First Hob Redundancy Protocols

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- Network Engineer
- IT Training
- Data Center
- Virtualization

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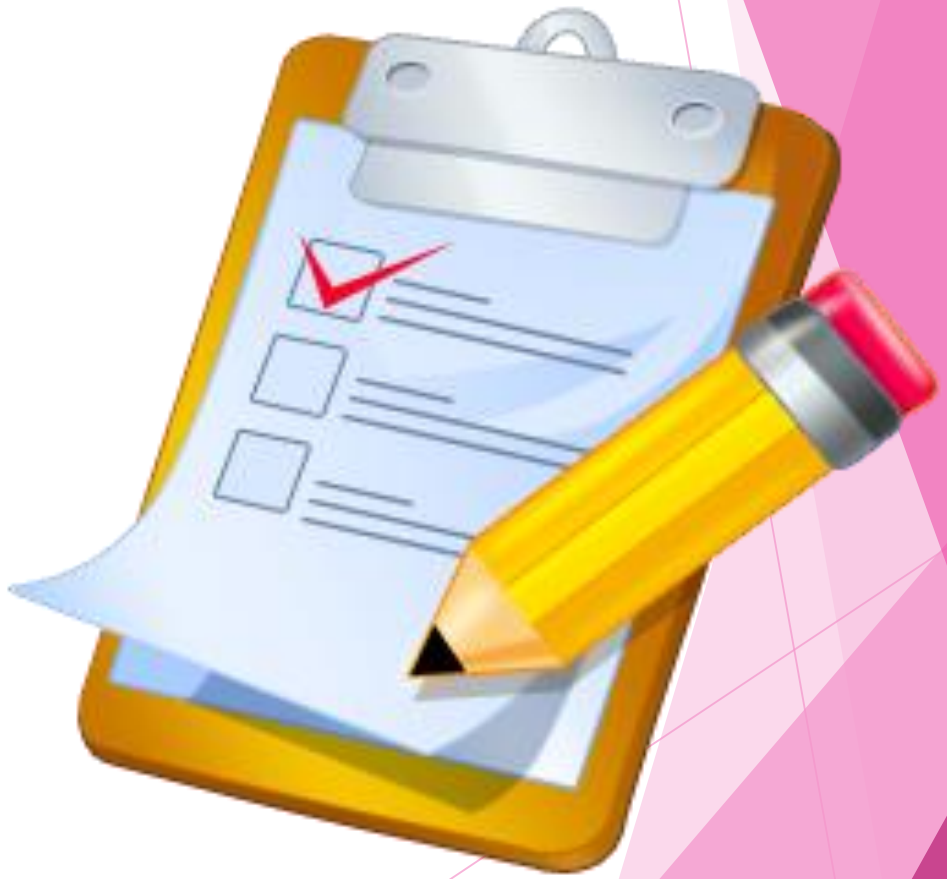
Agenda

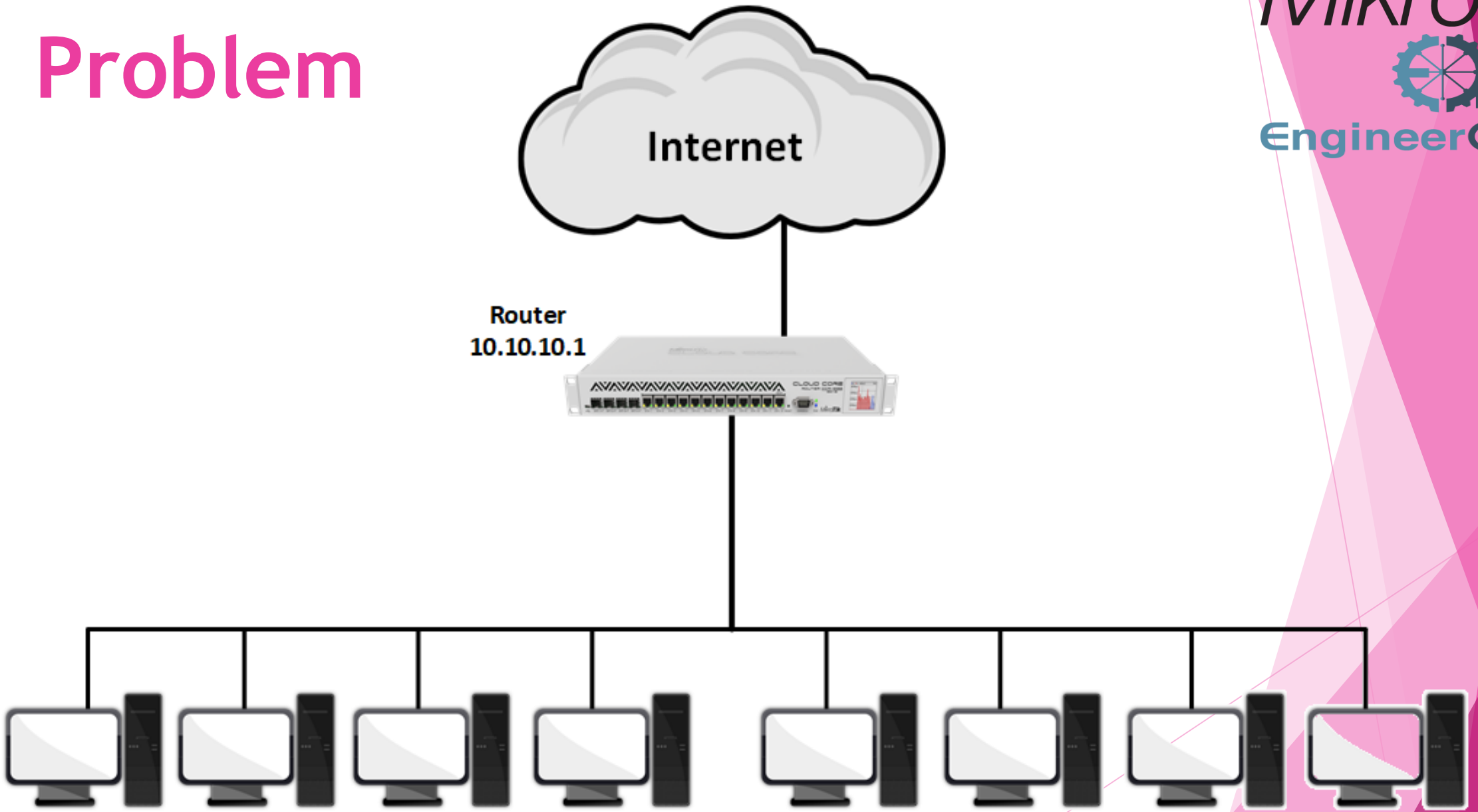
- What's FHRP
- Problem/Solutions
- Redundant Router Protocols
- What's the VRRP
- VRRP Operation
- VRRP Configuration
- Load Sharing
- Security in VRRP
- VRRP and IPV6



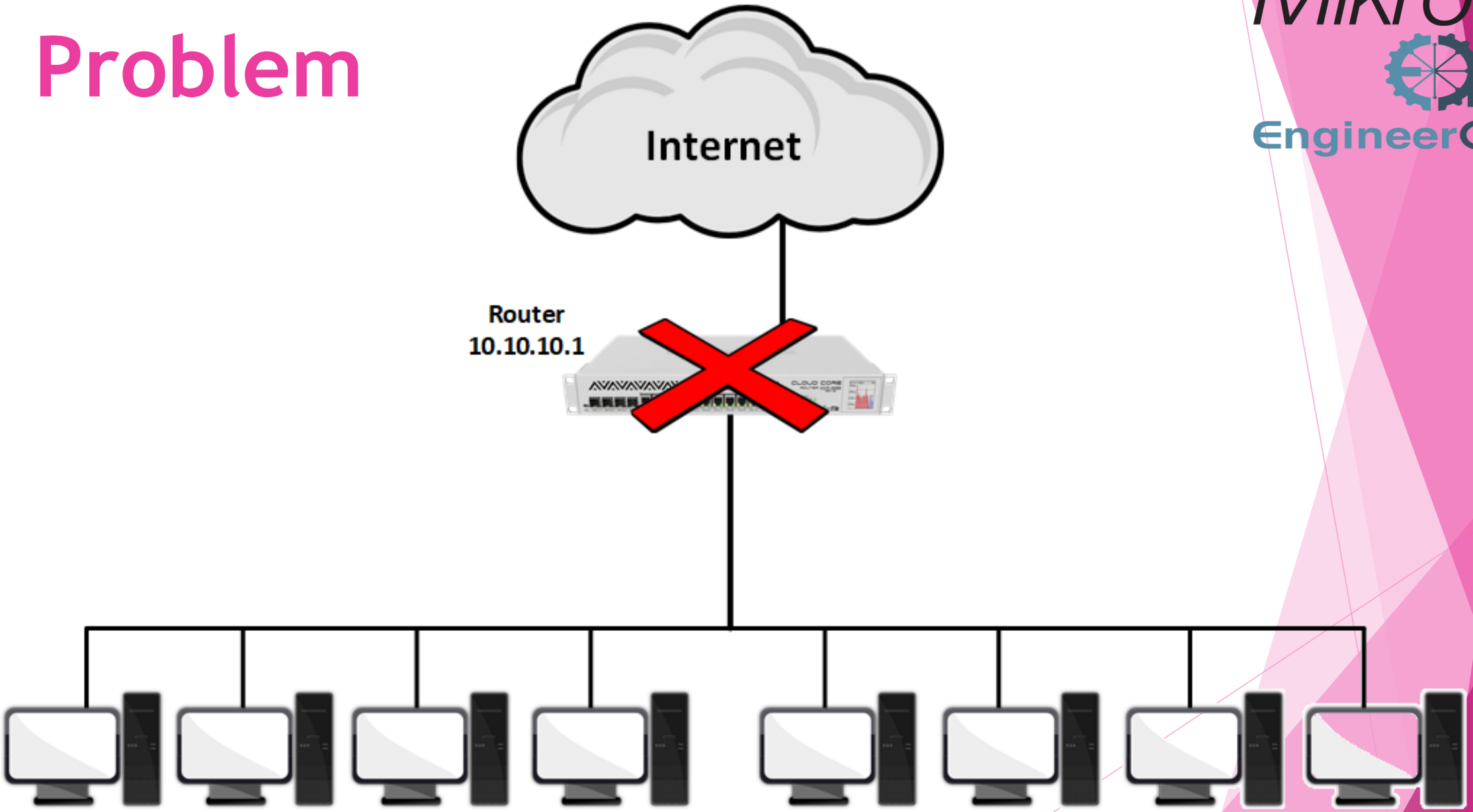
What's FHRP

- 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

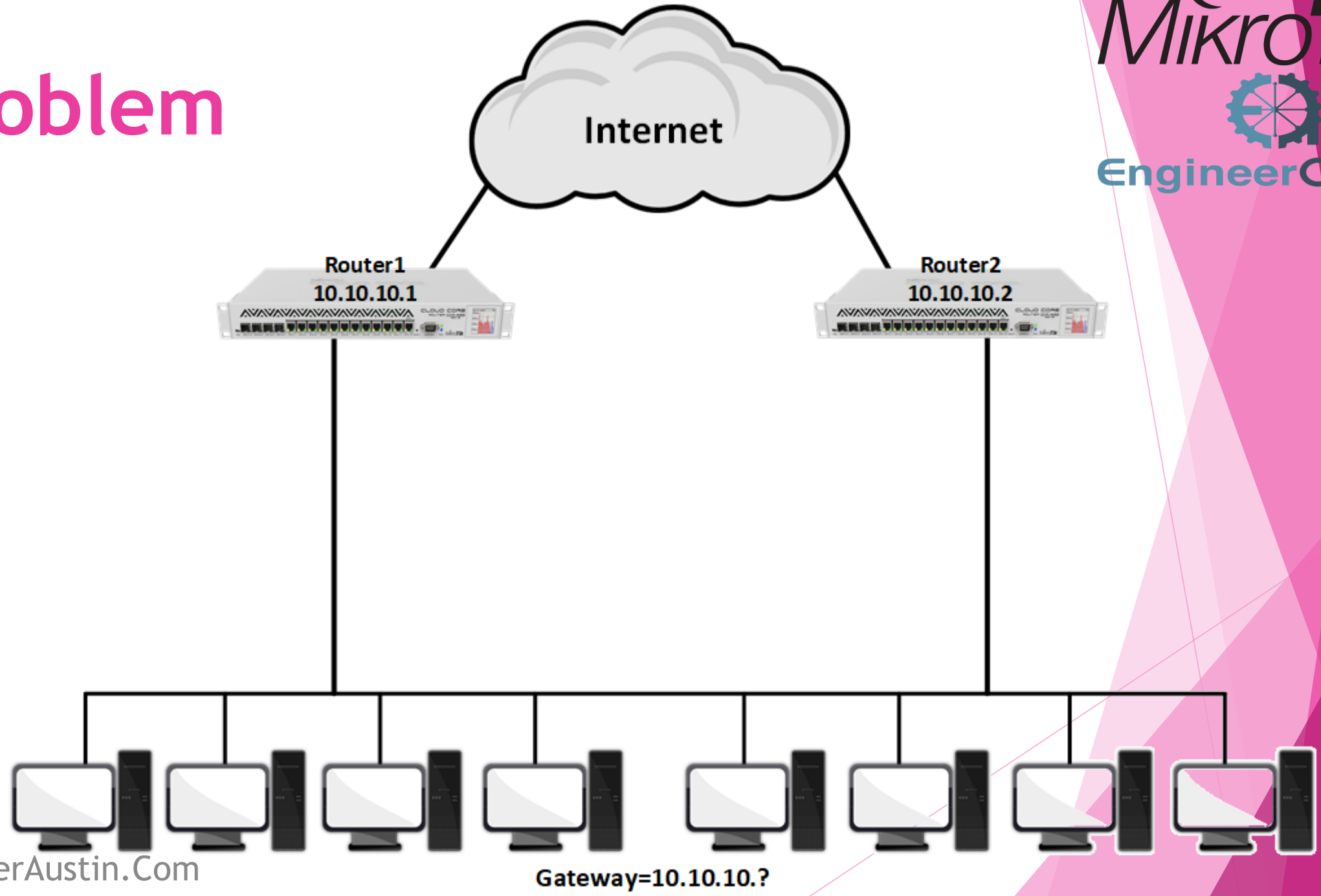
Problem



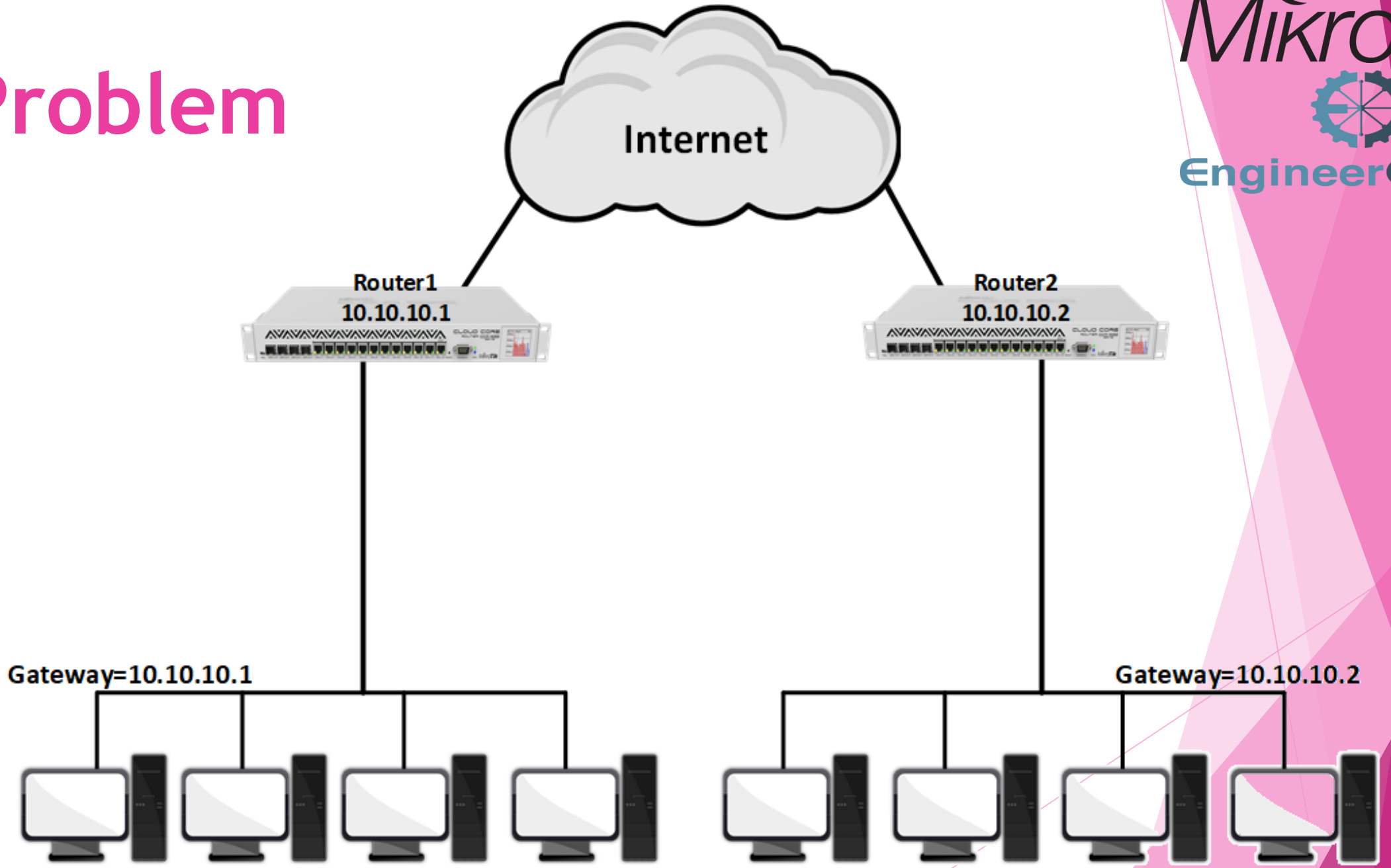
Problem



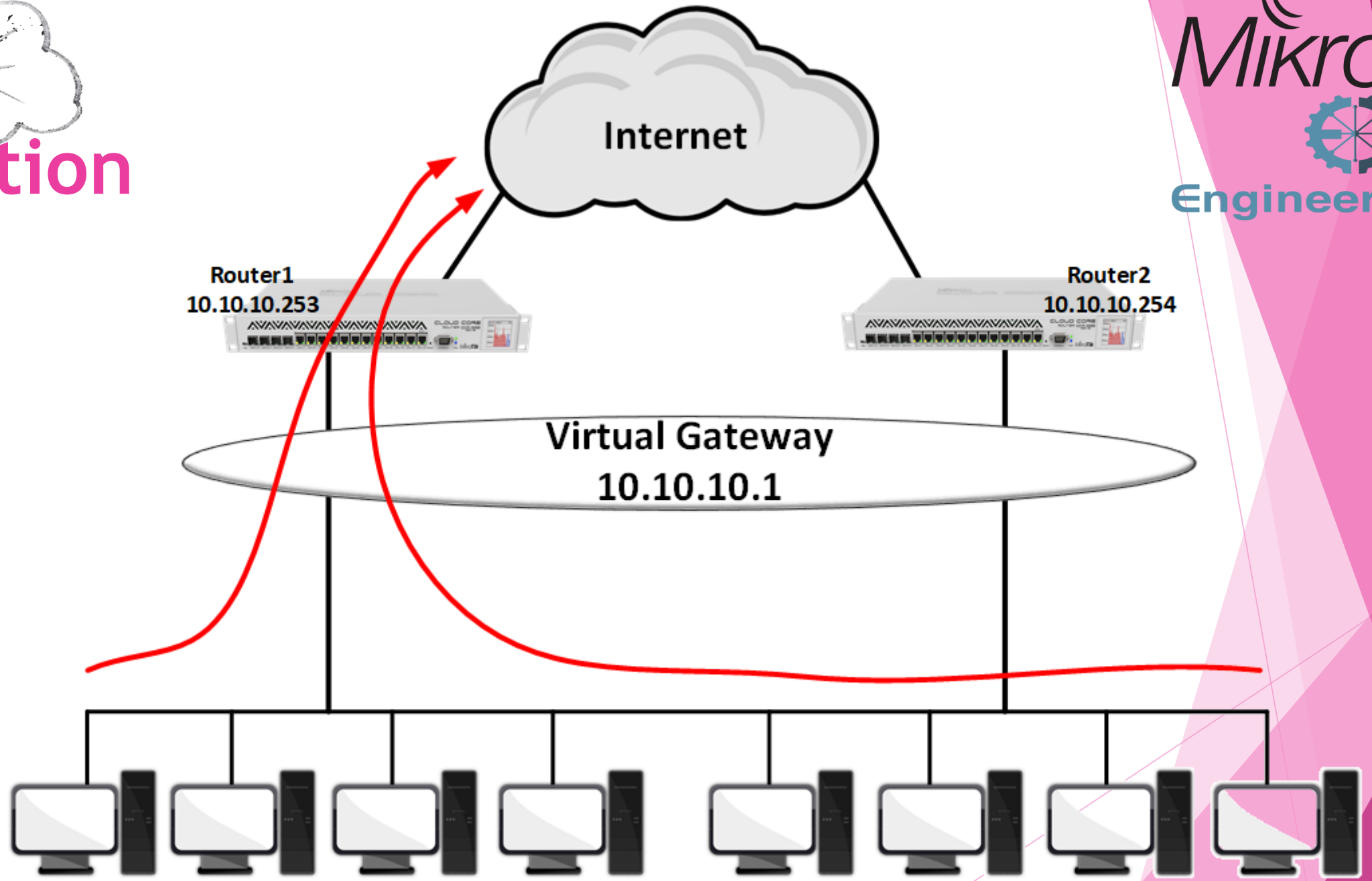
Problem



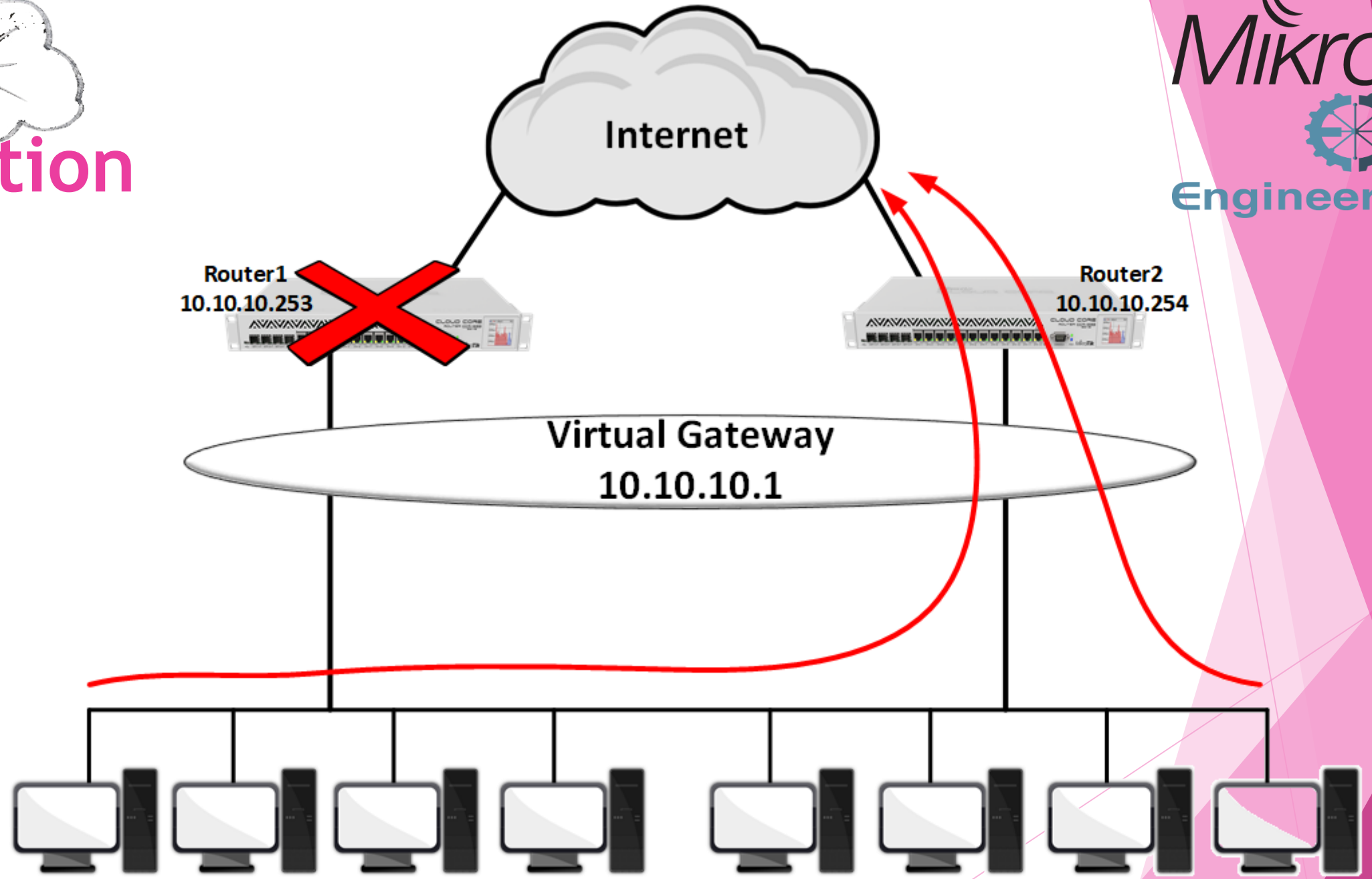
Problem


Internet
Router1
10.10.10.1
Router2
10.10.10.2
Gateway=10.10.10.1
Gateway=10.10.10.2

Solution


Internet
Router1
10.10.10.253
Router2
10.10.10.254
Virtual Gateway
10.10.10.1
Gateway=10.10.10.1

Solution


Internet
Router1
10.10.10.253
Router2
10.10.10.254
Virtual Gateway
10.10.10.1
Gateway=10.10.10.1

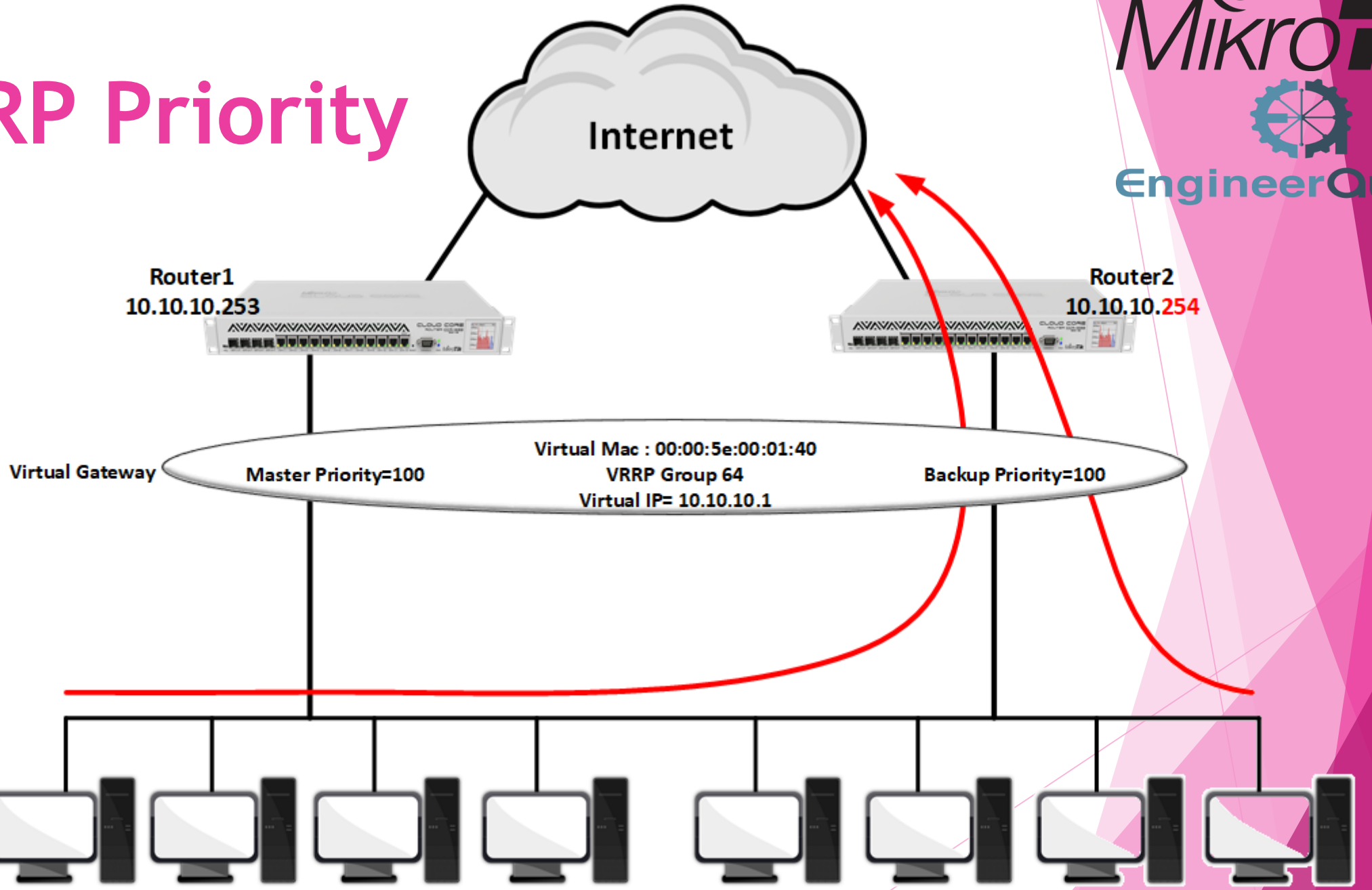
What's VRRP

- 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

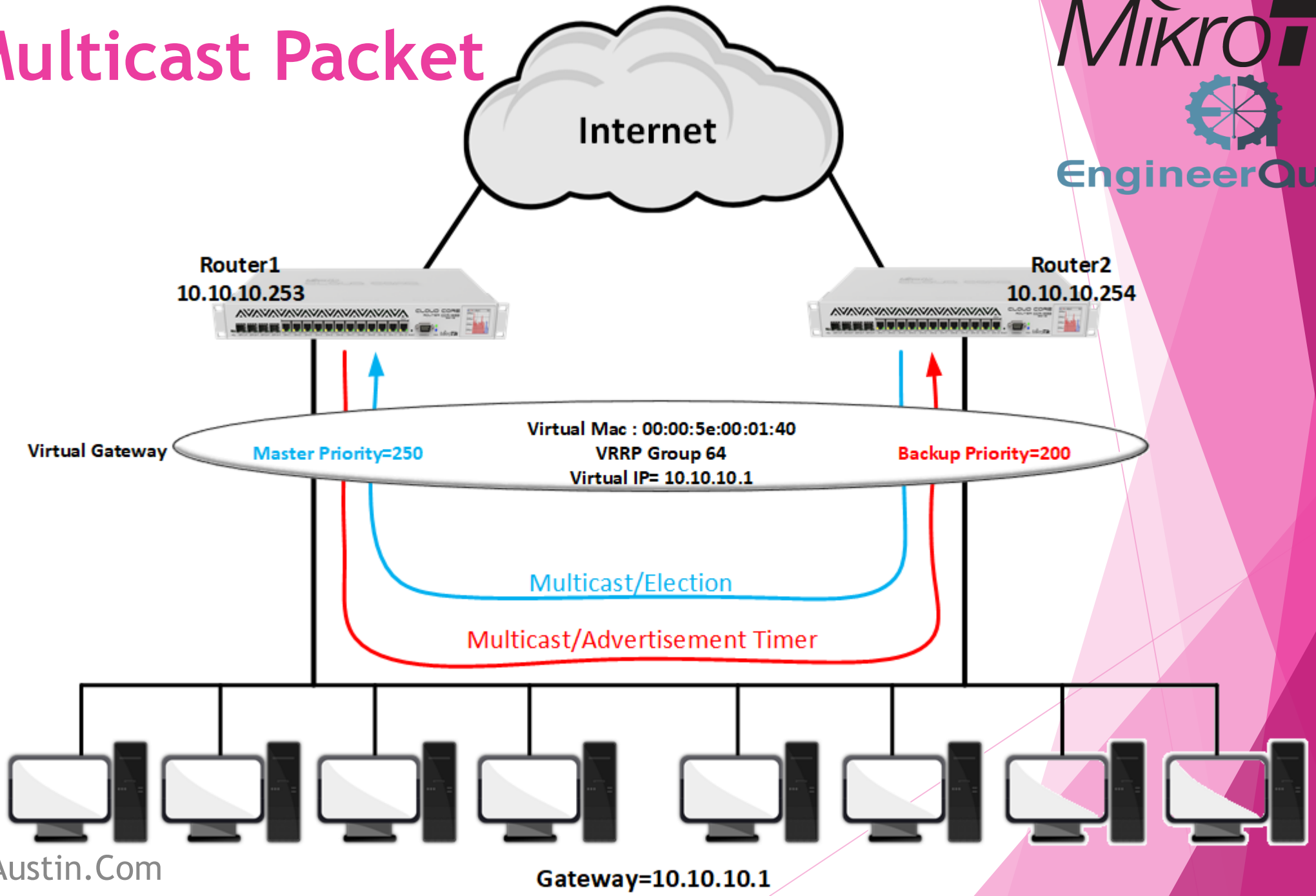
VRRP Mac Address

- 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

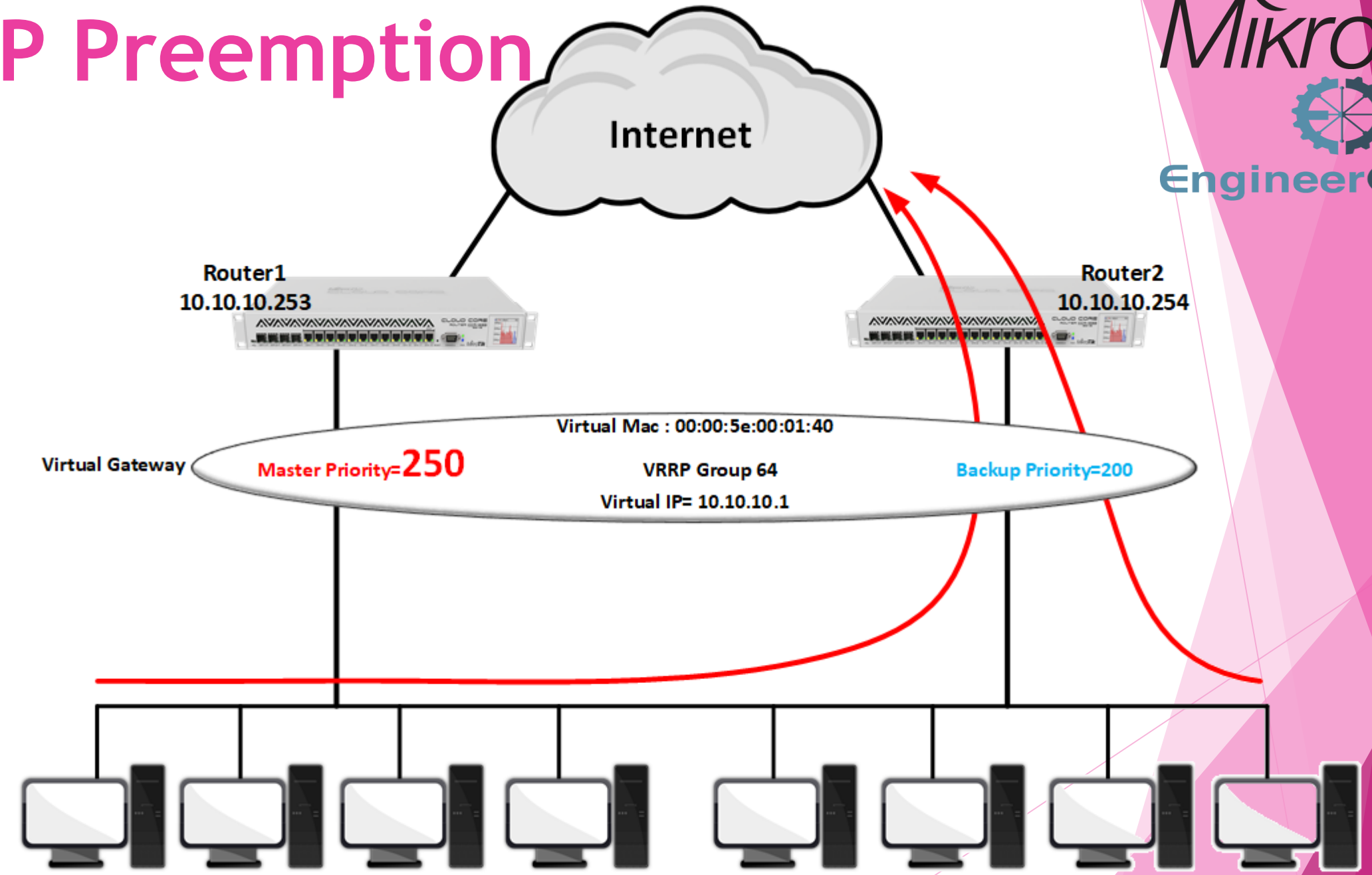
VRRP Priority



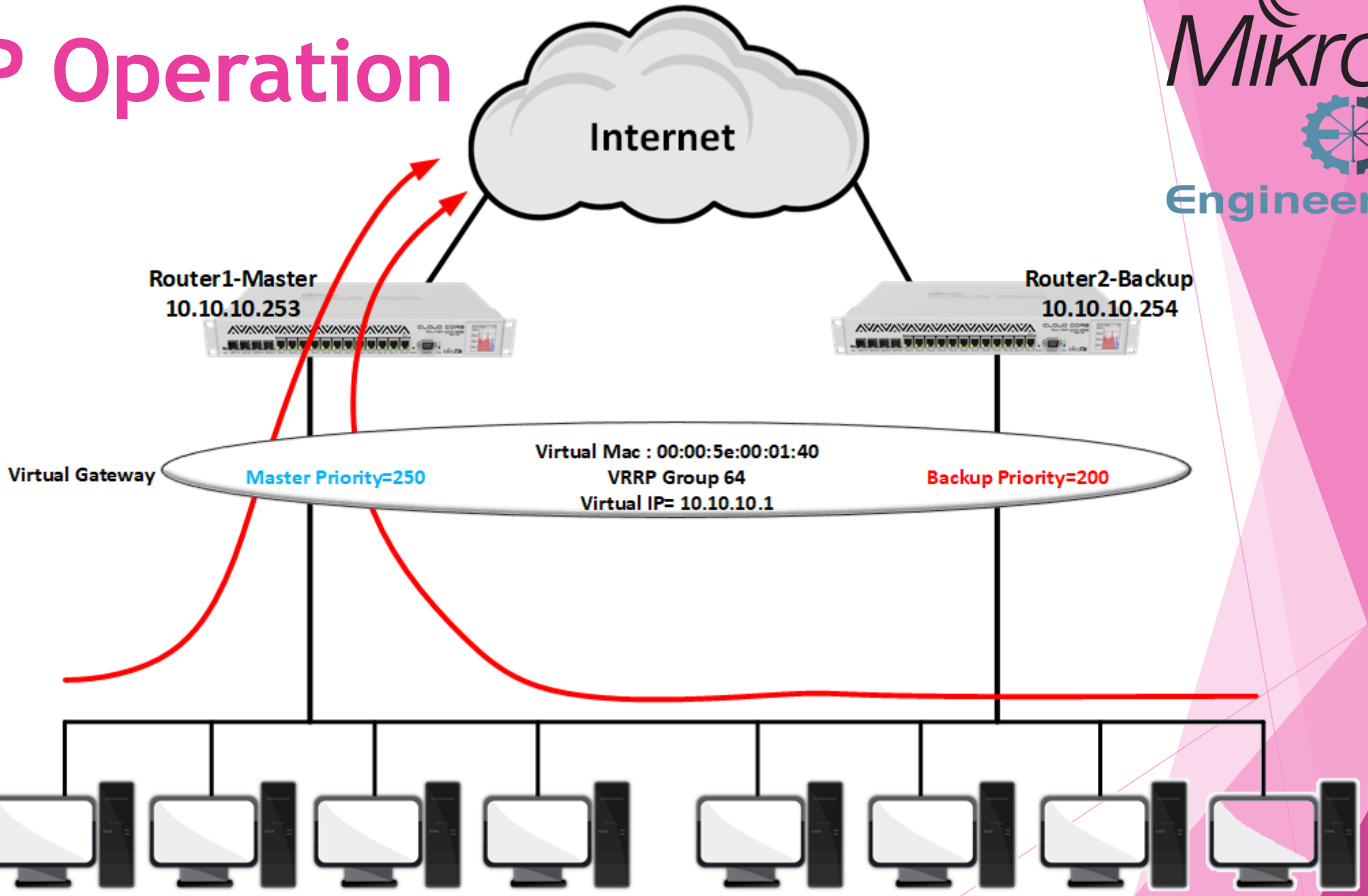
VVRP Multicast Packet



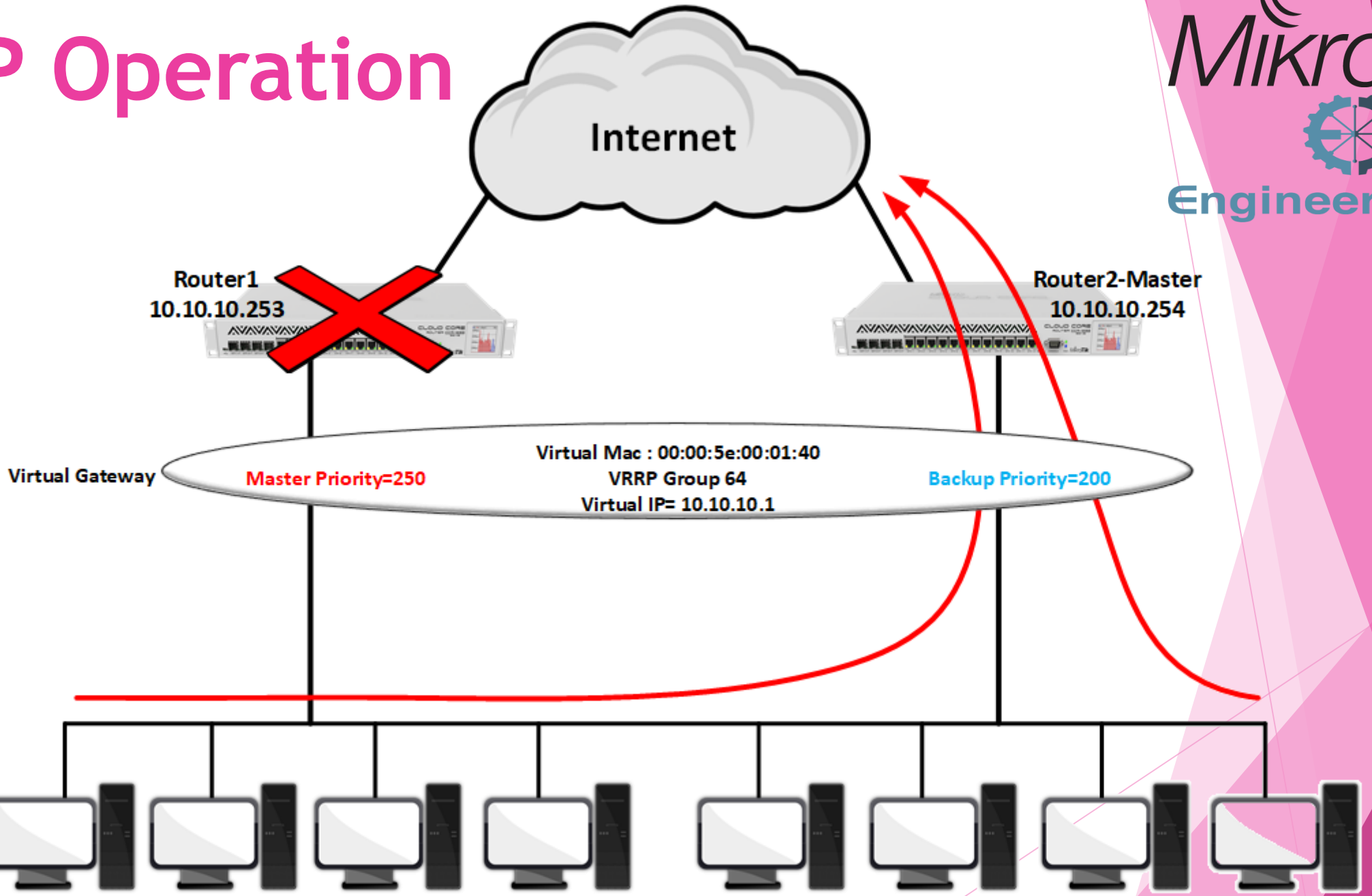
VRRP Preemption



VRRP Operation



VRRP Operation



VRRP Security

- None
- Simple
- AH

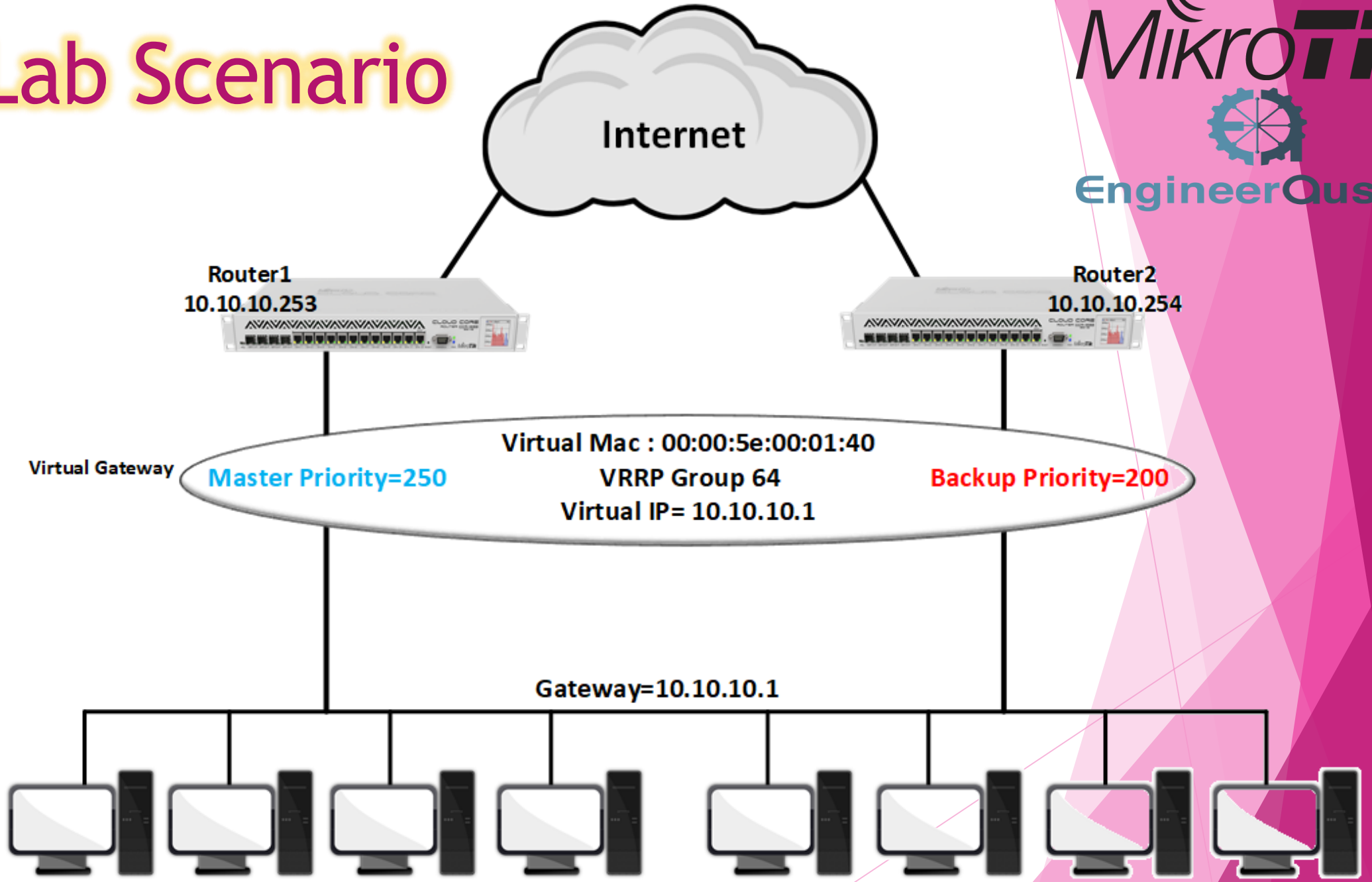
VRRP Versions

- Version2
- Version3
  - No Authentication

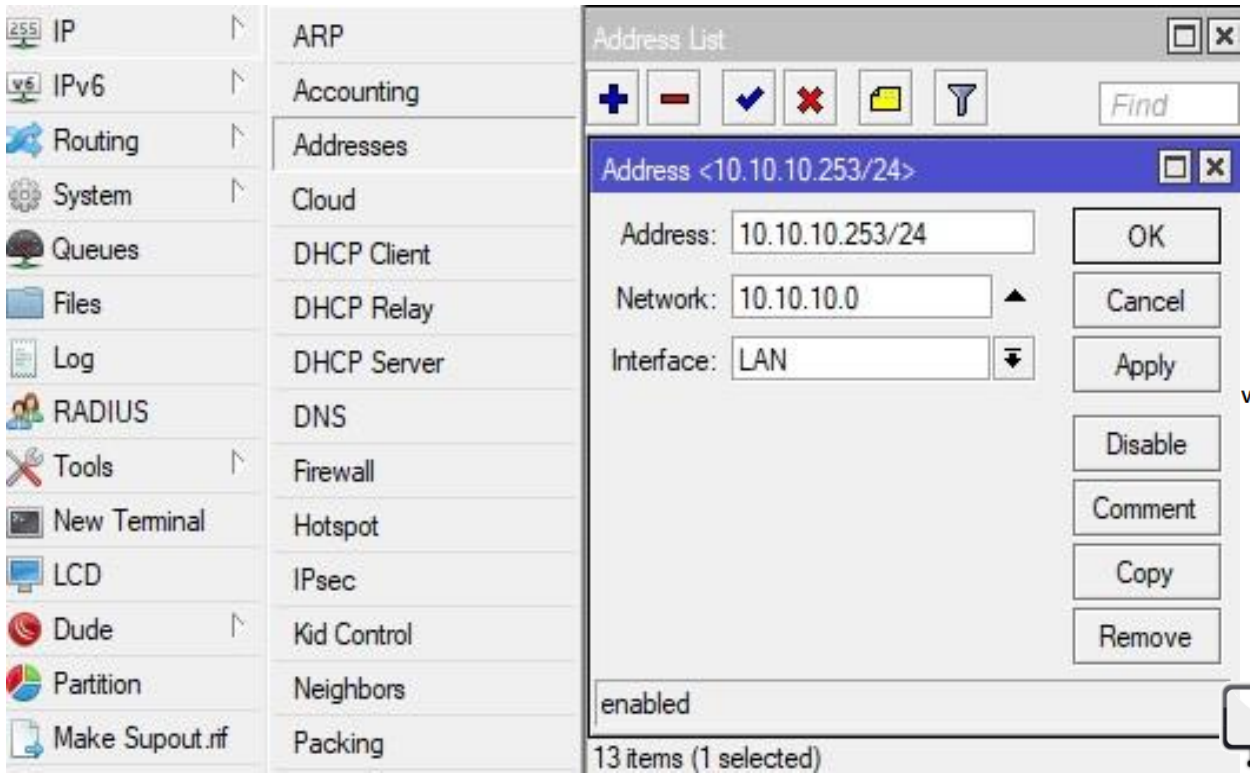
VRRP with IPV6

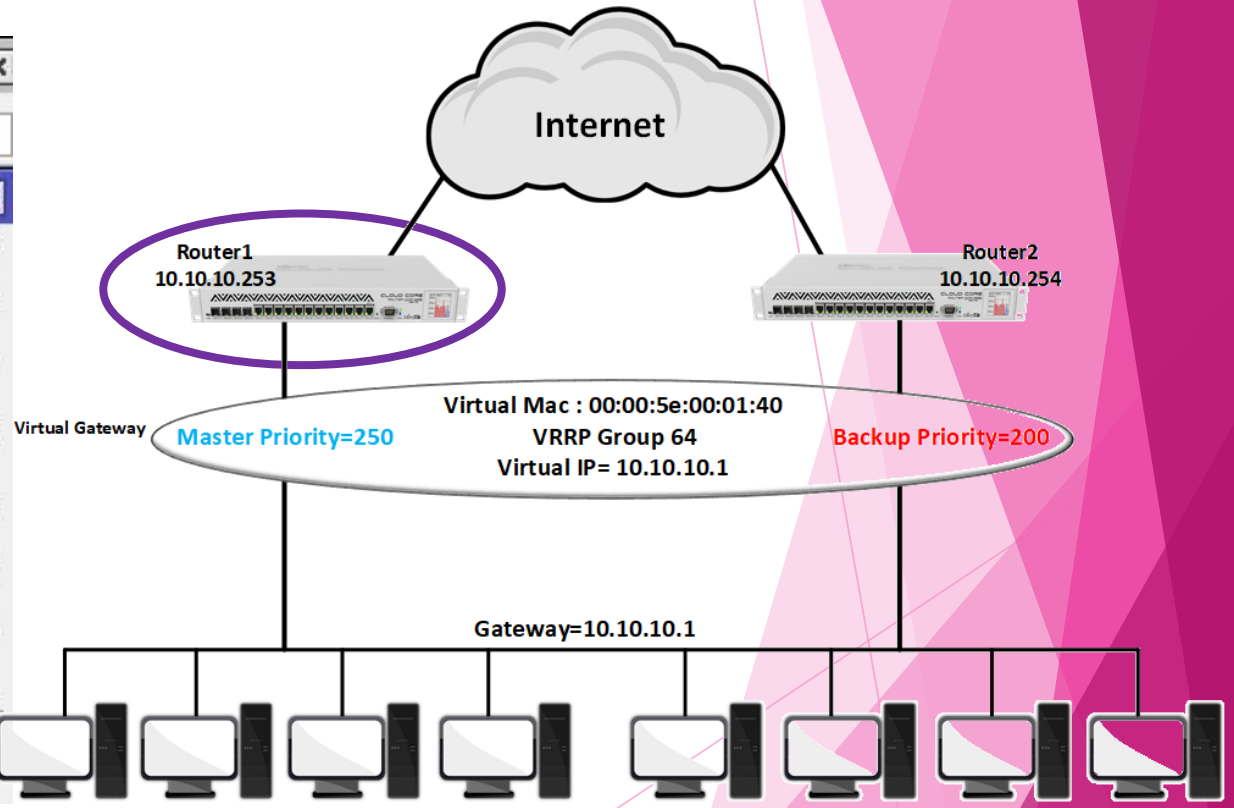
- VRRP Virtual Mac : 00:00:5e:00:02:<VRID>
- the multicast address is FF02:0:0:0:0:0:0:12

VRRP Lab Scenario



VRRP Scenario
Router1 Configuration





VRRP Scenario
Router1 Configuration

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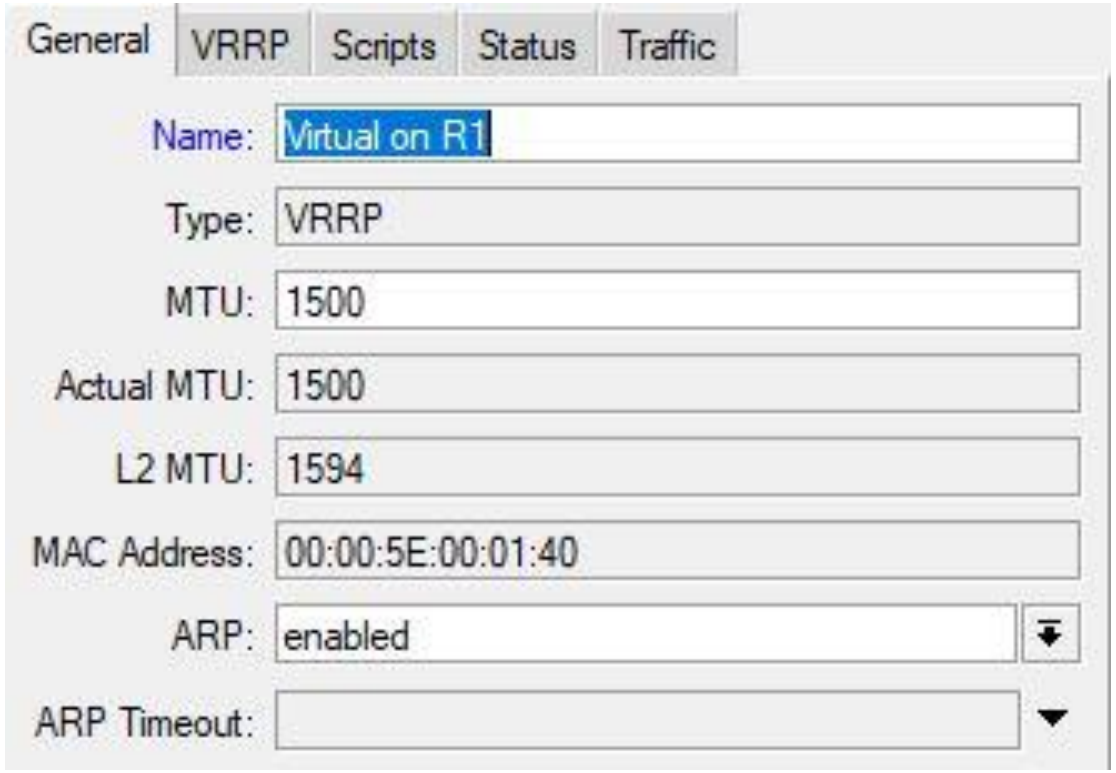
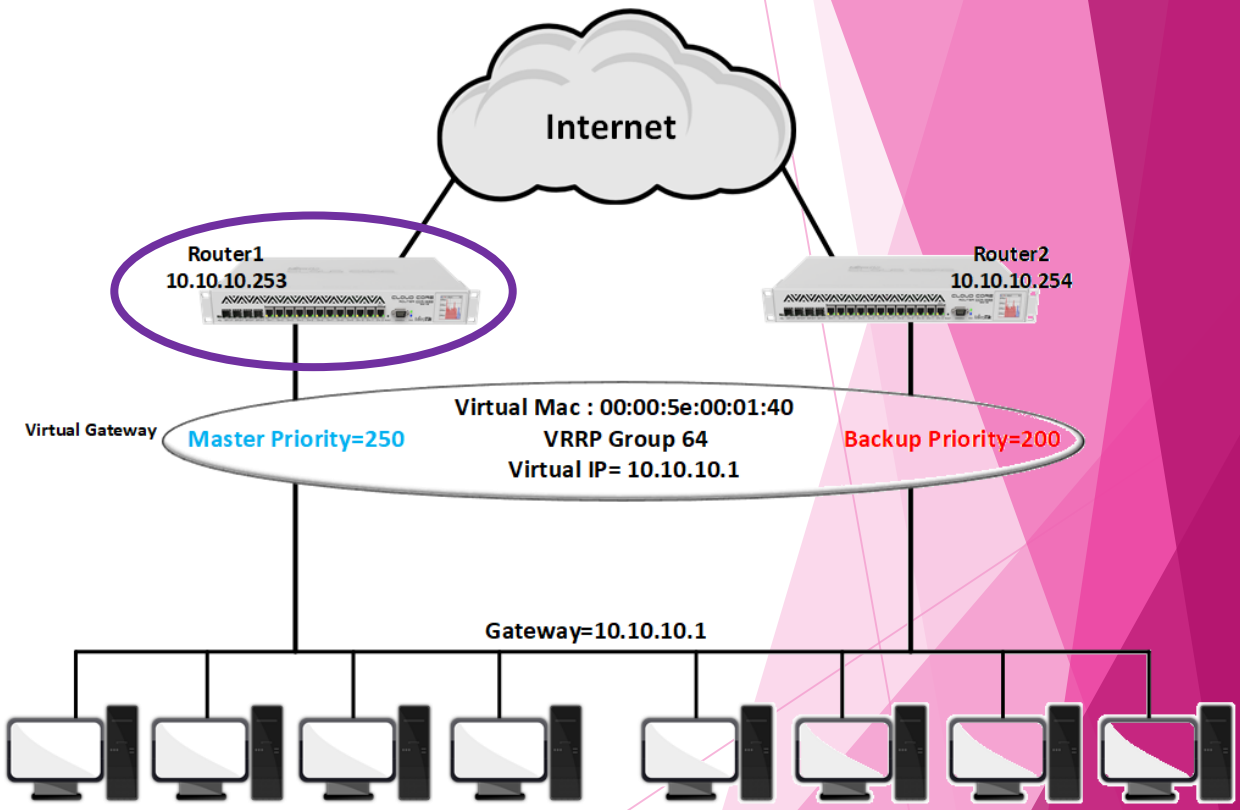
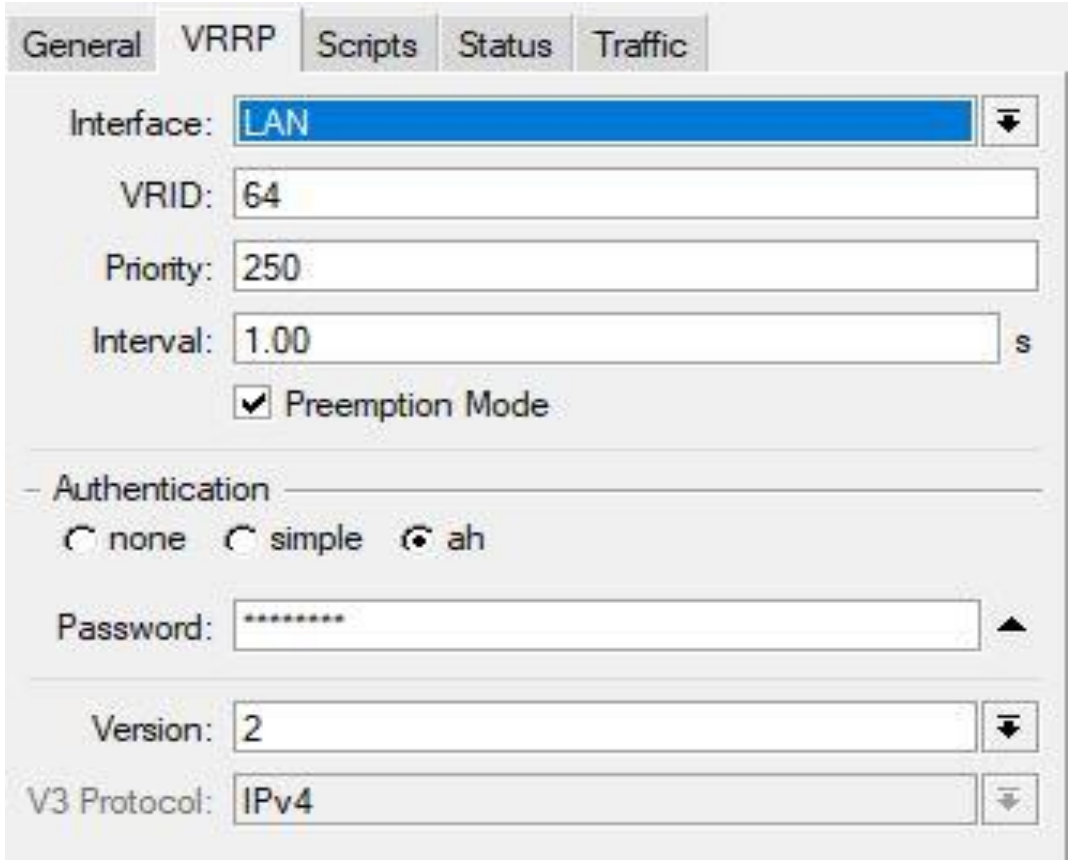
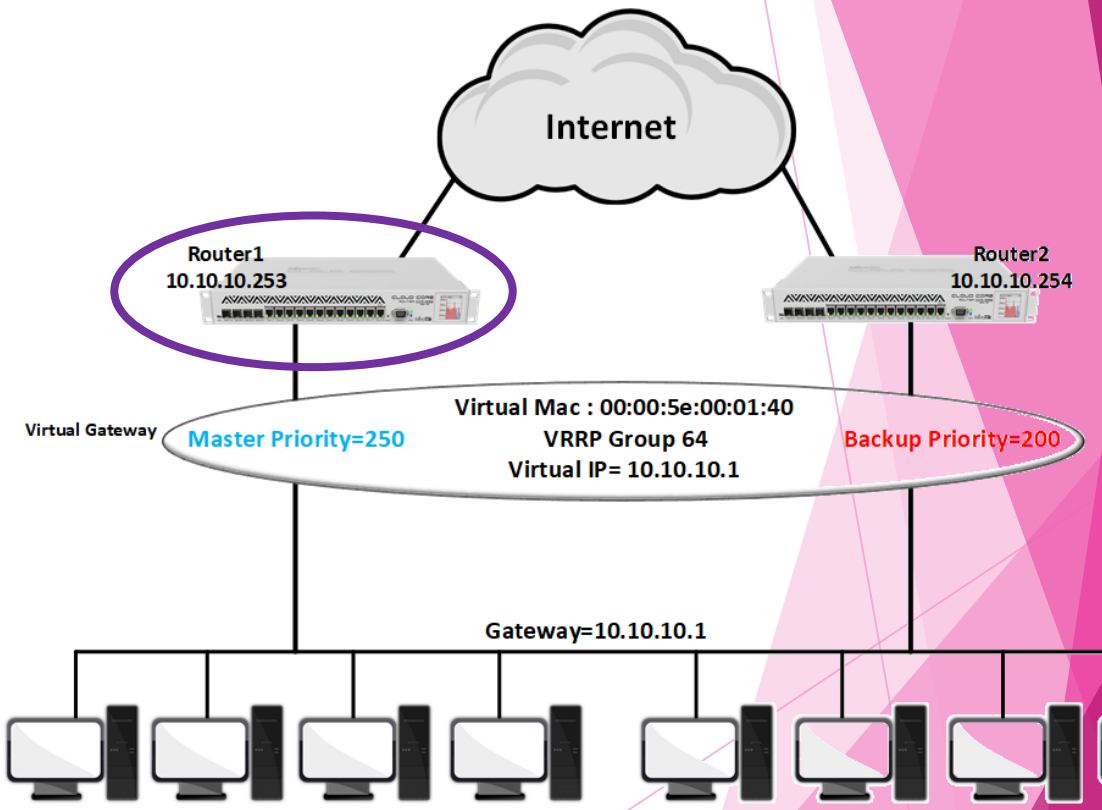




VRRP Scenario
Router1 Configuration





VRRP Scenario
Router1 Configuration

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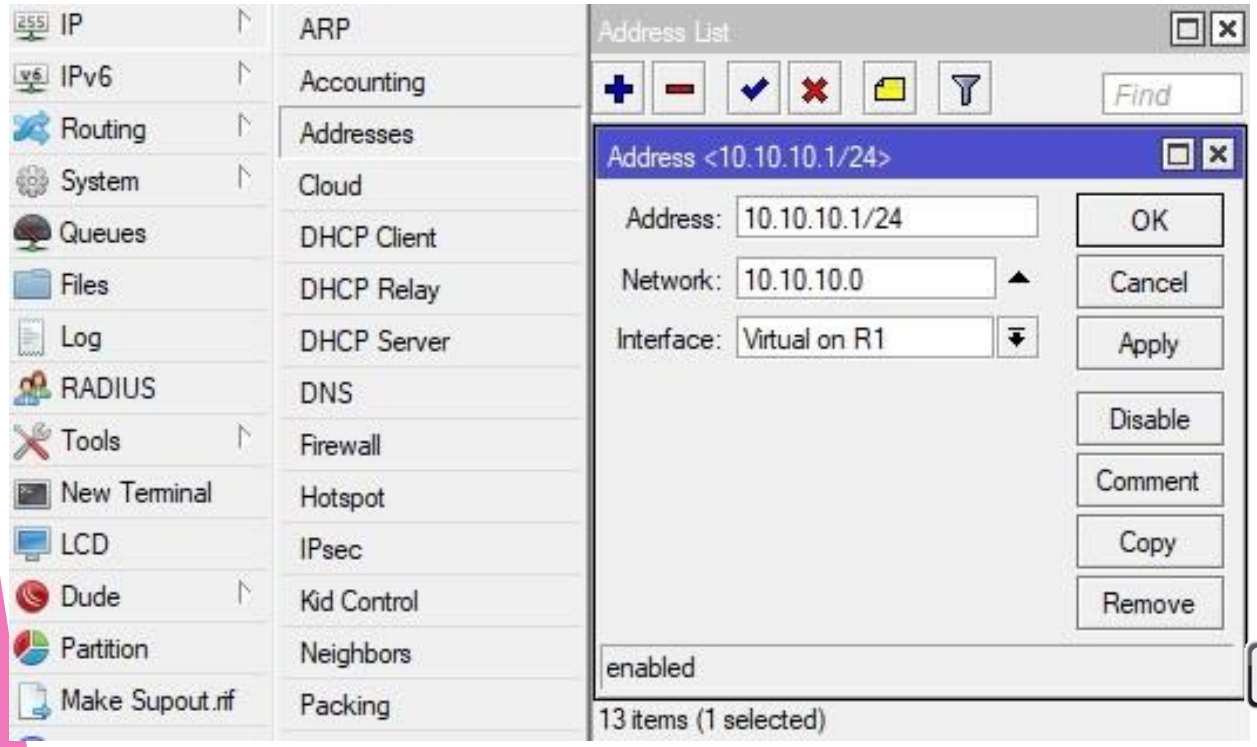
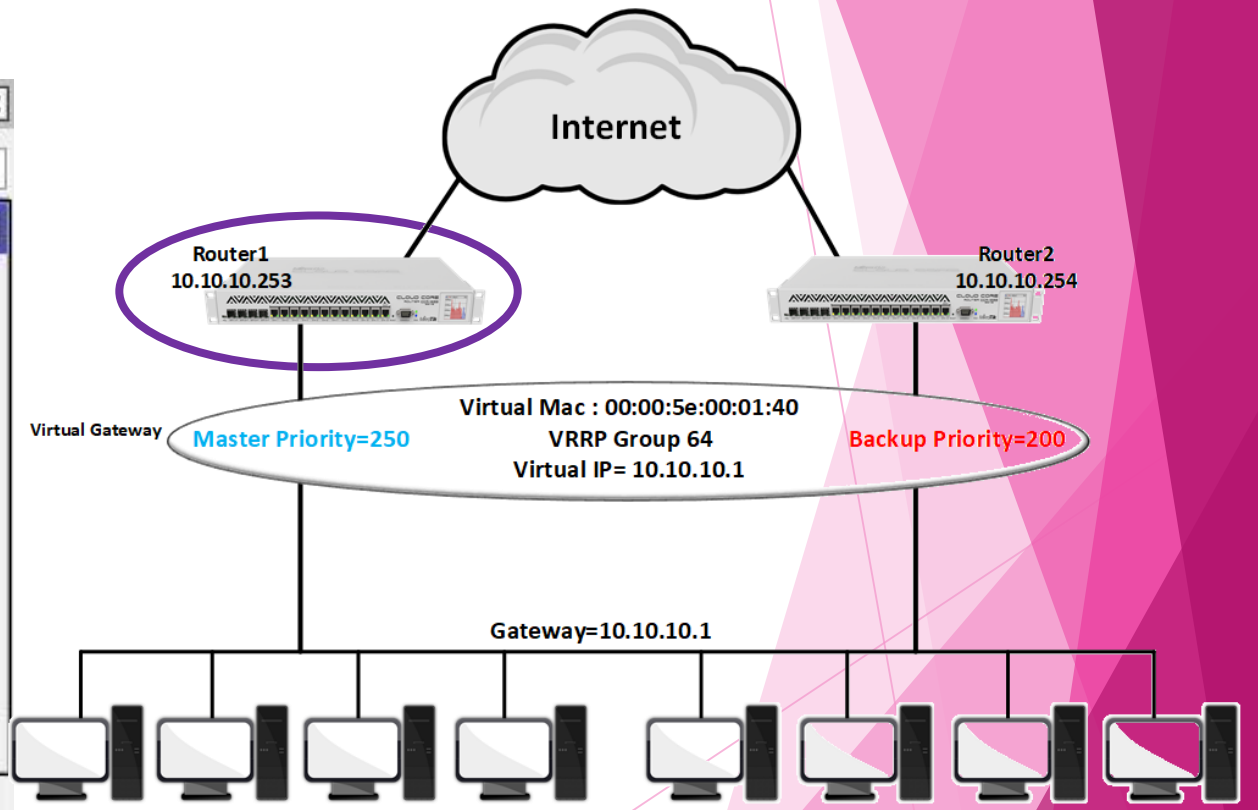
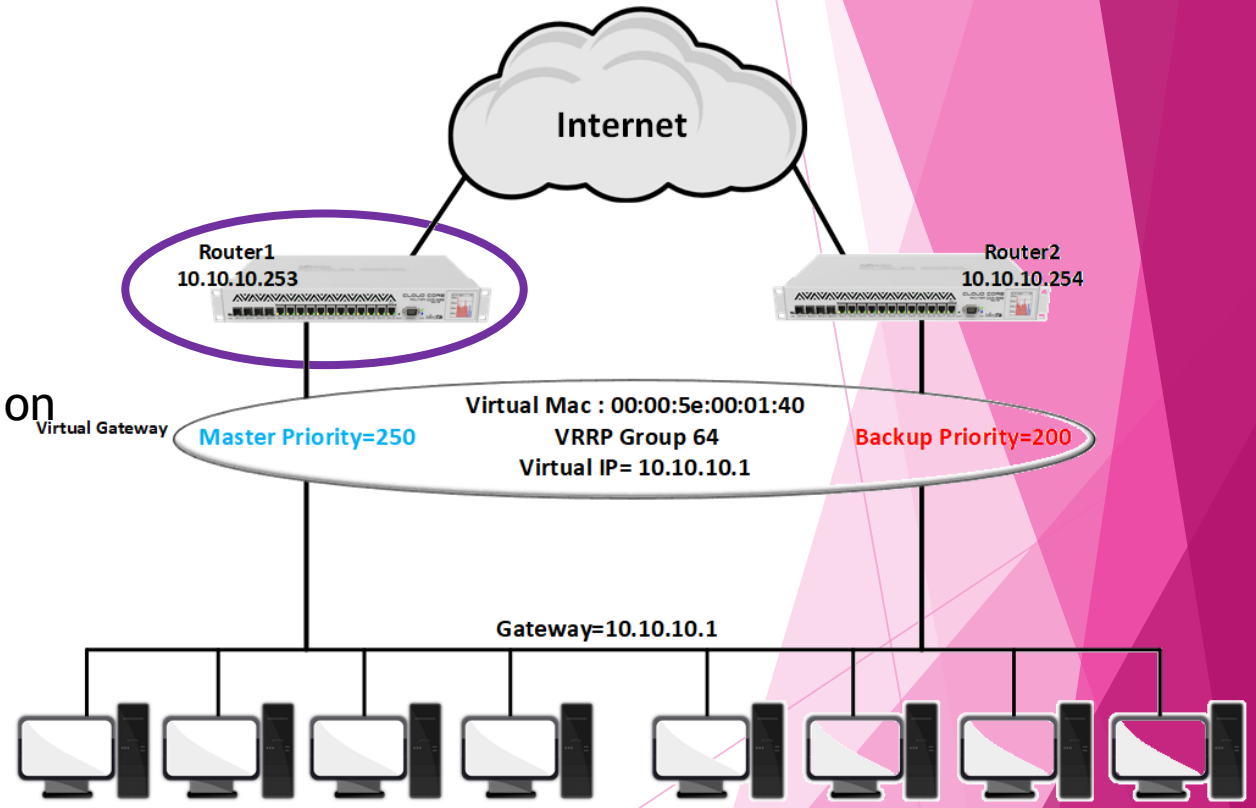


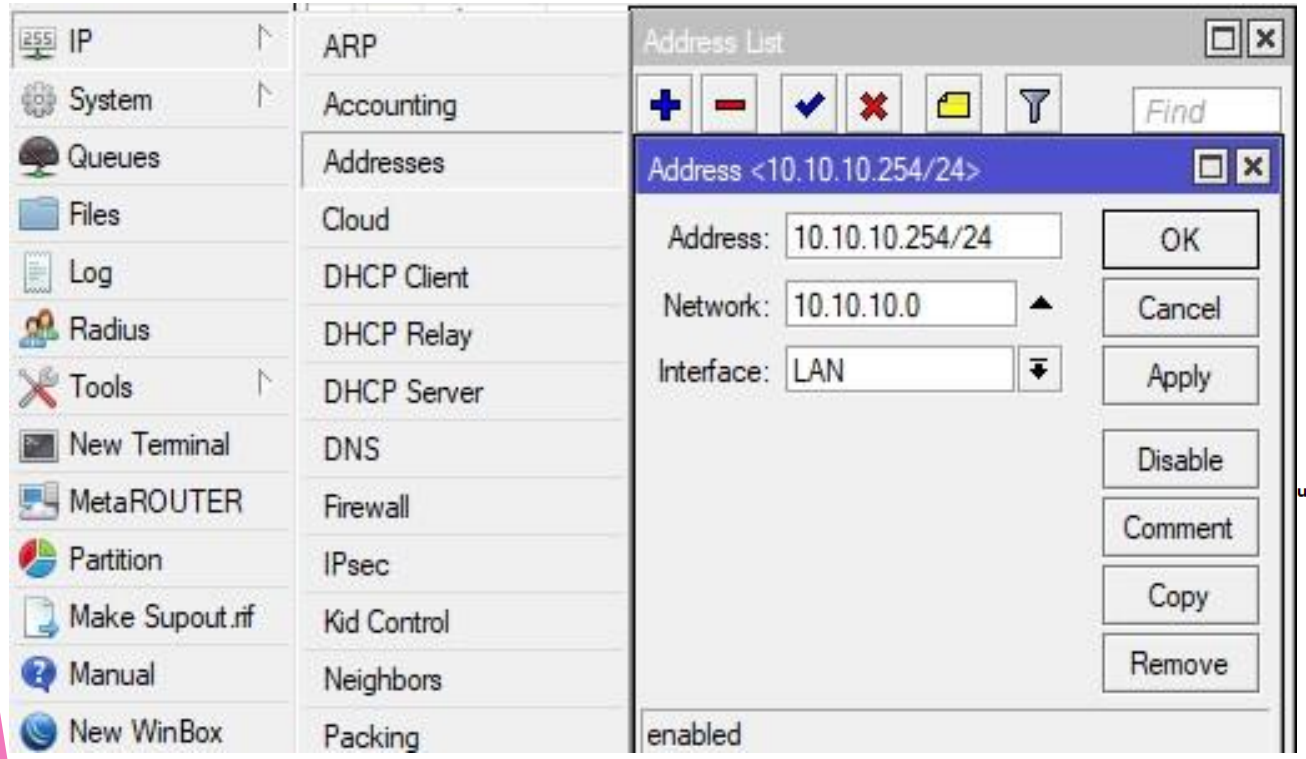


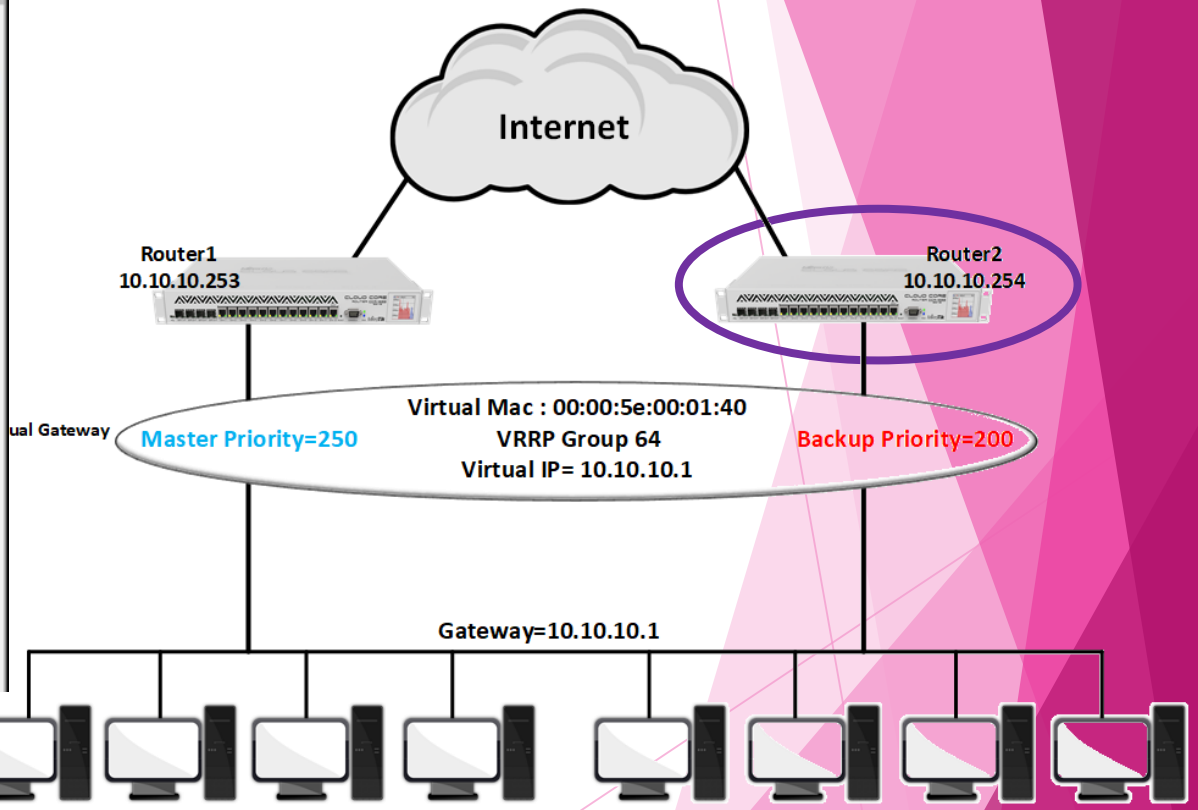
VRRP Scenario
Router1 Configuration

```
/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

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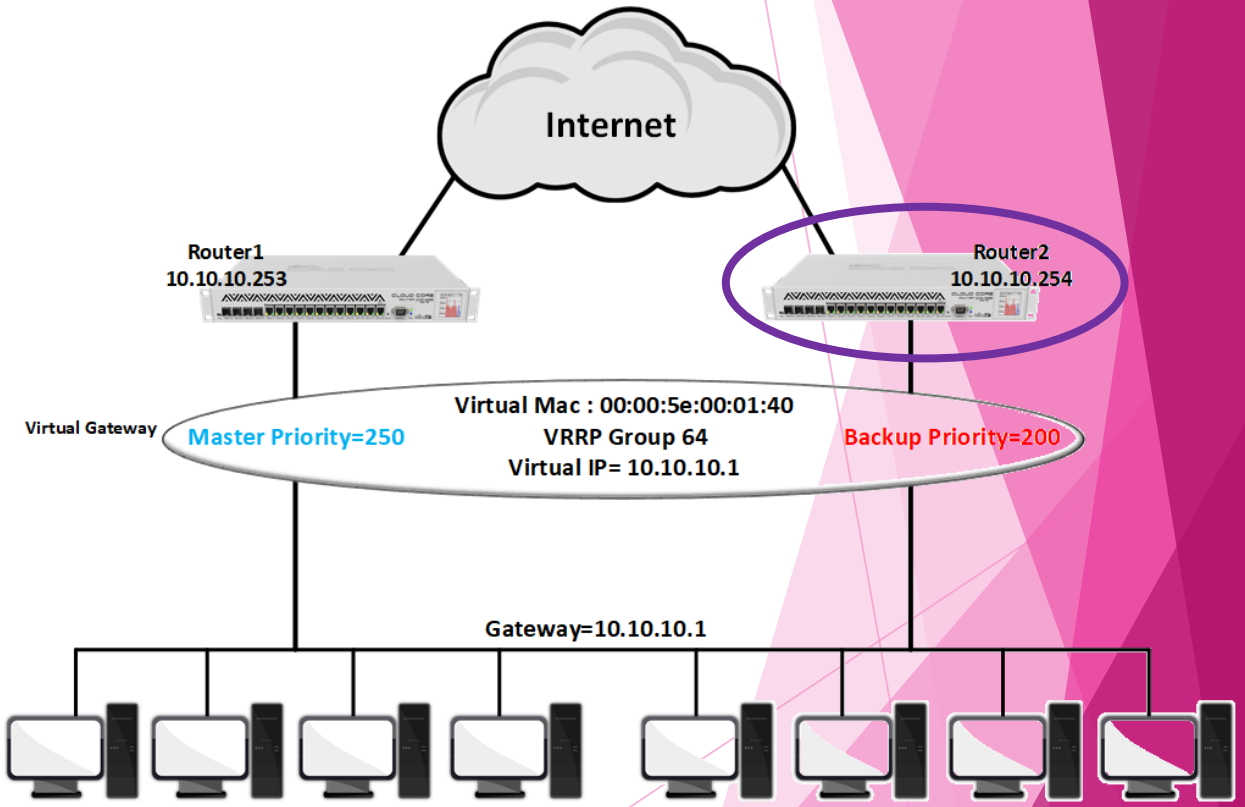
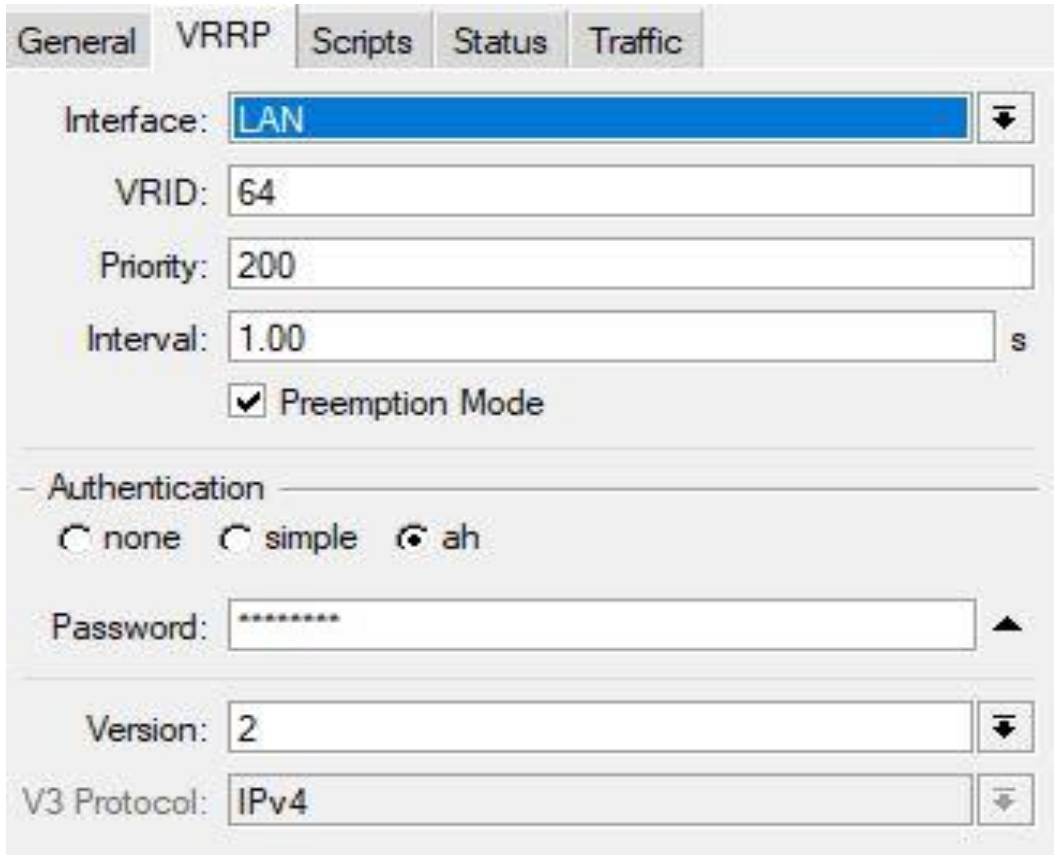
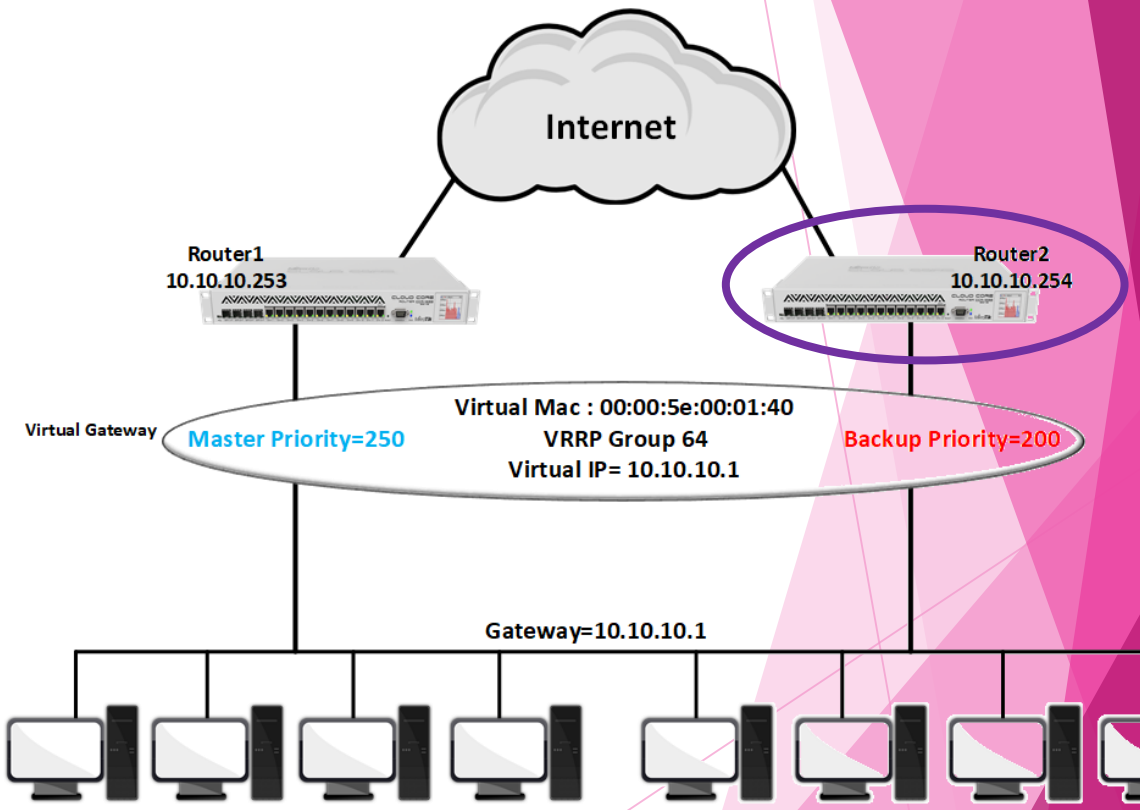
Name:	Virtual on R2
Type:	VRRP
MTU:	1500
Actual MTU:	1500
L2 MTU:	1594
MAC Address:	00:00:5E:00:01:40
ARP:	enabled
ARP Timeout:	



VRRP Scenario
Router2 Configuration





VRRP Scenario
Router2 Configuration

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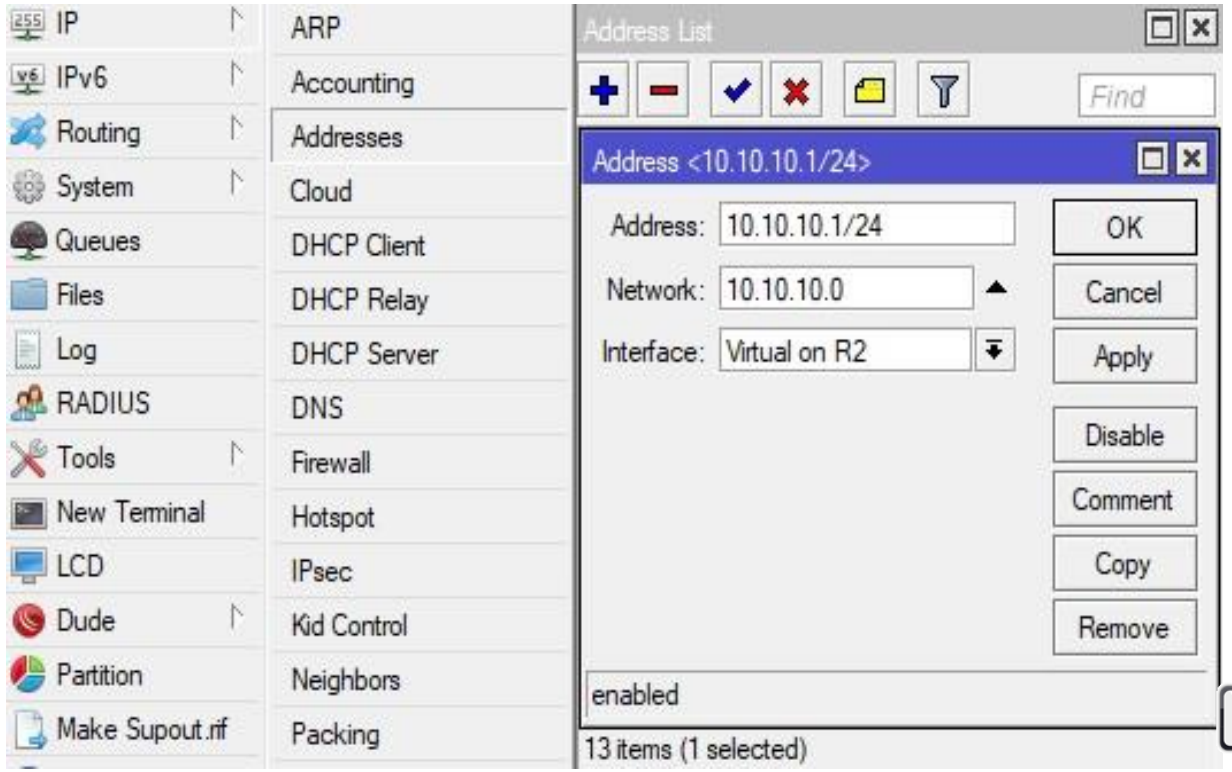
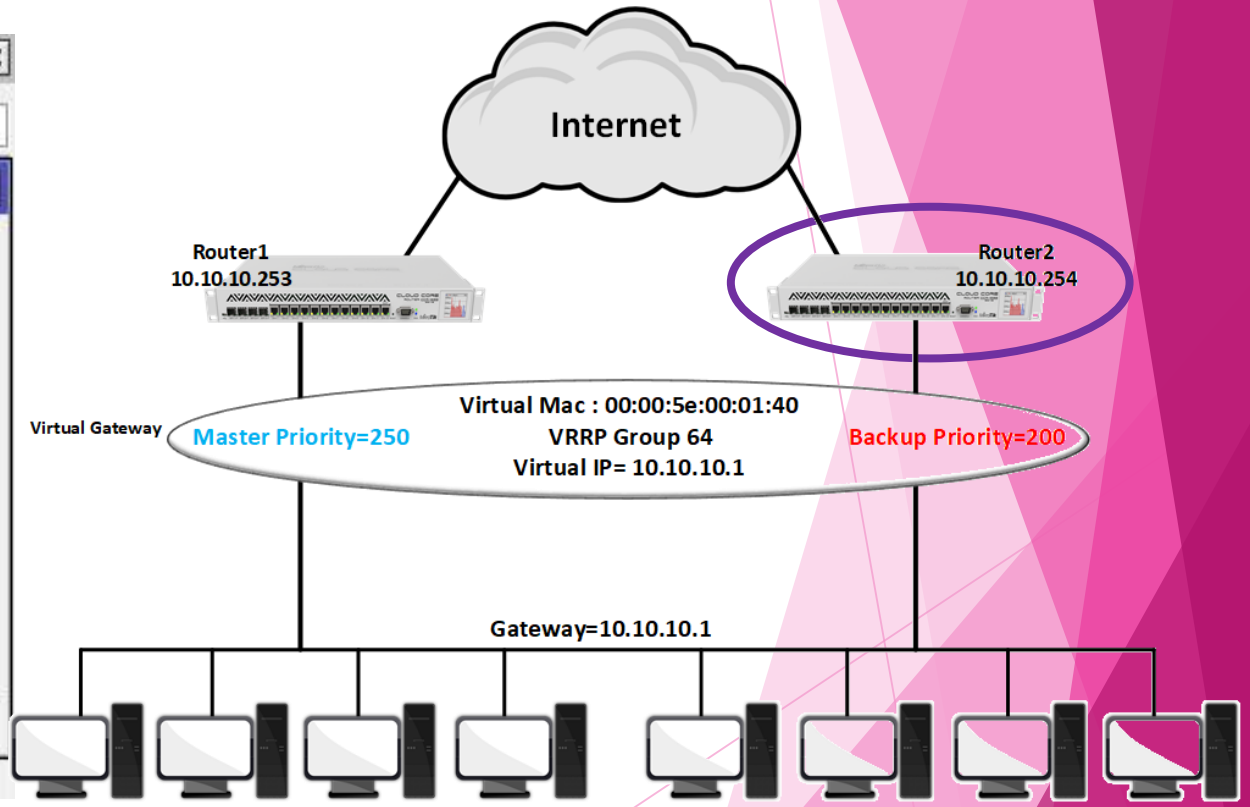
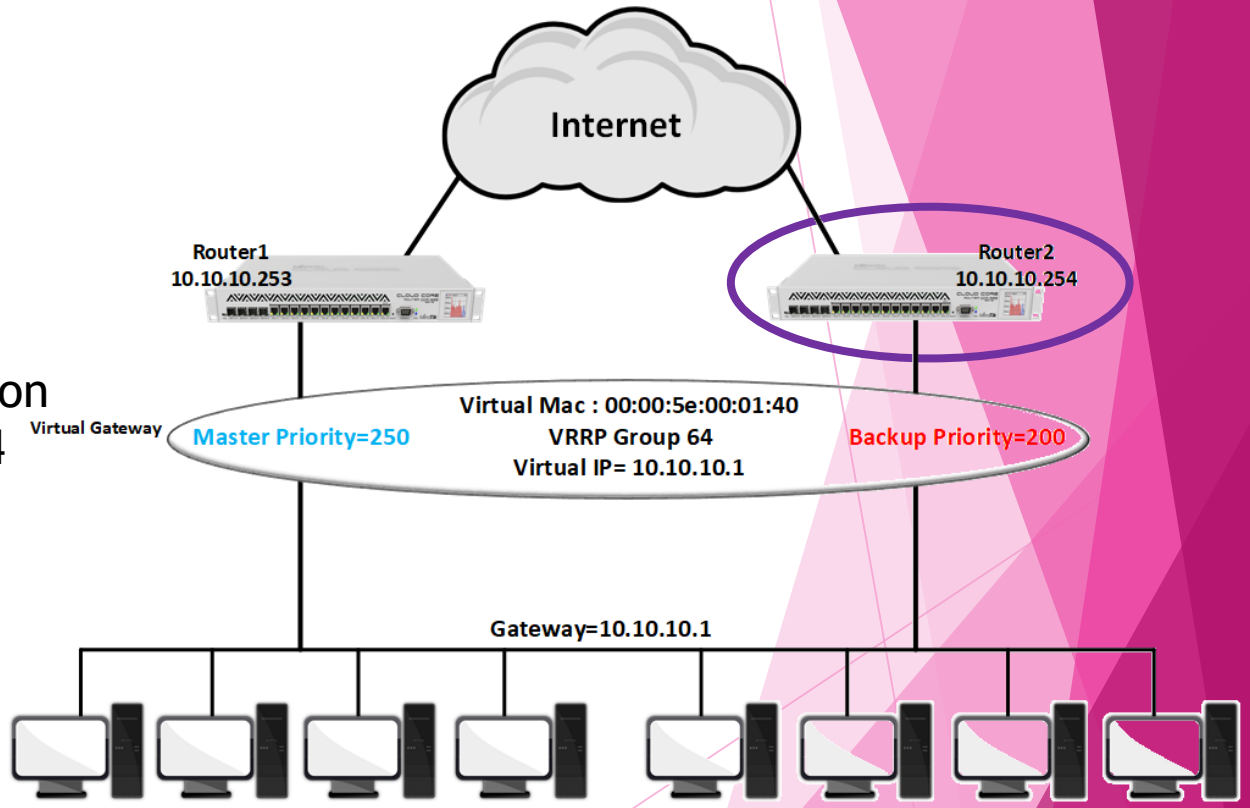


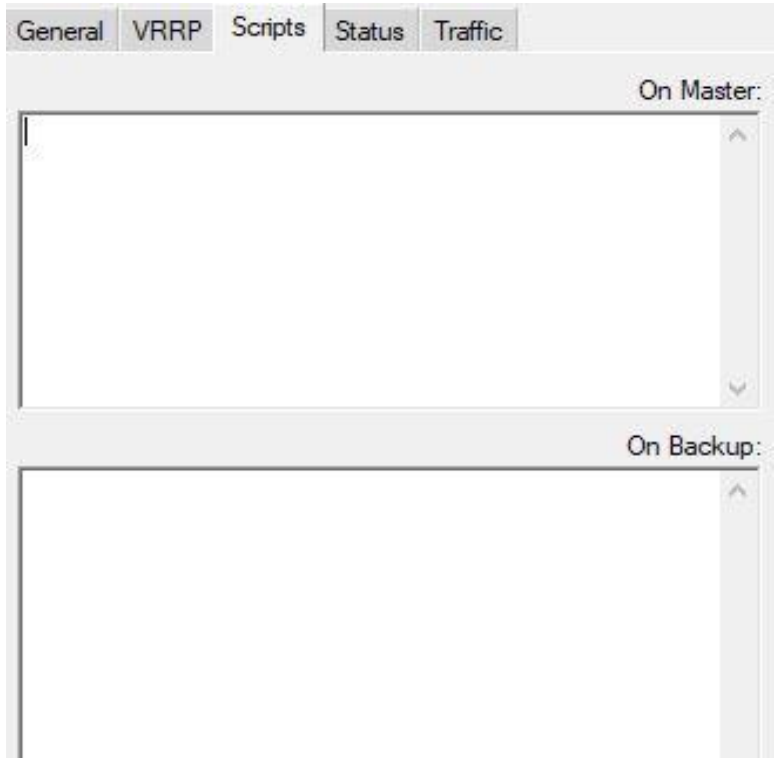


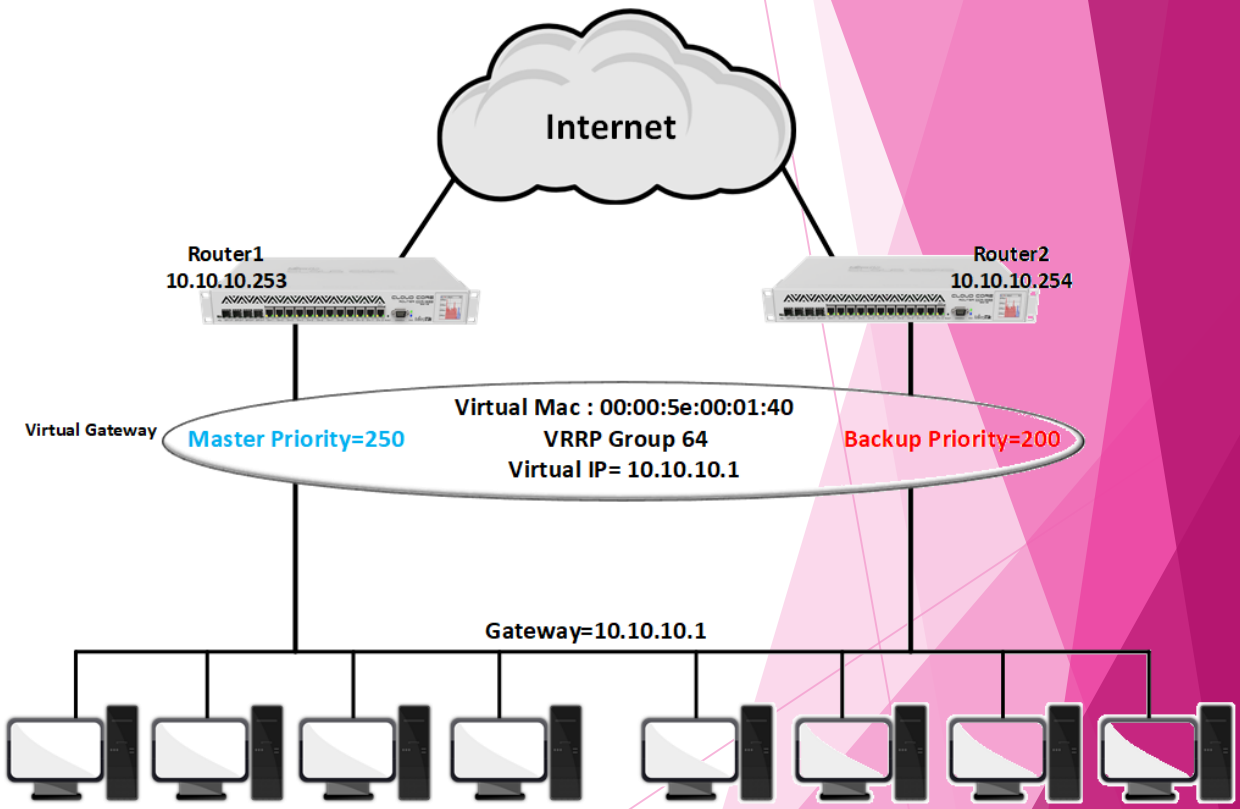
VRRP Scenario
Router2 Configuration

```
/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"
```



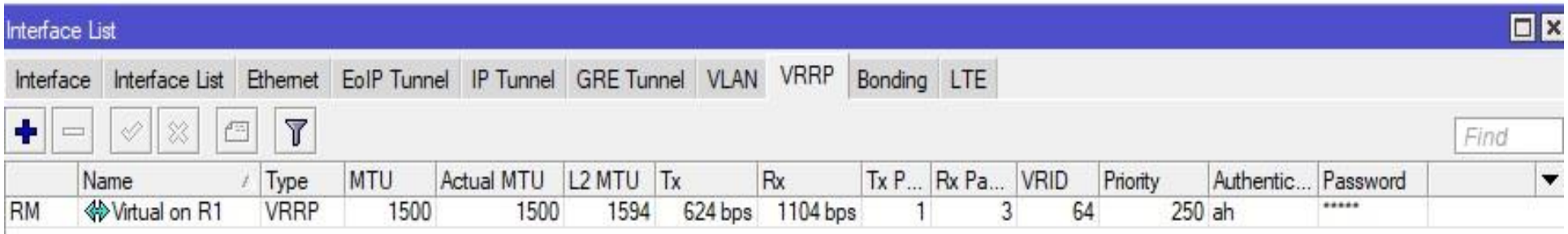
VRRP Scenario Script on Routers



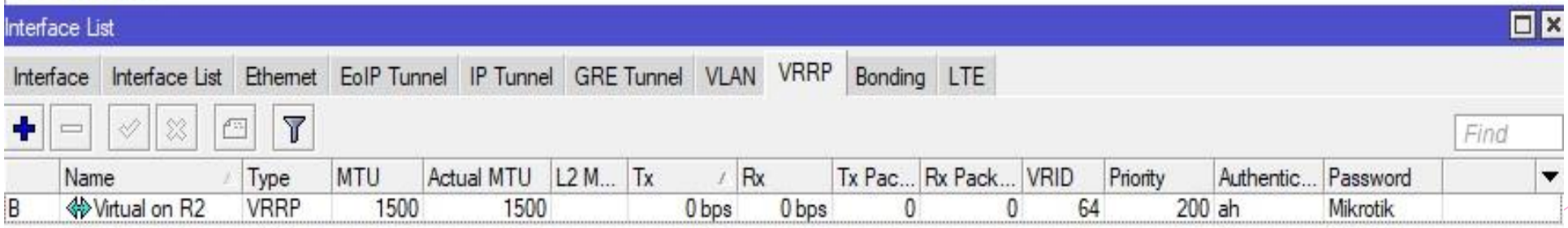


VRRP Scenario Configuration Verification

Router1



Router2



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

VRRP Test Result

```
C:\Users\Administrator>ping 10.10.10.1 -t

Pinging 10.10.10.1 with 32 bytes of data:
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
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Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Request timed out.
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
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Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
Reply from 10.10.10.1: bytes=32 time<1ms TTL=64
```
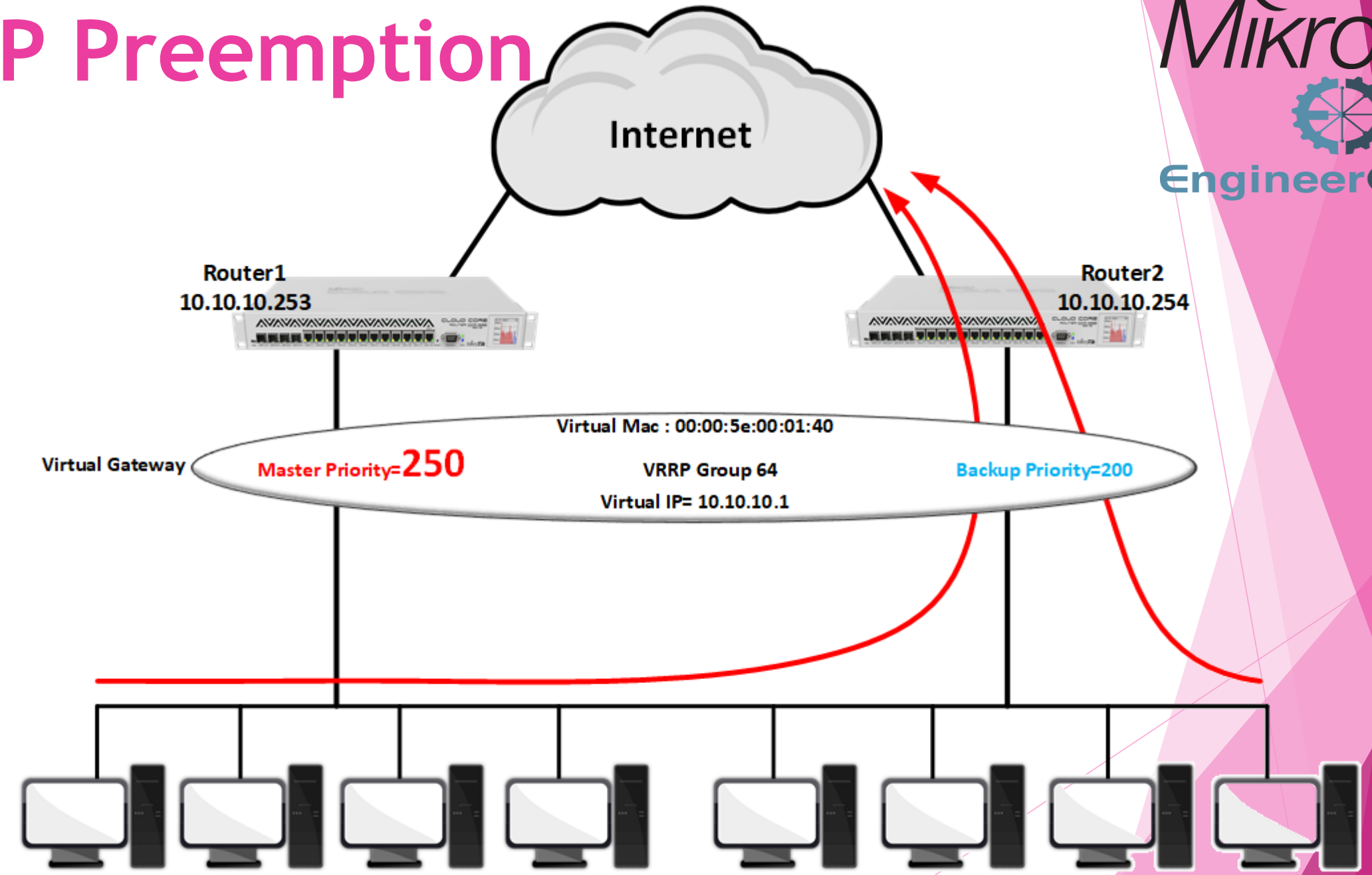
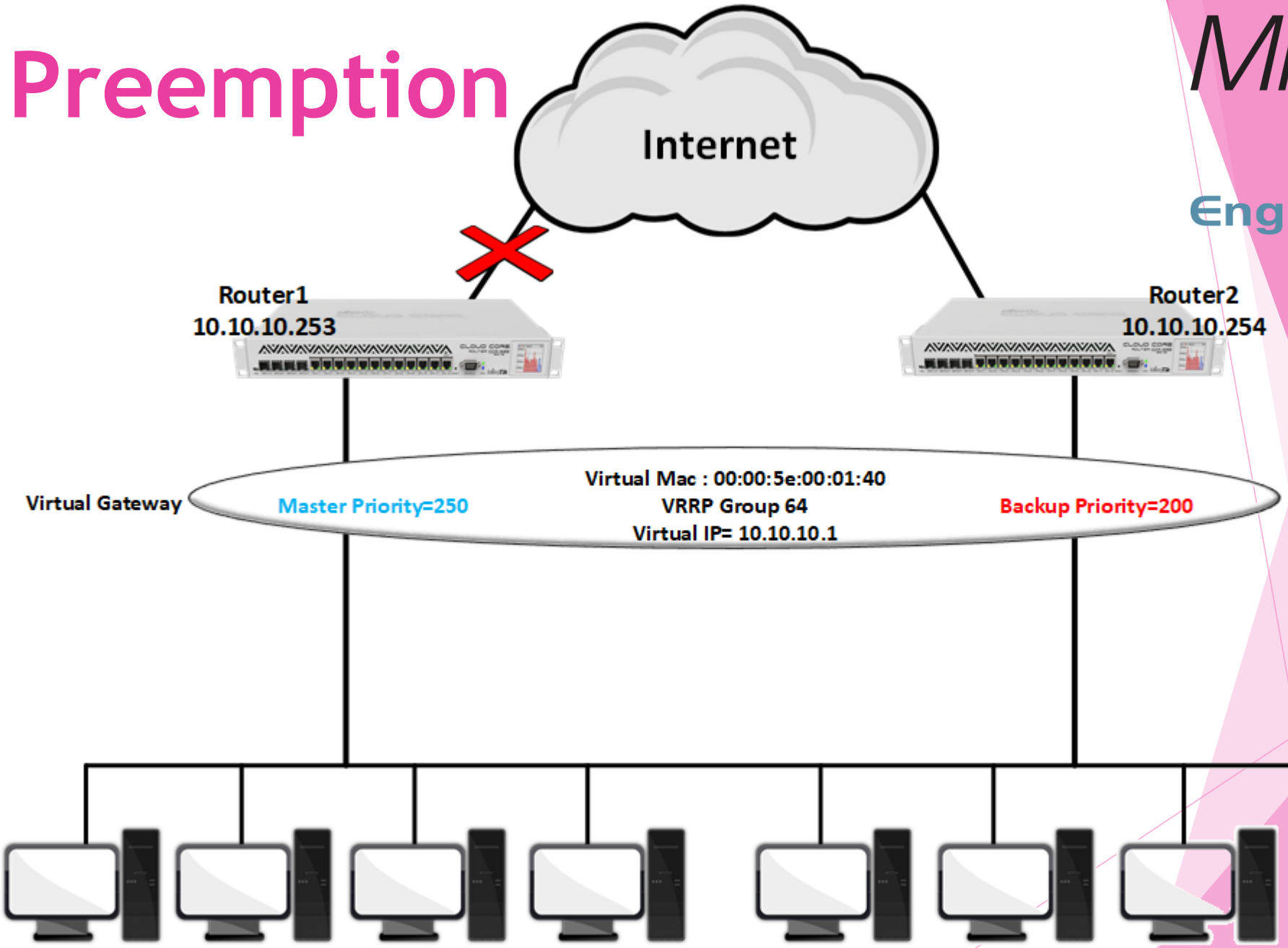

FHRP Protocols

	VRRP	GLBP
Packet	Standarad	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

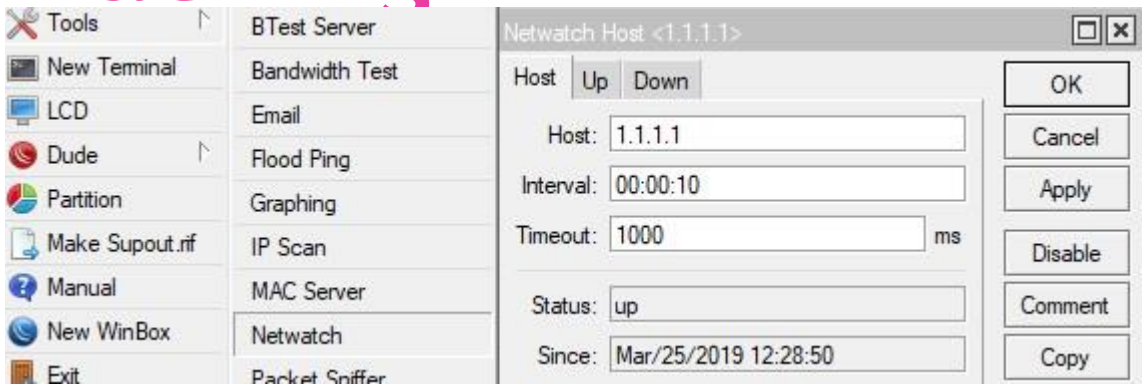
VRRP Preemption

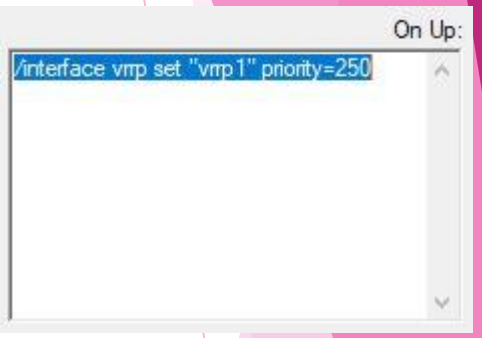


VRRP Preemption



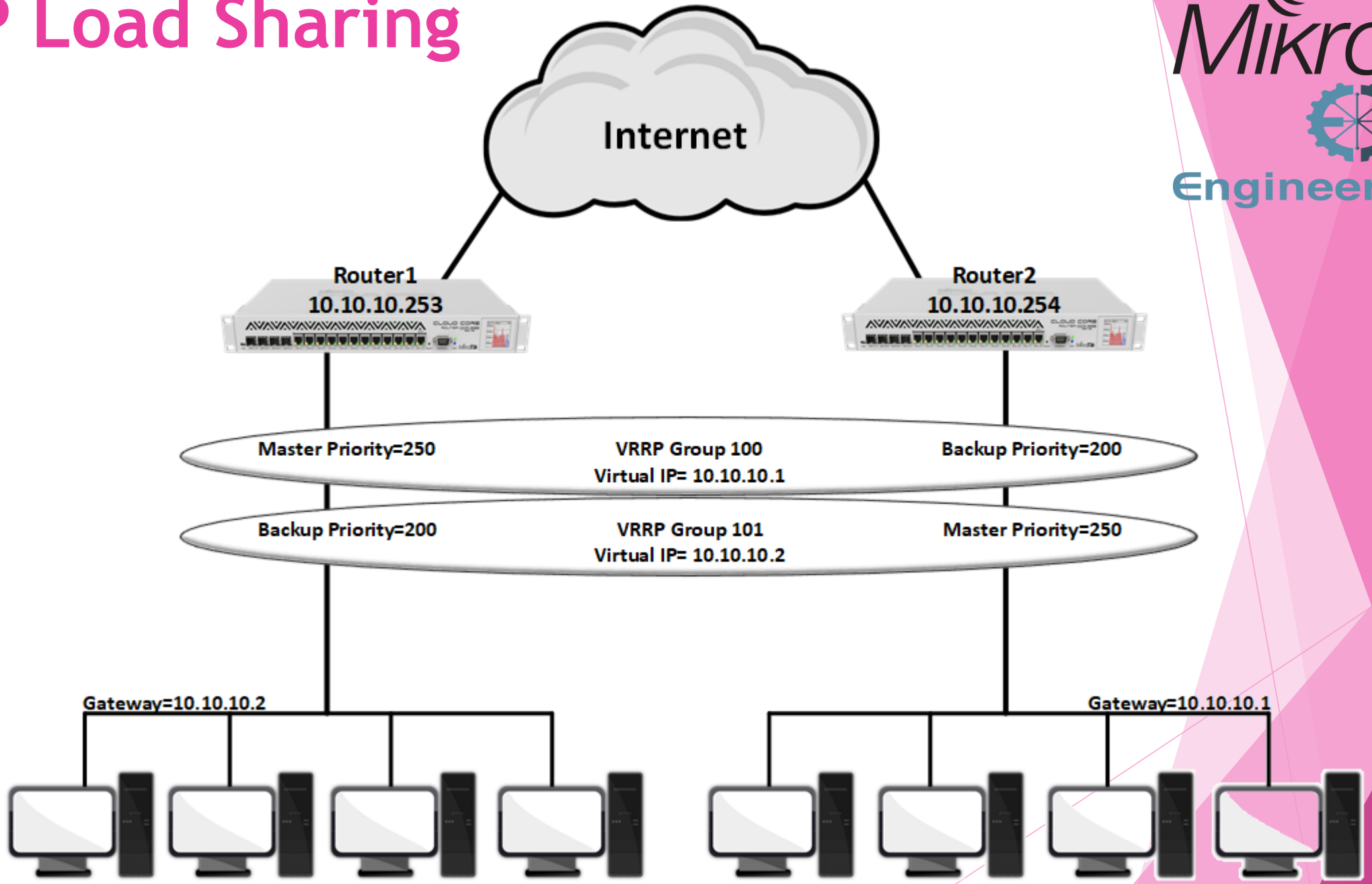
VRRP Preemption Interface Tracking






```
/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



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