

First Hop Redundancy Protocols

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EngineerQustin

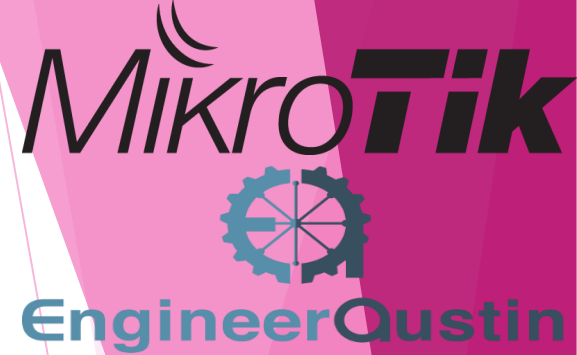
MikroTik

Mohammad Tayyebi

- MikroTik Certified Trainer and Academic Trainer
- Working with MikroTik solutions since 2008
- **Certifications :**
CCNA R&S, CCNP R&S, MTCE, VCP, EMC ISM, EMCSA, MTCNA, MTCRE, MTCTCE, MTCUME, MTCTCE, MTCIPV6, MTCSE, MTCINE

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- Global Consulting
- Evaluate, Design, Implement,
- Network Engineer
- IT Training
- Data Center
- Virtualization



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Agenda

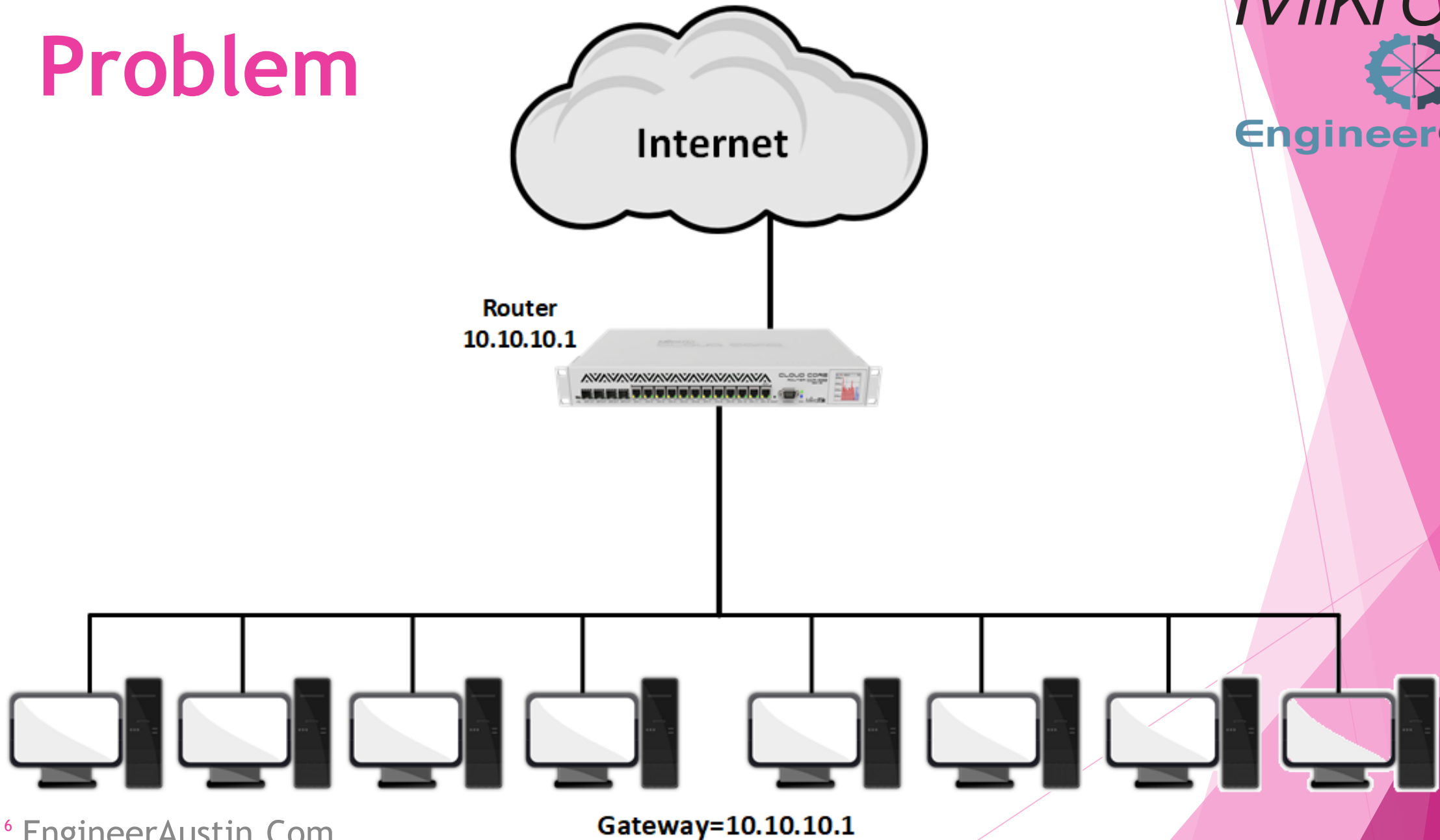
- ❖ What's FHRP
- ❖ Problem/Solutions
- ❖ Redundant Router Protocols
- ❖ What's the VRRP
- ❖ VRRP Operation
- ❖ VRRP Configuration
- ❖ Load Sharing
- ❖ Security in VRRP
- ❖ VRRP and IPV6



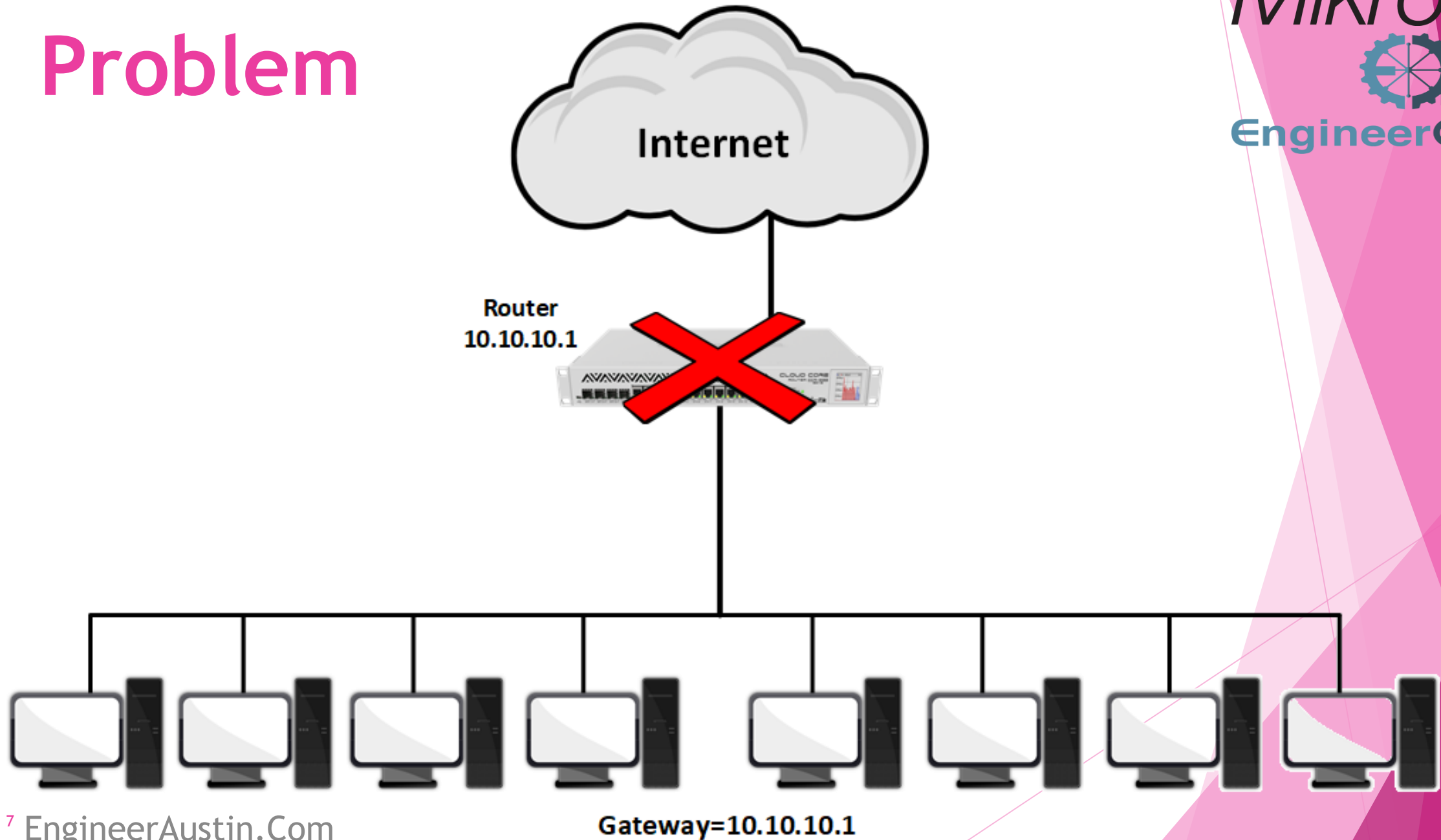
What's FHRP

- First Hob Redundancy Protocol
 - FHRP is designed to protect the Default Gateway by allowing two or more Routers to provide backup for that address.
 - In the event of failure of an active router, the backup router will take over the address, usually within a few seconds

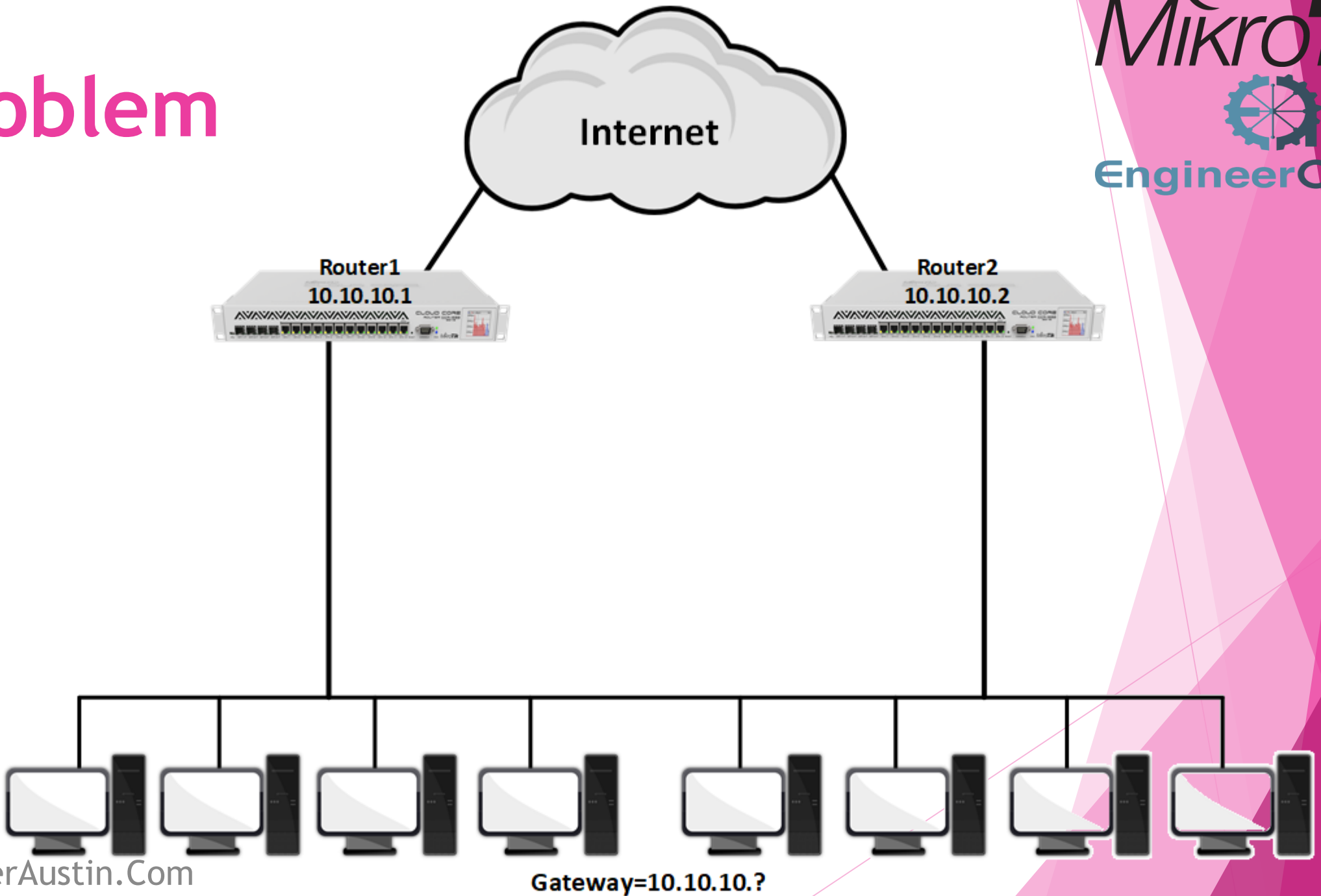
Problem



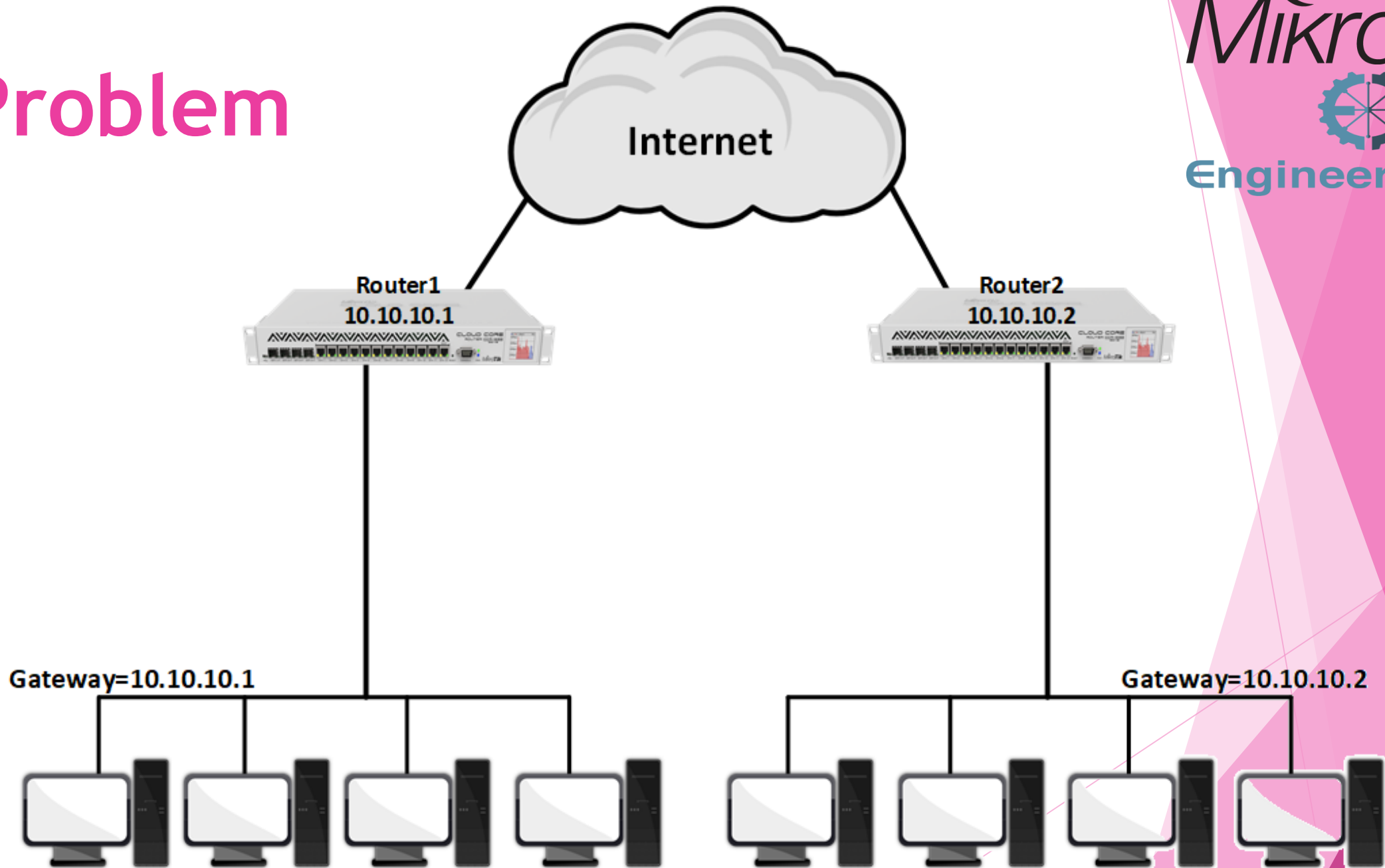
Problem

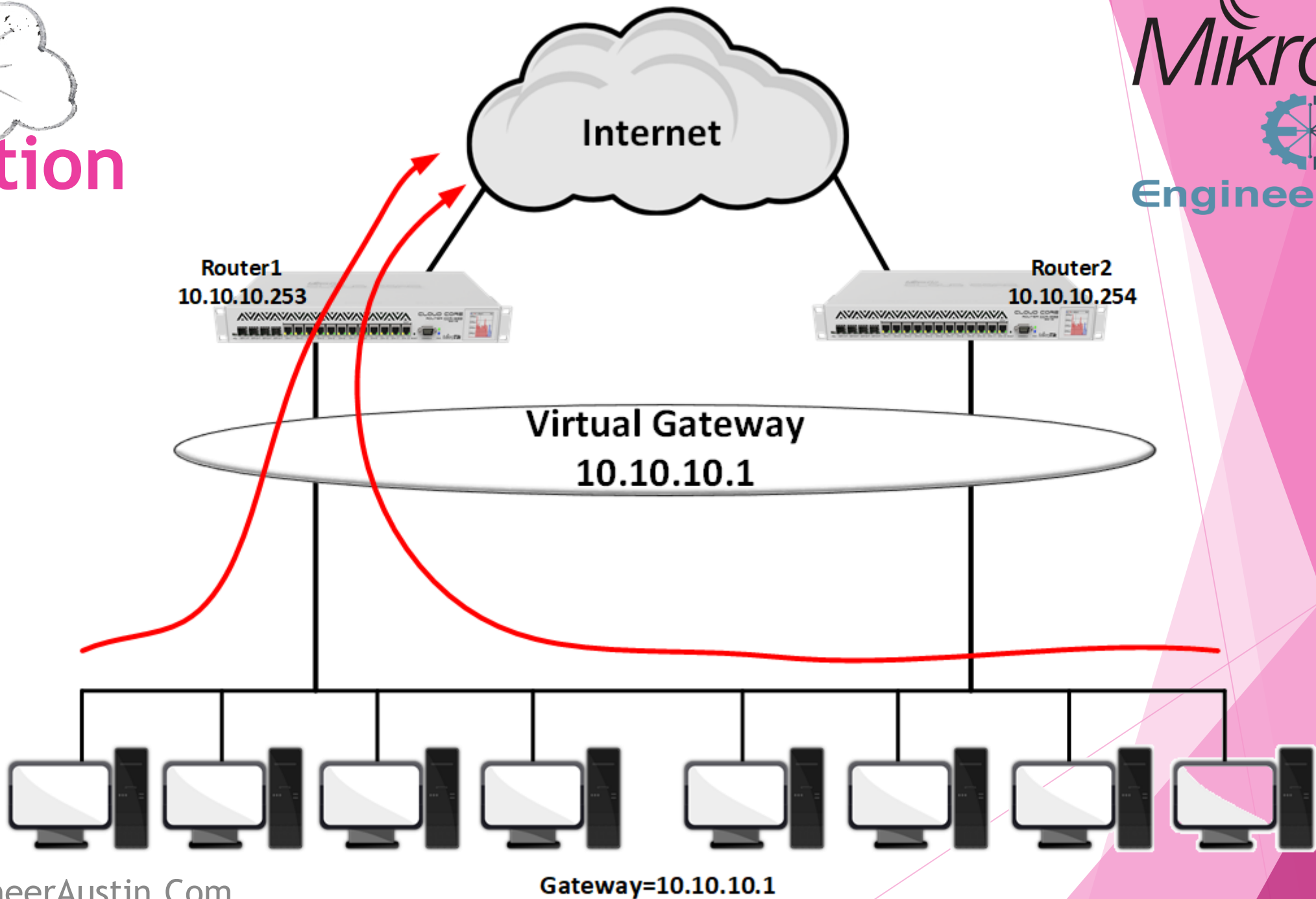


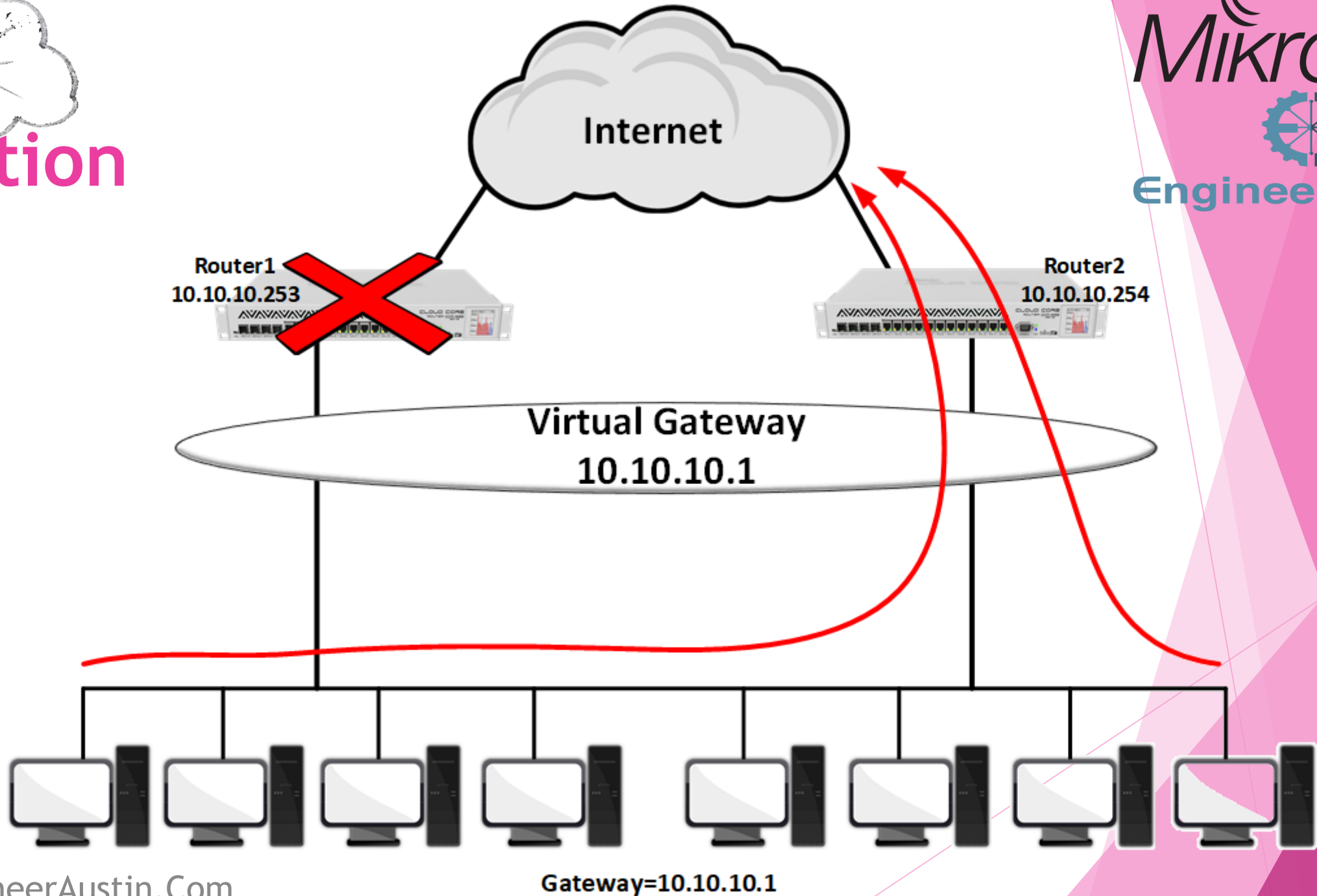
Problem



Problem







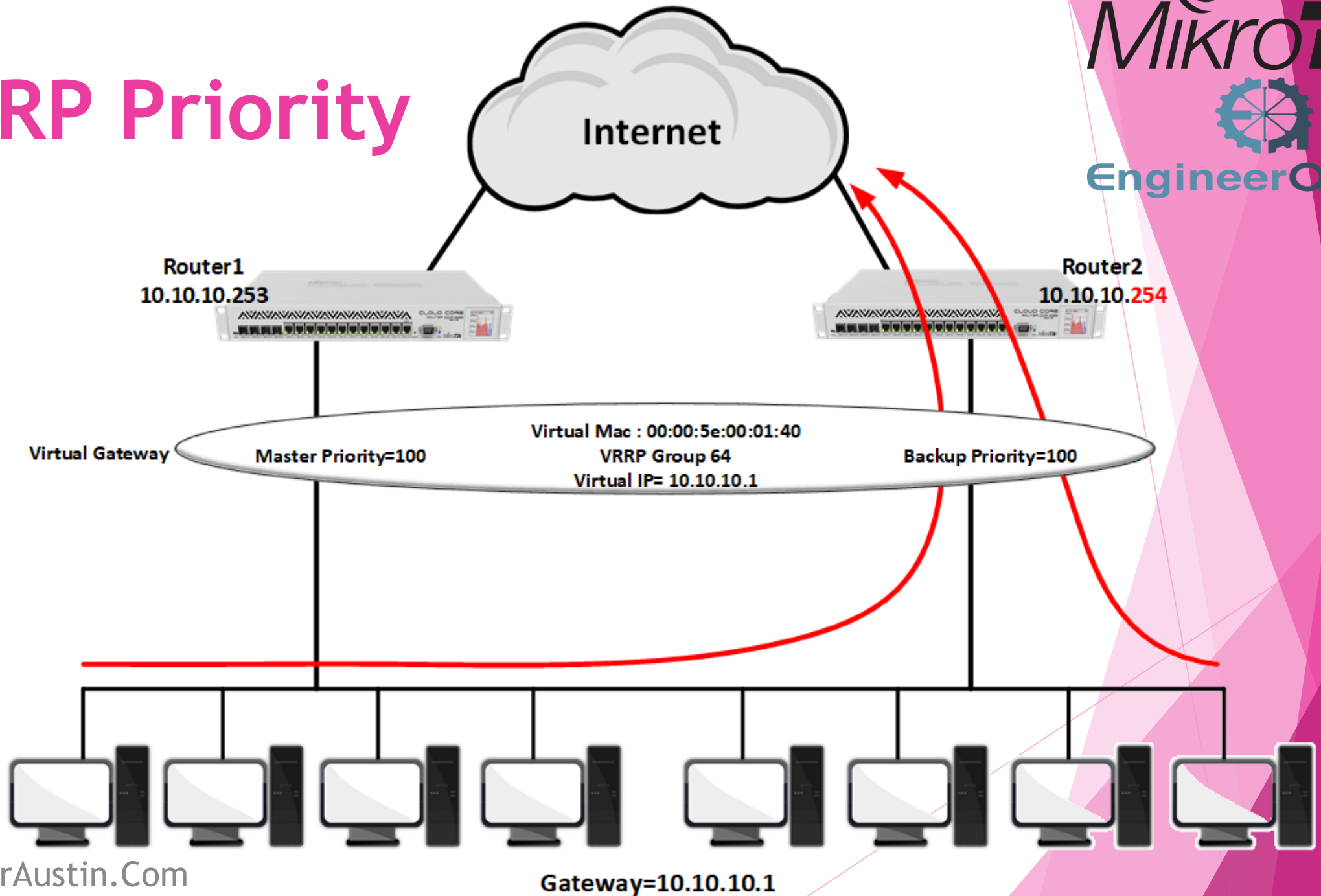
What's VRRP

- Standard Protocol
- Using IP Encapsulation 112
- Using 224.0.0.18 as Multicast Address
- Priority Range : 1-255 (Default : 100) Master/Backups
- Group Range : 0-255
- Mac Address : 00:00:5e:00:01:XX
- Preemption : Yes by Default
- Authentication : AH
- IPV6 Support

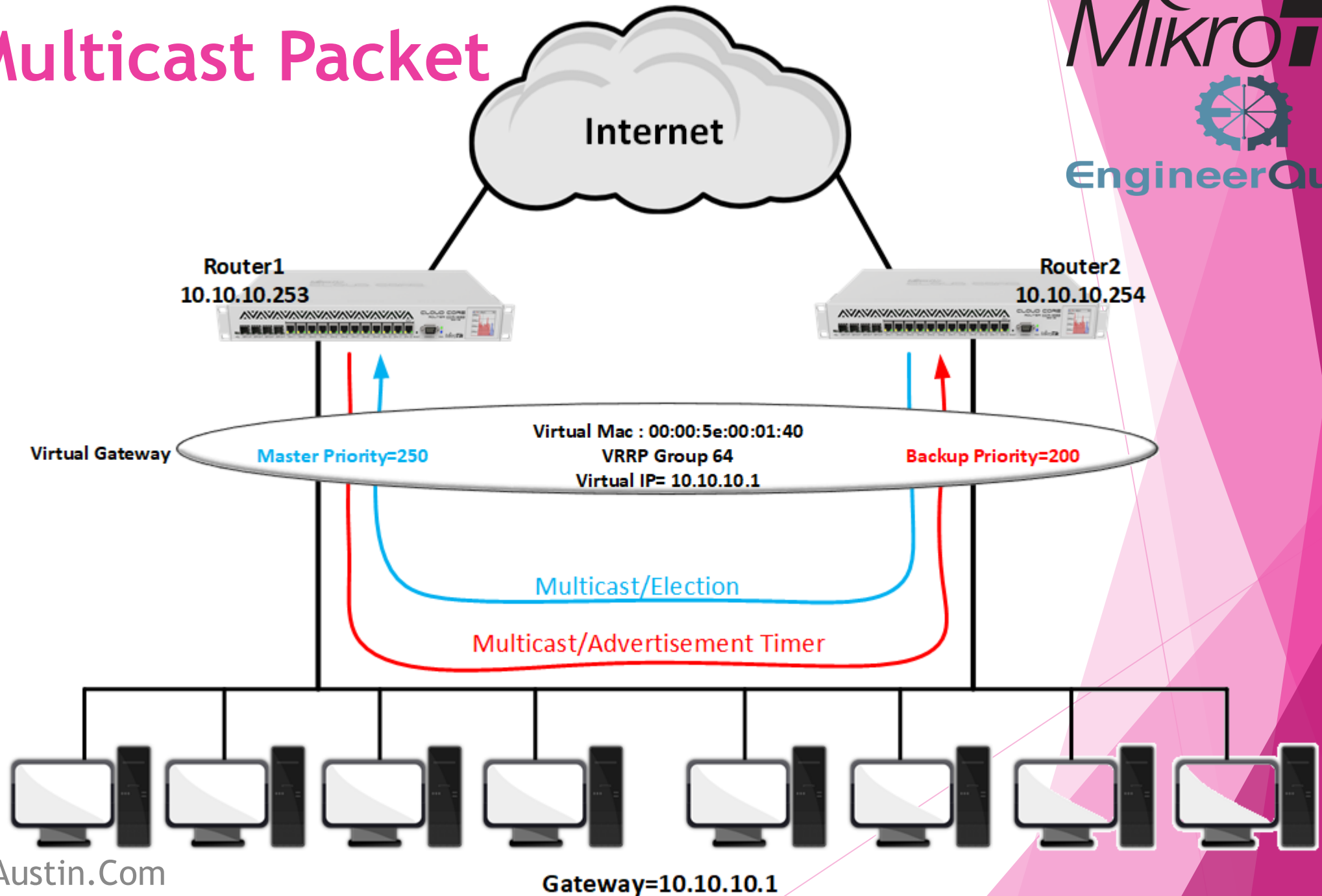
VRRP Mac Address

- IANA Mac Address Block : 00:00:5e
- VRRP Virtual Mac :
00:00:5e:00:01:<VRID>
- VRID Example :
 - VRID 10 00:00:5e:00:01:0a
 - VRID 100 00:00:5e:00:01:64

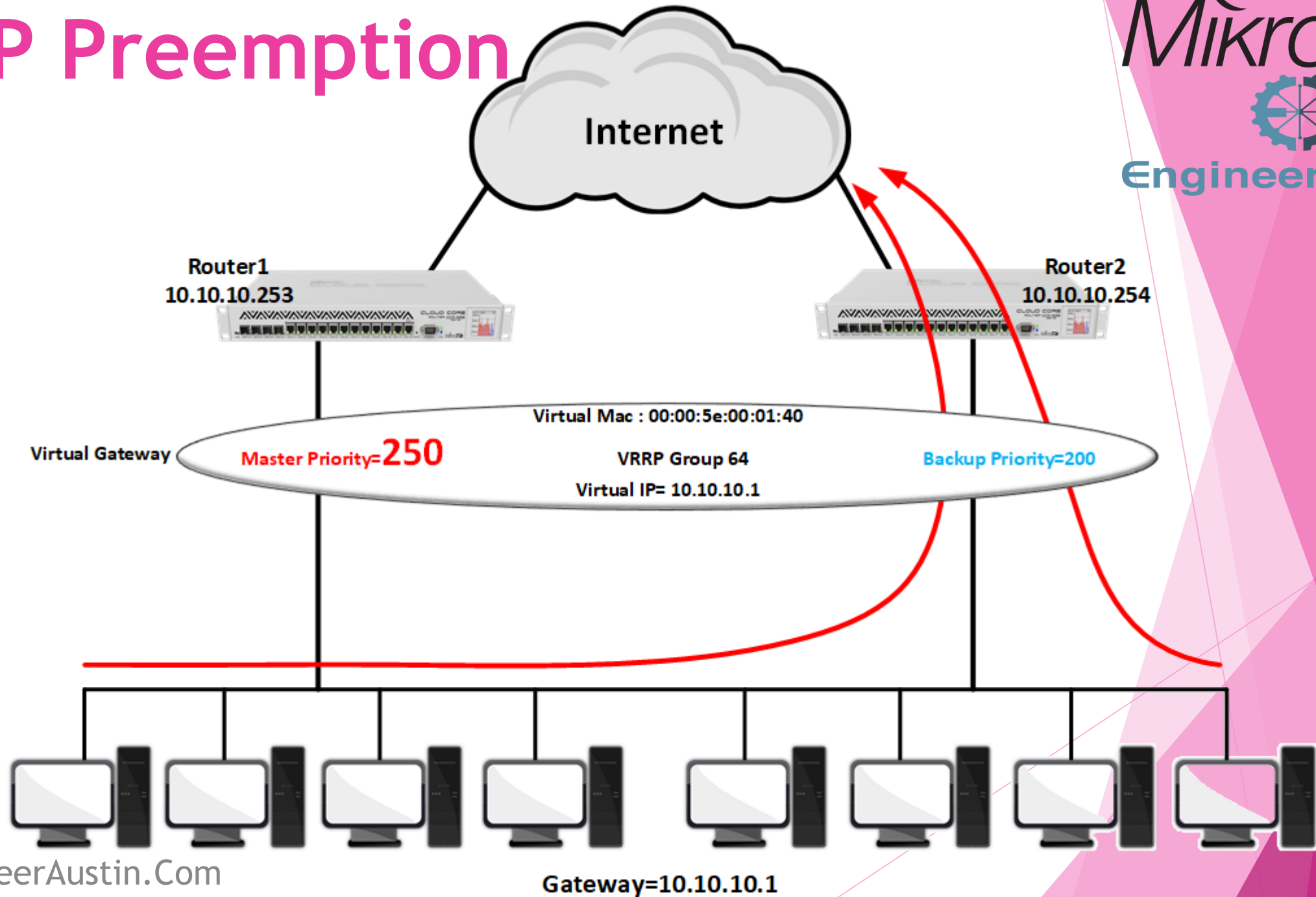
VRRP Priority



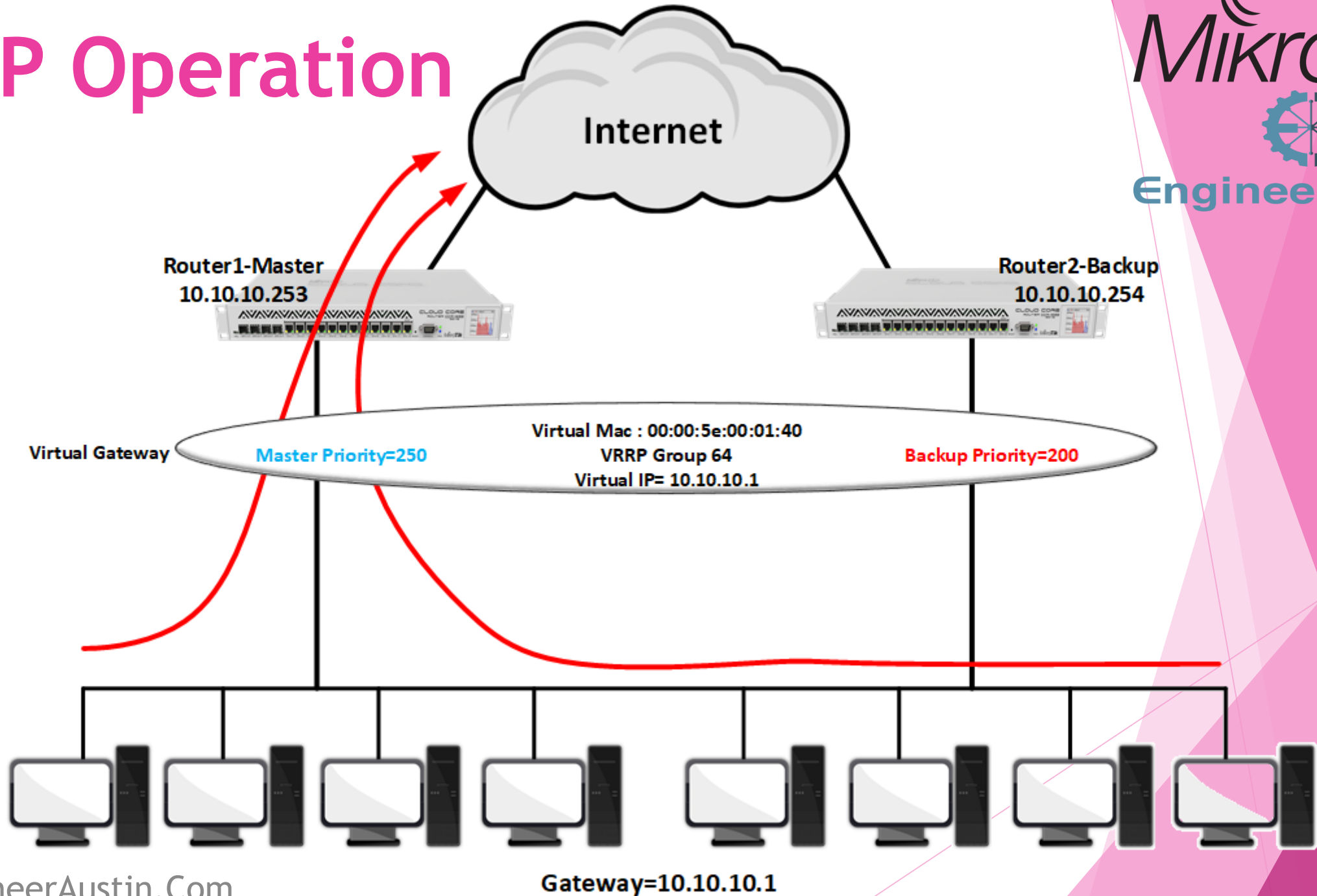
VVRP Multicast Packet



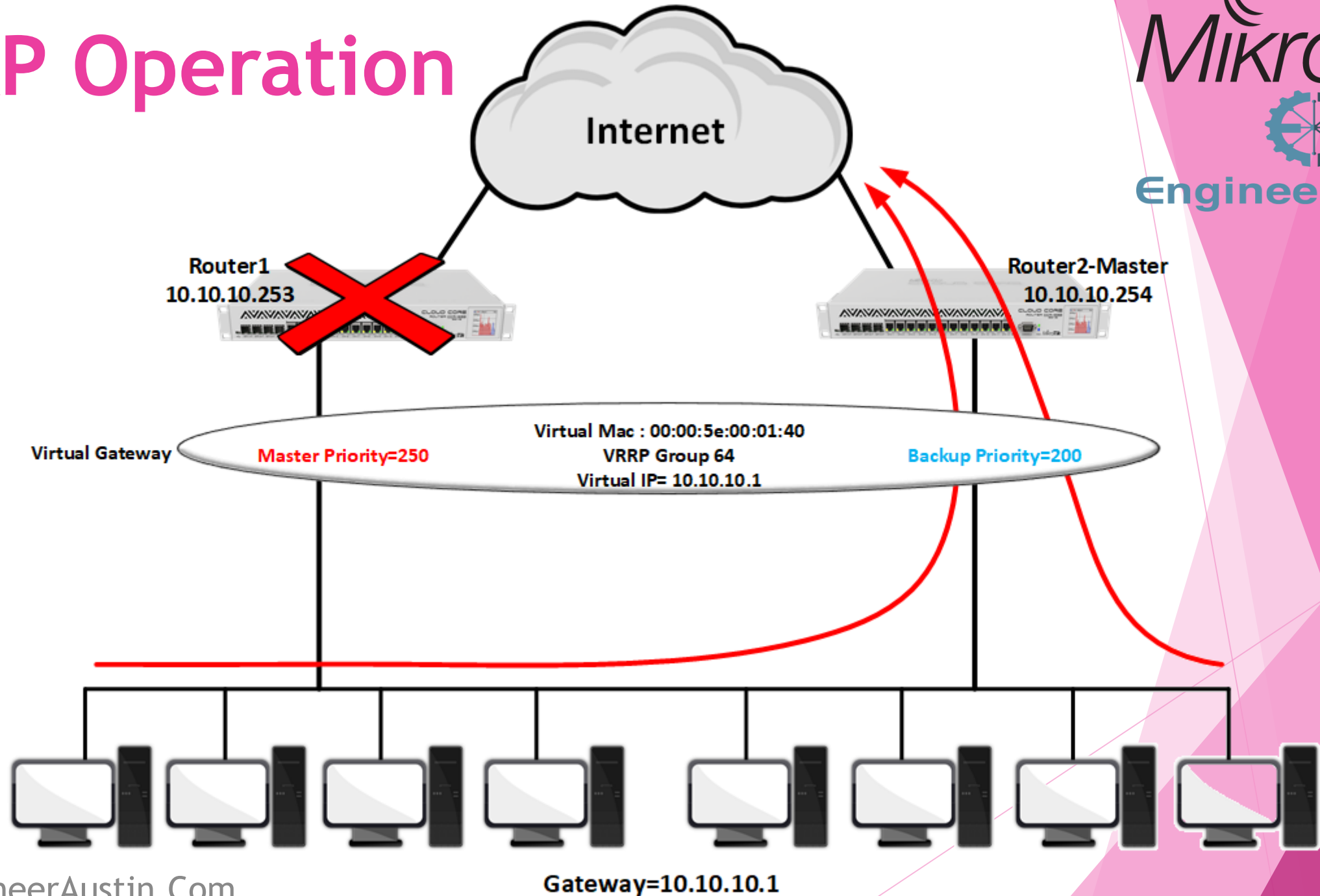
VRRP Preemption



VRRP Operation



VRRP Operation



VRRP Security

- None
- Simple
- AH

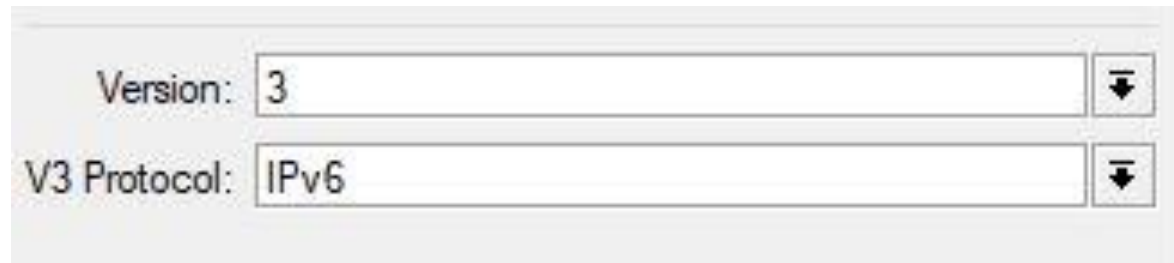
VRRP Versions

- Version2

- Version3

 - No Authentication

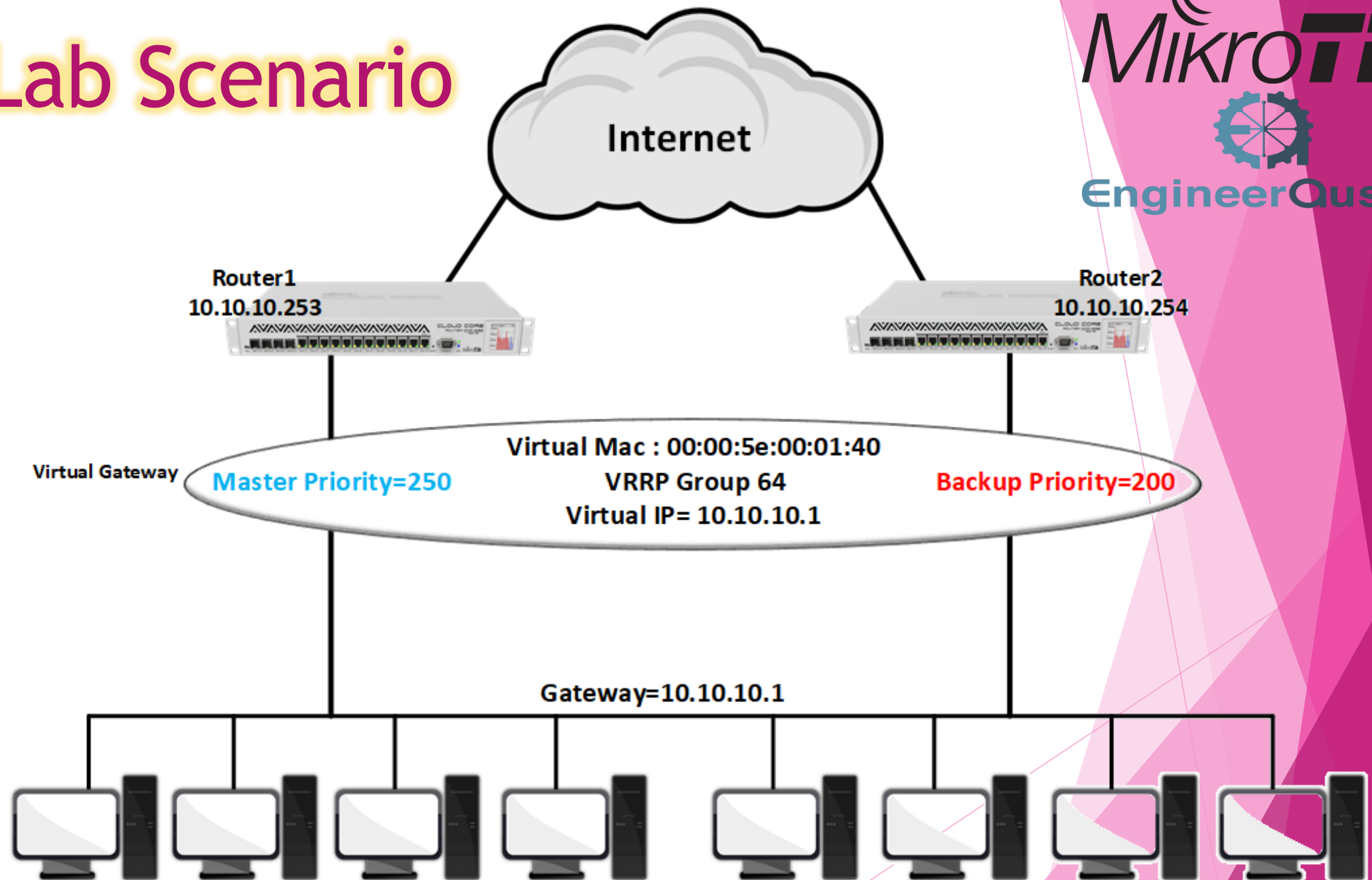
VRRP with IPV6



A screenshot of the MikroTik WinBox VRRP configuration window. It shows two dropdown menus. The first is labeled 'Version:' and has the value '3' selected. The second is labeled 'V3 Protocol:' and has the value 'IPv6' selected. Both dropdowns have a small arrow icon to their right.

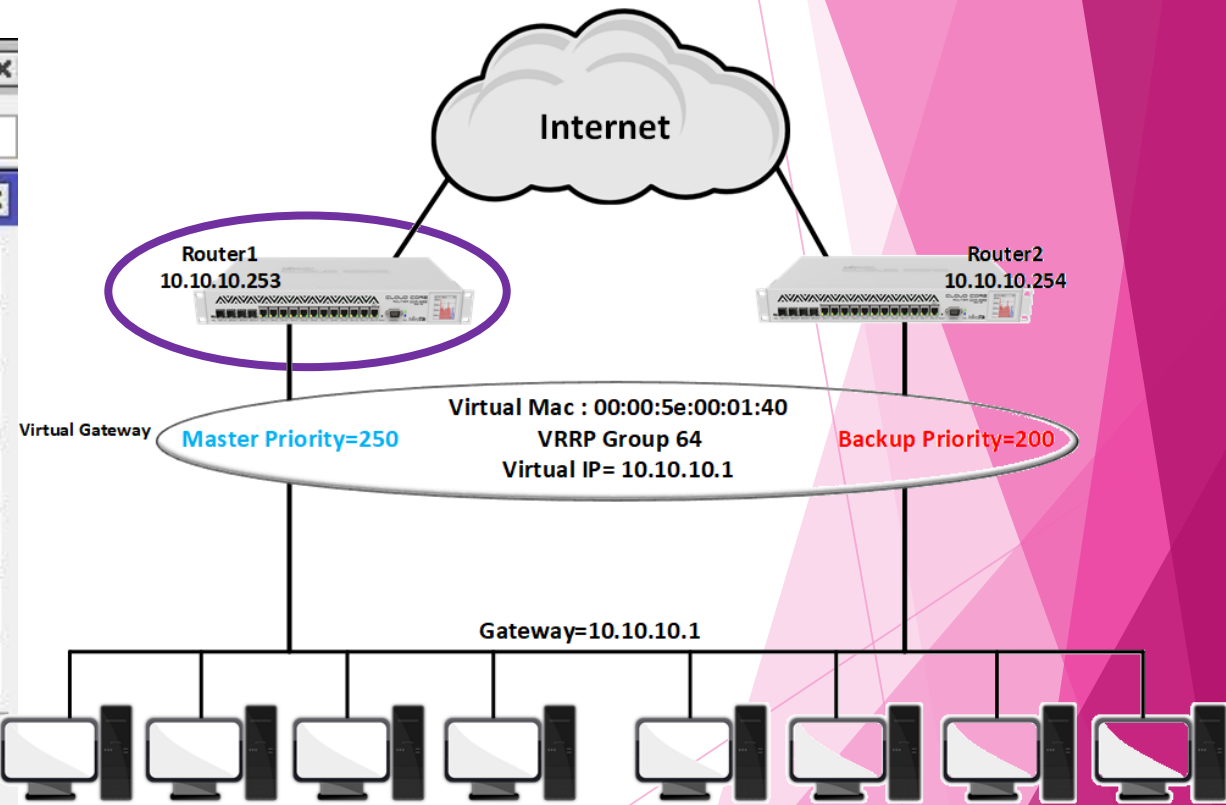
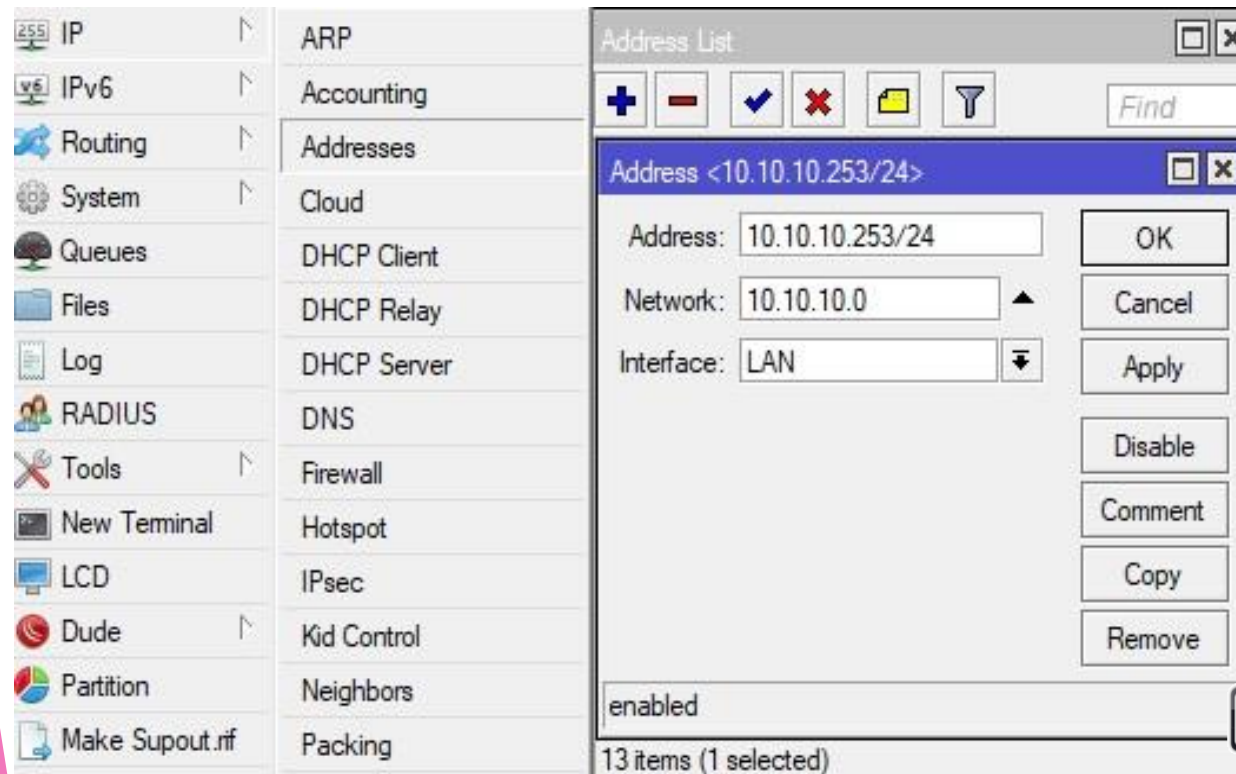
- VRRP Virtual Mac : 00:00:5e:00:02:<VRID>
- the multicast address is FF02:0:0:0:0:0:0:12

VRRP Lab Scenario



VRRP Scenario

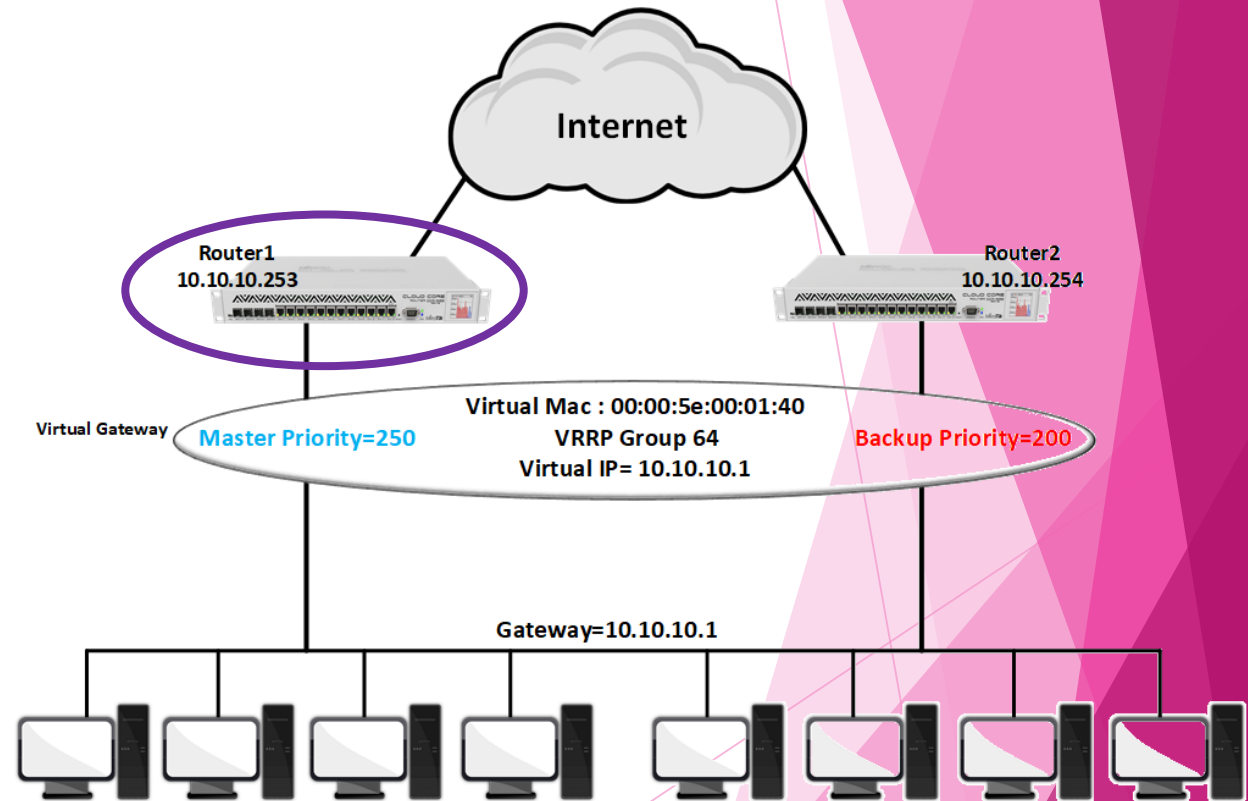
Router1 Configuration



VRRP Scenario

Router1 Configuration

General	VRRP	Scripts	Status	Traffic
Name:	Virtual on R1			
Type:	VRRP			
MTU:	1500			
Actual MTU:	1500			
L2 MTU:	1594			
MAC Address:	00:00:5E:00:01:40			
ARP:	enabled			
ARP Timeout:				



VRRP Scenario

Router1 Configuration

General VRRP Scripts Status Traffic

Interface: LAN

VRID: 64

Priority: 250

Interval: 1.00 s

☒ Preemption Mode

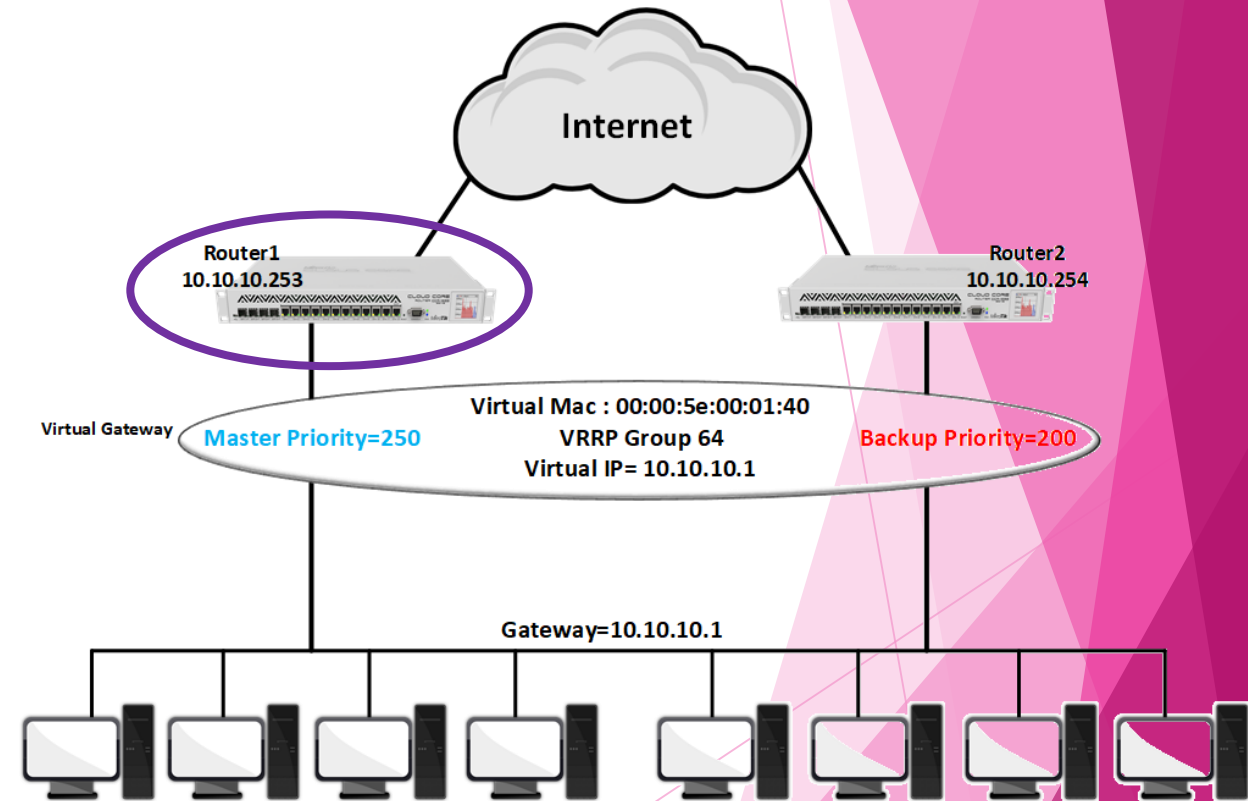
Authentication

☐ none ☐ simple ☒ ah

Password: *****

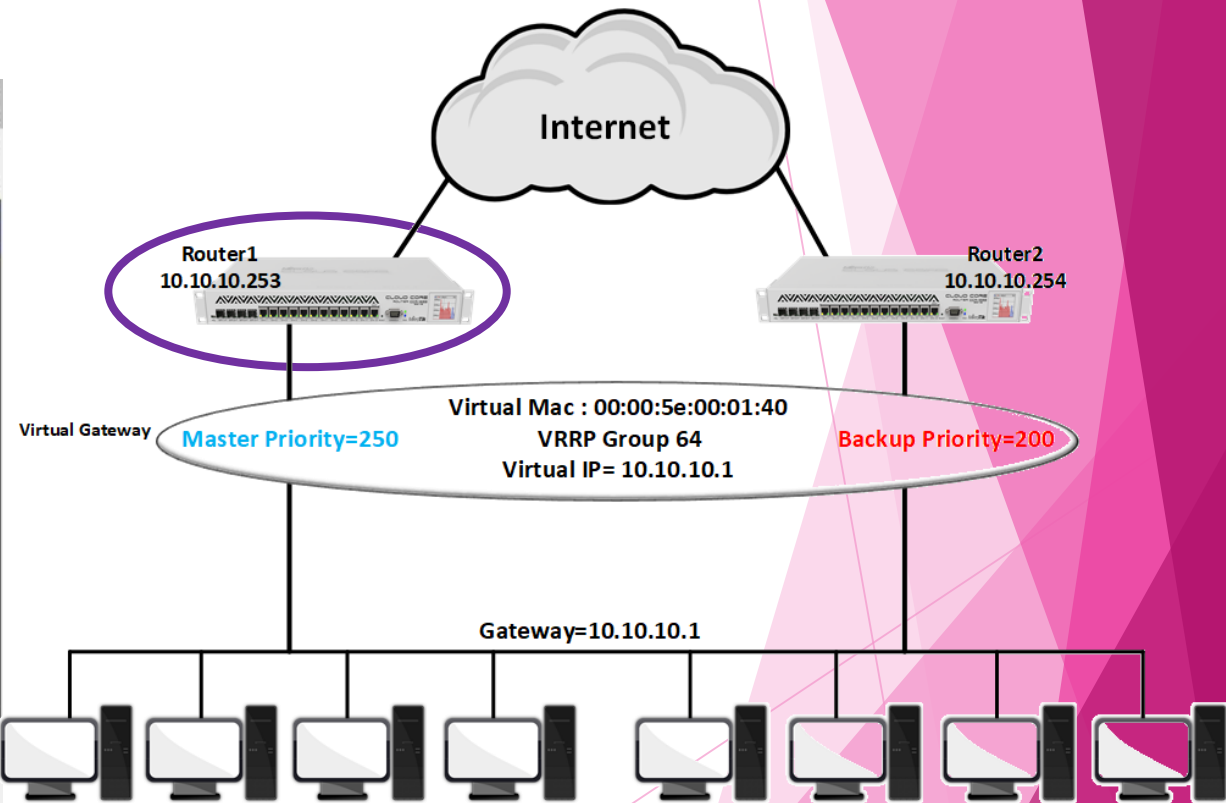
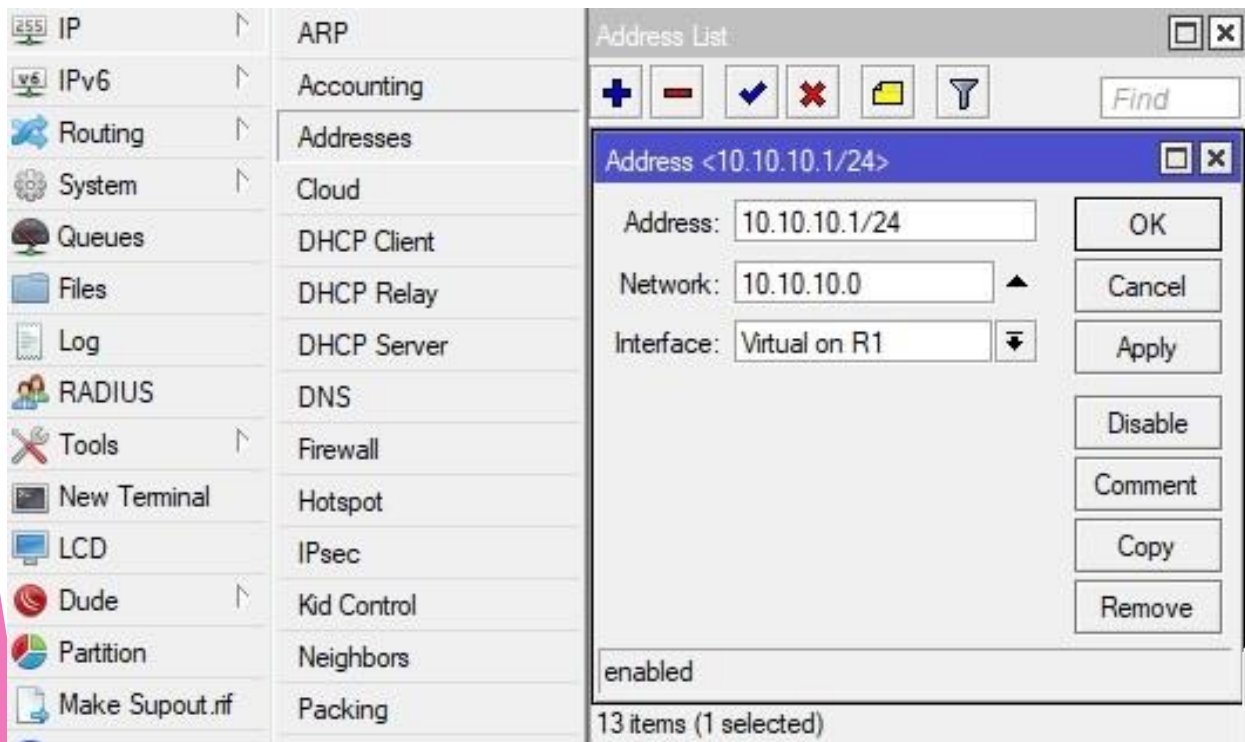
Version: 2

V3 Protocol: IPv4



VRRP Scenario

Router1 Configuration



VRRP Scenario

Router1 Configuration

```
/ip address
```

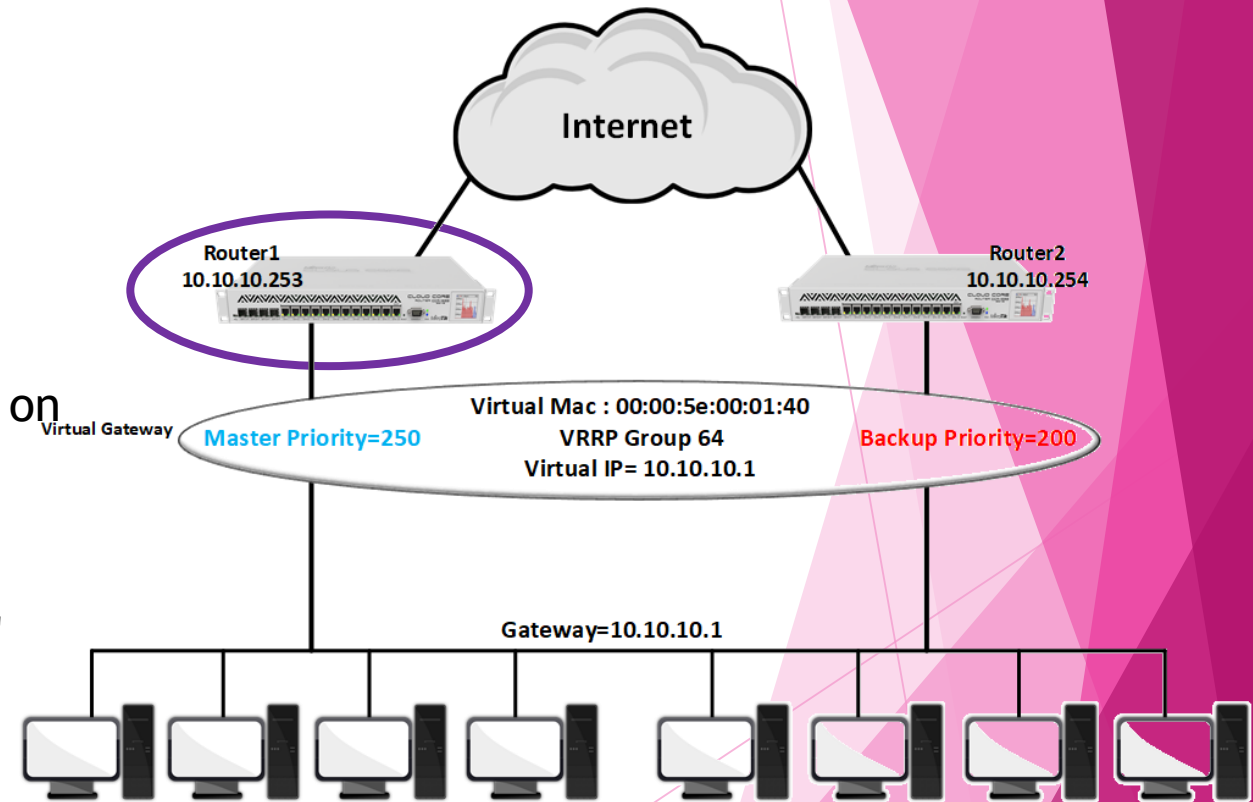
```
add address=10.10.10.253/24 interface=LAN
```

```
/interface vrrp
```

```
add authentication=ah interface=LAN name="Virtual on  
R1" password=***** priority=250 version=2 vrid=64
```

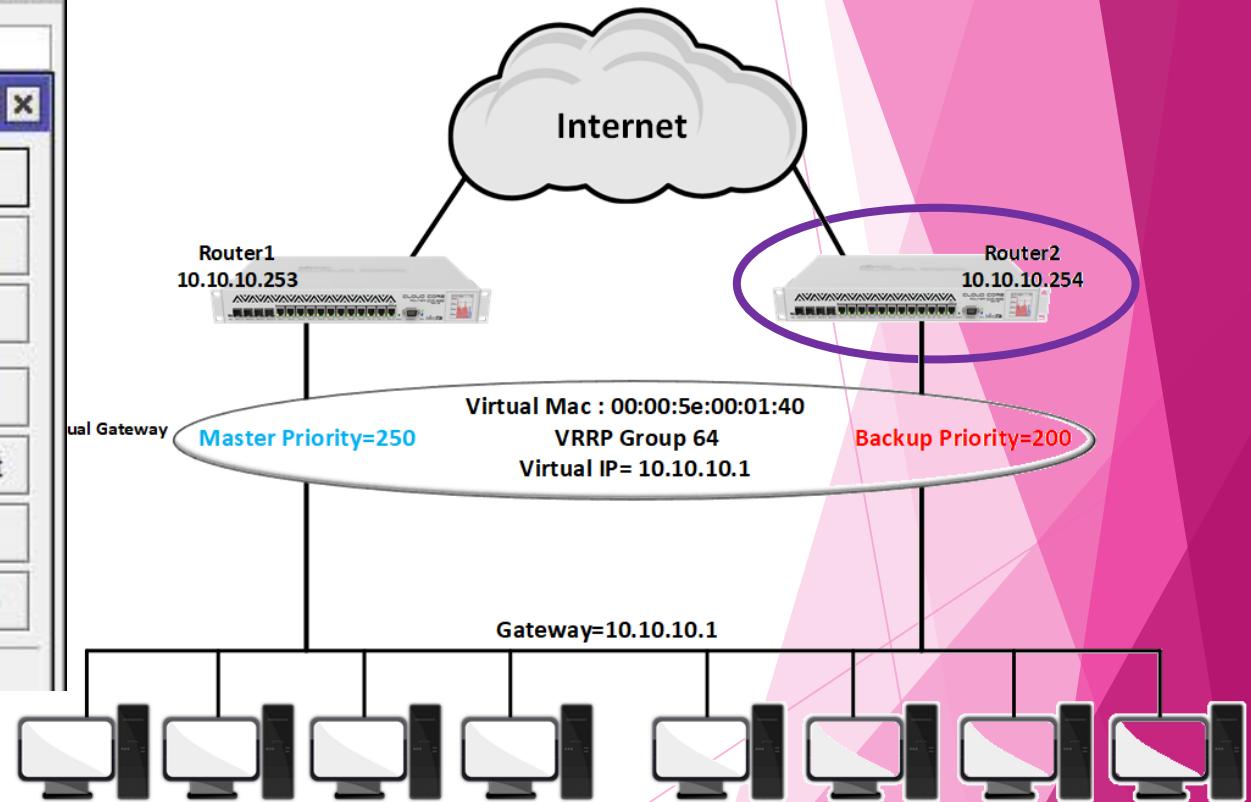
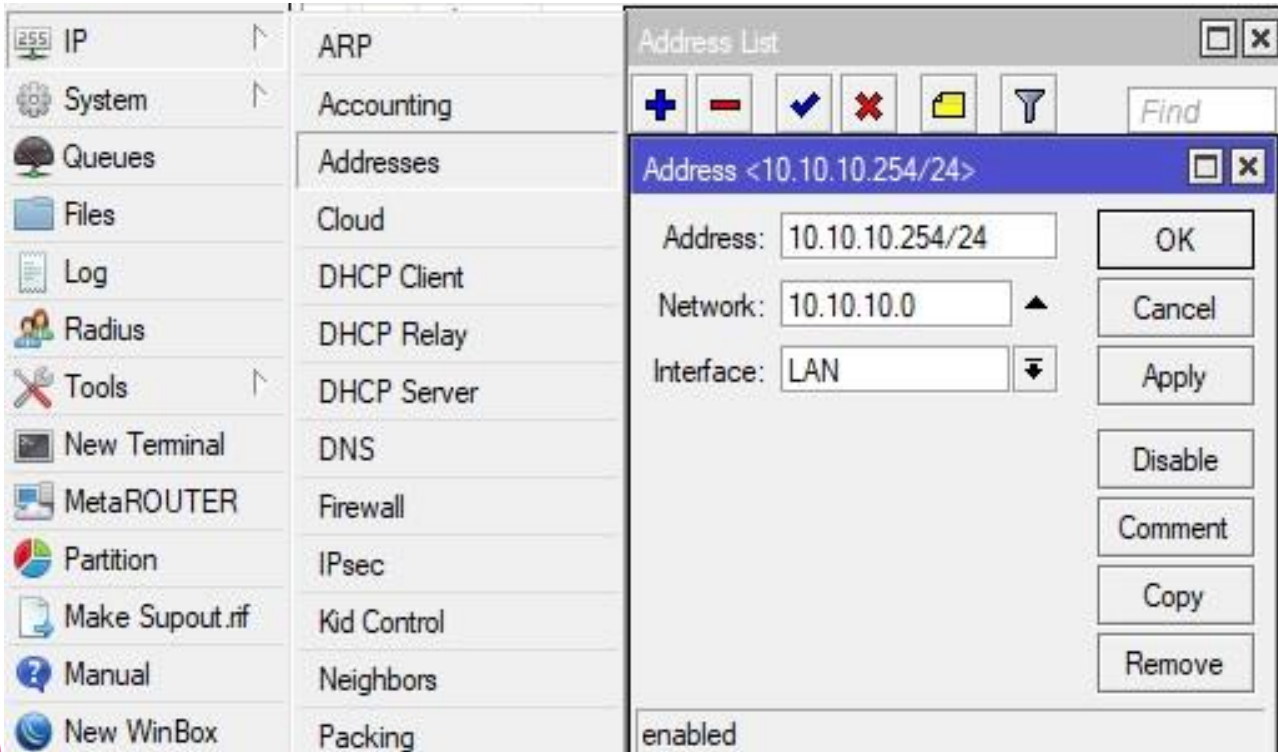
```
/ip address
```

```
add address=10.10.10.1/24 interface="Virtual on R1"
```



VRRP Scenario

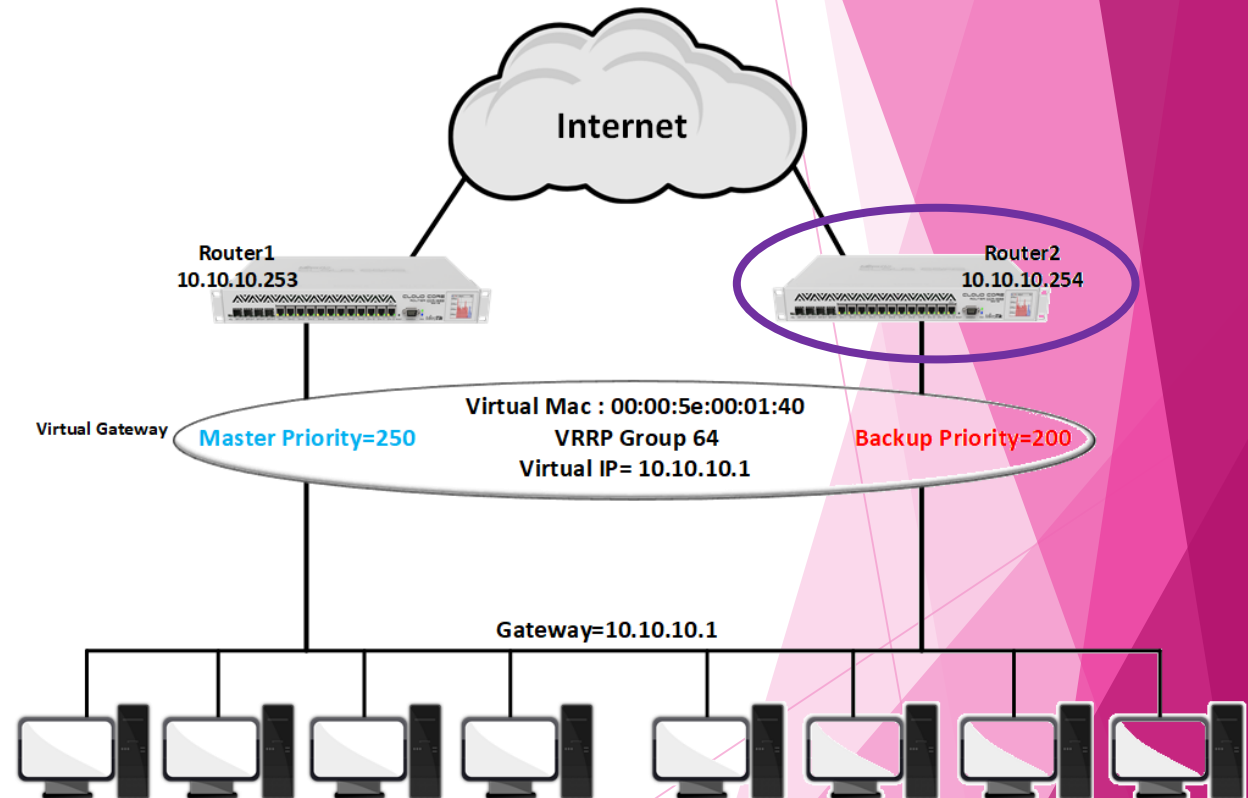
Router2 Configuration



VRRP Scenario

Router2 Configuration

Name:	Virtual on R2
Type:	VRRP
MTU:	1500
Actual MTU:	1500
L2 MTU:	1594
MAC Address:	00:00:5E:00:01:40
ARP:	enabled
ARP Timeout:	



VRRP Scenario

Router2 Configuration

General VRRP Scripts Status Traffic

Interface: LAN

VRID: 64

Priority: 200

Interval: 1.00 s

☒ Preemption Mode

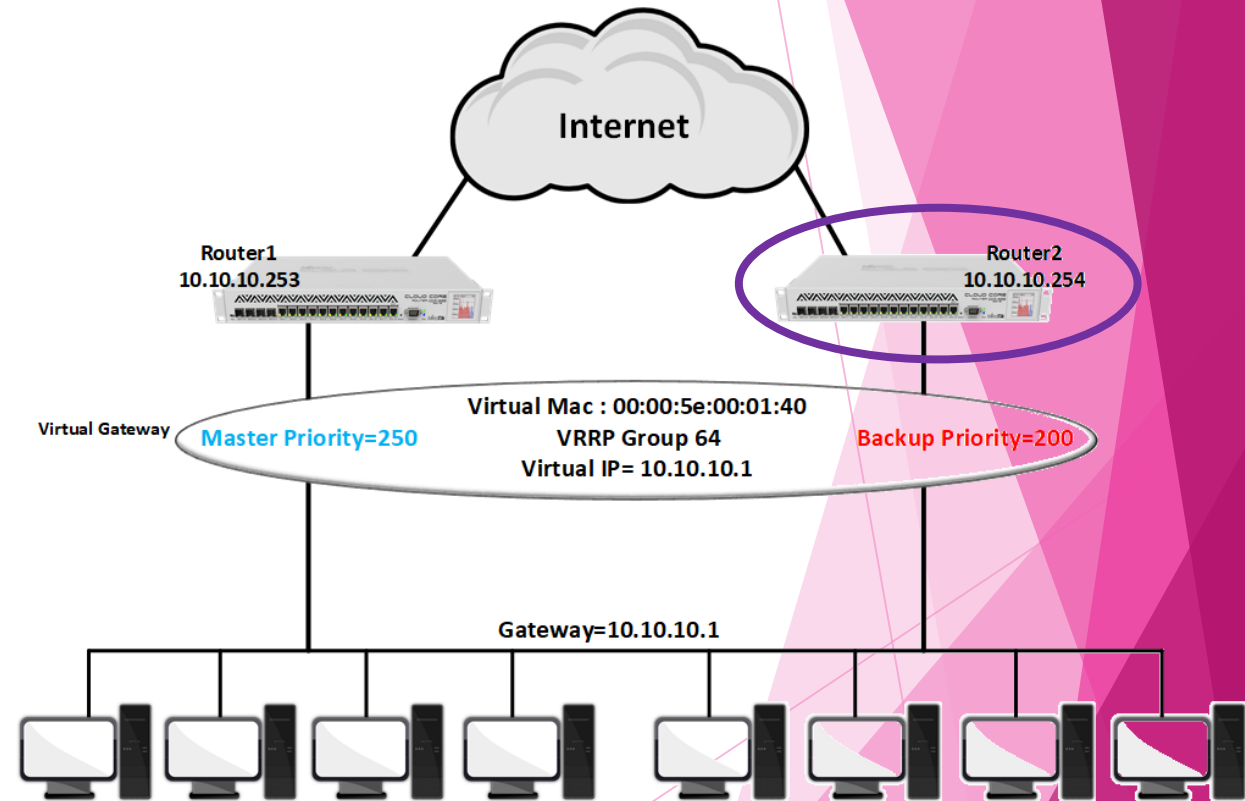
Authentication

☐ none ☐ simple ☒ ah

Password: *****

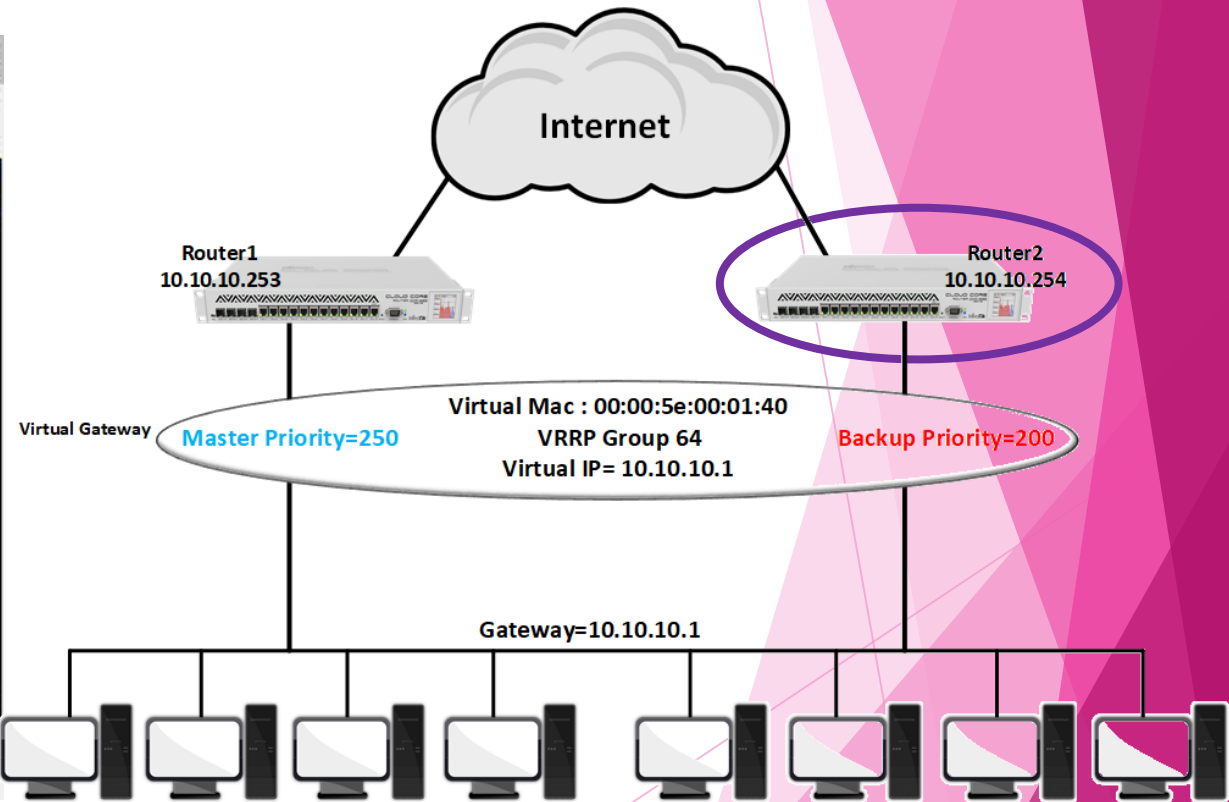
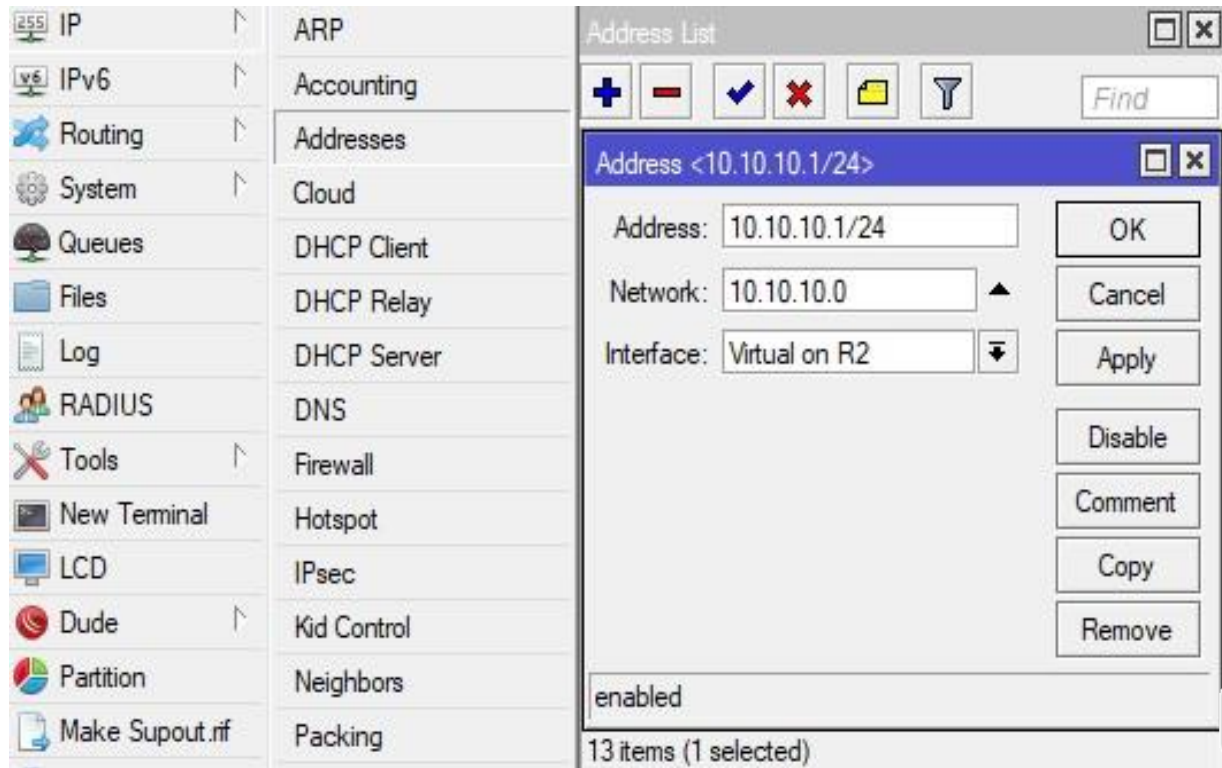
Version: 2

V3 Protocol: IPv4



VRRP Scenario

Router2 Configuration



VRRP Scenario

Router2 Configuration

/ip address

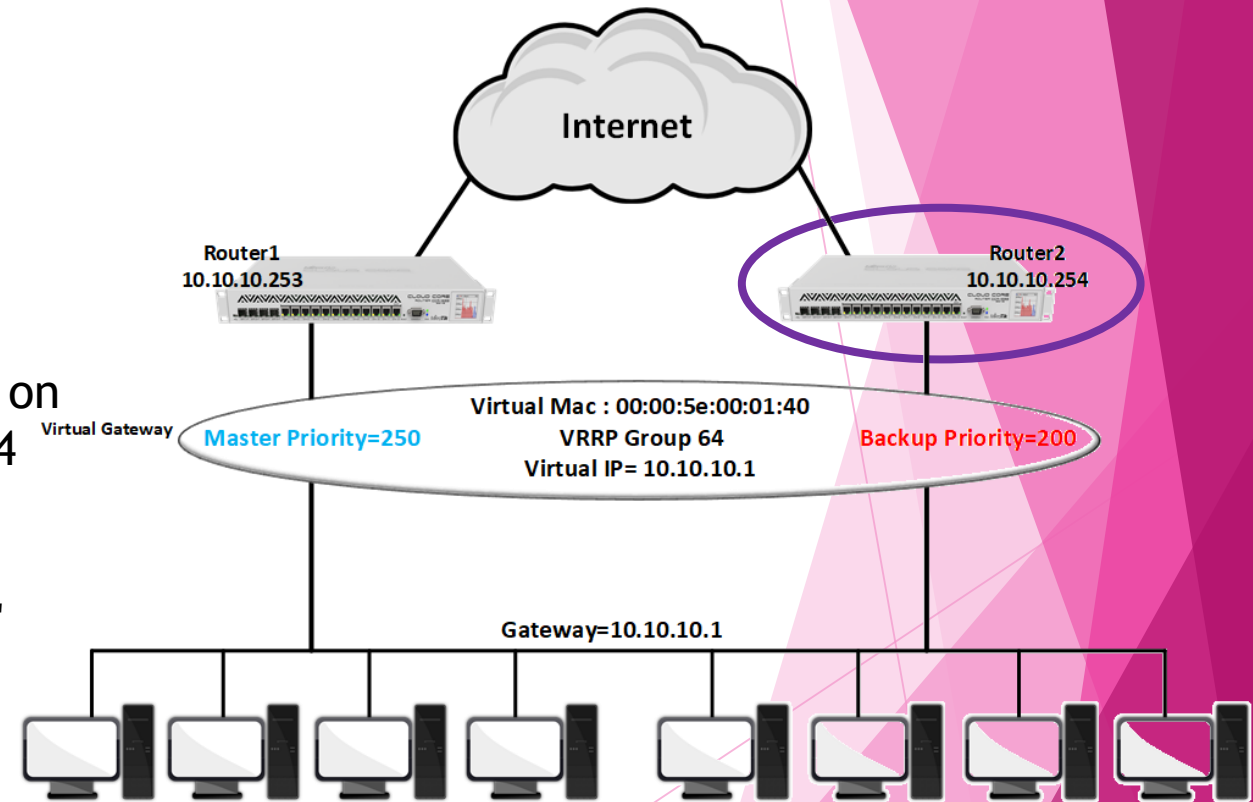
add address=10.10.10.253/24 interface=LAN

/interface vrrp

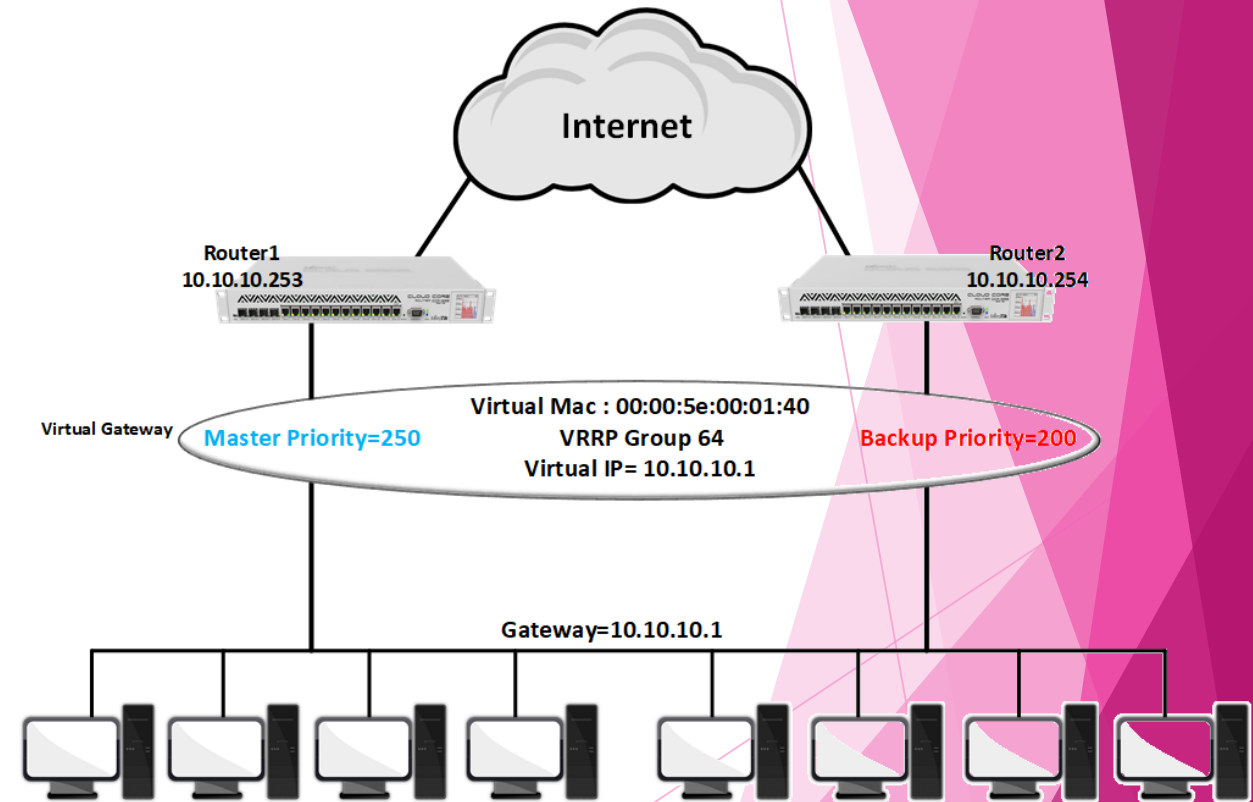
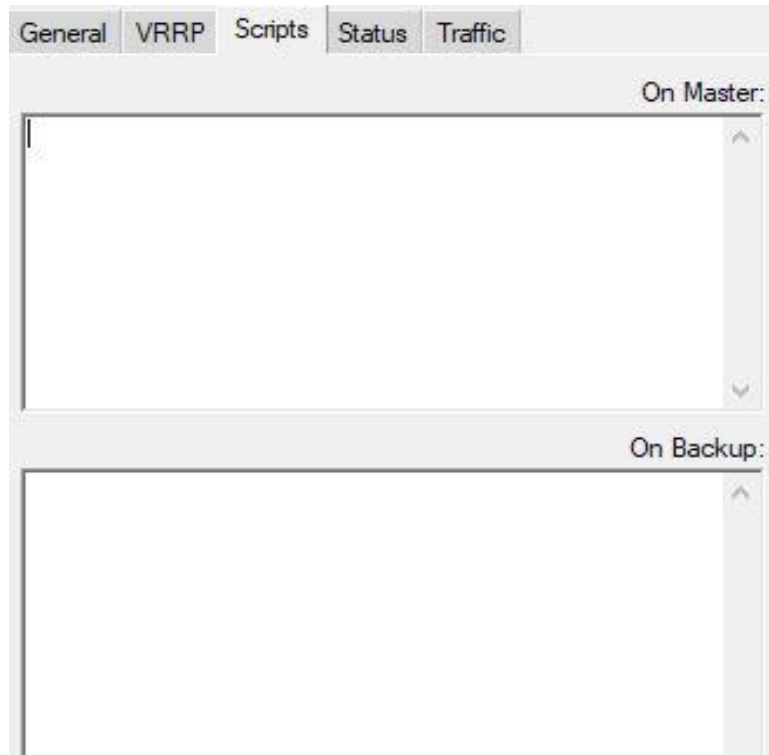
add authentication=ah interface=LAN name="Virtual on R1" password=Mikrotik priority=200 version=2 vrid=64

/ip address

add address=10.10.10.1/24 interface="Virtual on R1"



VRRP Scenario Script on Routers



VRRP Scenario Configuration Verification

Router1

Interface List

Interface

Interface List

Ethernet

EoIP Tunnel

IP Tunnel

GRE Tunnel

VLAN

VRRP

Bonding

LTE

Find

	Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx P...	Rx Pa...	VRID	Priority	Authentic...	Password	
RM	 Virtual on R1	VRRP	1500	1500	1594	624 bps	1104 bps	1	3	64	250	ah	*****	

Router2

Interface List

InterfaceInterface ListEthernetEoIP TunnelIP TunnelGRE TunnelVLANVRRPBondingLTE

Find

	Name	Type	MTU	Actual MTU	L2 M...	Tx	Rx	Tx Pac...	Rx Pack...	VRID	Priority	Authentic...	Password	
B	 Virtual on R2	VRRP	1500	1500		0 bps	0 bps	0	0	64	200	ah	Mikrotik	

I - invalid, R - running, M - master, B - backup

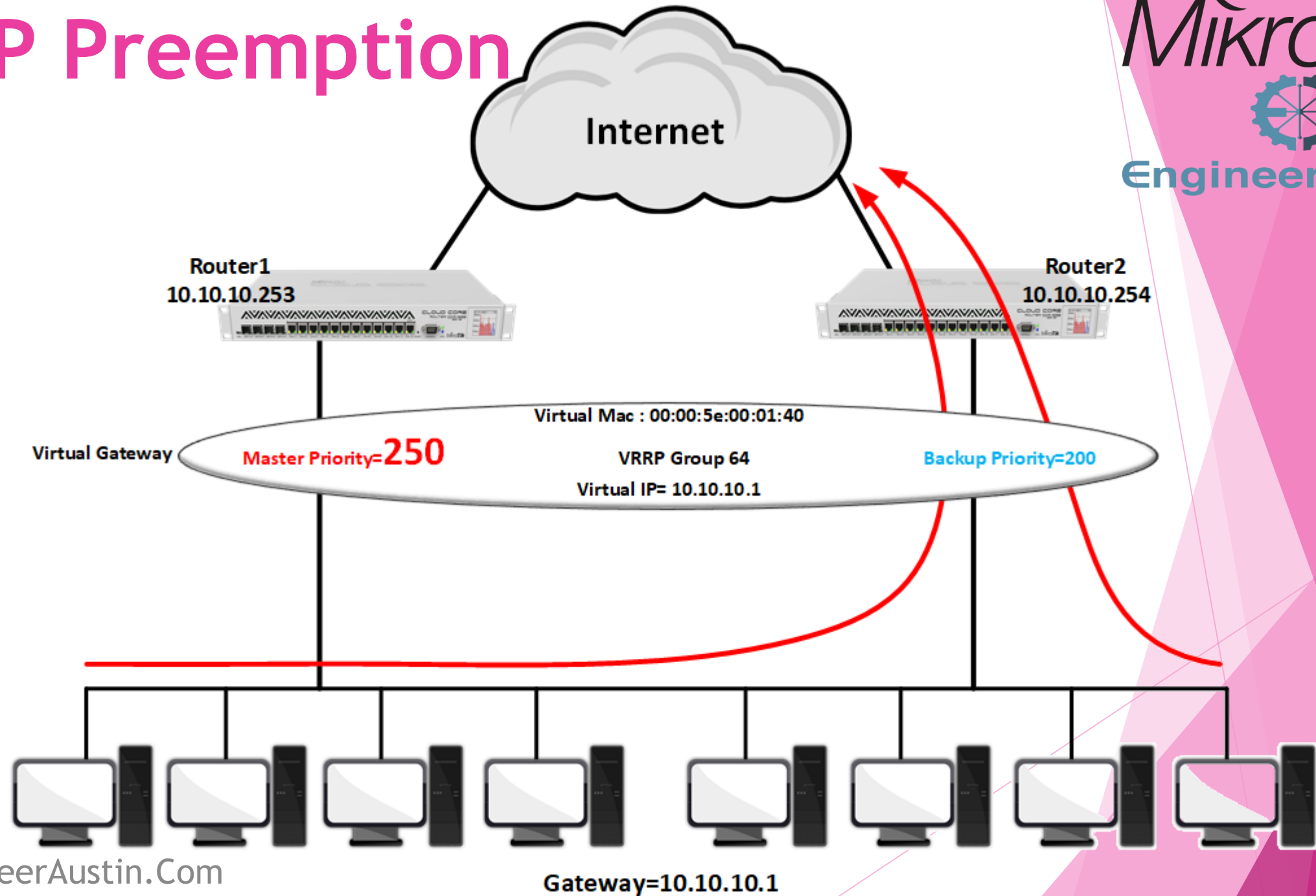
VRRP Test Result

[illegible]

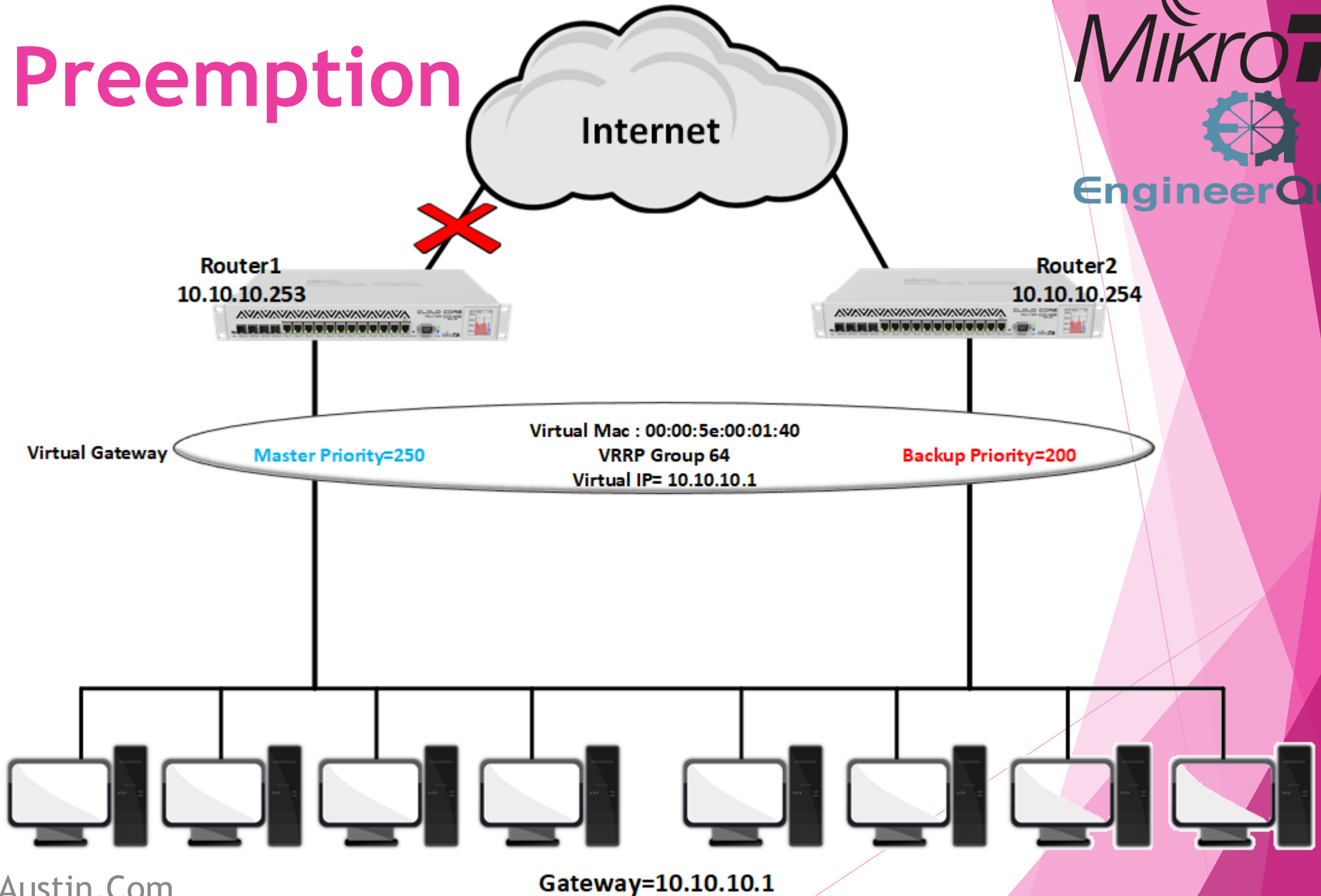
FHRP Protocols

	VRRP	GLBP
Packet	Standard	Cisco Proprietary
Protocol	IP Encapsulation 112	Udp encapsulation 3222
Group Range	0-255	0-1023
Multicast IP	224.0.0.18	224.0.0.102
Built-in Load Sharing	No Built in	Yes
Mac Address	Just one/Group	4/Group
Advertisement sender	Just by Master	All router in group
Advertisement Timer	1 Second	3 Second

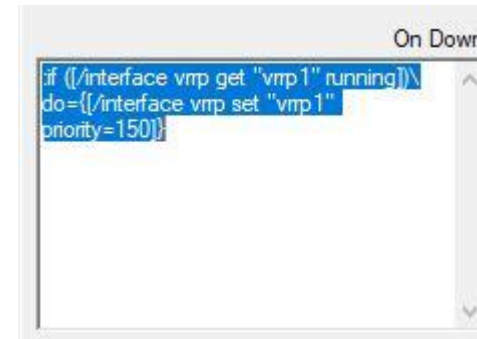
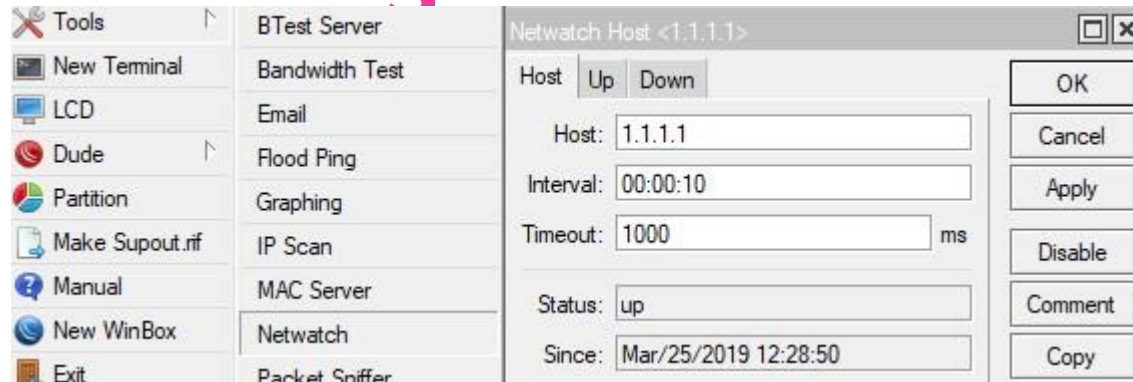
VRRP Preemption



VRRP Preemption



VRRP Preemption Interface Tracking

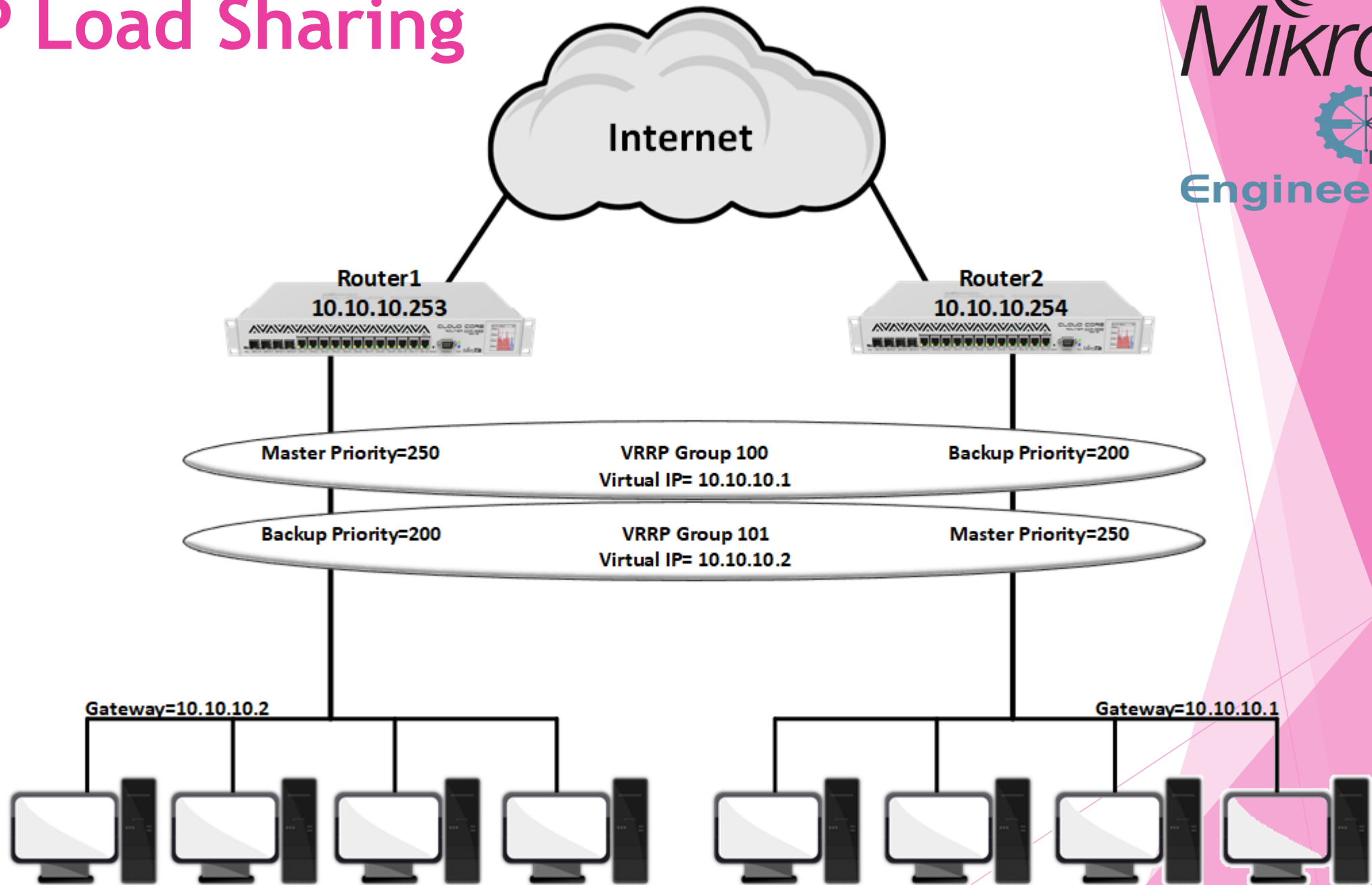


/tool netwatch

add host=1.1.1.1 interval=10s up-script="/interface vrrp set \"vrrp1\" priority=250"

down-script=":if ([/interface vrrp get \"vrrp1\" running])\\\r\ndo={[/interface vrrp set \"vrrp1\" priority=150]}"

VRRP Load Sharing



Resources



- Wiki.Mikrotik.Com
- Linux-IP.Net



Thank You For Your Attention