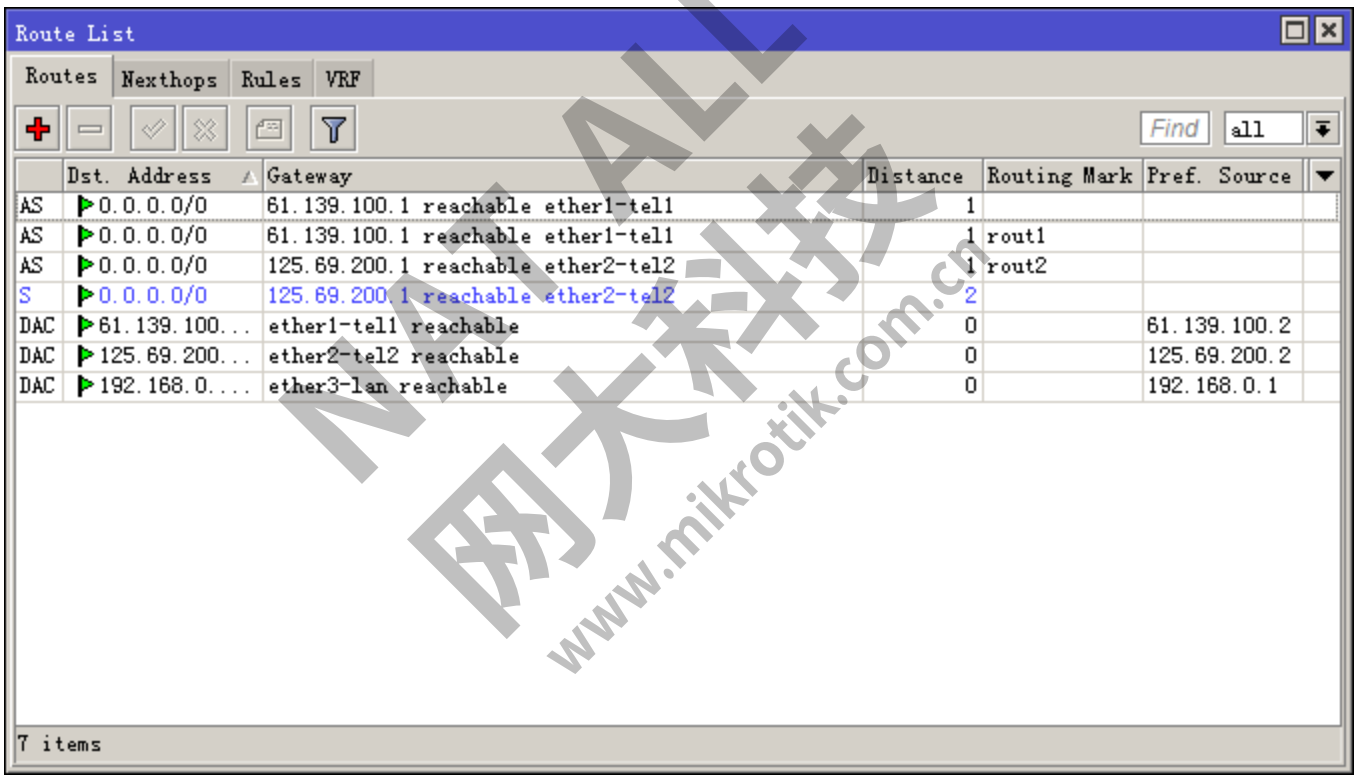
在Output链表中将连接标记为conn2的标记路由为rout2





NAT ALL 网大科技 www.mikrotik.com.cn

在路由里做路由指向

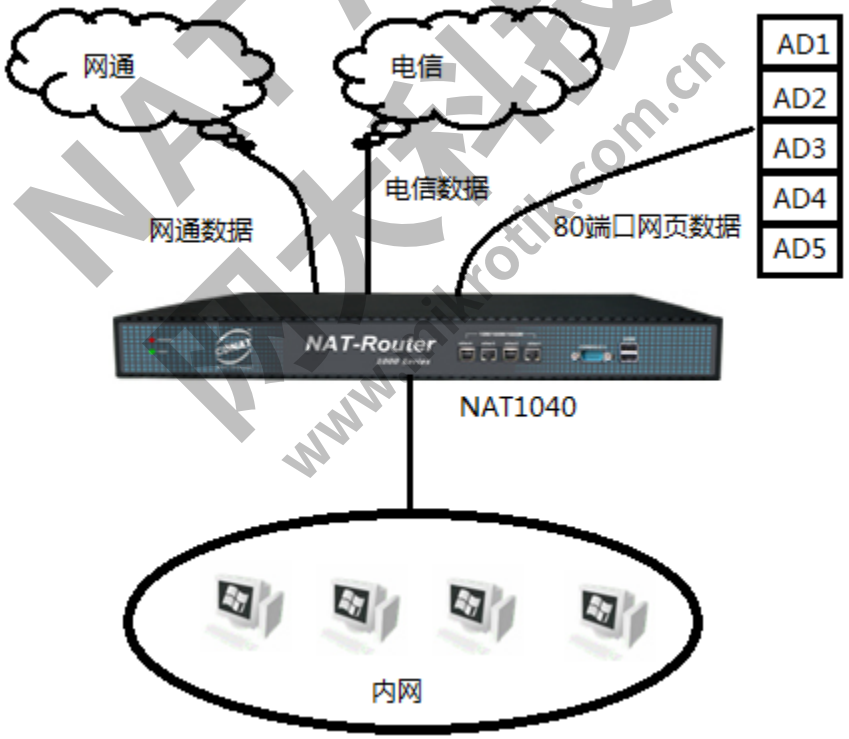


回程路由标记和之前分流路由标记，此处路由规则就不需要重复添加。

多线路复合应用

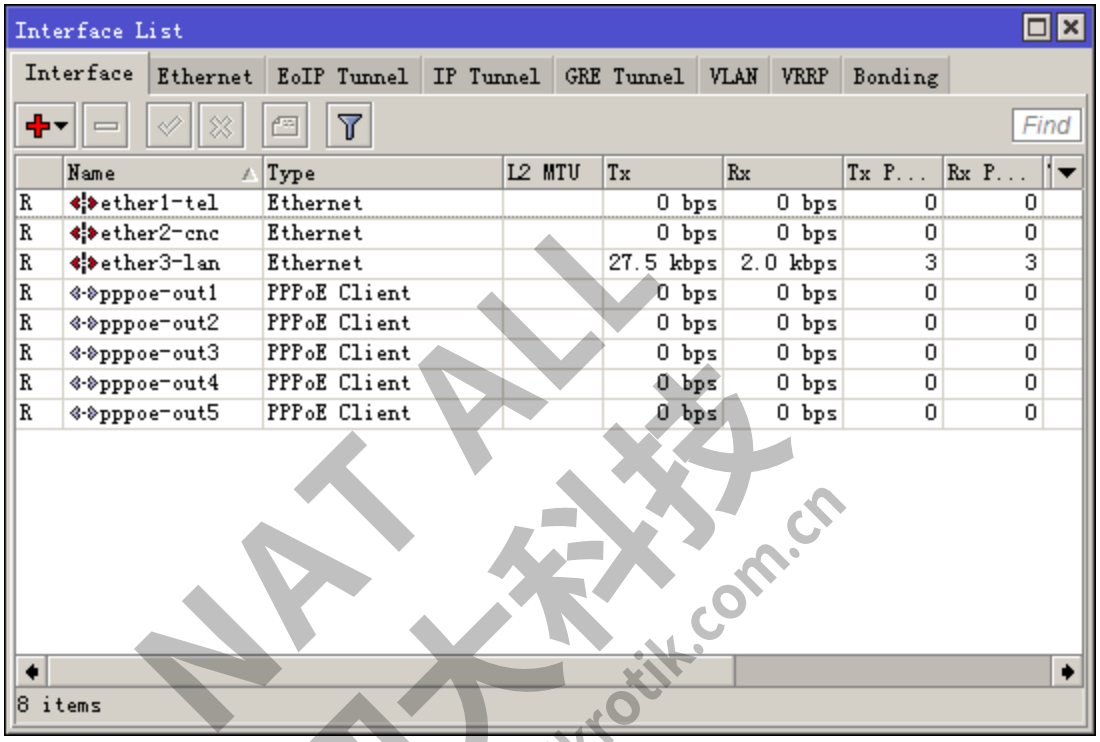
某网吧有5M电信光纤一条，5M网通光纤一条，5条4MADSL，内部主机120台。

简单网络结构

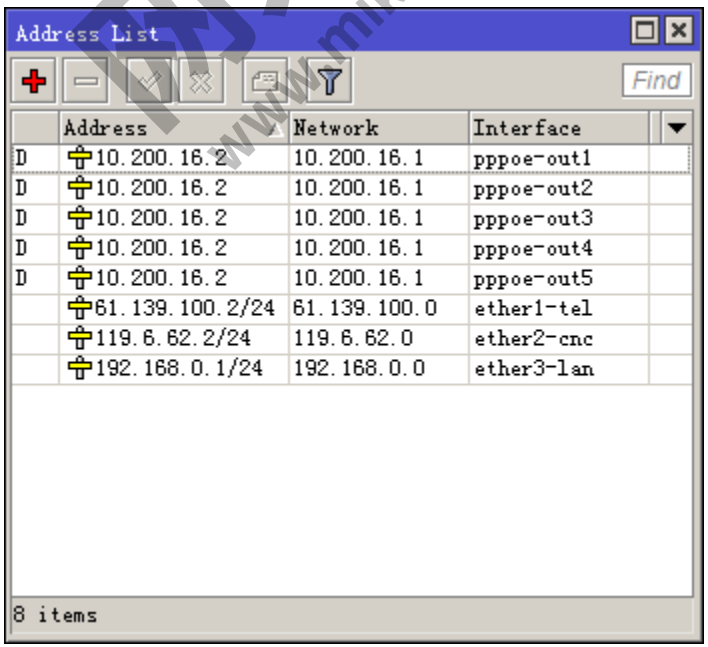


结合网页数据上传小，下行比较大的特点，让网页数据负载均衡走ADSL线路，然后导入网通路由表，让网通数据走网通光纤，默认路由走电信光纤

接口配置



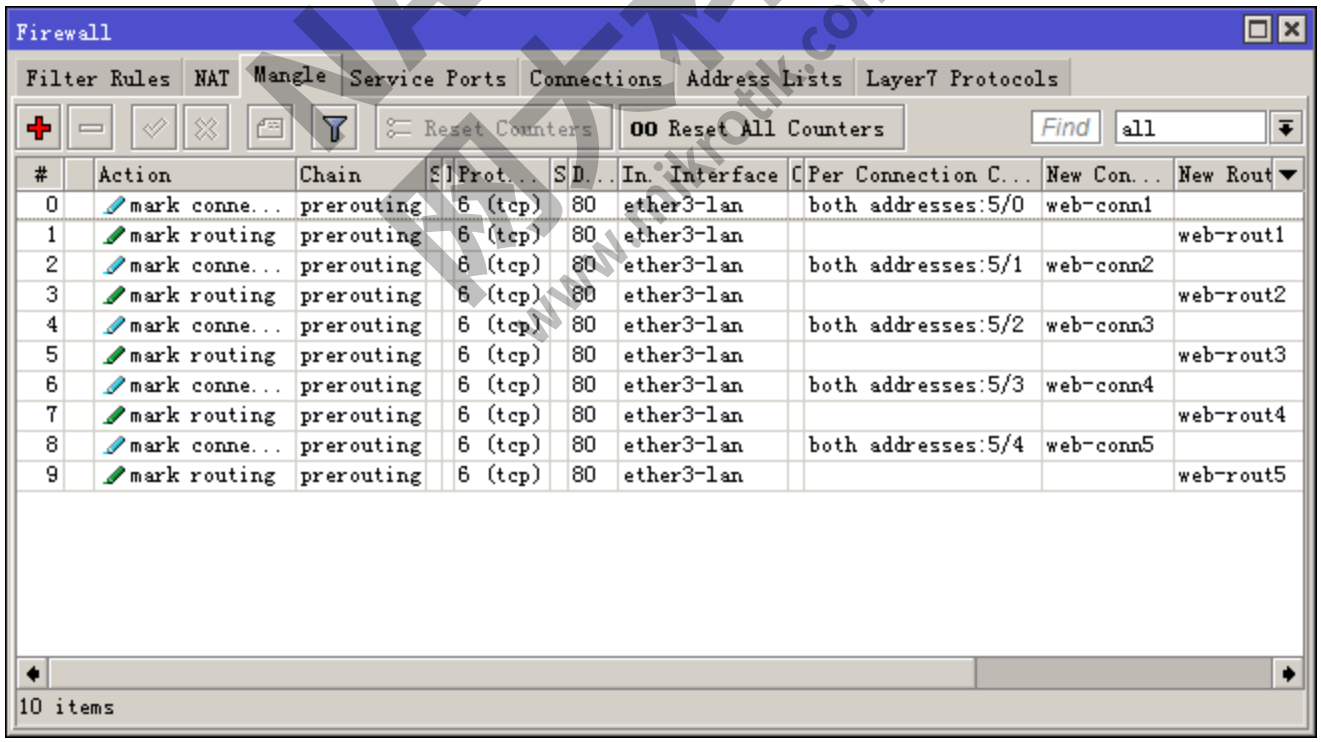
IP配置



NAT ALL 网大科技 www.mikrotik.com.cn

80端口分流路由标记

```
:for i from=1 to=5 do= {/ip firewall mangle add chain=prerouting in-interface=ether3-lan\
    protocol=tcp dst-port=80 per-connection-classifier=("bot"both-addresses:5/".($i-1)) \
    dst-address-type=!local action=mark-connection new-connection-mark=("web-conn".$i);\
    /ip firewall mangle add chain=prerouting in-interface=ether3-lan protocol=tcp \
    dst-port=80 connection-mark=("web-conn".$i) action=mark-routing\
    new-routing-mting-mark=("web-rout".$i)}
```



#	Action	Chain	S	Prot...	S	D...	In. Interface	C	Per Connection C...	New Con...	New Rout
0	mark conne...	prerouting		6 (tcp)		80	ether3-lan		both addresses:5/0	web-conn1	
1	mark routing	prerouting		6 (tcp)		80	ether3-lan				web-rout1
2	mark conne...	prerouting		6 (tcp)		80	ether3-lan		both addresses:5/1	web-conn2	
3	mark routing	prerouting		6 (tcp)		80	ether3-lan				web-rout2
4	mark conne...	prerouting		6 (tcp)		80	ether3-lan		both addresses:5/2	web-conn3	
5	mark routing	prerouting		6 (tcp)		80	ether3-lan				web-rout3
6	mark conne...	prerouting		6 (tcp)		80	ether3-lan		both addresses:5/3	web-conn4	
7	mark routing	prerouting		6 (tcp)		80	ether3-lan				web-rout4
8	mark conne...	prerouting		6 (tcp)		80	ether3-lan		both addresses:5/4	web-conn5	
9	mark routing	prerouting		6 (tcp)		80	ether3-lan				web-rout5

NAT ALL 网大科技 www.mikrotik.com.cn

导入联通路由表，路由指向

Route List

Routes | Nexthops | Rules | VRF

Find

#	Src. Address	Dst. Address	Routing ...	Interface	Action	Table
0		58.14.0.0/16			lookup	cnc
1		58.16.0.0/13			lookup	cnc
2		59.80.0.0/14			lookup	cnc
3		58.100.0.0/15			lookup	cnc
4		58.144.0.0/16			lookup	cnc
5		58.240.0.0/12			lookup	cnc
6		59.107.0.0/20			lookup	cnc
7		59.108.0.0/16			lookup	cnc
8		59.109.0.0/16			lookup	cnc
9		59.110.0.0/15			lookup	cnc
10		59.151.0.0/17			lookup	cnc

Route List

Routes | Nexthops | Rules | VRF

Find all

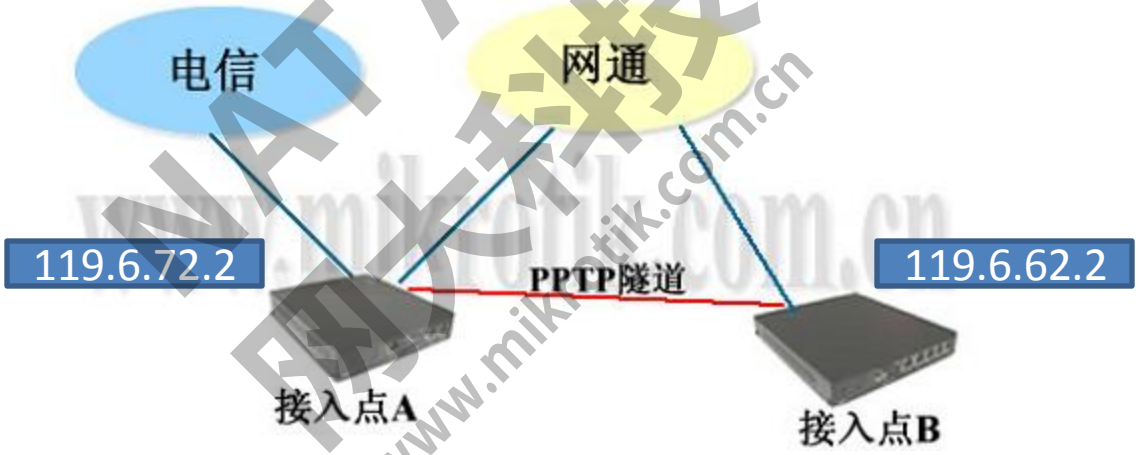
	Dst. Address	Gateway	Distance	Routing Mark	Pref. Sour
AS	0.0.0.0/0	61.139.100.1 reachable ether1-tel	1		
S	0.0.0.0/0	119.6.62.1 reachable ether2-cnc	2		
AS	0.0.0.0/0	119.6.62.1 reachable ether2-cnc	1	cnc	
AS	0.0.0.0/0	pppoe-out1 reachable	1	web-rout1	
AS	0.0.0.0/0	pppoe-out2 reachable	1	web-rout2	
AS	0.0.0.0/0	pppoe-out3 reachable	1	web-rout3	
AS	0.0.0.0/0	pppoe-out4 reachable	1	web-rout4	
AS	0.0.0.0/0	pppoe-out5 reachable	1	web-rout5	
DAC	10.200.16.1	pppoe-out1 reachable, pppoe-out2 rea...	0		10.200.16...
DAC	61.139.100...	ether1-tel reachable	0		61.139.100.2
DAC	119.6.62.0/24	ether2-cnc reachable	0		119.6.62.2
DAC	192.168.0....	ether3-lan reachable	0		192.168.0.1

12 items

NPL ALL 网大科技 www.mikrotik.com.cn

VPN借线

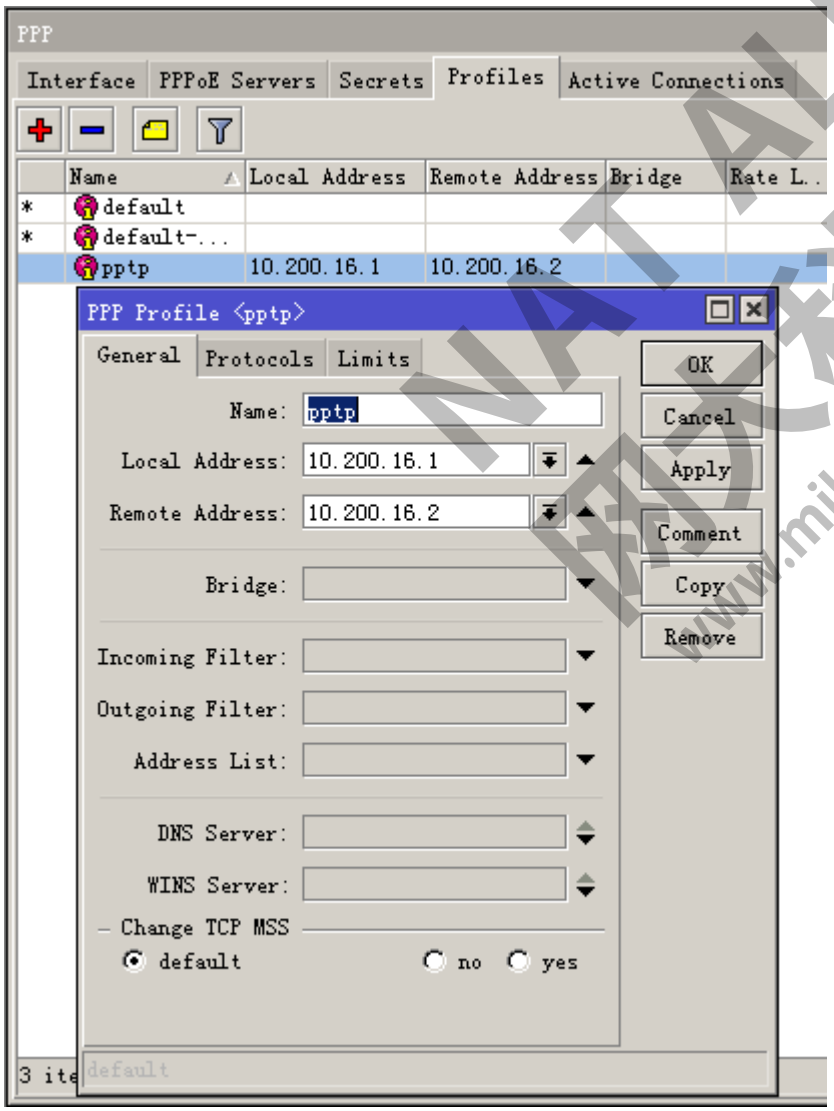
- 假设一个接入点A有电信和网通两条线路，并做了以网通为主，电信为静态路由策略设置。而另一个接入点B 接入了网通的线路，并且想通过PPTP隧道的方式借用接入点A的电信线路，现在看下面的图例



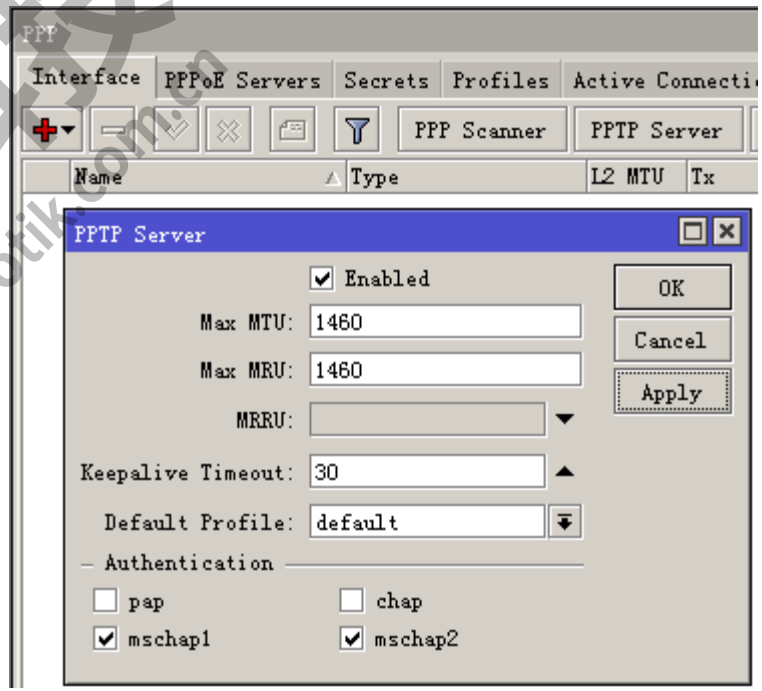
根据上面的案例，接入点A 和B他们都是共同使用了网通的线路，这里网通两个点之间的延迟小于10ms，网络延迟小才能保证足够的网速给B做电信的访问。首先建立从接入点B 到A的PPTP隧道，我们在接入点A设置PPTP服务器，在接入点B设置客户端。这里接入点A的网通IP地址为 119.6.72.2，B网通地址为119.6.62.2。

在A接入点配置PPTP-server

定义Profile

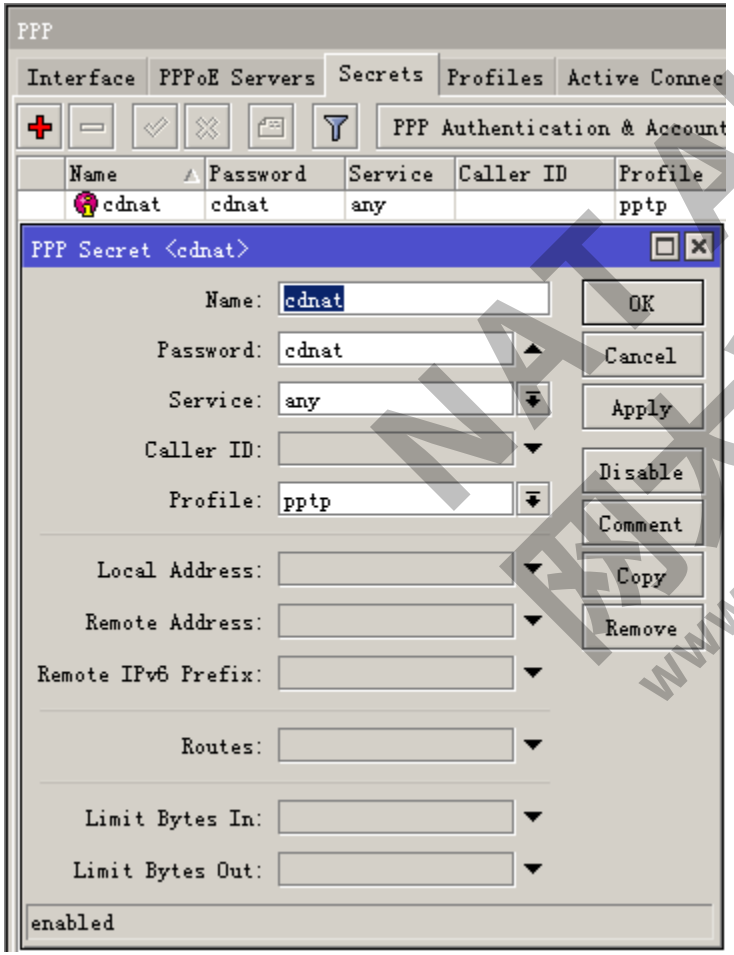


开启PPTP服务

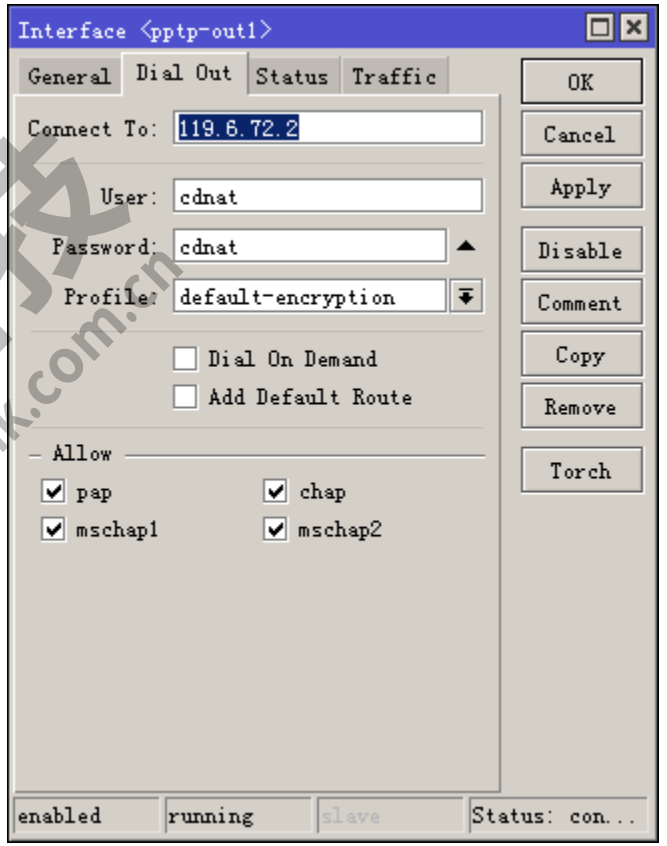


NAT ALL 网达科技 www.mikrotik.com.cn

在A接入点添加PPTP用户

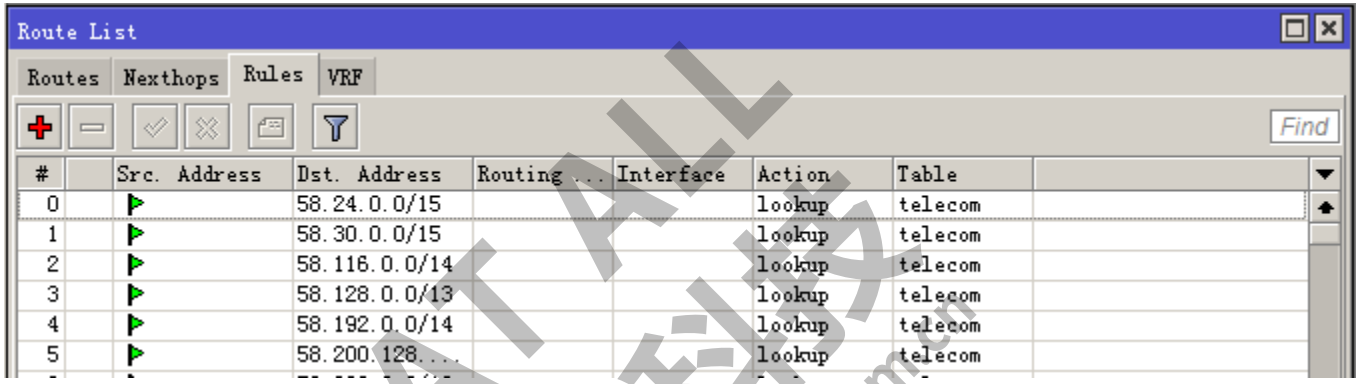


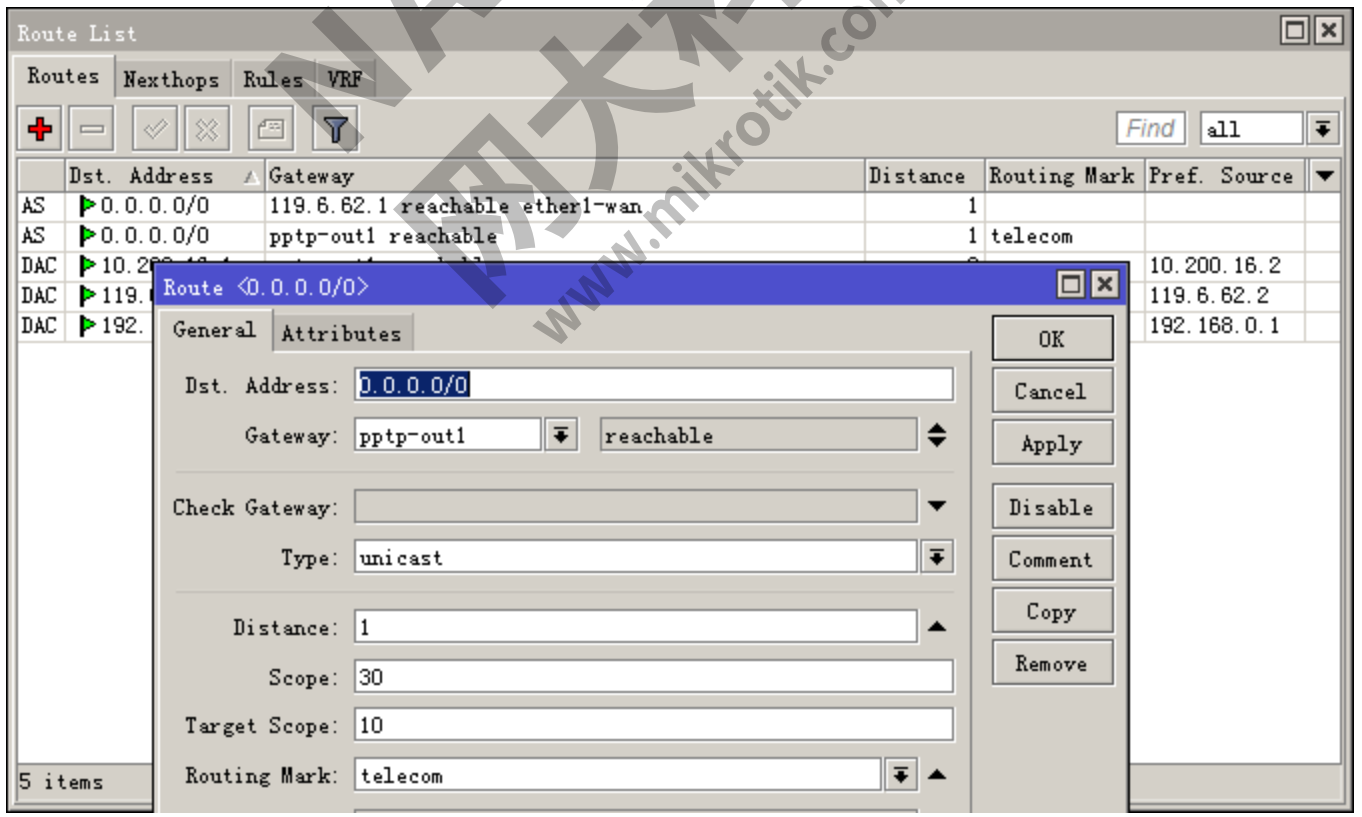
在B接入点建立PPTP隧道



NATALL 网大科技 www.mikrotik.com.cn

在B接入点导入电信路由表，并指定电信数据由PPTP隧道走向A接入点，再由A接入点的电信线路出去。





NAT ALL 网大科技 www.mikrotik.com