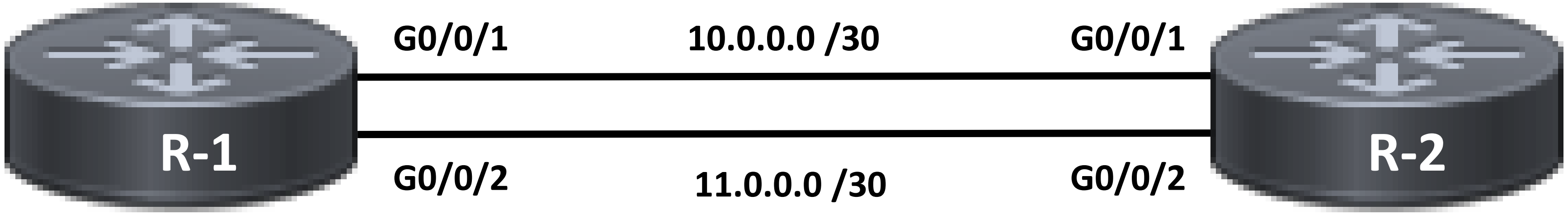
VRF BASICS

VIRTUAL ROUTING AND FORWARDING (VRF) IS THE PROCESS OF CREATING MULTIPLE LOGICAL INSTANCES OF A ROUTER ON A SINGLE PIECE OF HARDWARE. SIMILARLY TO HOW A VLAN SEPERATES A SWITCH INTO TWO COMPLETELY SEGREGATED LOGICAL LAYER 2 NETWORKS, A VRF BREAKS A ROUTER INTO TWO SEPARATE LAYER 3 NETWORKS THAT ARE ISOLATED FROM EACH OTHER.

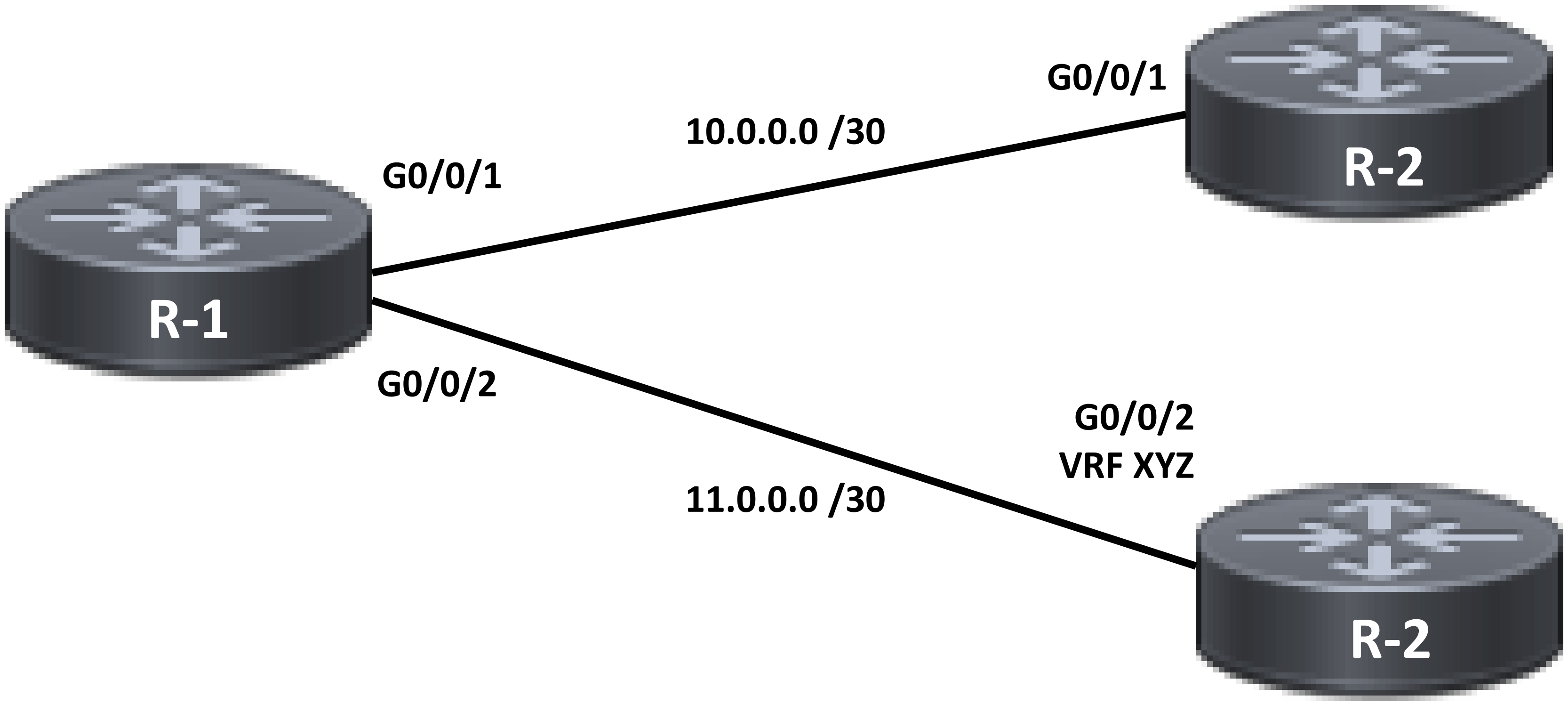
THAT MEANS TWO ROUTING TABLES AND TWO SETS OF DYNAMIC ROUTING PROCESSES THAT ARE NOT AWARE THEY ARE SHARING 1 PHYSICAL ROUTER.

BELOW IS AN EXAMPLE OF CONVENTION ROUTERS THAT ONLY HAVE A GLOBAL ROUTING TABLE.



```
R1#
Show ip route

C 10.0.0.0 /30 directly connected, G0/0/1
L 10.0.0.1 /32 directly connected, G0/0/1
C 11.0.0.0 /30 directly connected, G0/0/2
L 11.0.0.1 /32 directly connected, G0/0/2
```

```
R2#
Show ip route

C 10.0.0.0 /30 directly connected, G0/0/1
L 10.0.0.2 /32 directly connected, G0/0/1
C 11.0.0.0 /30 directly connected, G0/0/2
L 11.0.0.2 /32 directly connected, G0/0/1
```



ONCE A VRF IS DEFINED ON A ROUTER, THAT ROUTER ESSENTIALLY BECOMES TWO ROUTERS SHARING ONE SET OF PORTS, CPU AND OTHER PHYSICAL ASPECTS. UNDER THE VRF DEFINITION, LIST THE ADDRESS FAMILY THAT THE VRF WILL BE USED FOR (IPV4, IPV6 OR BOTH)

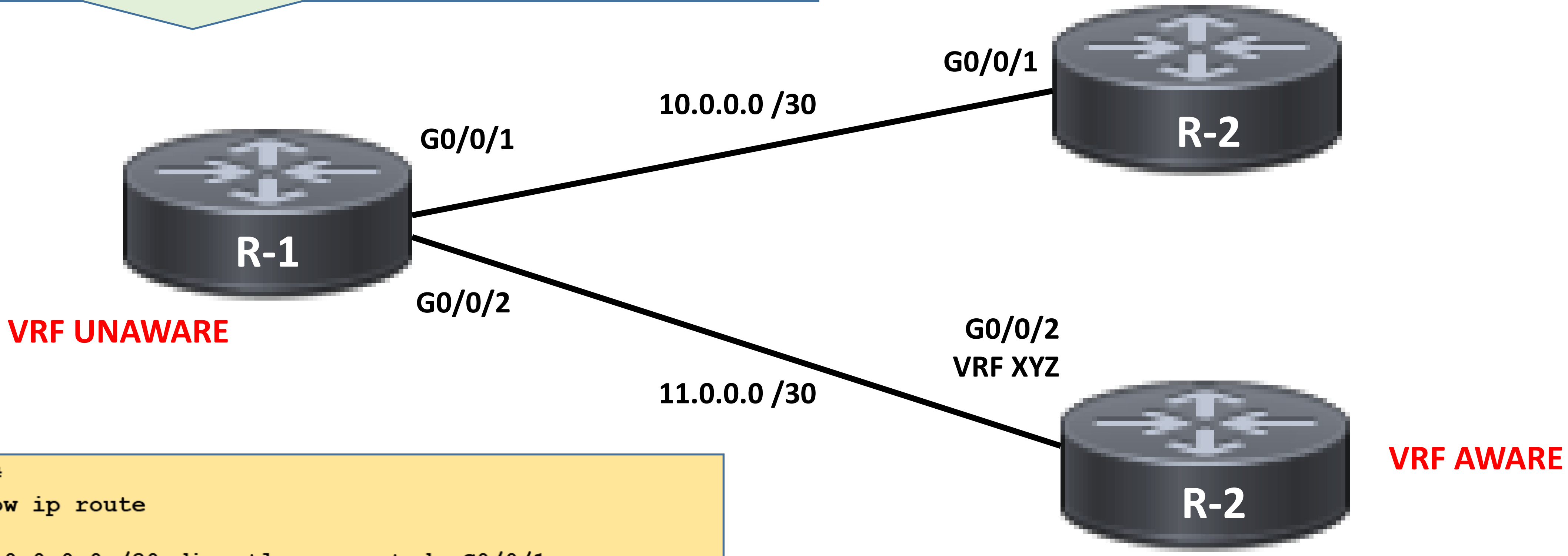
INTERFACES AND ROUTING PROTOCOLS/PROCESSES CAN BE ASSIGNED TO A VRF OR LEFT IN THE GLOBAL ROUTING TABLE.

IN THIS CASE R-2'S G0/0/2 INTERFACE IS ASSIGNED TO THE NEWLY CREATED VRF "XYZ".

```
R2#

Vrf definition XYZ
 address-family ipv4
 address-family ipv6

Interface g0/0/2
 vrf forwarding XYZ
 ip address 11.0.0.2 255.255.255.252

Interface g0/0/1
 ip address 10.0.0.2 255.255.255.252
```

INTERFACES IN THE GLOBAL ROUTING TABLE CAN BE CONNECTED TO INTERFACES IN A VRF. NEITHER DEVICE KNOWS WHETHER THE ROUTER ON THE OTHER SIDE OF THE LINK IS IN A VRF. FROM R-1'S PERSPECTIVE, HE THINKS HE IS CONNECTEC TO TWO DIFFERENT ROUTERS SINCE THE ROUTING TABLE INFORMATION HE RECEIVES FROM THE R-2 GLOBAL WILL BE DIFFERENT THAT THAT HE RECEIVES FROM THE R-2 VRF.

```
R2#
Show ip route

C 10.0.0.0 /30 directly connected, G0/0/1
L 10.0.0.2 /32 directly connected, G0/0/1
```

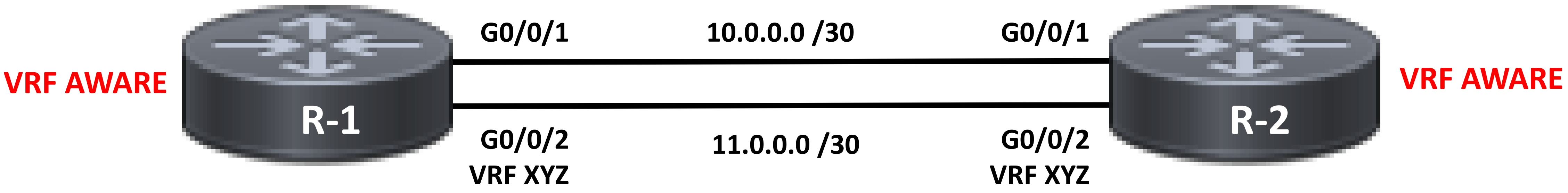


```
R1#
Show ip route

C 10.0.0.0 /30 directly connected, G0/0/1
L 10.0.0.1 /32 directly connected, G0/0/1
C 11.0.0.0 /30 directly connected, G0/0/2
L 11.0.0.1 /32 directly connected, G0/0/2
```

```
R2#
Show ip route vrf XYZ

C 11.0.0.0 /30 directly connected, G0/0/2
L 11.0.0.2 /32 directly connected, G0/0/2
```

```
R1#
Show ip route

C 10.0.0.0 /30 directly connected, G0/0/1
L 10.0.0.1 /32 directly connected, G0/0/1
```

```
R2#
Show ip route

C 10.0.0.0 /30 directly connected, G0/0/1
L 10.0.0.2 /32 directly connected, G0/0/1
```



```
R1#
Show ip route vrf XYZ

C 11.0.0.0 /30 directly connected, G0/0/1
L 11.0.0.1 /32 directly connected, G0/0/1
```

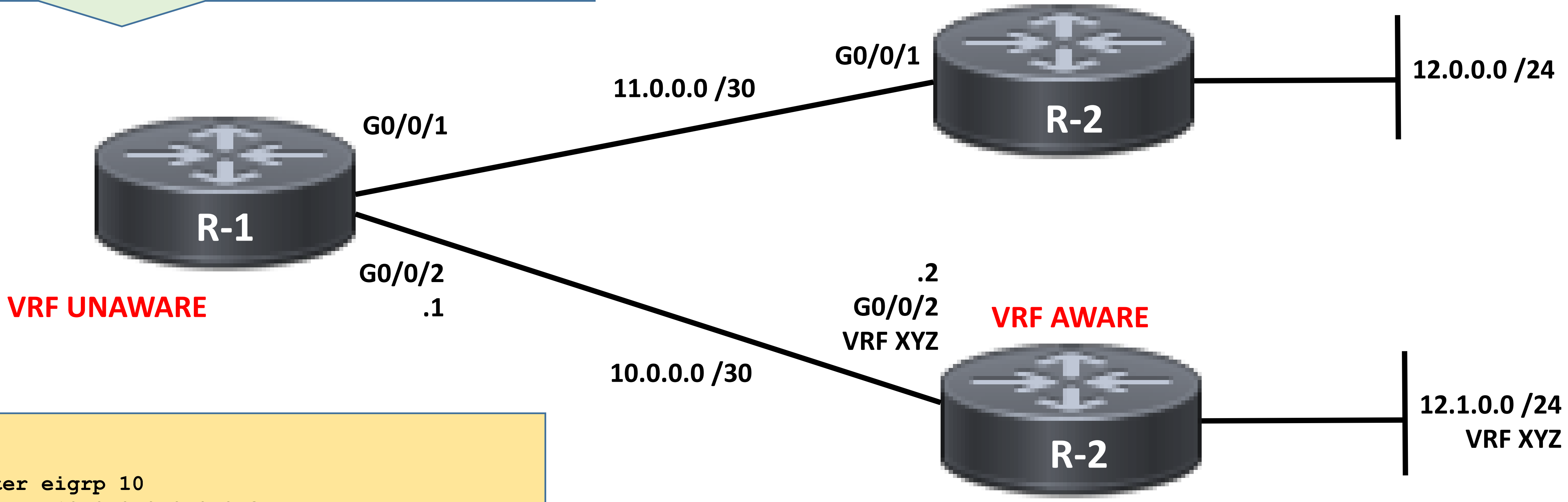
```
R2#
Show ip route vrf XYZ

C 11.0.0.0 /30 directly connected, G0/0/2
L 11.0.0.2 /32 directly connected, G0/0/1
```

VRFs CAN BE EXTENDED ACROSS MULTIPLE ROUTERS AND MAINTAIN THEIR ISOLATED PATH. IN THIS CASE VRF XYZ HAS BEEN CREATED ON BOTH R-1 AND R-2 ALLOWING FOR TRAFFIC WITHIN THAT VRF TO STAY SEPARATE FROM THE GLOBAL ROUTING TABLES ON BOTH DEVICES. THIS COULD BE EXTENDED ACROSS MANY MORE ROUTERS.

NOTE: THE EASIEST WAY TO CONFIGURE MULTIPLE VRFs THAT SPAN SEVERAL ROUTERS IS TO USE EVN AND VNET TRUNKS.

ROUTING PROTOCOLS AND STATIC ROUTES SUPPORT CONFIGURATION FOR VRFs AS WELL. WHEN A ROUTING PROTOCOL IS ASSIGNED TO A VRF, LIKE THE ONE TO THE RIGHT, THE DYNAMIC ROUTES IT LEARNS AND SHARES APPLY TO THAT VRF'S ROUTING TABLE RATHER THAN THE GLOBAL.

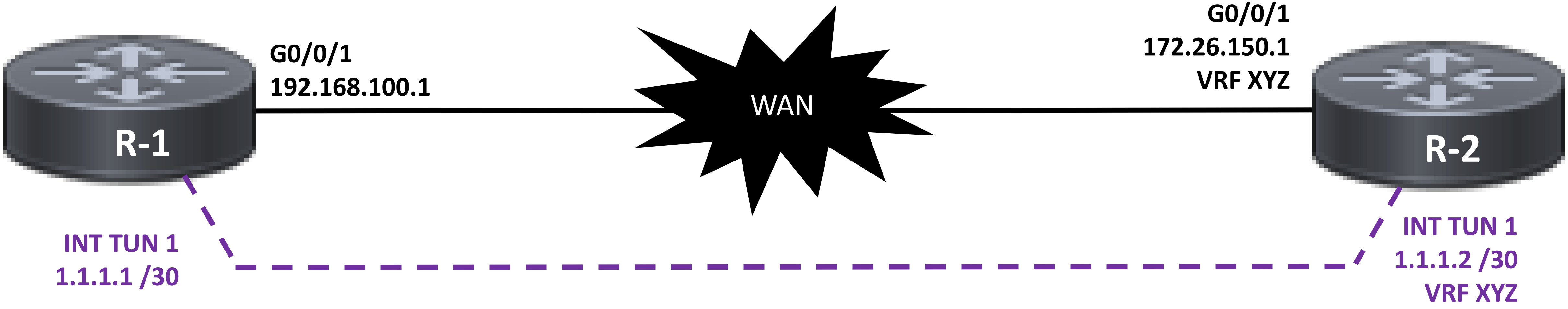
```
R2#

Router eigrp MSCHAT
Address-family ipv4 unicast vrf XYZ autonomous-system 10
Network 10.0.0.0 0.0.0.3
Network 12.1.0.0 0.0.0.255
Network 12.0.0.0 0.0.0.255
```



```
R1#

Router eigrp 10
Network 10.0.0.0 0.0.0.3

Show ip eigrp neighbor

0 10.0.0.2 G0/0/2  00:36…
```

```
R2#

Show ip eigrp neighbor

Show ip eigrp vrf XYZ neighbor

0 10.0.0.1 G0/0/2 00:36…
```

TUNNEL INTERFACES CAN ALSO UTILIZED VRFs FOR BOTH, TUNNEL UNDERLAY (SOUREC/DESTINATION) AND OVERLAY (TUNNEL INTERFACE).



R1 AND R2 HAVE BIDIRECTIONAL REACHABILITY FROM THEIR G0/0/1 INTERFACES

```
R1#

Int g0/0/1
Ip add 192.168.100.1 255.255.255.0

Ip route 172.26.150.1 255.255.255.255 g0/0/1

Int tun 1
Ip add 1.1.1.1 255.255.255.252
Tunnel source 192.168.100.1
Tunnel destination 172.26.150.1
```

```
R2#

Int g0/0/1
Vrf forwarding XYZ
Ip add 172.26.150.1 255.255.255.0

Ip route vrf XYZ 192.168.100.1 255.255.255.255 g0/0/1

Int tun 1
Vrf forwarding XYZ
Ip add 1.1.1.2 255.255.255.252
Tunnel destination 192.168.100.1
Tunnel source 172.26.150.1
Tunnel vrf XYZ
```