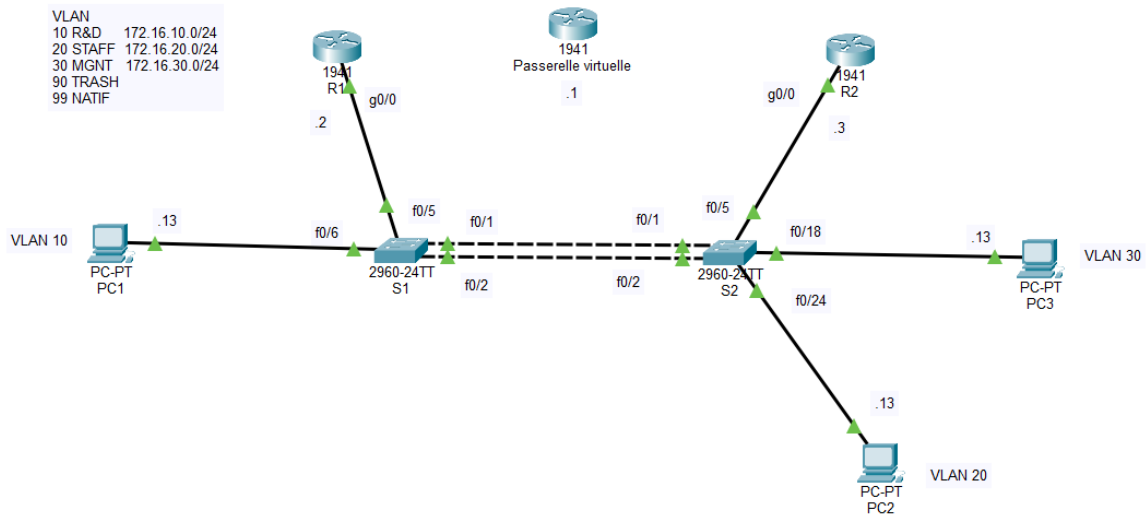


Labo DHCP - HSRP



ping depuis PC1 vers PC2

```
C:\>ping 172.16.20.129

Pinging 172.16.20.129 with 32 bytes of data:

Reply from 172.16.20.129: bytes=32 time<1ms TTL=127
Reply from 172.16.20.129: bytes=32 time<1ms TTL=127
Reply from 172.16.20.129: bytes=32 time<1ms TTL=127
Reply from 172.16.20.129: bytes=32 time<1ms TTL=127

Ping statistics for 172.16.20.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

ping depuis PC1 vers PC3

```
C:\>ping 172.16.30.129

Pinging 172.16.30.129 with 32 bytes of data:

Reply from 172.16.30.129: bytes=32 time<1ms TTL=127
Reply from 172.16.30.129: bytes=32 time<1ms TTL=127
Reply from 172.16.30.129: bytes=32 time=1ms TTL=127
Reply from 172.16.30.129: bytes=32 time=1ms TTL=127

Ping statistics for 172.16.30.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC1 vers s1

```
C:\>ping 172.16.30.11

Pinging 172.16.30.11 with 32 bytes of data:

Reply from 172.16.30.11: bytes=32 time<1ms TTL=254
Reply from 172.16.30.11: bytes=32 time=7ms TTL=254
Reply from 172.16.30.11: bytes=32 time<1ms TTL=254
Reply from 172.16.30.11: bytes=32 time<1ms TTL=254

Ping statistics for 172.16.30.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 1ms

C:\>
```

ping depuis PC1 vers s2

```
C:\>ping 172.16.30.12

Pinging 172.16.30.12 with 32 bytes of data:

Reply from 172.16.30.12: bytes=32 time<1ms TTL=254
Reply from 172.16.30.12: bytes=32 time<1ms TTL=254
Reply from 172.16.30.12: bytes=32 time<1ms TTL=254
Reply from 172.16.30.12: bytes=32 time<1ms TTL=254

Ping statistics for 172.16.30.12:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|
```

ping depuis PC1 vers R1

```
C:\>ping 172.16.10.2

Pinging 172.16.10.2 with 32 bytes of data:

Reply from 172.16.10.2: bytes=32 time<1ms TTL=255
Reply from 172.16.10.2: bytes=32 time<1ms TTL=255
Reply from 172.16.10.2: bytes=32 time<1ms TTL=255
Reply from 172.16.10.2: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|
```

ping depuis PC1 vers R2

```
C:\>ping 172.16.10.3

Pinging 172.16.10.3 with 32 bytes of data:

Reply from 172.16.10.3: bytes=32 time<1ms TTL=255
Reply from 172.16.10.3: bytes=32 time<1ms TTL=255
Reply from 172.16.10.3: bytes=32 time<1ms TTL=255
Reply from 172.16.10.3: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|
```

ping depuis PC1 vers la passerelle virtuelle (HSRP)

```
C:\>ping 172.16.10.1

Pinging 172.16.10.1 with 32 bytes of data:

Reply from 172.16.10.1: bytes=32 time<1ms TTL=255
Reply from 172.16.10.1: bytes=32 time=8ms TTL=255
Reply from 172.16.10.1: bytes=32 time<1ms TTL=255
Reply from 172.16.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 8ms, Average = 2ms

C:\>|
```

ping depuis PC2 vers S1

```
C:\>ping 172.16.30.11

Pinging 172.16.30.11 with 32 bytes of data:

Request timed out.
Reply from 172.16.30.11: bytes=32 time<1ms TTL=254
Reply from 172.16.30.11: bytes=32 time=1ms TTL=254
Reply from 172.16.30.11: bytes=32 time<1ms TTL=254

Ping statistics for 172.16.30.11:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC2 vers S2

```
C:\>ping 172.16.30.12

Pinging 172.16.30.12 with 32 bytes of data:

Reply from 172.16.30.12: bytes=32 time<1ms TTL=254
Reply from 172.16.30.12: bytes=32 time<1ms TTL=254
Reply from 172.16.30.12: bytes=32 time=1ms TTL=254
Reply from 172.16.30.12: bytes=32 time<1ms TTL=254

Ping statistics for 172.16.30.12:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC2 vers PC1

```
C:\>ping 172.16.10.11

Pinging 172.16.10.11 with 32 bytes of data:

Reply from 172.16.10.11: bytes=32 time<1ms TTL=127
Reply from 172.16.10.11: bytes=32 time<1ms TTL=127
Reply from 172.16.10.11: bytes=32 time<1ms TTL=127
Reply from 172.16.10.11: bytes=32 time<1ms TTL=127

Ping statistics for 172.16.10.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

ping depuis PC2 vers PC3

```
C:\>ping 172.16.30.129

Pinging 172.16.30.129 with 32 bytes of data:

Reply from 172.16.30.129: bytes=32 time<1ms TTL=127
Reply from 172.16.30.129: bytes=32 time=1ms TTL=127
Reply from 172.16.30.129: bytes=32 time=1ms TTL=127
Reply from 172.16.30.129: bytes=32 time=1ms TTL=127

Ping statistics for 172.16.30.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC2 vers la passerelle virtuelle (HSRP)

```
C:\>ping 172.16.20.1

Pinging 172.16.20.1 with 32 bytes of data:

Reply from 172.16.20.1: bytes=32 time<1ms TTL=255
Reply from 172.16.20.1: bytes=32 time<1ms TTL=255
Reply from 172.16.20.1: bytes=32 time=1ms TTL=255
Reply from 172.16.20.1: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC2 vers R1

```
C:\>ping 172.16.20.2

Pinging 172.16.20.2 with 32 bytes of data:

Reply from 172.16.20.2: bytes=32 time<1ms TTL=255
Reply from 172.16.20.2: bytes=32 time=1ms TTL=255
Reply from 172.16.20.2: bytes=32 time=1ms TTL=255
Reply from 172.16.20.2: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC2 vers R2

```
C:\>ping 172.16.20.3

Pinging 172.16.20.3 with 32 bytes of data:

Reply from 172.16.20.3: bytes=32 time<1ms TTL=255
Reply from 172.16.20.3: bytes=32 time=1ms TTL=255
Reply from 172.16.20.3: bytes=32 time<1ms TTL=255
Reply from 172.16.20.3: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.20.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC3 vers PC1

```
C:\>ping 172.16.10.11

Pinging 172.16.10.11 with 32 bytes of data:

Reply from 172.16.10.11: bytes=32 time<1ms TTL=127
Reply from 172.16.10.11: bytes=32 time<1ms TTL=127
Reply from 172.16.10.11: bytes=32 time=1ms TTL=127
Reply from 172.16.10.11: bytes=32 time=1ms TTL=127

Ping statistics for 172.16.10.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC3 vers PC2

```
C:\>ping 172.16.20.129

Pinging 172.16.20.129 with 32 bytes of data:

Reply from 172.16.20.129: bytes=32 time<1ms TTL=127
Reply from 172.16.20.129: bytes=32 time<1ms TTL=127
Reply from 172.16.20.129: bytes=32 time=5ms TTL=127
Reply from 172.16.20.129: bytes=32 time<1ms TTL=127

Ping statistics for 172.16.20.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 5ms, Average = 1ms

C:\>|
```

ping depuis PC3 vers s1

```
C:\>ping 172.16.30.11

Pinging 172.16.30.11 with 32 bytes of data:

Request timed out.
Reply from 172.16.30.11: bytes=32 time<1ms TTL=255
Reply from 172.16.30.11: bytes=32 time=7ms TTL=255
Reply from 172.16.30.11: bytes=32 time=1ms TTL=255

Ping statistics for 172.16.30.11:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 7ms, Average = 2ms

C:\>|
```

ping depuis PC3 vers s2

```
C:\>ping 172.16.30.12

Pinging 172.16.30.12 with 32 bytes of data:

Request timed out.
Reply from 172.16.30.12: bytes=32 time<1ms TTL=255
Reply from 172.16.30.12: bytes=32 time<1ms TTL=255
Reply from 172.16.30.12: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.30.12:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

ping depuis PC3 vers R1

```
C:\>ping 172.16.30.2

Pinging 172.16.30.2 with 32 bytes of data:

Reply from 172.16.30.2: bytes=32 time<1ms TTL=255
Reply from 172.16.30.2: bytes=32 time<1ms TTL=255
Reply from 172.16.30.2: bytes=32 time<1ms TTL=255
Reply from 172.16.30.2: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

ping depuis PC3 vers R2

```
C:\>ping 172.16.30.3

Pinging 172.16.30.3 with 32 bytes of data:

Reply from 172.16.30.3: bytes=32 time<1ms TTL=255
Reply from 172.16.30.3: bytes=32 time<1ms TTL=255
Reply from 172.16.30.3: bytes=32 time=1ms TTL=255
Reply from 172.16.30.3: bytes=32 time=1ms TTL=255

Ping statistics for 172.16.30.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

ping depuis PC3 vers la passerelle virtuelle (HSRP)

```
C:\>ping 172.16.30.1

Pinging 172.16.30.1 with 32 bytes of data:

Reply from 172.16.30.1: bytes=32 time<1ms TTL=255
Reply from 172.16.30.1: bytes=32 time=8ms TTL=255
Reply from 172.16.30.1: bytes=32 time<1ms TTL=255
Reply from 172.16.30.1: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.30.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 2ms

C:\>
```

show etherchannel summary sur S1 :

```

S1>show etherchannel summary
Flags: D - down          P - in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        f - failed to allocate aggregator
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

Number of channel-groups in use: 1
Number of aggregators:          1

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1 (SU)          PAgP       Fa0/1 (P) Fa0/2 (P)
S1>

```

show etherchannel summary sur S2 :

```

S2>show etherchannel summary
Flags: D - down          P - in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        f - failed to allocate aggregator
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

Number of channel-groups in use: 1
Number of aggregators:          1

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1 (SU)          PAgP       Fa0/1 (P) Fa0/2 (P)
S2>

```

show interfaces trunk sur S1 :

S1>show interfaces trunk

Port	Mode	Encapsulation	Status	Native vlan
Po1	on	802.1q	trunking	99
Fa0/5	on	802.1q	trunking	99

Port Vlans allowed on trunk

Po1 1-1005

Fa0/5 1-1005

Port Vlans allowed and active in management domain

Po1 1,10,20,30,90,99

Fa0/5 1,10,20,30,90,99

Port Vlans in spanning tree forwarding state and not pruned

Po1 1,10,20,30,90,99

Fa0/5 1,10,20,30,90,99

S1>

show interfaces trunk sur S2 :

S2>show interfaces trunk

Port	Mode	Encapsulation	Status	Native vlan
Po1	on	802.1q	trunking	99
Fa0/5	on	802.1q	trunking	99

Port Vlans allowed on trunk

Po1 1-1005

Fa0/5 1-1005

Port Vlans allowed and active in management domain

Po1 1,10,20,30,90,99

Fa0/5 1,10,20,30,90,99

Port Vlans in spanning tree forwarding state and not pruned

Po1 1,10,20,30,90,99

Fa0/5 1,10,20,30,90,99

S2>

show vlan brief sur S1 :

```
S1>show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/18, Fa0/24, Gig0/1, Gig0/2
10	R&D	active	Fa0/6
20	STAFF	active	
30	MGNT	active	
90	TRASH	active	Fa0/3, Fa0/4, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/19, Fa0/20, Fa0/21 Fa0/22, Fa0/23
99	NATIF	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

```
S1>
```

show vlan brief sur S2 :

```
S2>show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/6, Gig0/1, Gig0/2
10	R&D	active	
20	STAFF	active	Fa0/24
30	MGNT	active	Fa0/18
90	TRASH	active	Fa0/3, Fa0/4, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/19, Fa0/20, Fa0/21 Fa0/22, Fa0/23
99	NATIF	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

```
S2>
```

sh ip int br sur S1 :

```

S1>sh ip int br
Interface          IP-Address  OK? Method Status      Protocol
Port-channel1      unassigned  YES manual up          up
FastEthernet0/1     unassigned  YES manual up          up
FastEthernet0/2     unassigned  YES manual up          up
FastEthernet0/3     unassigned  YES manual administratively down down
FastEthernet0/4     unassigned  YES manual administratively down down
FastEthernet0/5     unassigned  YES manual up          up
FastEthernet0/6     unassigned  YES manual up          up
FastEthernet0/7     unassigned  YES manual administratively down down
FastEthernet0/8     unassigned  YES manual administratively down down
FastEthernet0/9     unassigned  YES manual administratively down down
FastEthernet0/10    unassigned  YES manual administratively down down
FastEthernet0/11    unassigned  YES manual administratively down down
FastEthernet0/12    unassigned  YES manual administratively down down
FastEthernet0/13    unassigned  YES manual administratively down down
FastEthernet0/14    unassigned  YES manual administratively down down
FastEthernet0/15    unassigned  YES manual administratively down down
FastEthernet0/16    unassigned  YES manual administratively down down
FastEthernet0/17    unassigned  YES manual administratively down down
FastEthernet0/18    unassigned  YES manual down         down
FastEthernet0/19    unassigned  YES manual administratively down down
FastEthernet0/20    unassigned  YES manual administratively down down
--More--

```

sh ip int br sur S2:

```

S2>sh ip int br
Interface          IP-Address  OK? Method Status      Protocol
Port-channel1      unassigned  YES manual up          up
FastEthernet0/1     unassigned  YES manual up          up
FastEthernet0/2     unassigned  YES manual up          up
FastEthernet0/3     unassigned  YES manual administratively down down
FastEthernet0/4     unassigned  YES manual administratively down down
FastEthernet0/5     unassigned  YES manual up          up
FastEthernet0/6     unassigned  YES manual down         down
FastEthernet0/7     unassigned  YES manual administratively down down
FastEthernet0/8     unassigned  YES manual administratively down down
FastEthernet0/9     unassigned  YES manual administratively down down
FastEthernet0/10    unassigned  YES manual administratively down down
FastEthernet0/11    unassigned  YES manual administratively down down
FastEthernet0/12    unassigned  YES manual administratively down down
FastEthernet0/13    unassigned  YES manual administratively down down
FastEthernet0/14    unassigned  YES manual administratively down down
FastEthernet0/15    unassigned  YES manual administratively down down
FastEthernet0/16    unassigned  YES manual administratively down down
FastEthernet0/17    unassigned  YES manual administratively down down
FastEthernet0/18    unassigned  YES manual up          up
FastEthernet0/19    unassigned  YES manual administratively down down
FastEthernet0/20    unassigned  YES manual administratively down down
--More--

```

ifconfig sur pc1 :

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::202:4AFF:FE11:E1B9
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 172.16.10.11
    Subnet Mask . . . . .: 255.255.255.0
    Default Gateway . . . . .: ::
                                   172.16.10.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
                                   0.0.0.0

C:\>
```

ifconfig sur pc2 :

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::20C:CFFF:FEC7:6C7B
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 172.16.20.129
    Subnet Mask . . . . .: 255.255.255.0
    Default Gateway . . . . .: ::
                                   172.16.20.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
                                   0.0.0.0

C:\>
```

ifconfig sur pc3 :

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address.....: FE80::230:A3FF:FE7C:2C8C
    IPv6 Address.....: ::
    IPv4 Address.....: 172.16.30.129
    Subnet Mask.....: 255.255.255.0
    Default Gateway.....: ::
                        172.16.30.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address.....: ::
    IPv6 Address.....: ::
    IPv4 Address.....: 0.0.0.0
    Subnet Mask.....: 0.0.0.0
    Default Gateway.....: ::
                        0.0.0.0

C:\>
```

sh ip inter br sur R1

```

R1>sh ip inter br
Interface                IP-Address      OK? Method Status      Protocol
GigabitEthernet0/0       unassigned      YES unset    up          up
GigabitEthernet0/0.10    172.16.10.2     YES manual    up          up
GigabitEthernet0/0.20    172.16.20.2     YES manual    up          up
GigabitEthernet0/0.30    172.16.30.2     YES manual    up          up
GigabitEthernet0/1       unassigned      YES unset    administratively down down
Vlan1                    unassigned      YES unset    administratively down down
R1>

```

sh ip route sur R1

```

R1>sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

    172.16.0.0/16 is variably subnetted, 6 subnets, 2 masks
C       172.16.10.0/24 is directly connected, GigabitEthernet0/0.10
L       172.16.10.2/32 is directly connected, GigabitEthernet0/0.10
C       172.16.20.0/24 is directly connected, GigabitEthernet0/0.20
L       172.16.20.2/32 is directly connected, GigabitEthernet0/0.20
C       172.16.30.0/24 is directly connected, GigabitEthernet0/0.30
L       172.16.30.2/32 is directly connected, GigabitEthernet0/0.30
R1>

```

sh ip inter br sur R2

sh ip route sur R2