

ISIS Accept Policies & Advanced IP routing with SPB - Test Setups VSP9000 Release 4.0

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- February 2018
- Version 4 (Extreme rebranding)

ISIS Accept policies

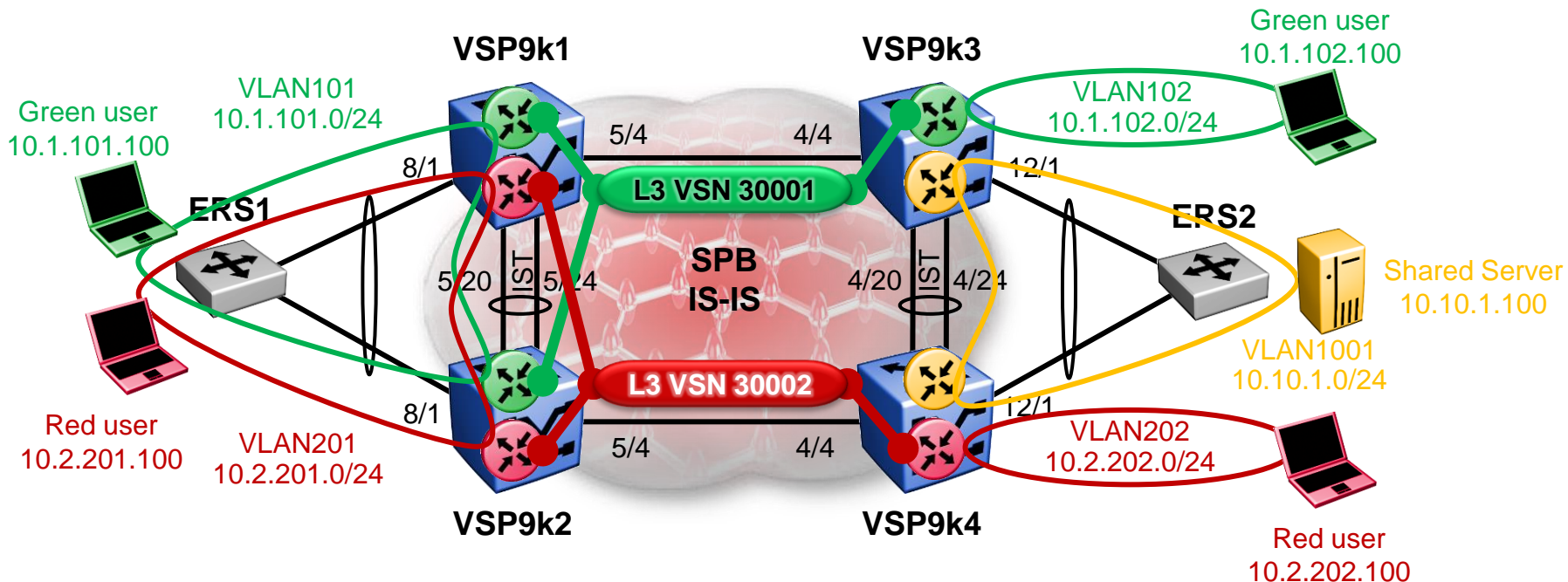
Last tested with: 4.0.0.0_B069

Example use #2
Inter-L3VSN route redistribution
Shared Servers/Subnets



Inter VRF-L3VSN route redistribution

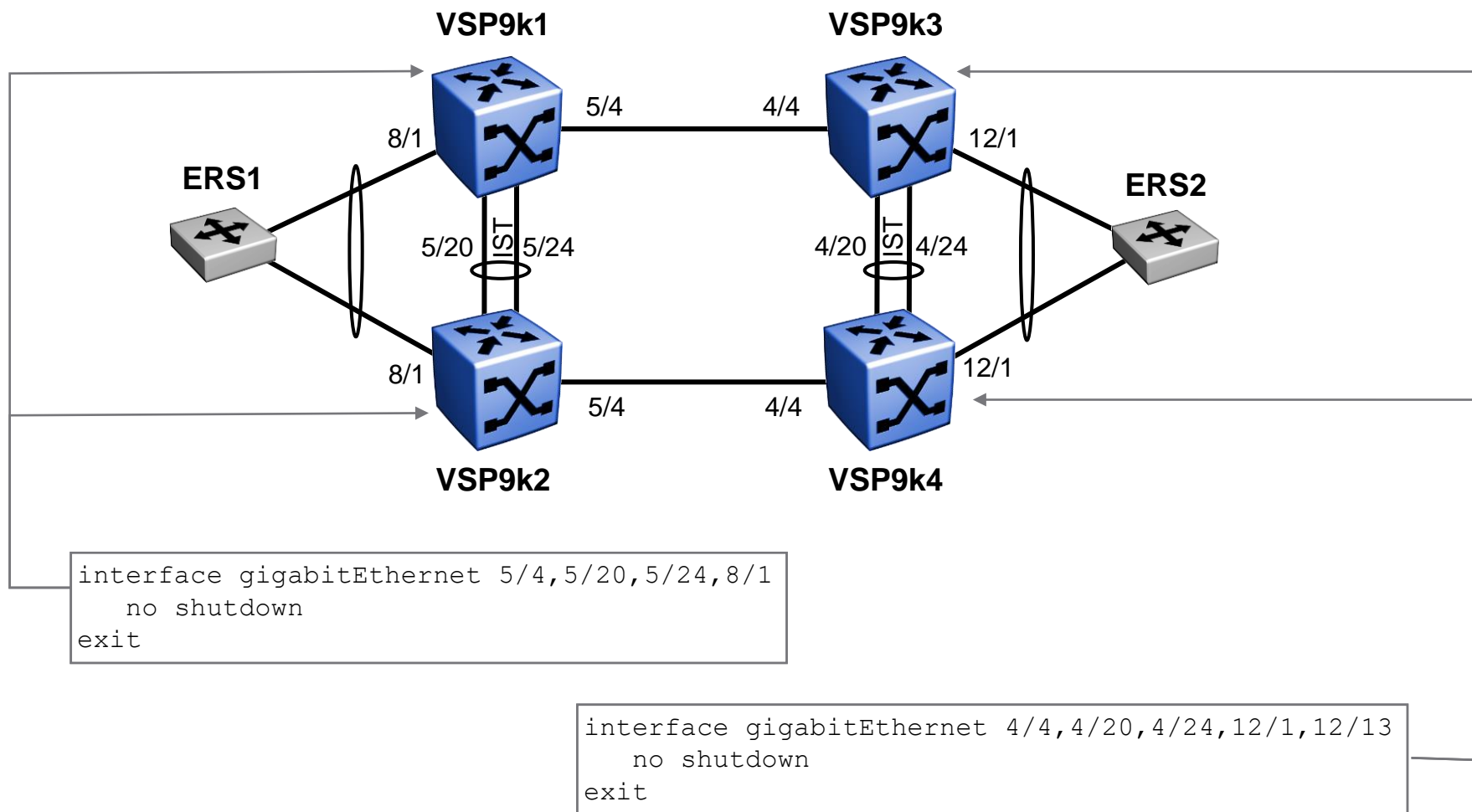
Goal



- Green users can communicate with other green users
- Red users can communicate with other red users
- Green and red users cannot communicate together
- Both green and red users can communicate with shared server
- NOTE: For this architecture we need ISIS Accept policies to be supported across all L3 BEBs
 - On our roadmap, VSP4000, VSP8000 and ERS8800 are all supposed to pick up ISIS Accept policies

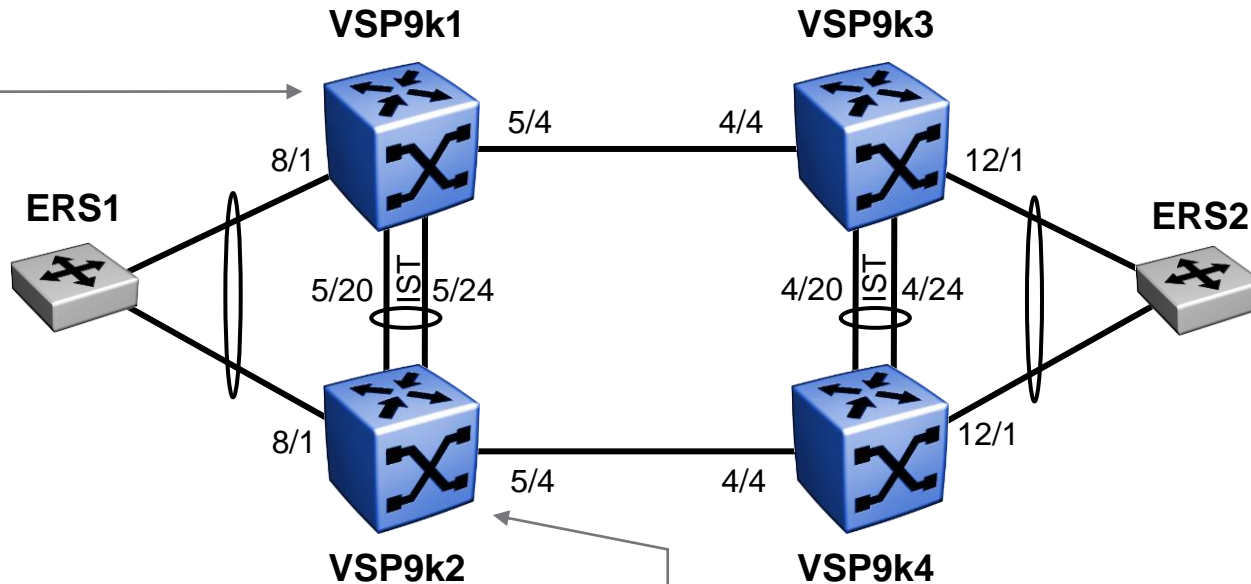
Inter VRF-L3VSN route redistribution

Interfaces used



Inter VRF-L3VSN route redistribution

SMLT Config



```

vlan create 4000 name "IST" type port-mstprstp 0
interface vlan 4000
    ip address 192.168.255.1 255.255.255.252
exit
mlt 512 enable name "IST"
mlt 512 member 5/20,5/24
mlt 512 vlan 4000
mlt 512 encapsulation dot1q
interface mlt 512
    ist peer-ip 192.168.255.2 vlan 4000
    ist enable
exit
mlt 1 enable name "ERS1"
mlt 1 member 8/1
mlt 1 encapsulation dot1q
interface mlt 1
    smlt
exit

```

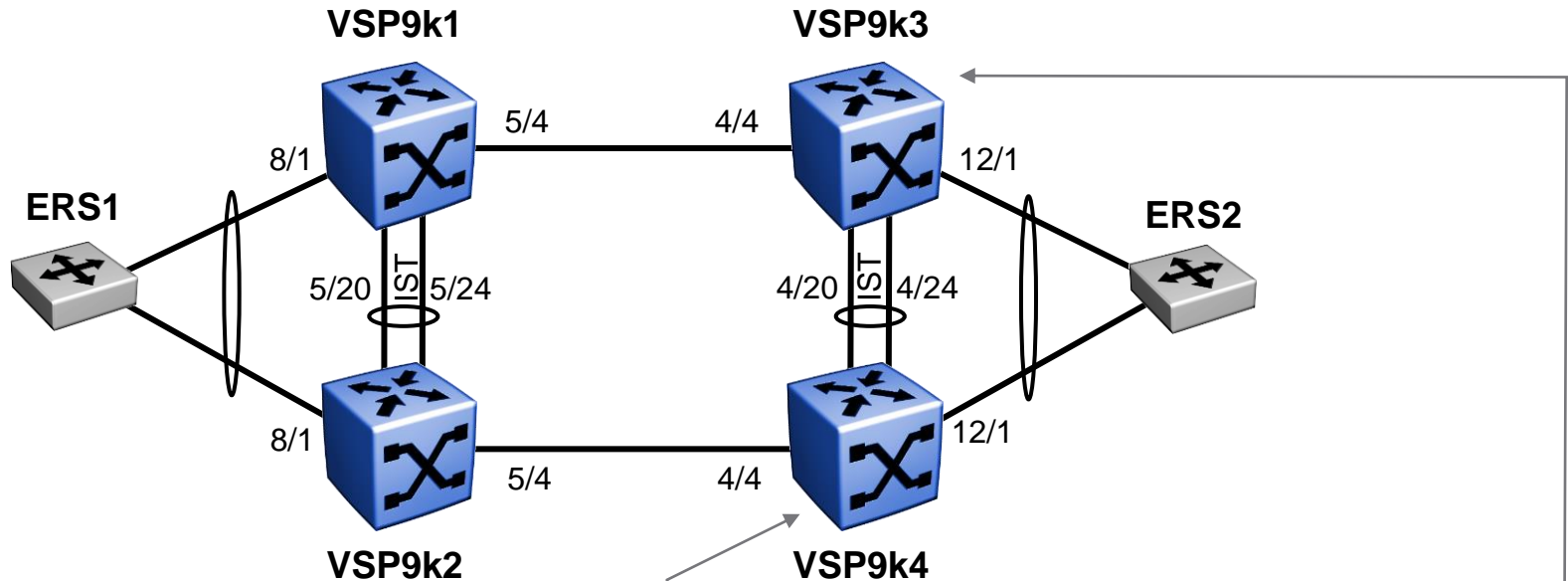
```

vlan create 4000 name "IST" type port-mstprstp 0
interface vlan 4000
    ip address 192.168.255.2 255.255.255.252
exit
mlt 512 enable name "IST"
mlt 512 member 5/20,5/24
mlt 512 vlan 4000
mlt 512 encapsulation dot1q
interface mlt 512
    ist peer-ip 192.168.255.1 vlan 4000
    ist enable
exit
mlt 1 enable name "ERS2"
mlt 1 member 12/1
mlt 1 encapsulation dot1q
interface mlt 1
    smlt
exit

```

Inter VRF-L3VSN route redistribution

SMLT Config



```

vlan create 4000 name "IST" type port-mstprstp 0
interface vlan 4000
    ip address 192.168.255.2 255.255.255.252
exit
mlt 512 enable name "IST"
mlt 512 member 4/20,4/24
mlt 512 vlan 4000
mlt 512 encapsulation dot1q
interface mlt 512
    ist peer-ip 192.168.255.1 vlan 4000
    ist enable
exit
mlt 1 enable name "ERS2"
mlt 1 member 12/1
mlt 1 encapsulation dot1q
interface mlt 1
    smlt
exit

```

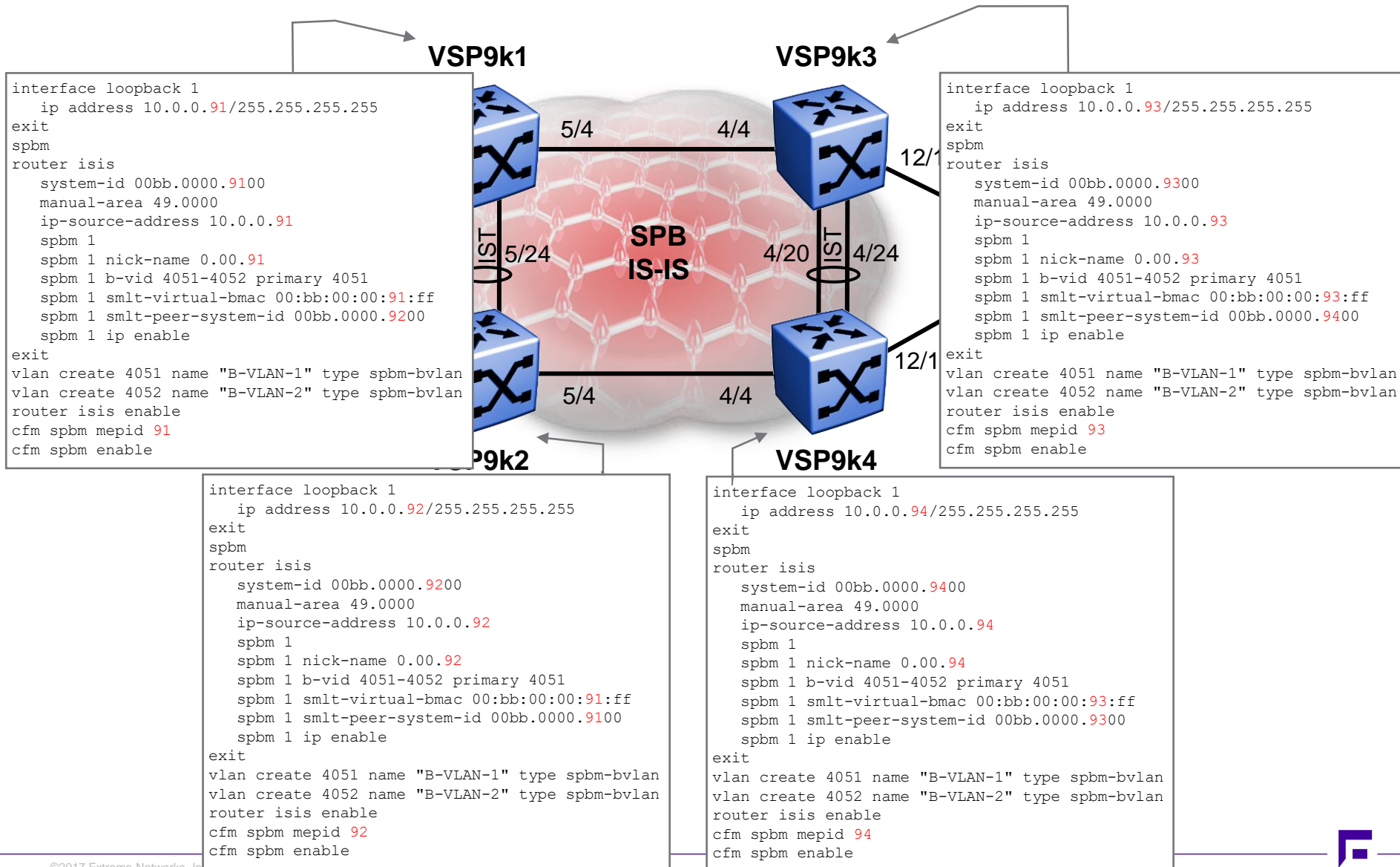
```

vlan create 4000 name "IST" type port-mstprstp 0
interface vlan 4000
    ip address 192.168.255.1 255.255.255.252
exit
mlt 512 enable name "IST"
mlt 512 member 4/20,4/24
mlt 512 vlan 4000
mlt 512 encapsulation dot1q
interface mlt 512
    ist peer-ip 192.168.255.2 vlan 4000
    ist enable
exit
mlt 1 enable name "ERS2"
mlt 1 member 12/1
mlt 1 encapsulation dot1q
interface mlt 1
    smlt
exit

```

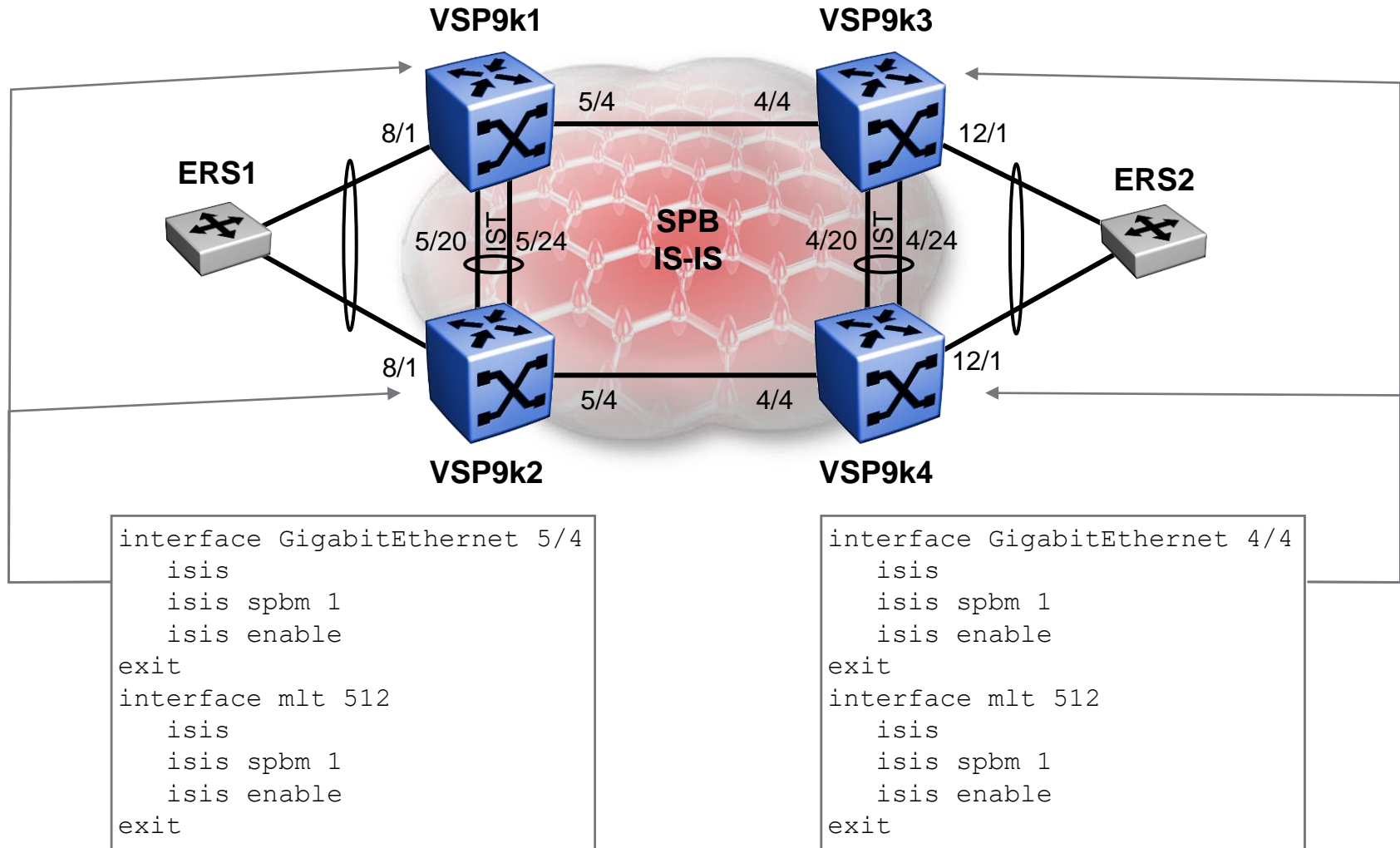
Inter VRF-L3VSN route redistribution

SPB Global Config



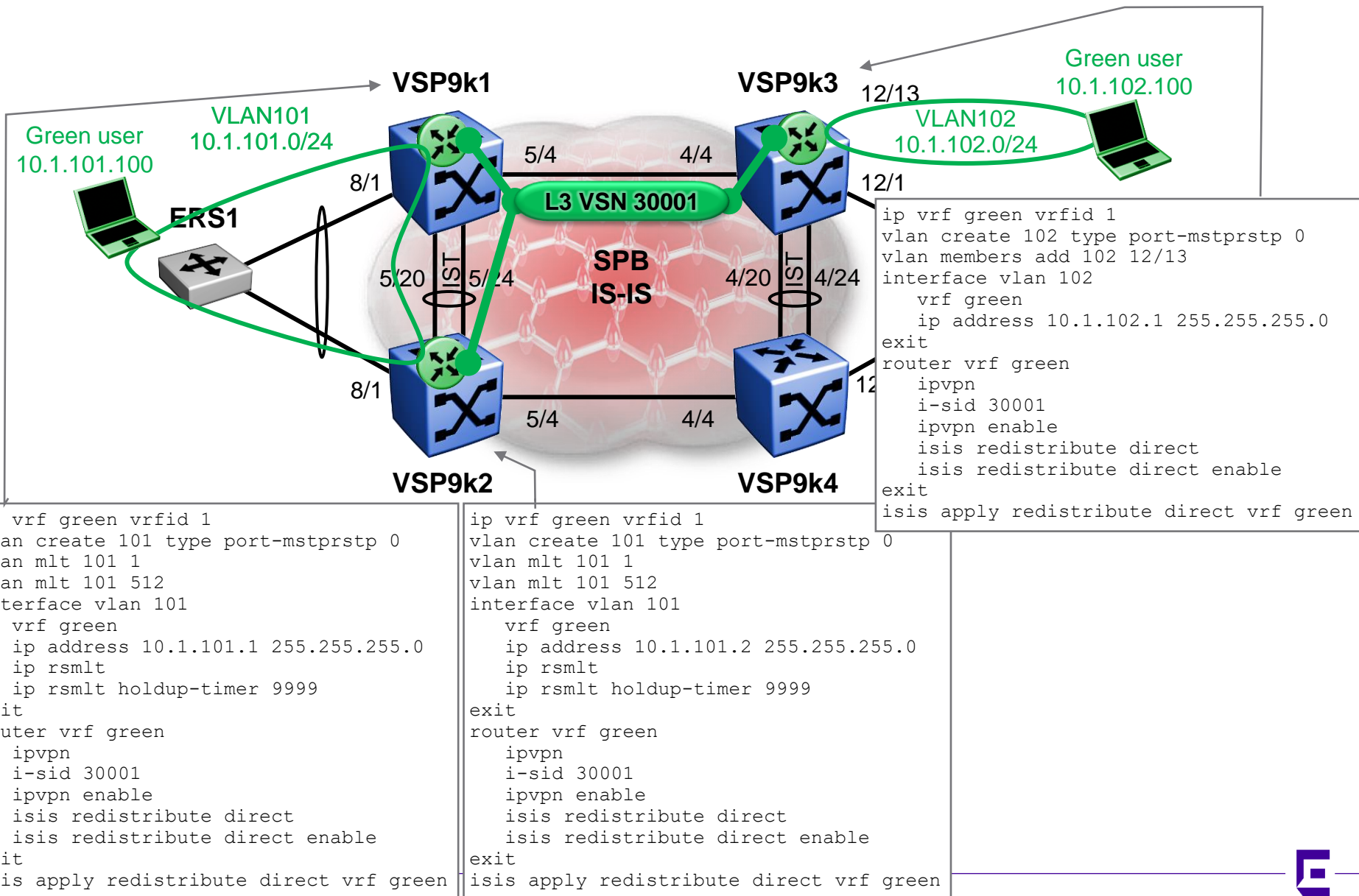
Inter VRF-L3VSN route redistribution

SPB Interface Config



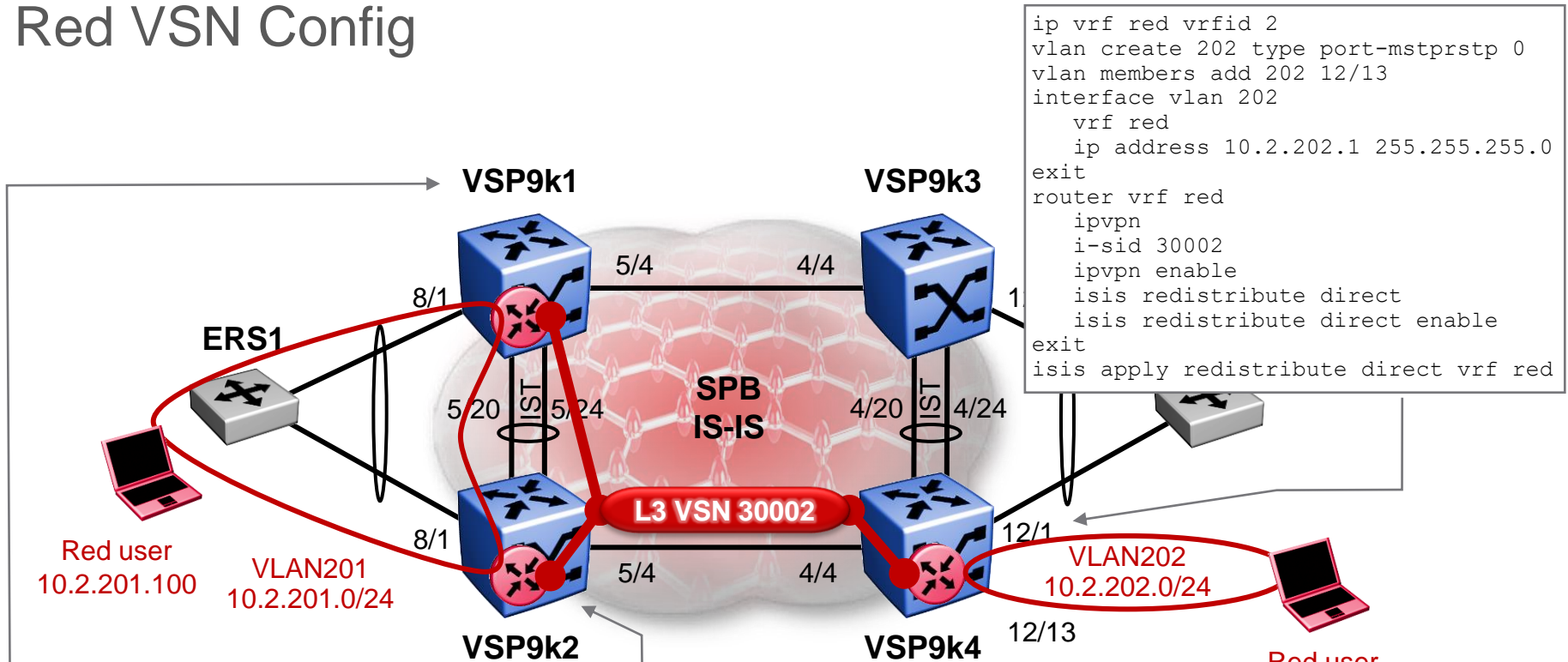
Inter VRF-L3VSN route redistribution

Green VSN Config



Inter VRF-L3VSN route redistribution

Red VSN Config



```

ip vrf red vrfid 2
vlan create 202 type port-mstprstp 0
vlan members add 202 12/13
interface vlan 202
vrf red
ip address 10.2.202.1 255.255.255.0
exit
router vrf red
ipvpn
i-sid 30002
ipvpn enable
isis redistribute direct
isis redistribute direct enable
exit
isis apply redistribute direct vrf red
  
```

```

ip vrf red vrfid 2
vlan create 201 type port-mstprstp 0
vlan mlt 201 1
vlan mlt 201 512
interface vlan 201
vrf red
ip address 10.2.201.1 255.255.255.0
ip rsmlt
ip rsmlt holdup-timer 9999
exit
router vrf red
ipvpn
i-sid 30002
ipvpn enable
isis redistribute direct
isis redistribute direct enable
exit
isis apply redistribute direct vrf red
  
```

```

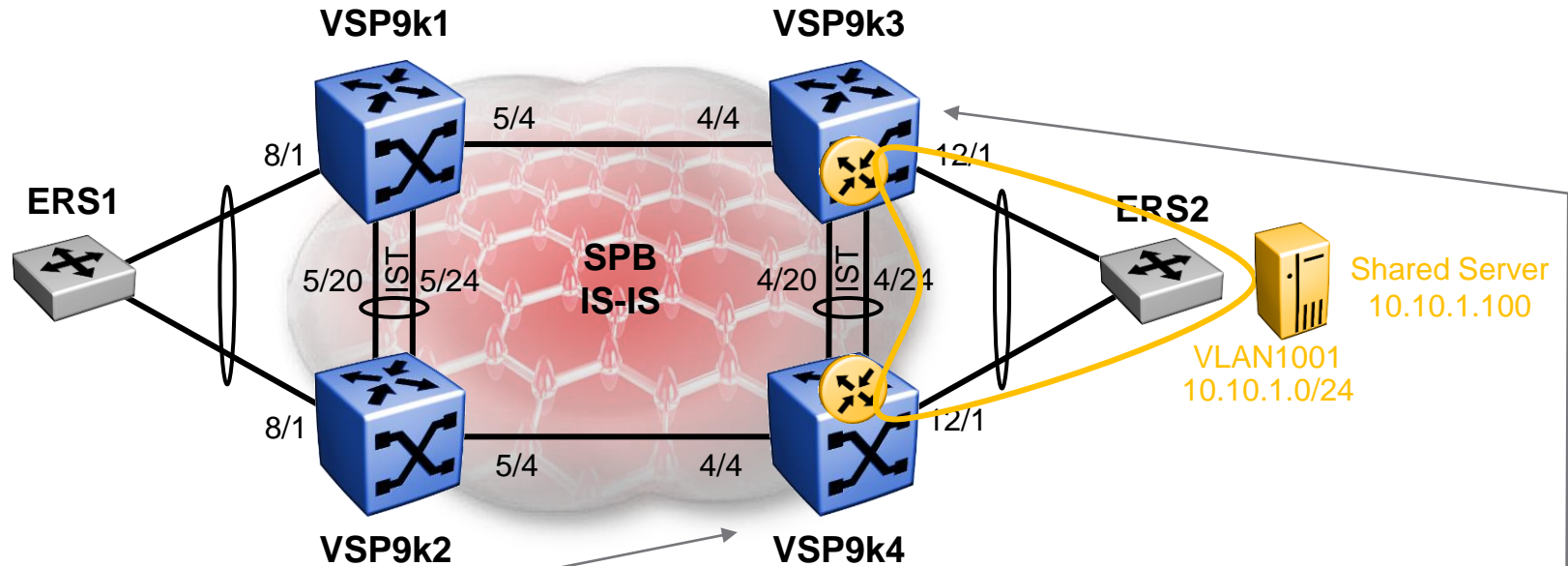
ip vrf red vrfid 2
vlan create 201 type port-mstprstp 0
vlan mlt 201 1
vlan mlt 201 512
interface vlan 201
vrf red
ip address 10.2.201.2 255.255.255.0
ip rsmlt
ip rsmlt holdup-timer 9999
exit
router vrf red
ipvpn
i-sid 30002
ipvpn enable
isis redistribute direct
isis redistribute direct enable
exit
isis apply redistribute direct vrf red
  
```

Red user
10.2.202.100



Inter VRF-L3VSN route redistribution

Server VRF Config

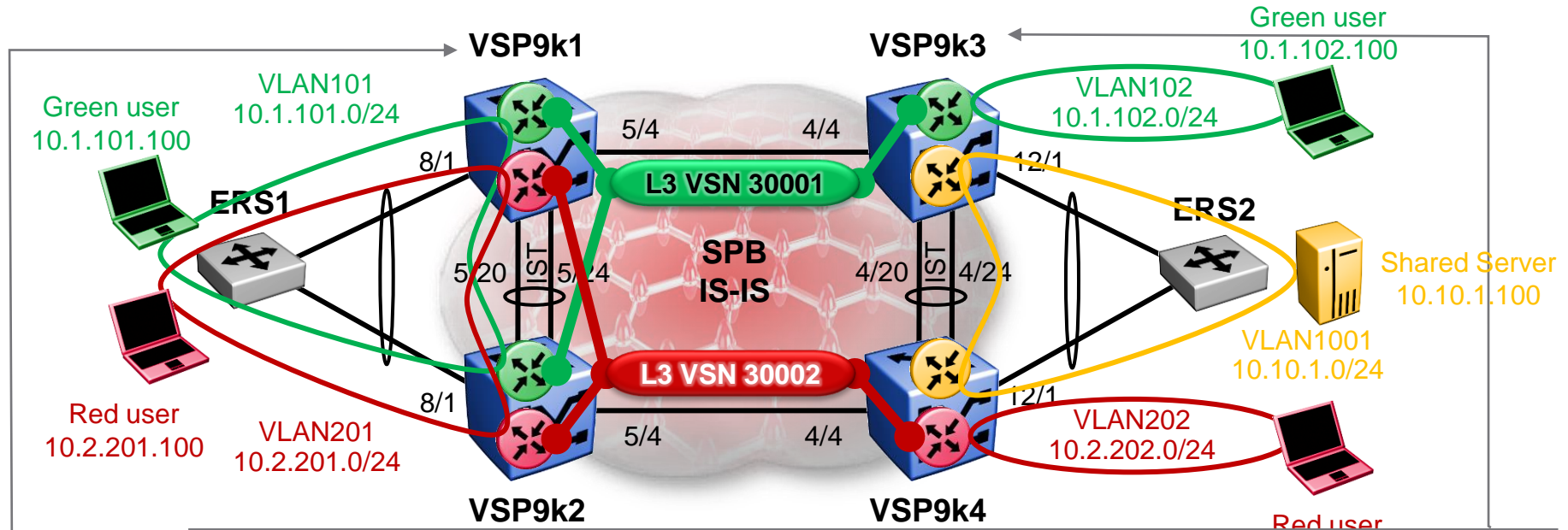


```
ip vrf shared vrfid 10
vlan create 1001 type port-mstprstp 0
vlan mlt 1001 1
vlan mlt 1001 512
interface vlan 1001
  vrf shared
  ip address 10.10.1.2 255.255.255.0
  ip rsmlt
  ip rsmlt holdup-timer 9999
exit
```

```
ip vrf shared vrfid 10
vlan create 1001 type port-mstprstp 0
vlan mlt 1001 1
vlan mlt 1001 512
interface vlan 1001
  vrf shared
  ip address 10.10.1.1 255.255.255.0
  ip rsmlt
  ip rsmlt holdup-timer 9999
exit
```

Inter VRF-L3VSN route redistribution

Checking Green VRF routes



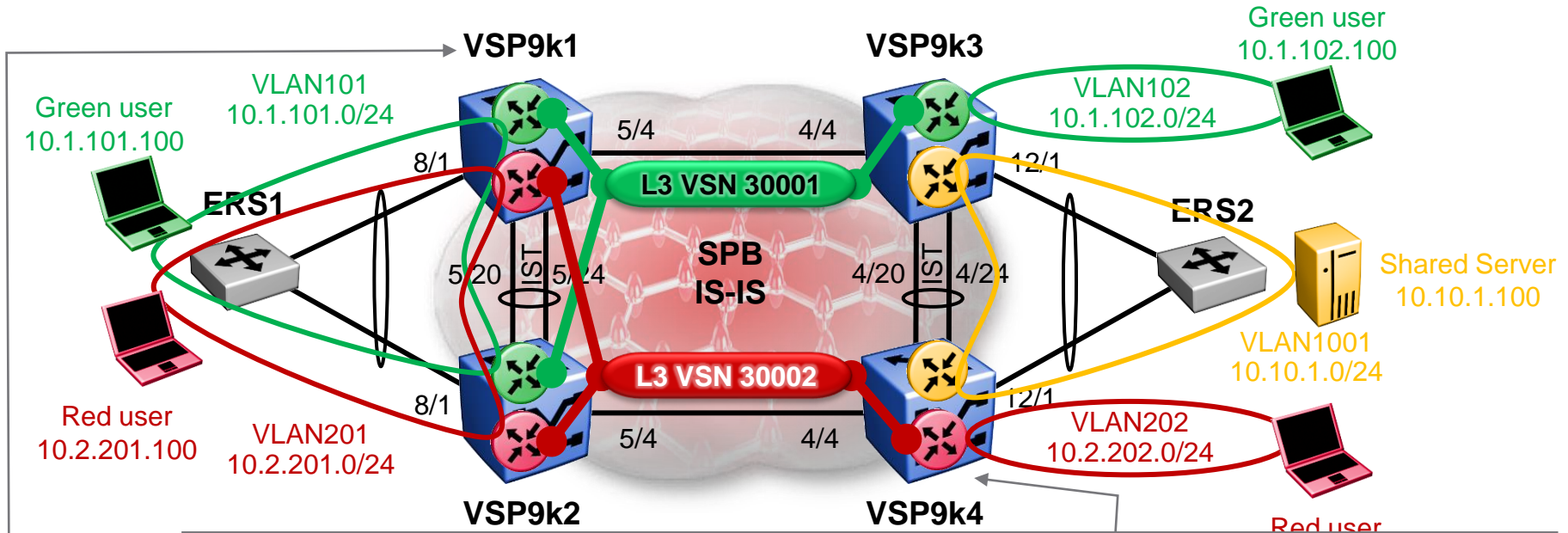
```
VSP9000-3:1#% show ip route vrf green
=====
IP Route - VRF green
=====
DST                MASK                NEXT                NH
                   VRF                VRF                VRF
INTER              COST  FACE  PROT  AGE  TYPE  PRF
-----
10.1.101.0         255.255.255.0      VSP9000-1          green
10.1.102.0         255.255.255.0      10.1.102.1         -
                   10                102            LOC  0    DB    0
```

```
VSP9000-1:1#% show ip route vrf green
=====
IP Route - VRF green
=====
DST                MASK                NEXT                NH
                   VRF                VRF                VRF
INTER              COST  FACE  PROT  AGE  TYPE  PRF
-----
10.1.101.0         255.255.255.0      10.1.101.1         -
10.1.102.0         255.255.255.0      VSP9000-3          green
                   10                4051           ISIS  0    IBSV  7
```



Inter VRF-L3VSN route redistribution

Checking Red VRF routes



```
VSP9000-4:1#% show ip route vrf red
```

```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	VSP9000-2	red	10	4051	ISIS	0	IBSV	7
10.2.202.0	255.255.255.0	10.2.202.1	-	1	202	LOC	0	DB	0

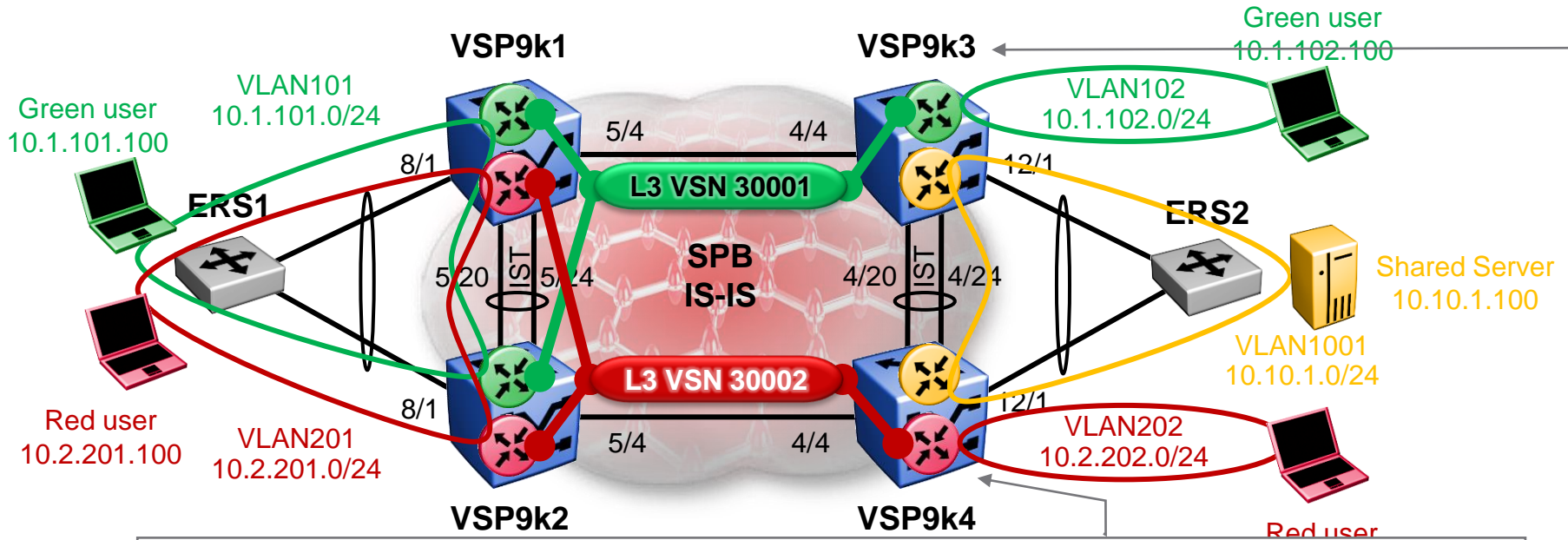
```
VSP9000-1:1#% show ip route vrf red
```

```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	10.2.201.1	-	1	201	LOC	0	DB	0
10.2.202.0	255.255.255.0	VSP9000-4	red	20	4051	ISIS	0	IBSV	7

Inter VRF-L3VSN route redistribution

Checking Shared VRF routes



```
VSP9000-4:1#% show ip route vrf shared
```

IP Route - **VRF shared**

DST	MASK	NEXT	NH VRF	INTER COST FACE	PROT	AGE	TYPE	PRF
10.10.1.0	255.255.255.0	10.10.1.2	-	1 1001	LOC	0	DB	0

```
VSP9000-3:1#% show ip route vrf shared
```

IP Route - **VRF shared**

DST	MASK	NEXT	NH VRF	INTER COST FACE	PROT	AGE	TYPE	PRF
10.10.1.0	255.255.255.0	10.10.1.1	-	1 1001	LOC	0	DB	0

Inter VRF-L3VSN route redistribution

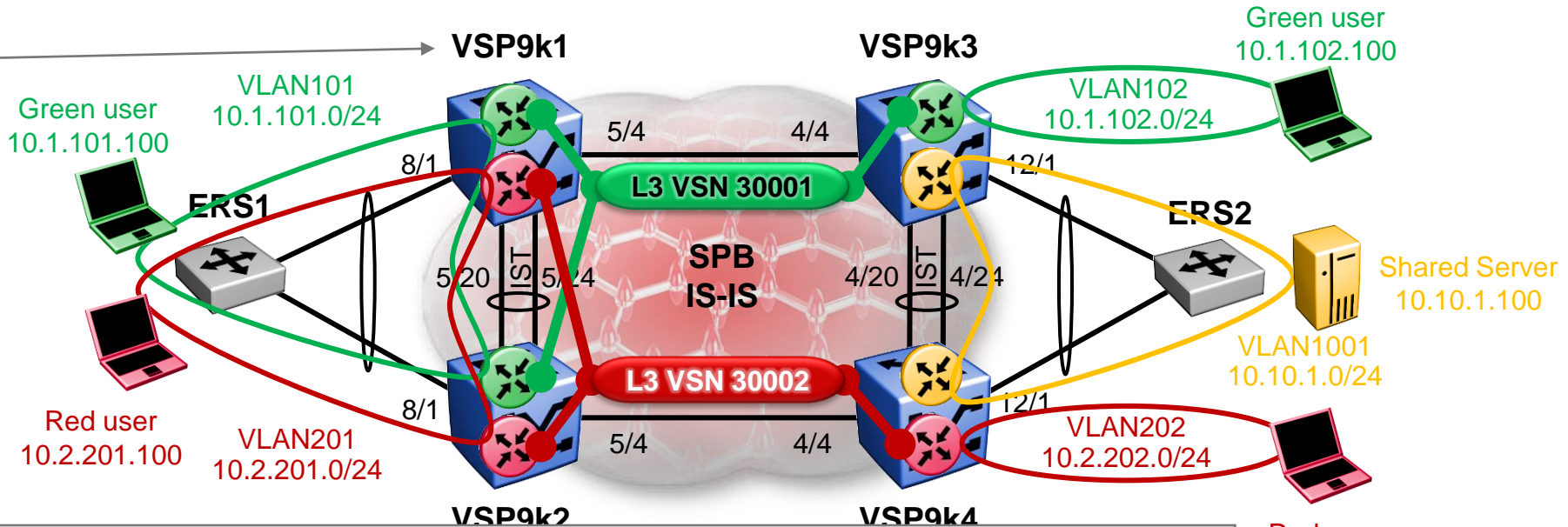
Checkpoint

- The VSNs (L3VSN / VRFs) have been created
- We have not configured any IP route redistribution between the L3VSNs yet
 - In the preceding slides we can see that only the IP routes within the same L3VSN I-SID are learnt
- So right now only users within the same L3VSN can communicate
- Next step is to redistribute the shared VRF IP routes into both the Green and Red VSNs



Inter VRF-L3VSN route redistribution

Checking available ISIS IP routes



```
VSP9000-1:1# show isis lsdb ip-unicast
```

ISIS IP-UNICAST-ROUTE SUMMARY

I-SID	ADDRESS	PREFIX LENGTH	METRIC	TLV TYPE	LSP FRAG	HOST NAME
-	10.0.0.91	32	1	135	0x2	VSP9000-1
30001	10.1.101.0	24	1	184	0x3	VSP9000-1
30002	10.2.201.0	24	1	184	0x3	VSP9000-1
-	10.0.0.92	32	1	135	0x2	VSP9000-2
30001	10.1.101.0	24	1	184	0x3	VSP9000-2
30002	10.2.201.0	24	1	184	0x3	VSP9000-2
-	10.0.0.93	32	1	135	0x2	VSP9000-3
30001	10.1.102.0	24	1	184	0x3	VSP9000-3
-	10.0.0.94	32	1	135	0x2	VSP9000-4
30002	10.2.202.0	24	1	184	0x3	VSP9000-4

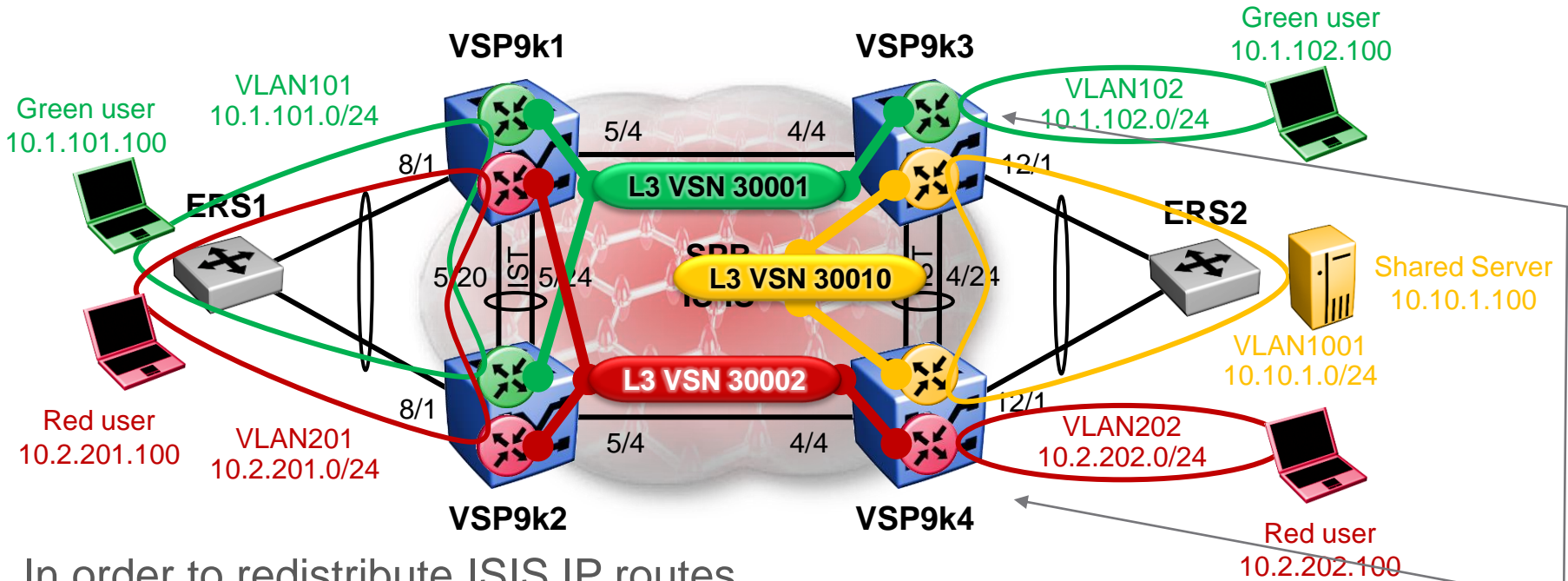
Red user
10.2.202.100

This new command in 4.0.0.0 shows all the available IP routes contained in the ISIS LSDB. Note that we are missing the shared VRF IP route.



Inter VRF-L3VSN route redistribution

Redist Shared VSN routes into Green & Red



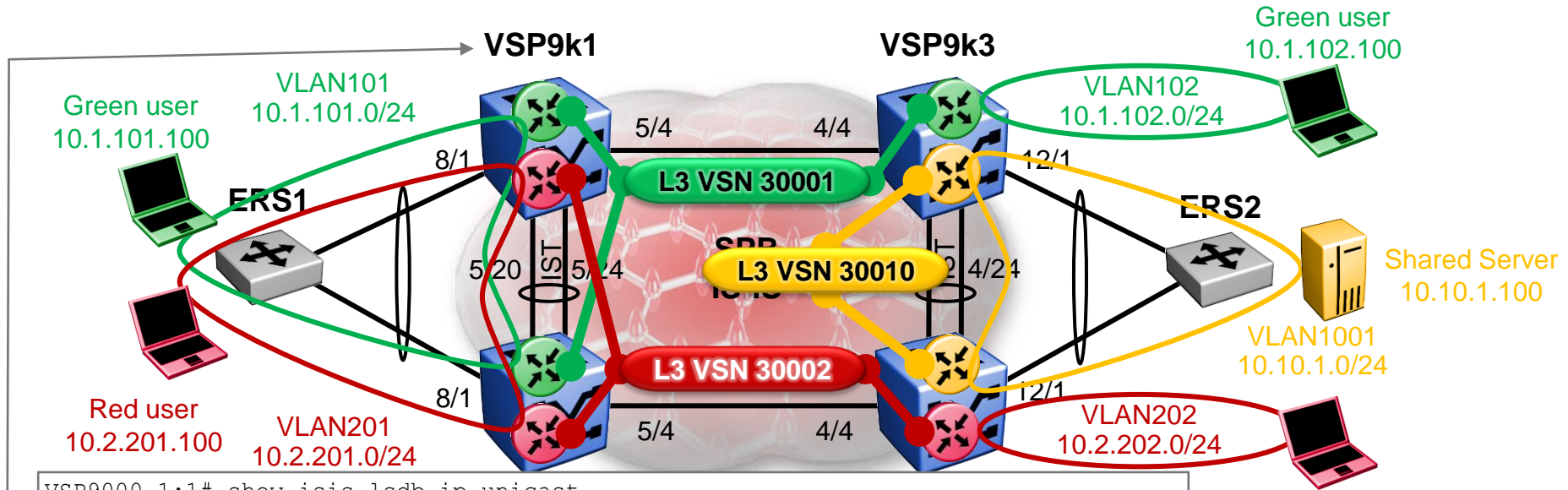
- In order to redistribute ISIS IP routes into a VRF we need those routes to be advertised in ISIS against a L3VSN I-SID
- So, even though the Shared VRF does not need to be L3VSN extended across the Fabric here, we will need to create a L3VSN for it anyway

```

router vrf shared
  ipvpn
  i-sid 30010
  ipvpn enable
  isis redistribute direct
  isis redistribute direct enable
exit
isis apply redistribute direct vrf shared
  
```

Inter VRF-L3VSN route redistribution

Checking available ISIS IP routes again



```
VSP9000-1:1# show isis lsdb ip-unicast
```

ISIS IP-UNICAST-ROUTE SUMMARY

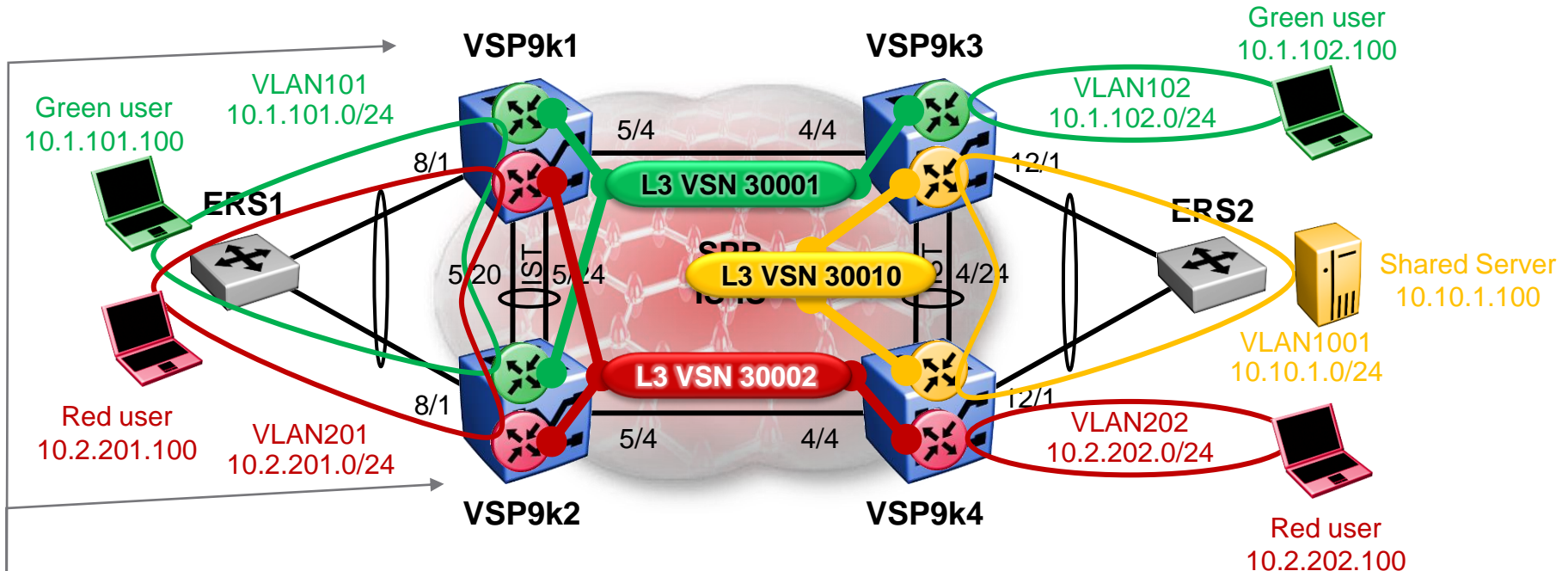
I-SID	ADDRESS	PREFIX LENGTH	METRIC	TLV TYPE	LSP FRAG	HOST NAME
-	10.0.0.91	32	1	135	0x2	VSP9000-1
30001	10.1.101.0	24	1	184	0x3	VSP9000-1
30002	10.2.201.0	24	1	184	0x3	VSP9000-1
-	10.0.0.92	32	1	135	0x2	VSP9000-2
30001	10.1.101.0	24	1	184	0x3	VSP9000-2
30002	10.2.201.0	24	1	184	0x3	VSP9000-2
-	10.0.0.93	32	1	135	0x2	VSP9000-3
30001	10.1.102.0	24	1	184	0x3	VSP9000-3
30010	10.10.1.0	24	1	184	0x3	VSP9000-3
-	10.0.0.94	32	1	135	0x2	VSP9000-4
30002	10.2.202.0	24	1	184	0x3	VSP9000-4
30010	10.10.1.0	24	1	184	0x3	VSP9000-4

Red user
10.2.202.100

- Now we also see the shared VRF IP route

Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



```

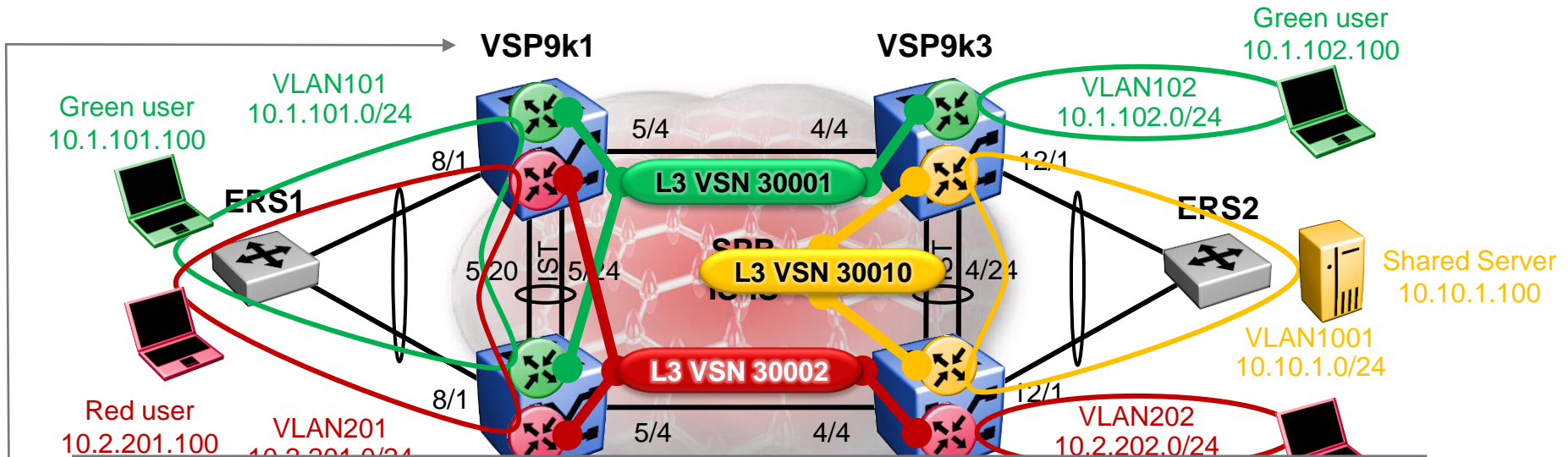
router vrf green
  isis accept i-sid 30010 enable
exit
isis apply accept vrf green

router vrf red
  isis accept i-sid 30010 enable
exit
isis apply accept vrf red
  
```

- New ISIS Accept policies in Rel 4.0
- Here accepting all IP routes with I-SID 30010

Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



```
VSP9000-1:1#% show ip route vrf green
```

```
IP Route - VRF green
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.1	-	1	101	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-3	green	10	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200

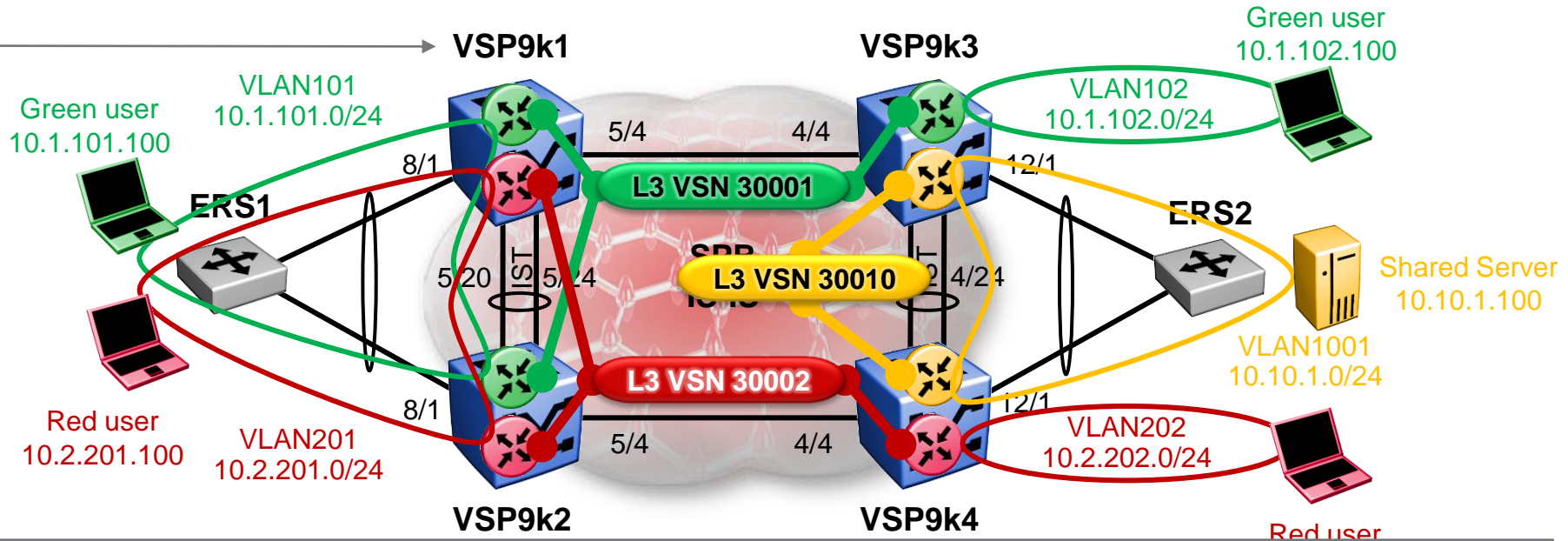
```
VSP9000-1:1#% show ip route vrf red
```

```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	10.2.201.1	-	1	201	LOC	0	DB	0
10.2.202.0	255.255.255.0	VSP9000-4	red	20	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200

Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



```
VSP9000-1:1#% show isis spbm ip-unicast-fib id 30001
```

SPBM IP-UNICAST FIB ENTRY INFO

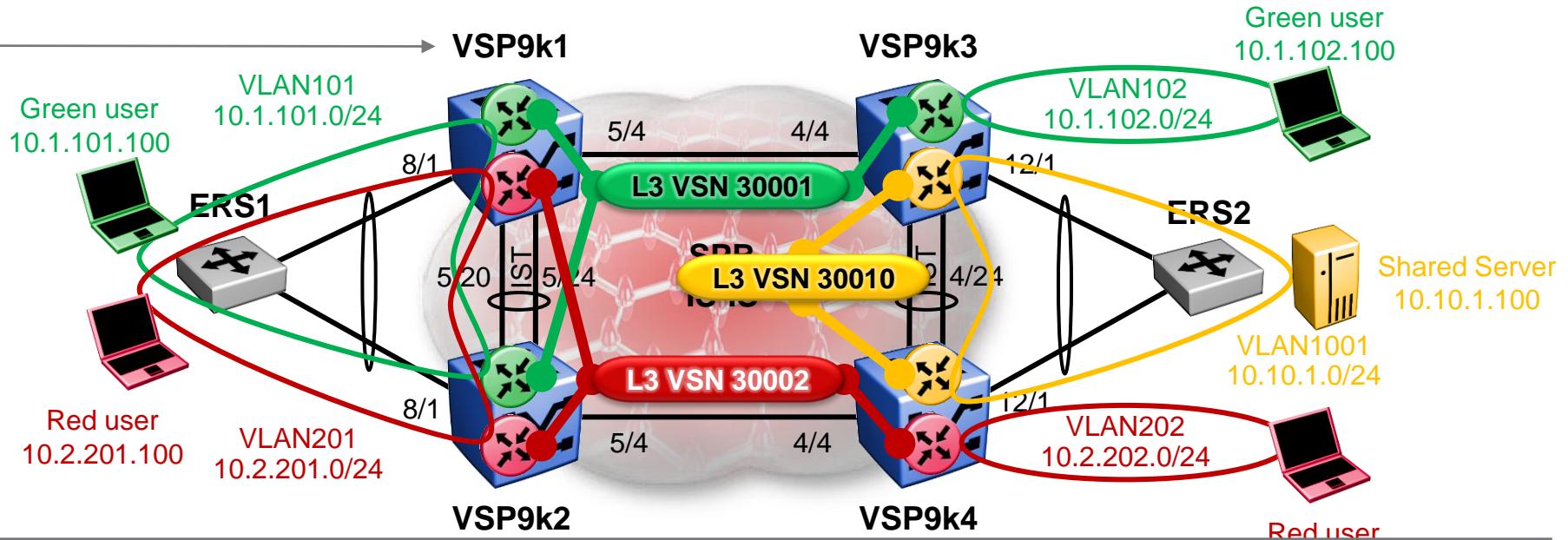
VRF	VRF ISID	DEST ISID	Destination	NH BEB	OUTGOING VLAN	SPBM INTERFACE	SPBM COST	PREFIX COST	IP ROUTE PREFERENCE
green	30001	30001	10.1.101.0/24	VSP9000-2	4051	IST	10	1	7
green	30001	30001	10.1.101.0/24	VSP9000-2	4052	IST	10	1	7
green	30001	30001	10.1.102.0/24	VSP9000-3	4051	5/4	10	1	7
green	30001	30001	10.1.102.0/24	VSP9000-3	4052	5/4	10	1	7
green	30001	30010	10.10.1.0/24	VSP9000-3	4051	5/4	10	1	200
green	30001	30010	10.10.1.0/24	VSP9000-3	4052	5/4	10	1	200
green	30001	30010	10.10.1.0/24	VSP9000-4	4051	IST	20	1	200
green	30001	30010	10.10.1.0/24	VSP9000-4	4052	5/4	20	1	200

- Lowest Pref, and lowest cost route was installed; Note pref=200 for inter I-SID



Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



```
VSP9000-1:1#% show isis spbm ip-unicast-fib id 30002
```

SPBM IP-UNICAST FIB ENTRY INFO

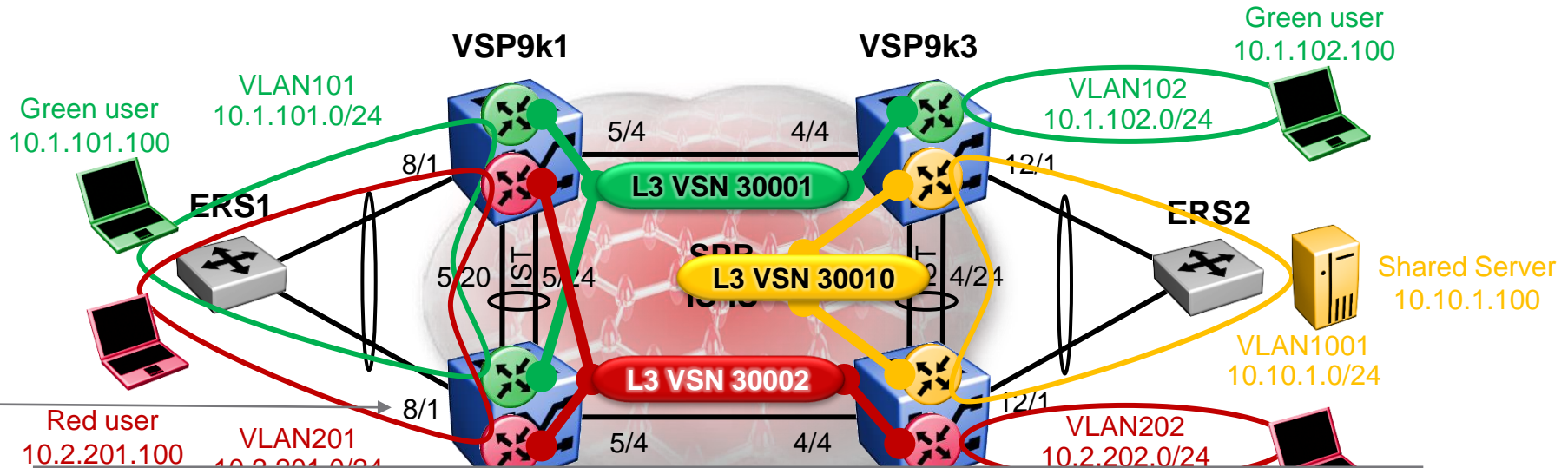
VRF	VRF ISID	DEST ISID	Destination	NH BEB	OUTGOING VLAN	SPBM INTERFACE	SPBM COST	PREFIX COST	IP ROUTE PREFERENCE
red	30002	30002	10.2.201.0/24	VSP9000-2	4051	IST	10	1	7
red	30002	30002	10.2.201.0/24	VSP9000-2	4052	IST	10	1	7
red	30002	30002	10.2.202.0/24	VSP9000-4	4051	IST	20	1	7
red	30002	30002	10.2.202.0/24	VSP9000-4	4052	5/4	20	1	7
red	30002	30010	10.10.1.0/24	VSP9000-3	4051	5/4	10	1	200
red	30002	30010	10.10.1.0/24	VSP9000-3	4052	5/4	10	1	200
red	30002	30010	10.10.1.0/24	VSP9000-4	4051	IST	20	1	200
red	30002	30010	10.10.1.0/24	VSP9000-4	4052	5/4	20	1	200

- Lowest Pref, and lowest cost route was installed; Note pref=200 for inter I-SID



Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



```
VSP9000-2:1#% show ip route vrf green
```

```
IP Route - VRF green
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.2	-	1	101	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-3	green	20	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-4	30010	10	4051	ISIS	0	IBSV	200

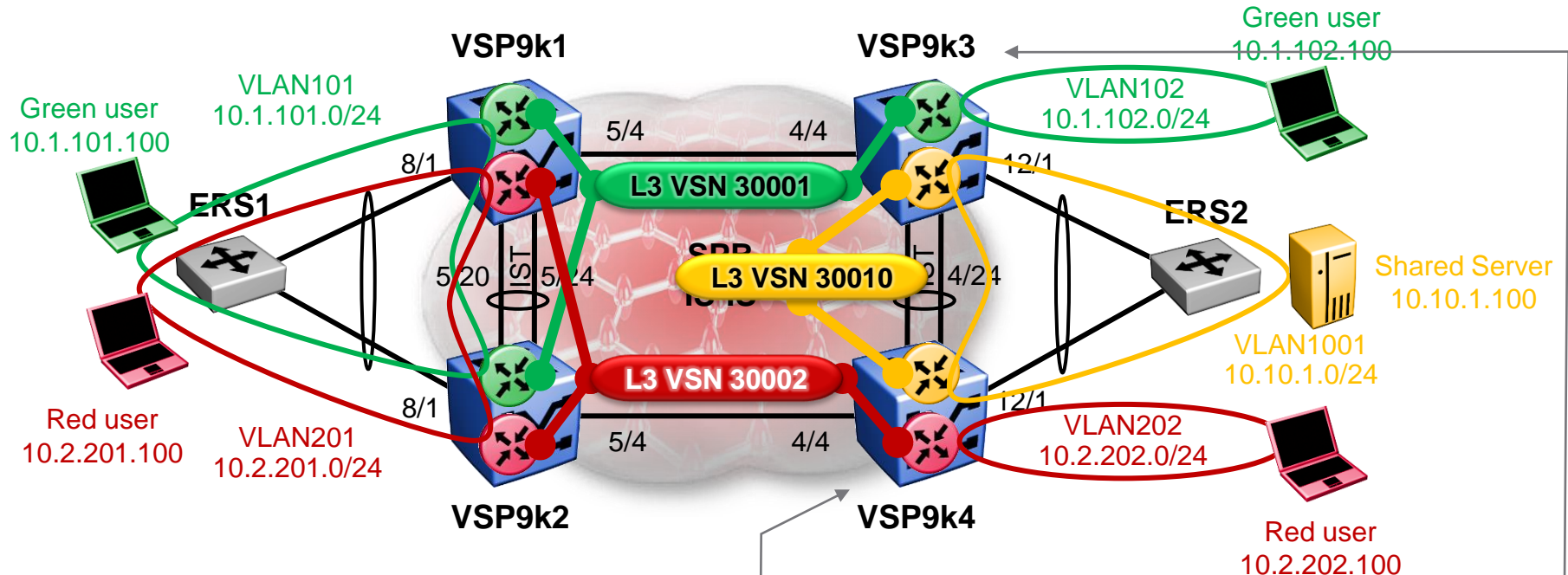
```
VSP9000-2:1#% show ip route vrf red
```

```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	10.2.201.2	-	1	201	LOC	0	DB	0
10.2.202.0	255.255.255.0	VSP9000-4	red	10	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-4	30010	10	4051	ISIS	0	IBSV	200

Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



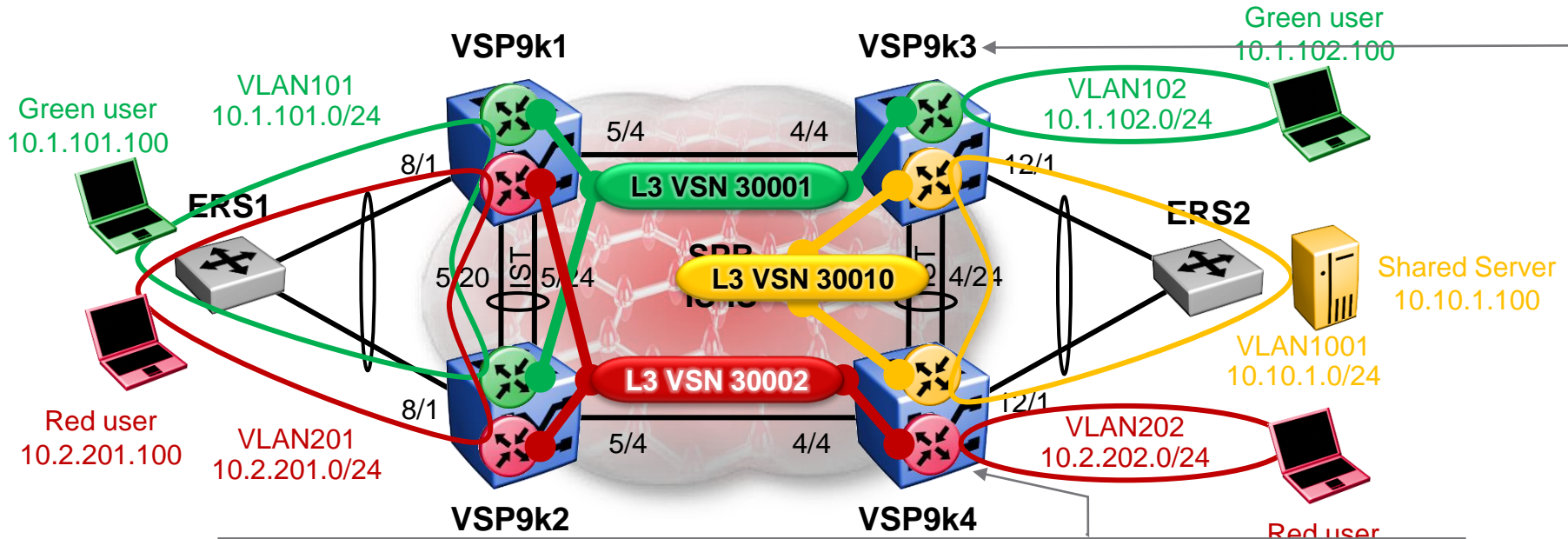
- New ISIS Accept policies in Rel 4.0
- Note that on these BEBs we are effectively going to achieve IP route redistribution between the local VRFs

```
router vrf green
  isis accept i-sid 30010 enable
exit
isis apply accept vrf green
```

```
router vrf red
  isis accept i-sid 30010 enable
exit
isis apply accept vrf red
```


Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



```
VSP9000-4:1#% show ip route vrf red
```

```
=====
```

```
IP Route - VRF red
```

```
=====
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	VSP9000-2	red	10 4051	ISIS	0	IBSV	7
10.2.202.0	255.255.255.0	10.2.202.1	-	1 202	LOC	0	DB	0
10.10.1.0	255.255.255.0	10.10.1.2	shared	0 1001	ISIS	0	IB	200

```
VSP9000-3:1#% show ip route vrf green
```

```
=====
```

```
IP Route - VRF green
```

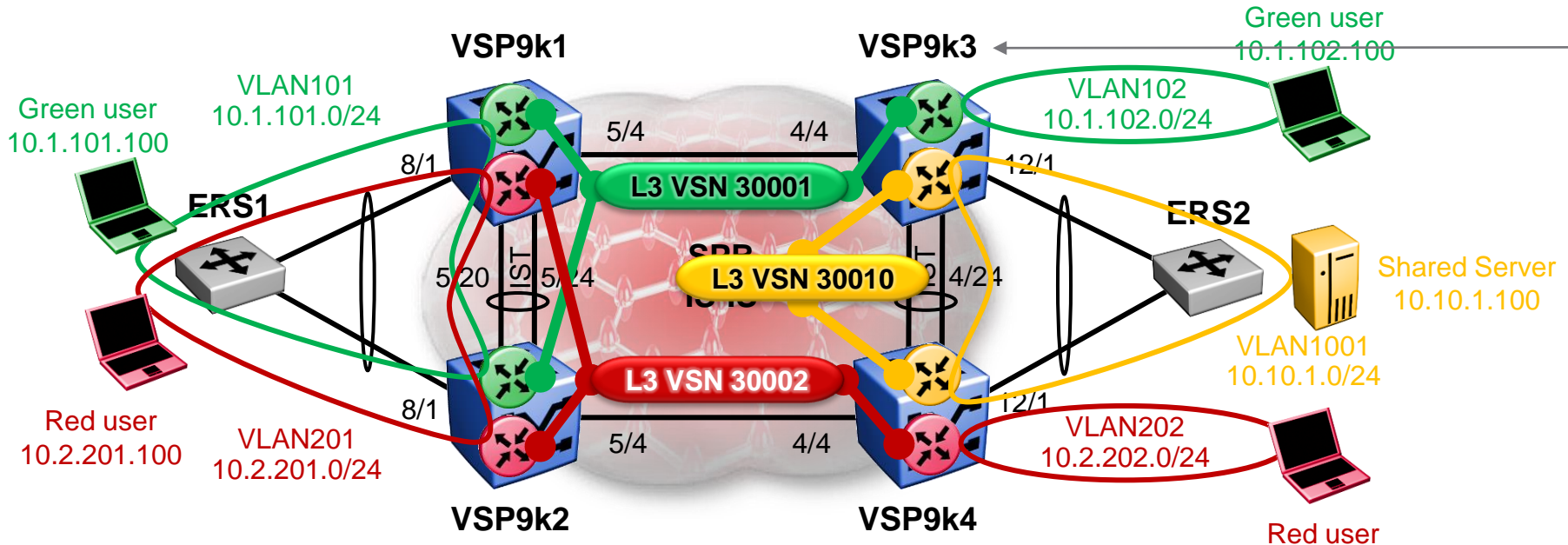
```
=====
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-1	green	10 4051	ISIS	0	IBSV	7
10.1.102.0	255.255.255.0	10.1.102.1	-	1 102	LOC	0	DB	0
10.10.1.0	255.255.255.0	10.10.1.1	shared	0 1001	ISIS	0	IB	200



Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



```
VSP9000-3:1#% show isis spbm ip-unicast-fib id 30001
```

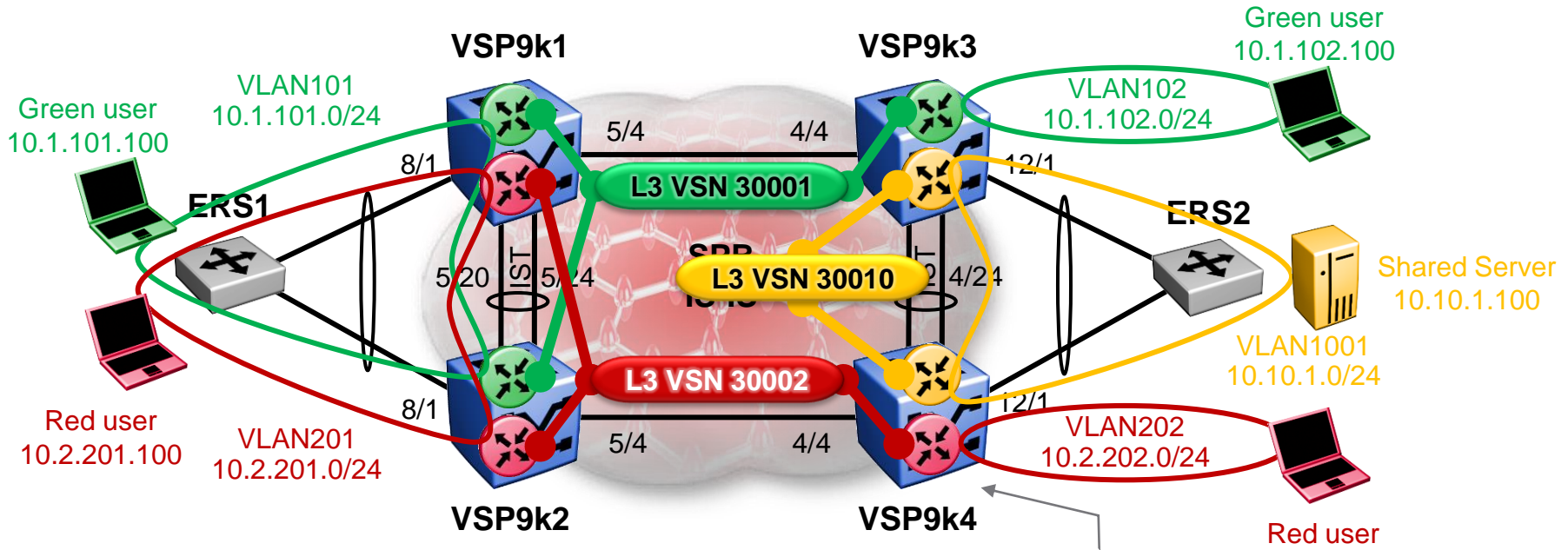
SPBM IP-UNICAST FIB ENTRY INFO

VRF	VRF ISID	DEST ISID	Destination	NH BEB	OUTGOING VLAN	SPBM INTERFACE	SPBM COST	PREFIX COST	IP ROUTE PREFERENCE
green	30001	30001	10.1.101.0/24	VSP9000-1	4051	4/4	10	1	7
green	30001	30001	10.1.101.0/24	VSP9000-1	4052	4/4	10	1	7
green	30001	30001	10.1.101.0/24	VSP9000-2	4051	4/4	20	1	7
green	30001	30001	10.1.101.0/24	VSP9000-2	4052	IST	20	1	7
green	30001	30010	10.10.1.0/24	VSP9000-3	1001	Local	0	1	200
green	30001	30010	10.10.1.0/24	VSP9000-4	4051	IST	10	1	200
green	30001	30010	10.10.1.0/24	VSP9000-4	4052	IST	10	1	200

- Lowest Pref, and lowest cost route was installed; Note Local route has cost=0

Inter VRF-L3VSN route redistribution

Accept Shared VSN routes into Green & Red VSNs



```
VSP9000-4:1#% show isis spbm ip-unicast-fib id 30002
```

SPBM IP-UNICAST FIB ENTRY INFO

VRF	VRF ISID	DEST ISID	Destination	NH BEB	OUTGOING VLAN	INTERFACE	SPBM COST	PREFIX COST	IP ROUTE PREFERENCE
red	30002	30002	10.2.201.0/24	VSP9000-1	4051	4/4	20	1	7
red	30002	30002	10.2.201.0/24	VSP9000-1	4052	IST	20	1	7
red	30002	30002	10.2.201.0/24	VSP9000-2	4051	4/4	10	1	7
red	30002	30002	10.2.201.0/24	VSP9000-2	4052	4/4	10	1	7
red	30002	30010	10.10.1.0/24	VSP9000-3	4051	IST	10	1	200
red	30002	30010	10.10.1.0/24	VSP9000-3	4052	IST	10	1	200
red	30002	30010	10.10.1.0/24	VSP9000-4	1001	Local	0	1	200

- Lowest Pref, and lowest cost route was installed; Note Local route has cost=0

Inter VRF-L3VSN route redistribution

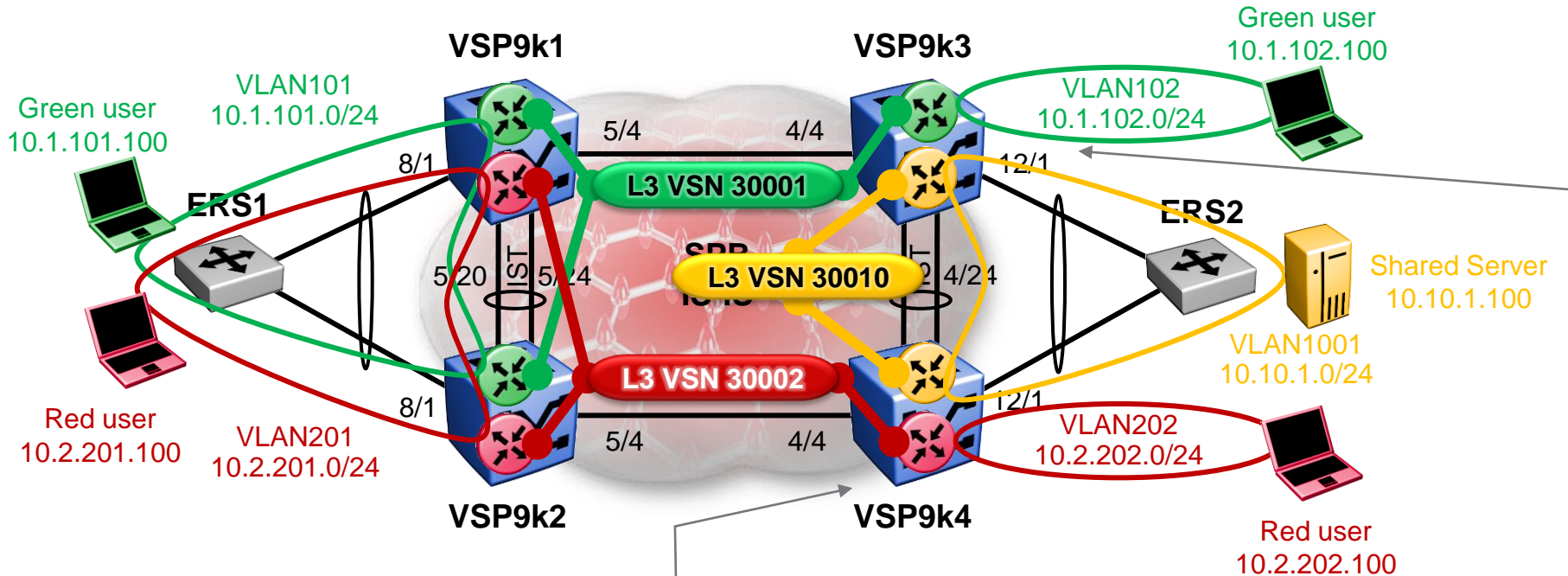
Checkpoint

- We have now succeeded in redistribution the Shared VRF IP route into both the Green and Red VSNs
- However the Green and Red users are still not able to communicate with the Shared Server because the Shared VRF does not have a return IP route towards the Green and Red users
 - Yes packets from Green & Red Users now reach the Shared Server
 - But the Shared Server's replies will get dropped in the Shared VRF due to no IP route to destination
- We therefore need to also redistribute the Green and Red IP subnets into the Shared VRFs



Inter VRF-L3VSN route redistribution

Accept Green & Red VSN routes into Shared VRF

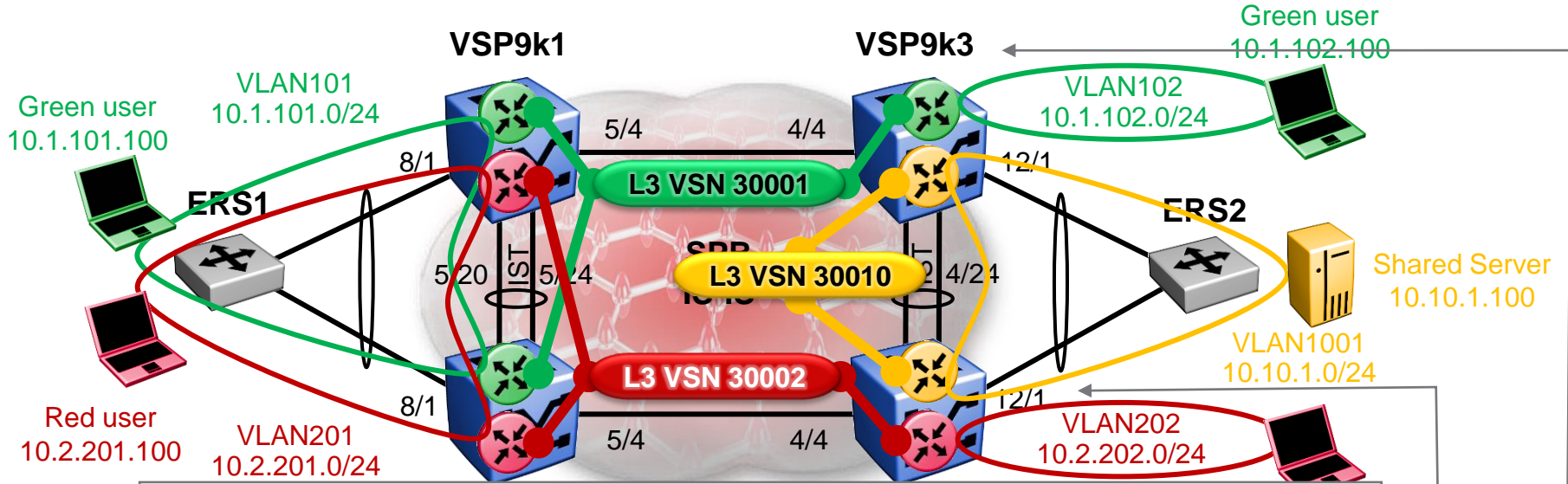


```
router vrf shared
  ip isid-list users list 30001,30002
  isis accept isid-list users enable
exit
isis apply accept vrf shared
```

- New ISIS Accept policies in Rel 4.0
- Note that this time we are using an ISID-List as this is an easier way to accept IP routes from 2 or more L3 I-SIDs

Inter VRF-L3VSN route redistribution

Accept Green & Red VSN routes into Shared VRF



```
VSP9000-4:1#% show ip route vrf shared
```

```
IP Route - VRF shared
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-2	30001	10	4051	ISIS	0	IBSV	200
10.1.102.0	255.255.255.0	VSP9000-3	30001	10	4051	ISIS	0	IBSV	200
10.2.201.0	255.255.255.0	VSP9000-2	red	10	4051	ISIS	0	IBSV	200
10.2.202.0	255.255.255.0	10.2.202.1	red	0	202	ISIS	0	IB	200
10.10.1.0	255.255.255.0	10.10.1.2	-	1	1001	LOC	0	DB	0

```
VSP9000-3:1#%
```

```
IP Route - VRF shared
```

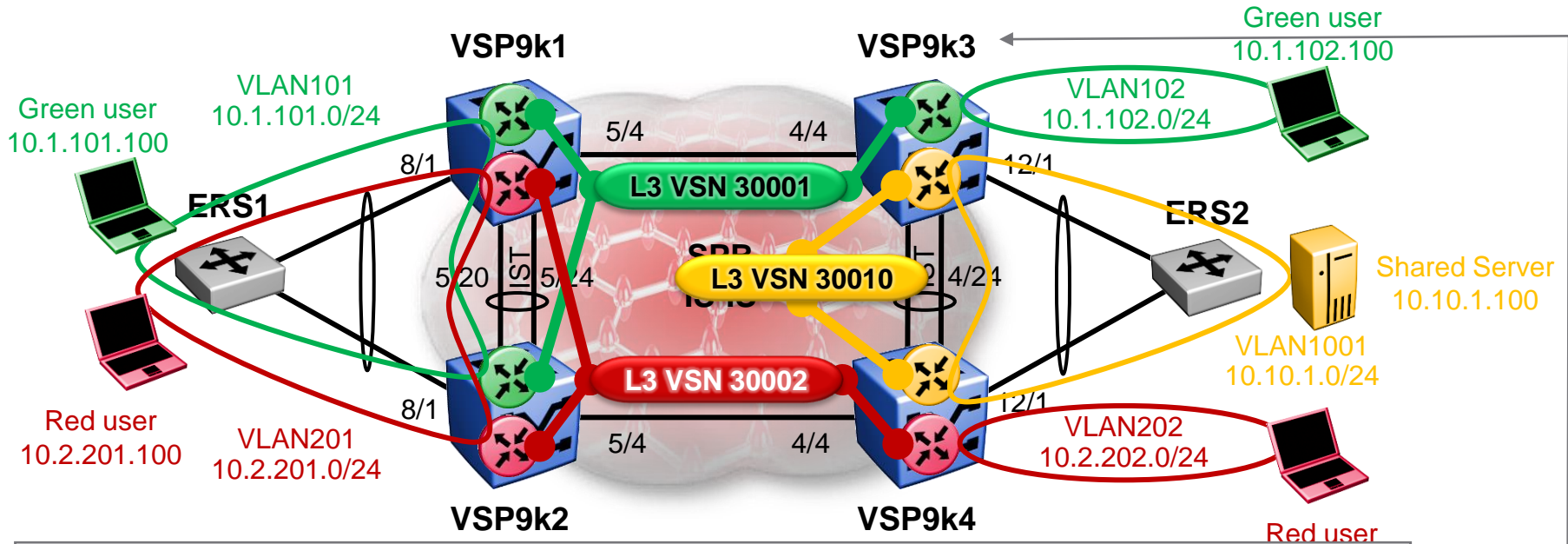
DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-1	green	10	4051	ISIS	0	IBSV	200
10.1.102.0	255.255.255.0	10.1.102.1	green	0	102	ISIS	0	IB	200
10.2.201.0	255.255.255.0	VSP9000-1	30002	10	4051	ISIS	0	IBSV	200
10.2.202.0	255.255.255.0	VSP9000-4	30002	10	4051	ISIS	0	IBSV	200
10.10.1.0	255.255.255.0	10.10.1.1	-	1	1001	LOC	0	DB	0

Note how NH VRF/ISID only resolves to VRF name if we have that VRF locally configured



Inter VRF-L3VSN route redistribution

Accept Green & Red VSN routes into Shared VRF



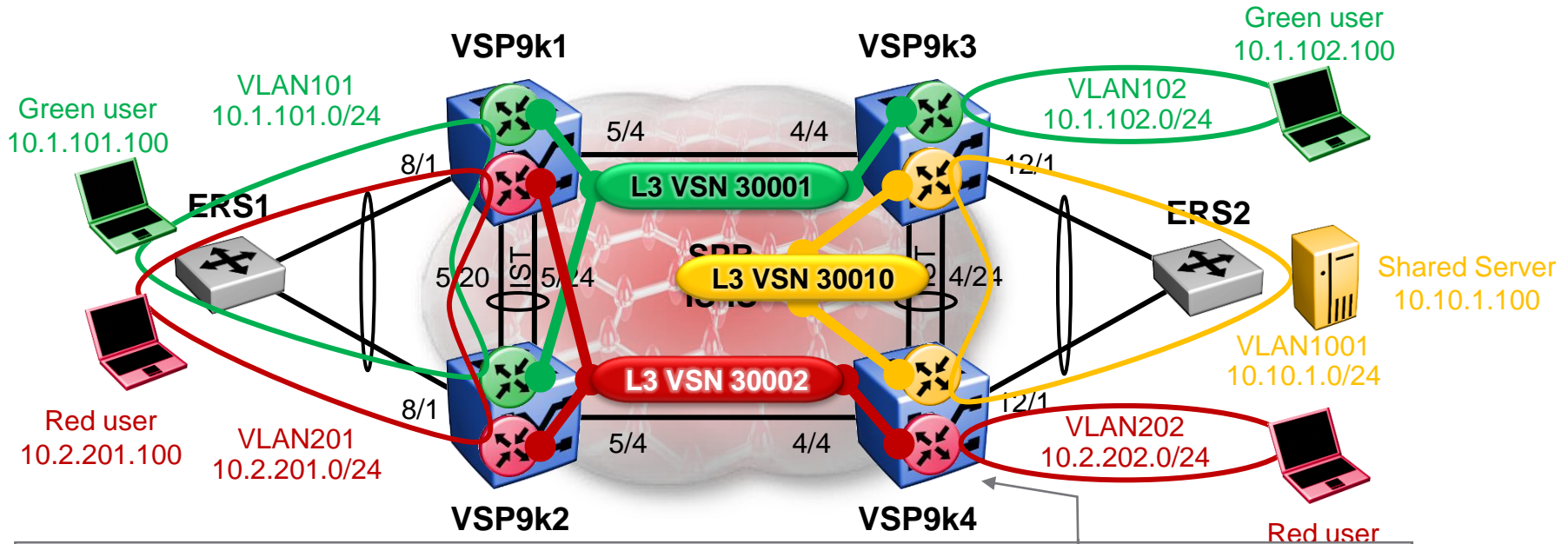
```
VSP9000-3:1#% show isis spbm ip-unicast-fib id 30010
```

SPBM IP-UNICAST FIB ENTRY INFO

VRF	VRF ISID	DEST ISID	Destination	NH BEB	OUTGOING VLAN	INTERFACE	SPBM COST	PREFIX COST	IP ROUTE PREFERENCE
shared	30010	30001	10.1.101.0/24	VSP9000-1	4051	4/4	10	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-1	4052	4/4	10	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-2	4051	4/4	20	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-2	4052	IST	20	1	200
shared	30010	30001	10.1.102.0/24	VSP9000-3	102	Local	0	1	200
shared	30010	30002	10.2.201.0/24	VSP9000-1	4051	4/4	10	1	200
shared	30010	30002	10.2.201.0/24	VSP9000-1	4052	4/4	10	1	200
shared	30010	30002	10.2.201.0/24	VSP9000-2	4051	4/4	20	1	200
shared	30010	30002	10.2.201.0/24	VSP9000-2	4052	IST	20	1	200
shared	30010	30002	10.2.202.0/24	VSP9000-4	4051	IST	10	1	200
shared	30010	30002	10.2.202.0/24	VSP9000-4	4052	IST	10	1	200
shared	30010	30010	10.10.1.0/24	VSP9000-4	4051	IST	10	1	7
shared	30010	30010	10.10.1.0/24	VSP9000-4	4052	IST	10	1	7

Inter VRF-L3VSN route redistribution

Accept Green & Red VSN routes into Shared VRF



```
VSP9000-4:1#% show isis spbm ip-unicast-fib id 30010
```

SPBM IP-UNICAST FIB ENTRY INFO

VRF	VRF ISID	DEST ISID	Destination	NH BEB	OUTGOING VLAN	INTERFACE	SPBM COST	PREFIX COST	IP ROUTE PREFERENCE
shared	30010	30001	10.1.101.0/24	VSP9000-1	4051	4/4	20	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-1	4052	IST	20	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-2	4051	4/4	10	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-2	4052	4/4	10	1	200
shared	30010	30001	10.1.102.0/24	VSP9000-3	4051	IST	10	1	200
shared	30010	30001	10.1.102.0/24	VSP9000-3	4052	IST	10	1	200
shared	30010	30002	10.2.201.0/24	VSP9000-1	4051	4/4	20	1	200
shared	30010	30002	10.2.201.0/24	VSP9000-1	4052	IST	20	1	200
shared	30010	30002	10.2.201.0/24	VSP9000-2	4051	4/4	10	1	200
shared	30010	30002	10.2.201.0/24	VSP9000-2	4052	4/4	10	1	200
shared	30010	30002	10.2.202.0/24	VSP9000-4	202	Local	0	1	200
shared	30010	30010	10.10.1.0/24	VSP9000-3	4051	IST	10	1	7
shared	30010	30010	10.10.1.0/24	VSP9000-3	4052	IST	10	1	7

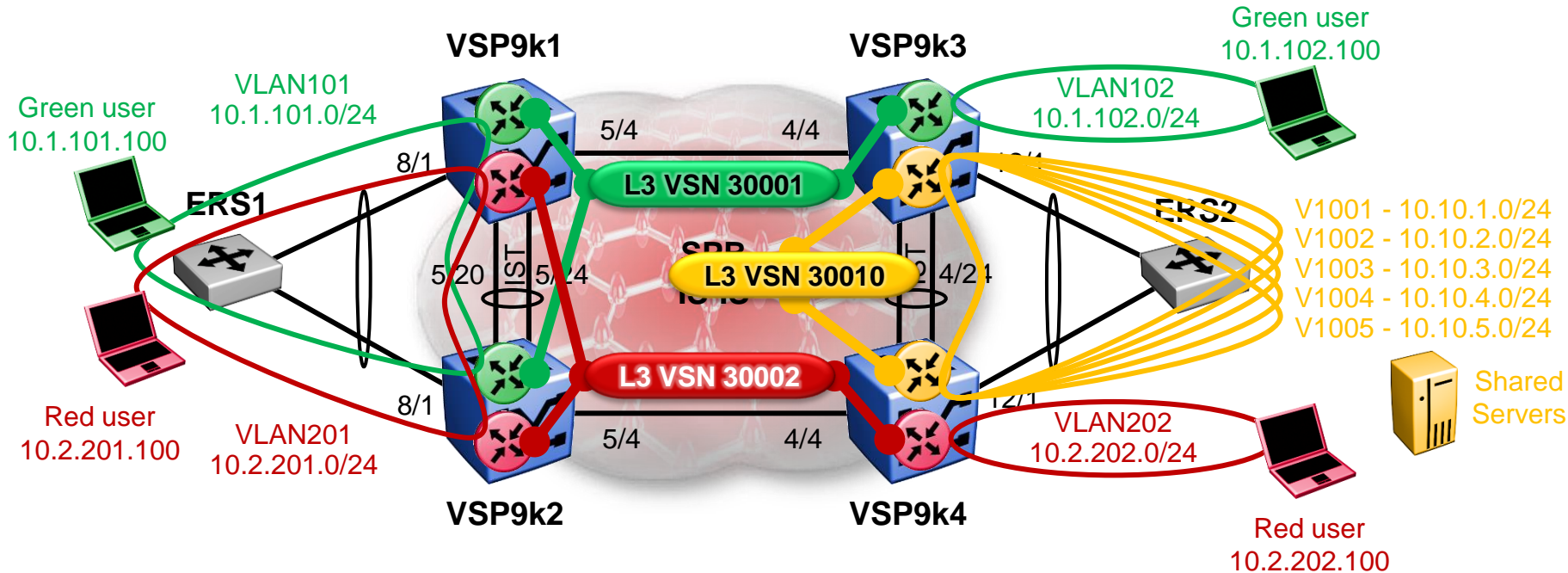
Inter VRF-L3VSN route redistribution

Checkpoint

- We have now succeeded in redistribution the Shared VRF IP route into both the Green and Red VSNs
- And we have redistributed all the Green & Red user subnets into the Shared VRF
- So Green & Red users can now communicate with the Shared Server
- But can Green & Red users talk to each other ?
 - No, because within the Green VRF there is no IP route to reach the Red IP subnets
 - And vice-versa
 - However, the same would not be the case if we had redistributed a default route from the Shared VRF into the Green & Red VSNs
 - This scenario is covered in example use #4

Inter VRF-L3VSN route redistribution

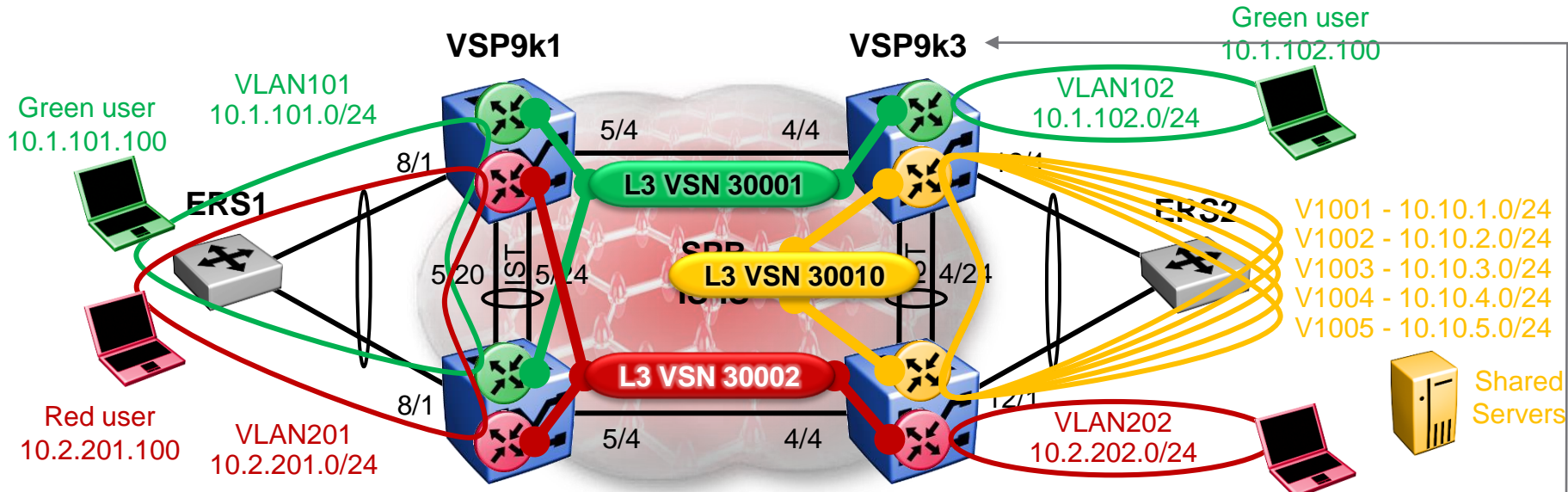
Redistribute Summarised Shared VSN routes



- We now have lots of Server subnets in the Shared VRF
- We want to summarize these subnets as 1 single IP route 10.10.0.0/21

Inter VRF-L3VSN route redistribution

Shared VRF additional subnets Config



```

vlan create 1002 type port-mstprstp 0
vlan create 1003 type port-mstprstp 0
vlan create 1004 type port-mstprstp 0
vlan create 1005 type port-mstprstp 0
mlt 1 vlan 1002,1003,1004,1005
mlt 512 vlan 1002,1003,1004,1005
interface vlan 1002
    vrf shared
    ip address 10.10.2.2 255.255.255.0
exit
interface vlan 1003
    vrf shared
    ip address 10.10.3.2 255.255.255.0
exit
interface vlan 1004
    vrf shared
    ip address 10.10.4.2 255.255.255.0
exit
interface vlan 1005
    vrf shared
    ip address 10.10.5.2 255.255.255.0
exit
    
```

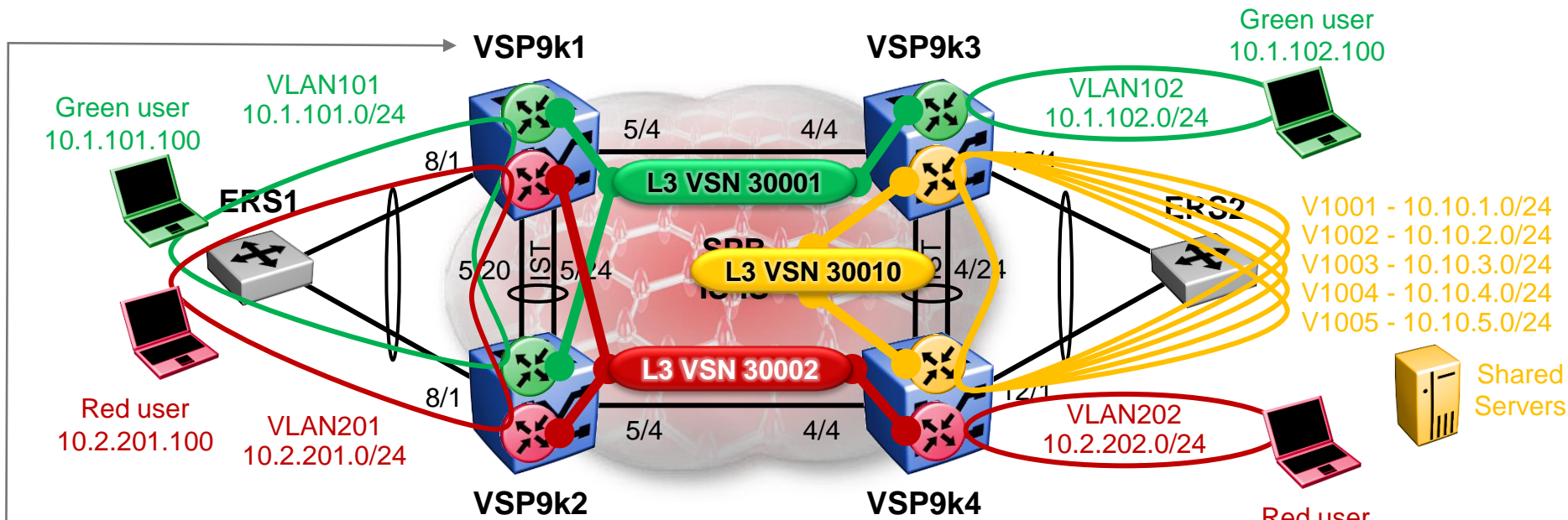
VSP9k4

```

vlan create 1002 type port-mstprstp 0
vlan create 1003 type port-mstprstp 0
vlan create 1004 type port-mstprstp 0
vlan create 1005 type port-mstprstp 0
mlt 1 vlan 1002,1003,1004,1005
mlt 512 vlan 1002,1003,1004,1005
interface vlan 1002
    vrf shared
    ip address 10.10.2.1 255.255.255.0
exit
interface vlan 1003
    vrf shared
    ip address 10.10.3.1 255.255.255.0
exit
interface vlan 1004
    vrf shared
    ip address 10.10.4.1 255.255.255.0
exit
interface vlan 1005
    vrf shared
    ip address 10.10.5.1 255.255.255.0
exit
    
```

Inter VRF-L3VSN route redistribution

Shared VRF additional subnets Config



```
VSP9000-1:1#% show ip route vrf green
```

```
=====
```

```
IP Route - VRF green
```

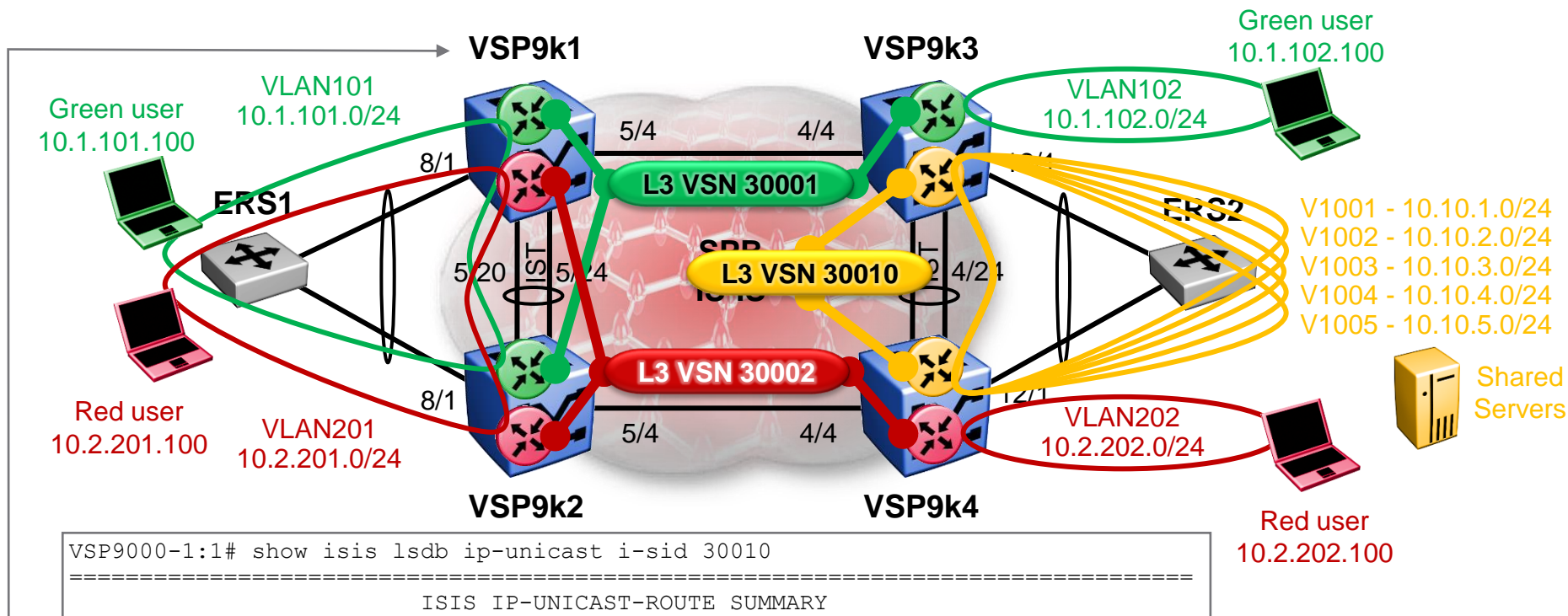
```
=====
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.1	-	1	101	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-3	green	10	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200
10.10.2.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200
10.10.3.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200
10.10.4.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200
10.10.5.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200

- We want to summarise the Server subnets as 1 single 10.10.0.0/21 network

Inter VRF-L3VSN route redistribution

Redist Summarised Shared VSN routes



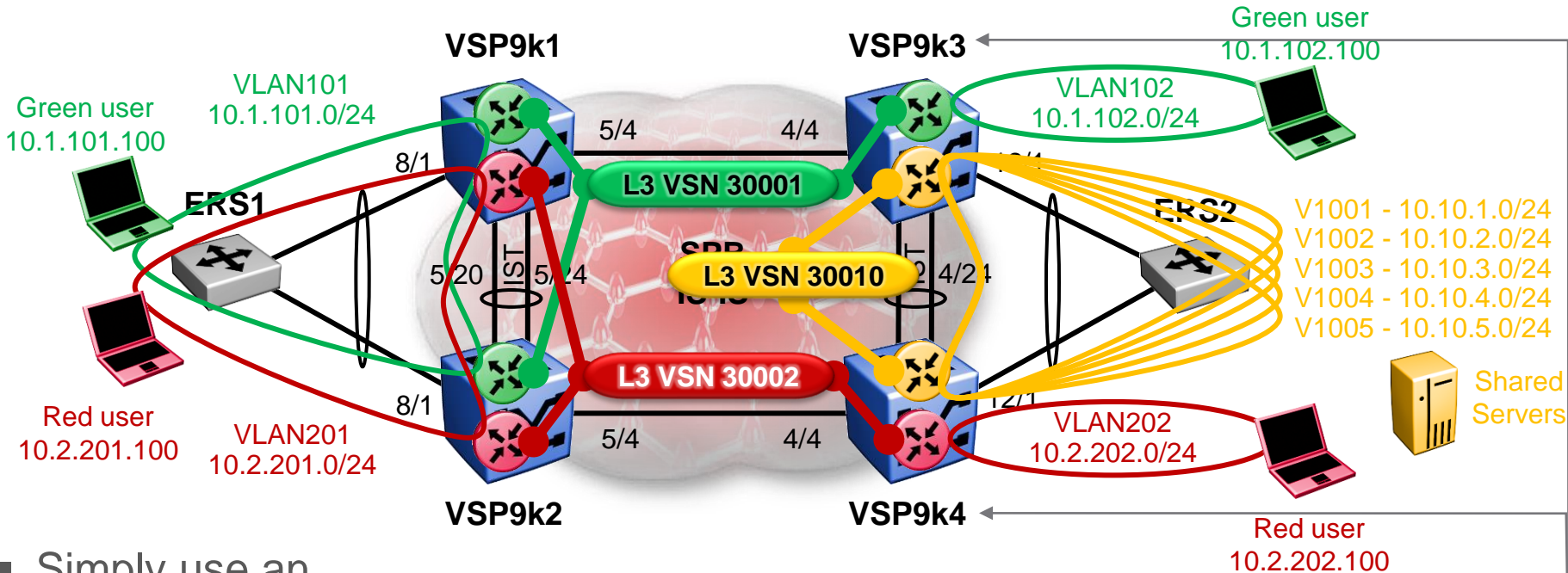
```
VSP9000-1:1# show isis lsdbs ip-unicast i-sid 30010
```

ISIS IP-UNICAST-ROUTE SUMMARY

I-SID	ADDRESS	PREFIX LENGTH	METRIC	TLV TYPE	LSP FRAG	HOST NAME
30010	10.10.1.0	24	1	184	0x3	VSP9000-3
30010	10.10.2.0	24	1	184	0x3	VSP9000-3
30010	10.10.3.0	24	1	184	0x3	VSP9000-3
30010	10.10.4.0	24	1	184	0x3	VSP9000-3
30010	10.10.5.0	24	1	184	0x3	VSP9000-3
30010	10.10.1.0	24	1	184	0x3	VSP9000-4
30010	10.10.2.0	24	1	184	0x3	VSP9000-4
30010	10.10.3.0	24	1	184	0x3	VSP9000-4
30010	10.10.4.0	24	1	184	0x3	VSP9000-4
30010	10.10.5.0	24	1	184	0x3	VSP9000-4

Inter VRF-L3VSN route redistribution

Redist Summarised Shared VSN routes

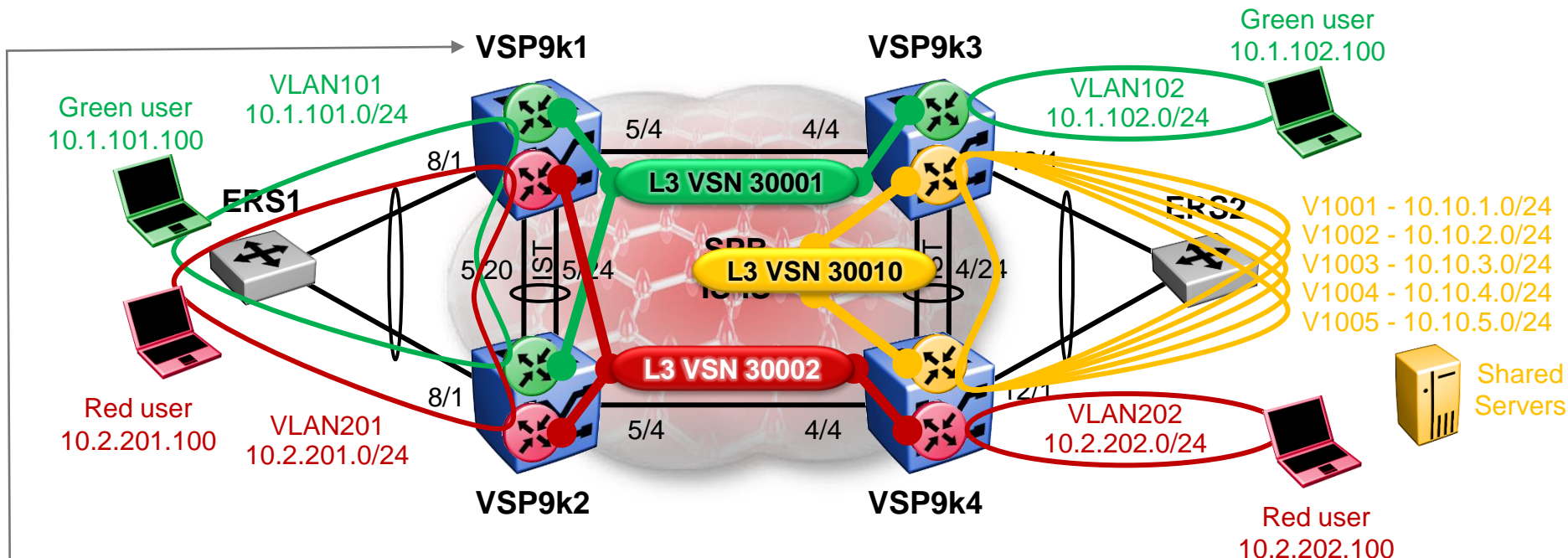


- Simply use an injectlist and apply it to the already existing ISIS redistribution of direct routes in the Shared VRF

```
router vrf shared
  ip prefix-list "server_nets" 10.10.0.0/21
  route-map "summarize-server_nets" 1
    enable
    set injectlist "server_nets"
  exit
  isis redistribute direct route-map "summarize-server_nets"
exit
isis apply redistribute direct vrf shared
```

Inter VRF-L3VSN route redistribution

Redist Summarised Shared VSN routes



```
VSP9000-1:1# show isis lsdb ip-unicast i-sid 30010
```

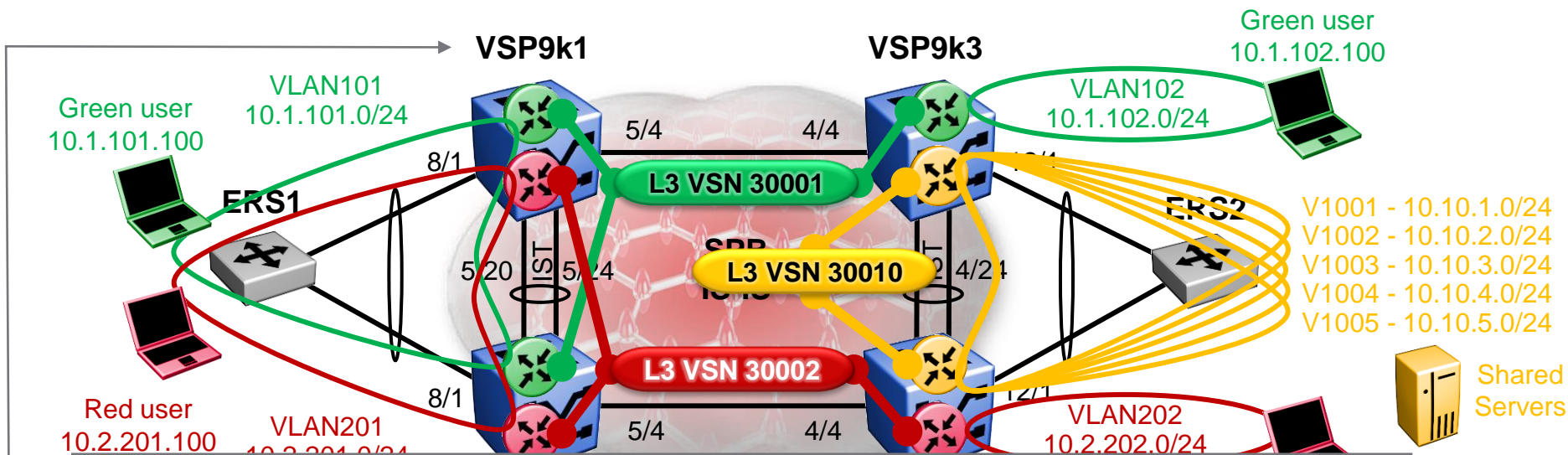
ISIS IP-UNICAST-ROUTE SUMMARY

I-SID	ADDRESS	PREFIX LENGTH	METRIC	TLV TYPE	LSP FRAG	HOST NAME
30010	10.10.0.0	21	1	184	0x3	VSP9000-3
30010	10.10.0.0	21	1	184	0x3	VSP9000-4

2 out of 12 Total Num of Entries

Inter VRF-L3VSN route redistribution

Redist Summarised Shared VSN routes



```
VSP9000-1:1#% show ip route vrf green
```

```
IP Route - VRF green
```

DST	MASK	NEXT	NH VRF/ISID	COST	FACE	INTER PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.1	-	1	101	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-3	green	10	4051	ISIS	0	IBSV	7
10.10.0.0	255.255.248.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200

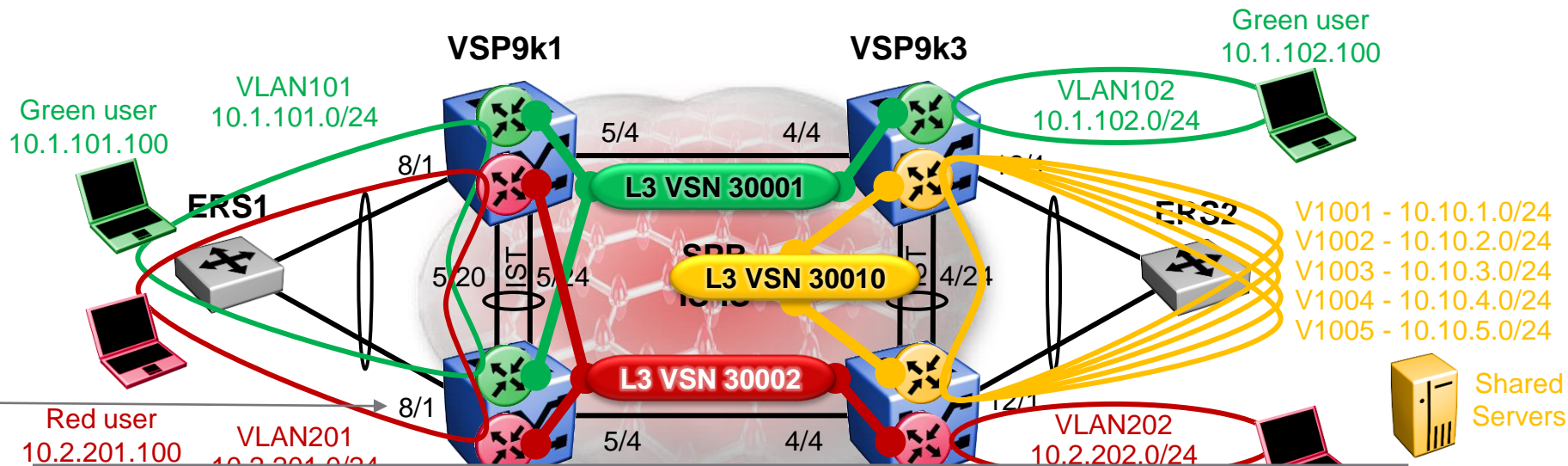
```
VSP9000-1:1#% show ip route vrf red
```

```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF/ISID	COST	FACE	INTER PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	10.2.201.1	-	1	201	LOC	0	DB	0
10.2.202.0	255.255.255.0	VSP9000-4	red	20	4051	ISIS	0	IBSV	7
10.10.0.0	255.255.248.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200

Inter VRF-L3VSN route redistribution

Redist Summarised Shared VSN routes



```
VSP9000-2:1#% show ip route vrf green
```

```
IP Route - VRF green
```

DST	MASK	NEXT	NH VRF/ISID	COST	FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.2	-	1	101	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-3	green	20	4051	ISIS	0	IBSV	7
10.10.0.0	255.255.248.0	VSP9000-4	30010	10	4051	ISIS	0	IBSV	200

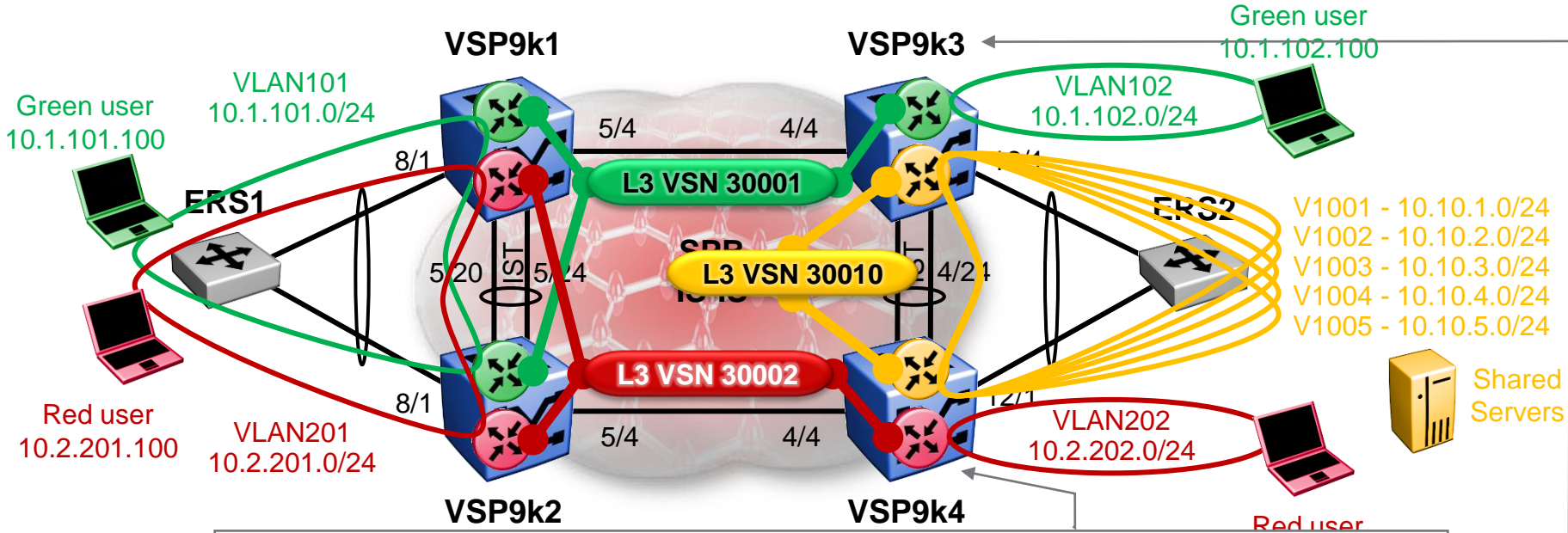
```
VSP9000-2:1#% show ip route vrf red
```

```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF/ISID	COST	FACE	PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	10.2.201.2	-	1	201	LOC	0	DB	0
10.2.202.0	255.255.255.0	VSP9000-4	red	10	4051	ISIS	0	IBSV	7
10.10.0.0	255.255.248.0	VSP9000-4	30010	10	4051	ISIS	0	IBSV	200

Inter VRF-L3VSN route redistribution

Summarised routes will not work on local VRFs



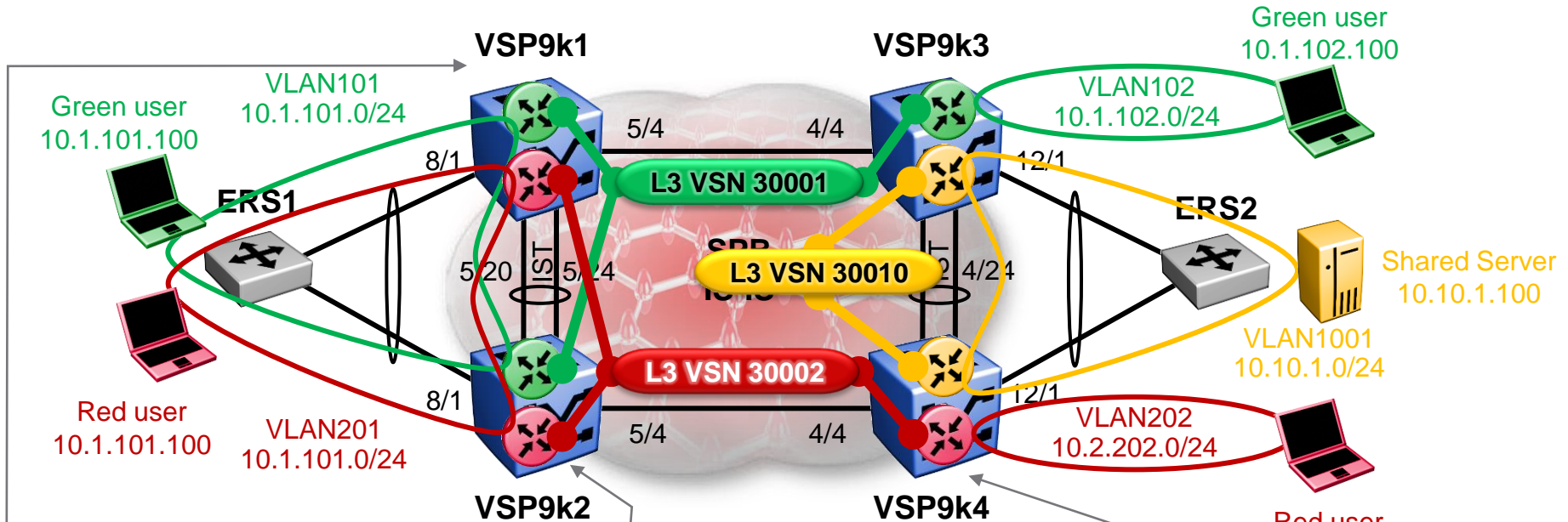
```
VSP9000-4:1#% show ip route vrf red
=====
IP Route - VRF red
=====
DST          MASK          NEXT          NH          INTER
VRF/ISID    COST FACE    PROT AGE  TYPE  PRF
-----
10.2.201.0   255.255.255.0 VSP9000-2    red         10  4051  ISIS 0  IBSV 7
10.2.202.0   255.255.255.0 10.2.202.1   -           1   202   LOC 0  DB   0
```

```
VSP9000-3:1#% show ip route vrf green
=====
IP Route - VRF green
=====
DST          MASK          NEXT          NH          INTER
VRF/ISID    COST FACE    PROT AGE  TYPE  PRF
-----
10.1.101.0   255.255.255.0 VSP9000-1    green        10  4051  ISIS 0  IBSV 7
10.1.102.0   255.255.255.0 10.1.102.1   -           1   102   LOC 0  DB   0
```

- NOTE, summarizing the VSN routes can only be done when they will only be ISIS accepted on a different BEB from the one where they were summarized

Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
interface vlan 201
  no ip address 10.2.201.1
  ip address 10.1.101.1 255.255.255.0
  ip rsmt
  ip rsmt holdup-timer 9999
exit
```

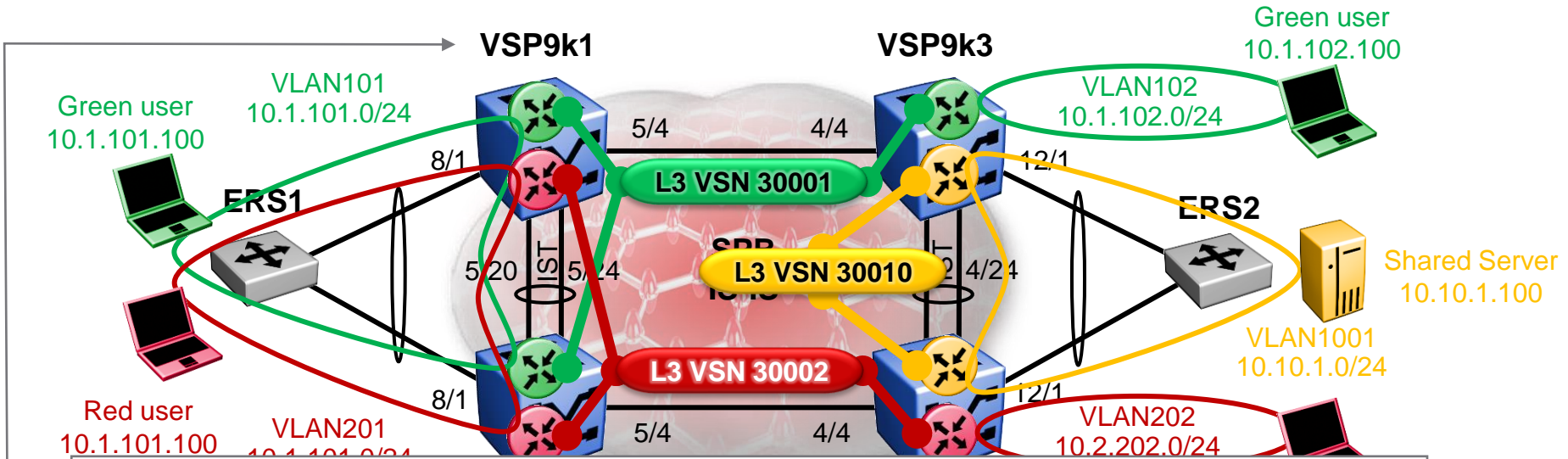
```
interface vlan 201
  no ip address 10.2.201.2
  ip address 10.1.101.2 255.255.255.0
  ip rsmt
  ip rsmt holdup-timer 9999
exit
```

```
interface vlan 202
  no ip address 10.2.202.1
  ip address 10.1.102.1 255.255.255.0
exit
```

- In this setup variant, the IP subnets of the Red L3VSN are changed to overlap the IP subnets of Green L3VSN
- We want to test how we can control which IP routes the Shared VRFs accept

Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
VSP9000-1:1#% show ip route vrf green
```

```
IP Route - VRF green
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.1	-	1	101	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-3	green	10	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200

```
VSP9000-1:1#% show ip route vrf red
```

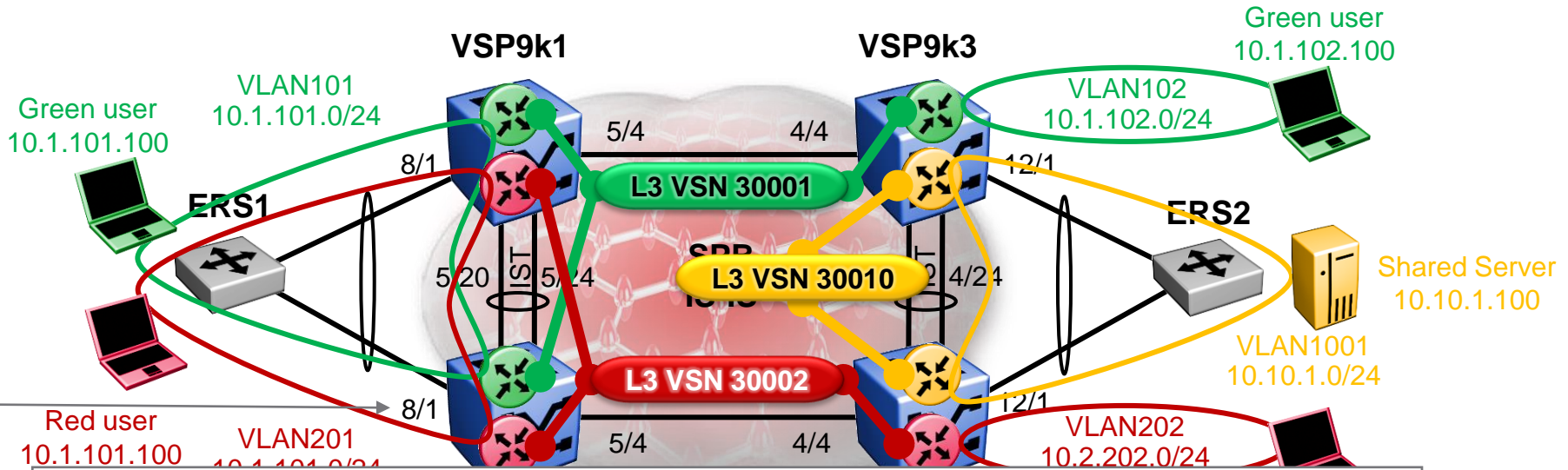
```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.1	-	1	201	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-4	red	20	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-3	30010	10	4051	ISIS	0	IBSV	200

▶ Ok

Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
VSP9000-2:1#% show ip route vrf green
```

```
IP Route - VRF green
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.2	-	1	101	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-3	green	20	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-4	30010	10	4051	ISIS	0	IBSV	200

```
VSP9000-2:1#% show ip route vrf red
```

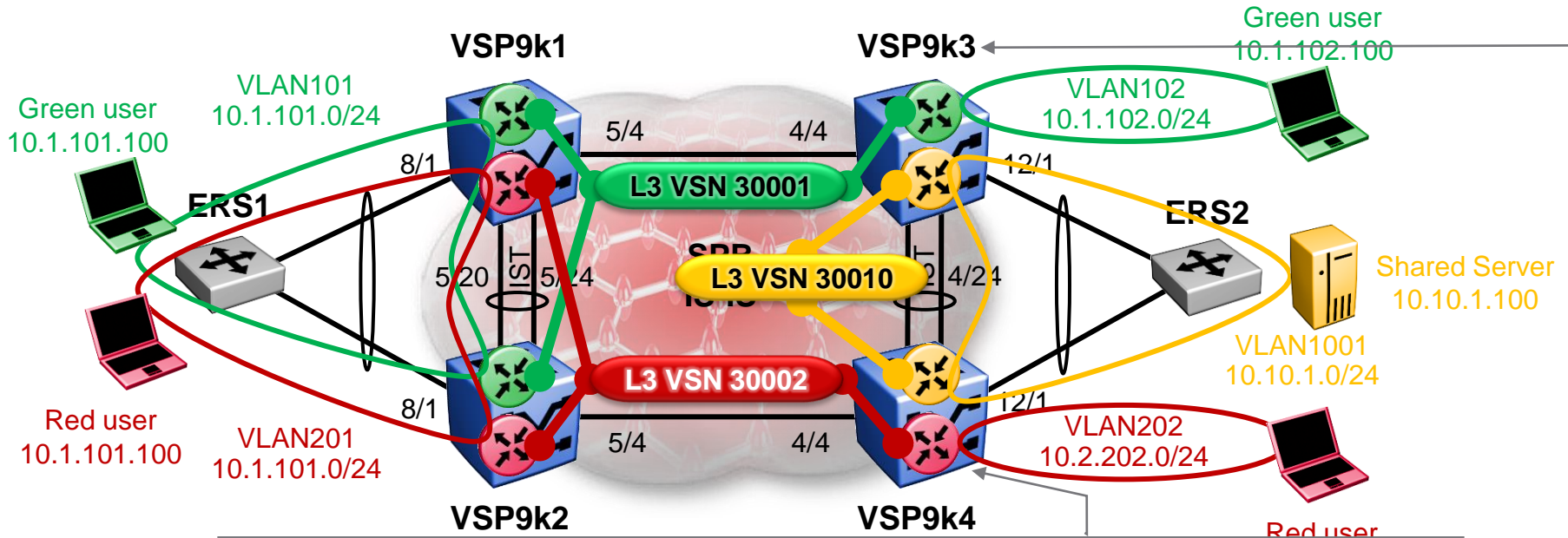
```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.2	-	1	201	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-4	red	10	4051	ISIS	0	IBSV	7
10.10.1.0	255.255.255.0	VSP9000-4	30010	10	4051	ISIS	0	IBSV	200

▶ Ok

Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
VSP9000-4:1#% show ip route vrf red
```

IP Route - VRF red									
DST	MASK	NEXT	NH VRF/ISID	INTER COST	FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-2	red	10	4051	ISIS	0	IBSV	7
10.1.102.0	255.255.255.0	10.1.102.1	-	1	202	LOC	0	DB	0
10.10.1.0	255.255.255.0	10.10.1.2	shared	0	1001	ISIS	0	IB	200

```
VSP9000-3:1#% show ip route vrf green
```

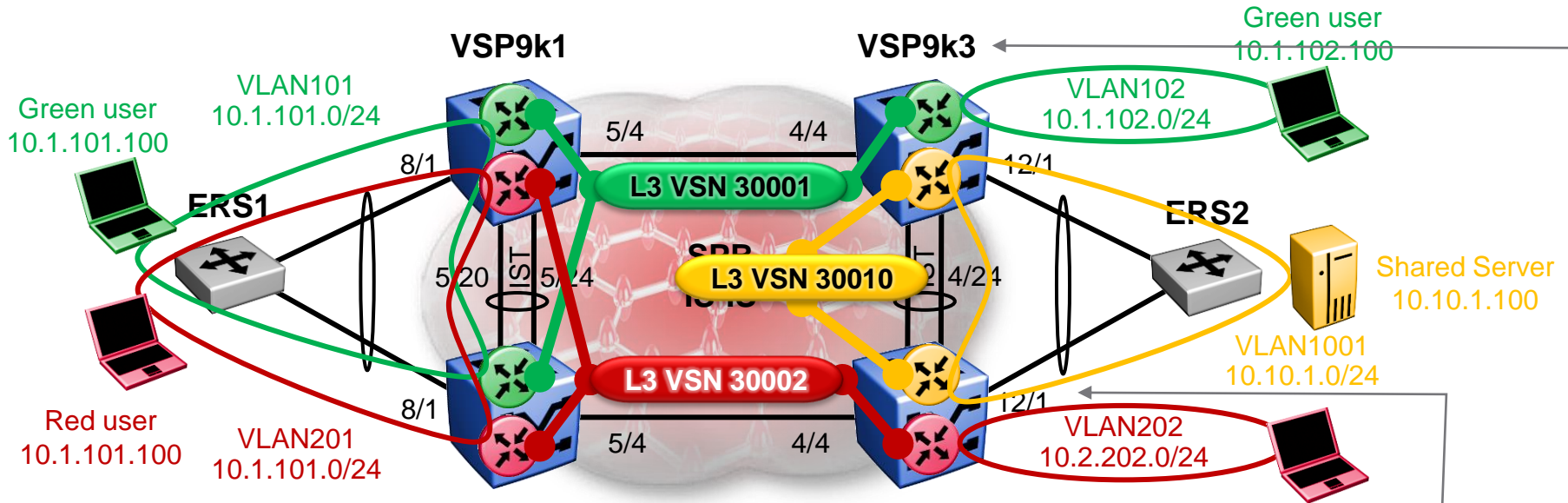
IP Route - VRF green									
DST	MASK	NEXT	NH VRF/ISID	INTER COST	FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-1	green	10	4051	ISIS	0	IBSV	7
10.1.102.0	255.255.255.0	10.1.102.1	-	1	102	LOC	0	DB	0
10.10.1.0	255.255.255.0	10.10.1.1	shared	0	1001	ISIS	0	IB	200

Ok



Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
VSP9000-4:1#% show ip route vrf shared
```

```
IP Route - VRF shared
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-2	30001	10 4051	ISIS	0	IBSV	200
10.1.102.0	255.255.255.0	10.1.102.1	red	0 202	ISIS	0	IB	200
10.10.1.0	255.255.255.0	10.10.1.2	-	1 1001	LOC	0	DB	0

```
VSP9000-3:1#% show ip route vrf shared
```

```
IP Route - VRF shared
```

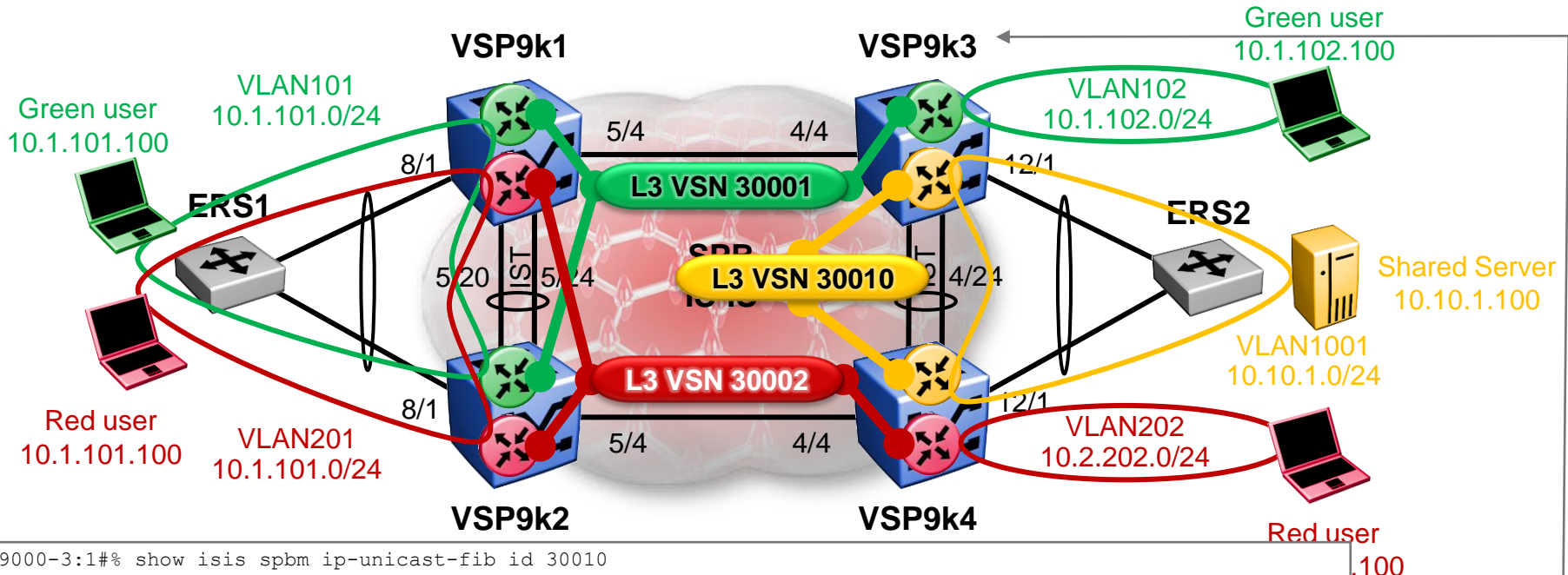
DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-1	green	10 4051	ISIS	0	IBSV	200
10.1.102.0	255.255.255.0	10.1.102.1	green	0 102	ISIS	0	IB	200
10.10.1.0	255.255.255.0	10.10.1.1	-	1 1001	LOC	0	DB	0

- Ouch!
- Not consistent



Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
VSP9000-3:1# show isis spbm ip-unicast-fib id 30010
```

```
=====
SPBM IP-UNICAST FIB ENTRY INFO
=====
```

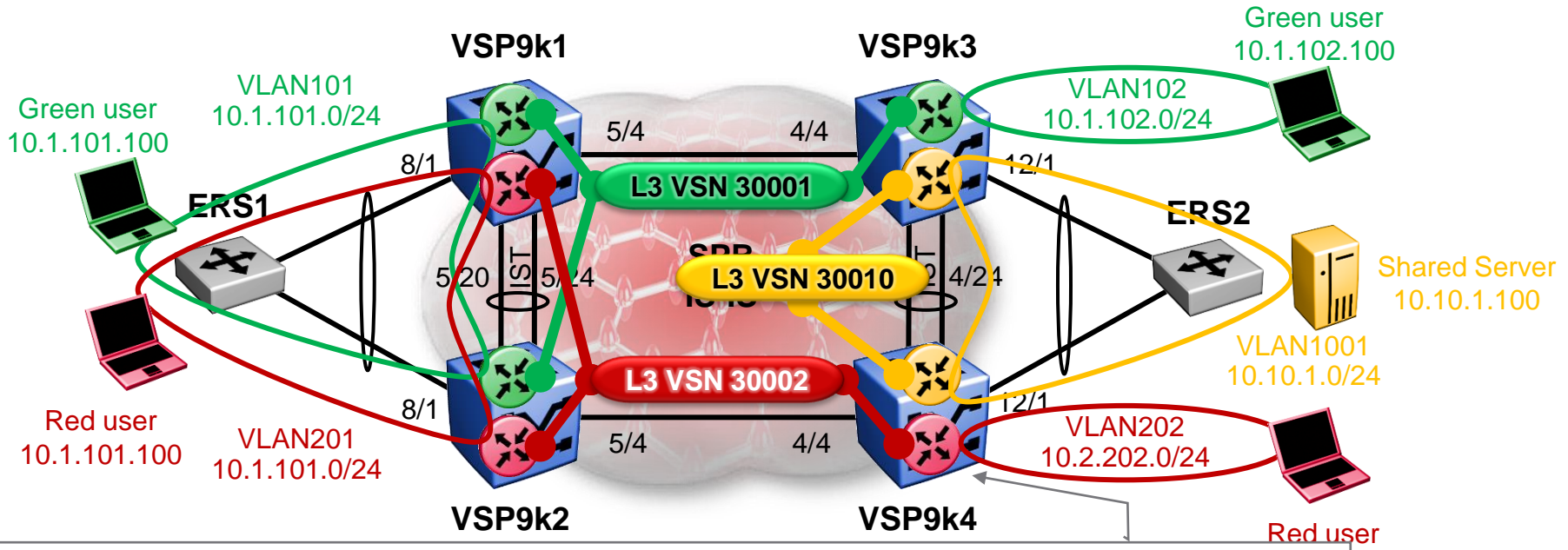
VRF	VRF ISID	DEST ISID	Destination	NH BEB	OUTGOING VLAN	SPBM INTERFACE	COST	PREFIX COST	IP ROUTE PREFERENCE
shared	30010	30001	10.1.101.0/24	VSP9000-1	4051	4/4	10	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-1	4052	4/4	10	1	200
shared	30010	30002	10.1.101.0/24	VSP9000-1	4051	4/4	10	1	200
shared	30010	30002	10.1.101.0/24	VSP9000-1	4052	4/4	10	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-2	4051	4/4	20	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-2	4052	IST	20	1	200
shared	30010	30002	10.1.101.0/24	VSP9000-2	4051	4/4	20	1	200
shared	30010	30002	10.1.101.0/24	VSP9000-2	4052	IST	20	1	200
shared	30010	30001	10.1.102.0/24	VSP9000-3	102	Local	0	1	200
shared	30010	30002	10.1.102.0/24	VSP9000-4	4051	IST	10	1	200
shared	30010	30002	10.1.102.0/24	VSP9000-4	4052	IST	10	1	200
shared	30010	30010	10.10.1.0/24	VSP9000-4	4051	IST	10	1	7
shared	30010	30010	10.10.1.0/24	VSP9000-4	4052	IST	10	1	7

Installed routes are highlighted



Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



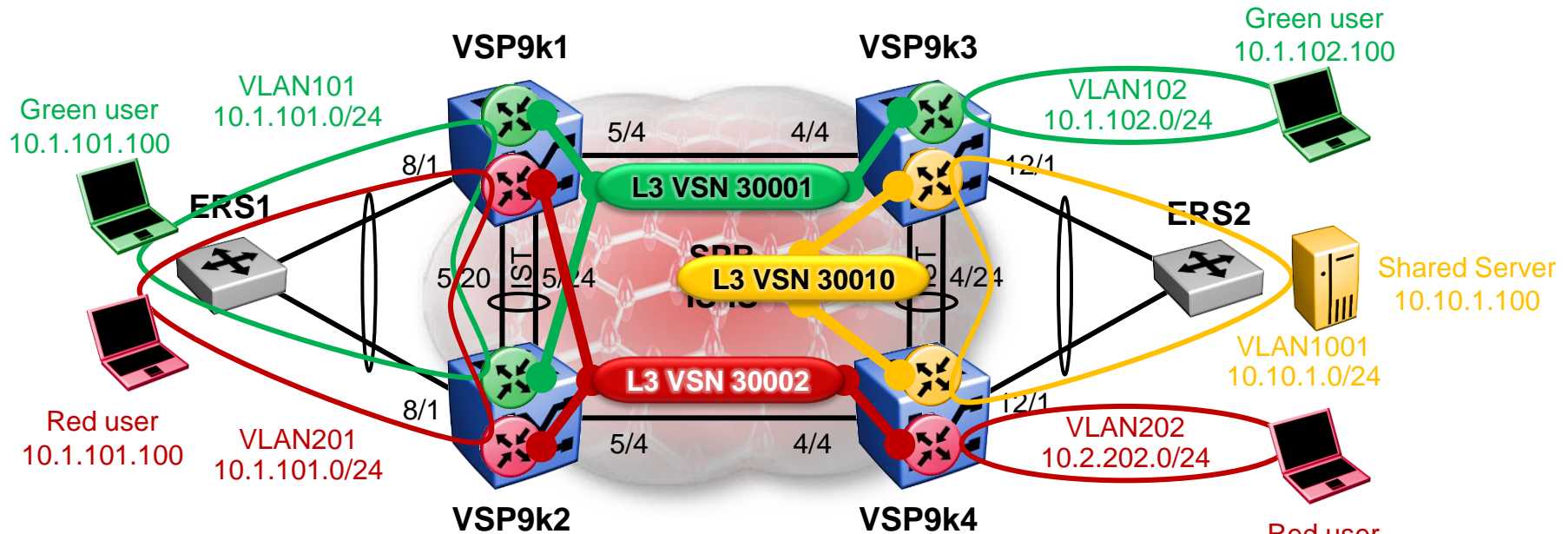
```
VSP9000-4:1# show isis spbm ip-unicast-fib id 30010
=====
SPBM IP-UNICAST FIB ENTRY INFO
=====
VRF      VRF   DEST      OUTGOING  SPBM   PREFIX  IP ROUTE
ISID     ISID   Destination  NH BEB   VLAN  INTERFACE COST   COST   PREFERENCE
-----
shared   30010 30001     10.1.101.0/24  VSP9000-1  4051 4/4    20    1    200
shared   30010 30001     10.1.101.0/24  VSP9000-1  4052 IST    20    1    200
shared   30010 30002     10.1.101.0/24  VSP9000-1  4051 4/4    20    1    200
shared   30010 30002     10.1.101.0/24  VSP9000-1  4052 IST    20    1    200
shared   30010 30001     10.1.101.0/24  VSP9000-2  4051 4/4    10    1    200
shared   30010 30001     10.1.101.0/24  VSP9000-2  4052 4/4    10    1    200
shared   30010 30002     10.1.101.0/24  VSP9000-2  4051 4/4    10    1    200
shared   30010 30002     10.1.101.0/24  VSP9000-2  4052 4/4    10    1    200
shared   30010 30001     10.1.102.0/24  VSP9000-3  4051 IST    10    1    200
shared   30010 30001     10.1.102.0/24  VSP9000-3  4052 IST    10    1    200
shared   30010 30002     10.1.102.0/24  VSP9000-4  202 Local  0    1    200
shared   30010 30010     10.10.1.0/24   VSP9000-3  4051 IST    10    1    7
shared   30010 30010     10.10.1.0/24   VSP9000-3  4052 IST    10    1    7
```

Installed routes are highlighted



Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



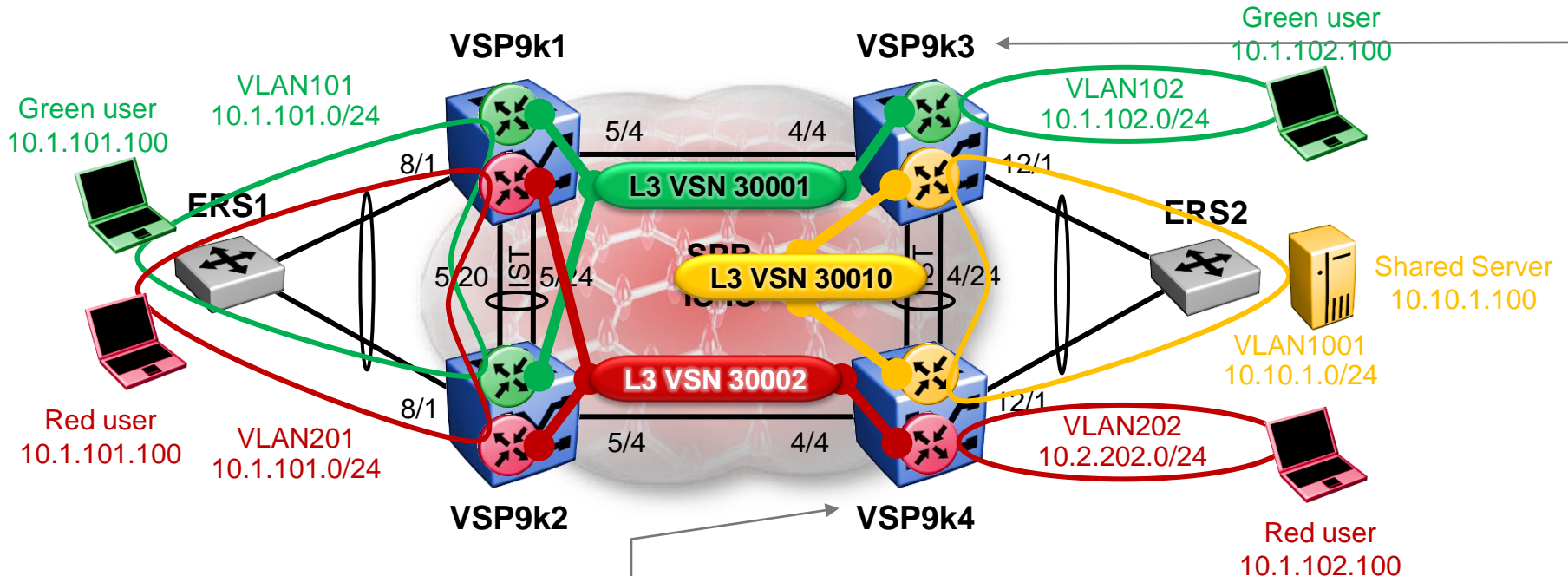
■ Tie breaking rules:

- Local Routes preferred over Inter VSN routes
- Routes with lowest route preference
 - can be changed using route-map policy on accept side
- Routes with lowest SPBM cost
- Routes with lowest prefix cost
 - can be changed using route-map on redistributing side
- Routes with lower ISID preferred
- Choose route from lowest BMAC

- NOTE that in case of equal cost, the routes will never go into ECMP as they do not lead to the same destination (even if the route is the same)
- In this scenario we want to override which of the overlapping Green/Red IP routes is accepted in the Shared VRFs
- We are going to try and give priority to the Red VSN IP routes over the Green ones
- We could use a route-map to only accept those IP routes from Red VSN (and not Green) but it could always happen that accidentally the same route is seen from different VSNs for which we import all routes. So we want a more general solution to make sure we remain consistent if that happens

Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



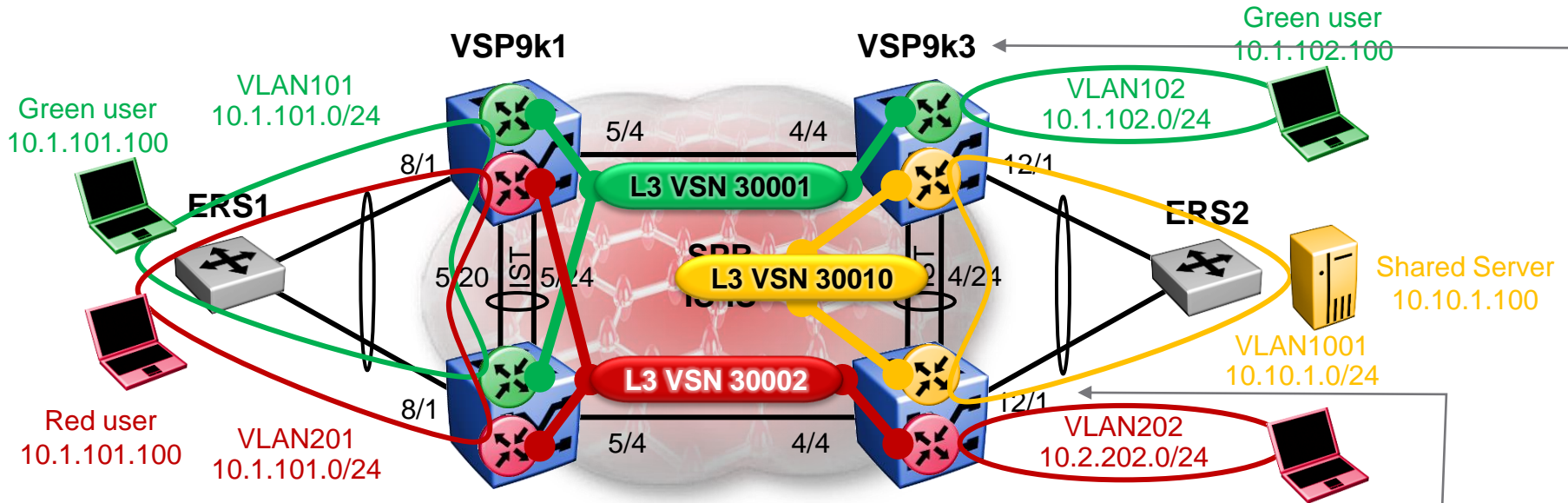
- Here we are simply forcing all Red/30002 IP routes to use a Pref of 180 (instead of default 200)

```

router vrf shared
  route-map "pref180" 1
    enable
    set ip-preference 180
  exit
exit
router vrf shared
  isis accept i-sid 30001 enable
  isis accept i-sid 30002 enable
  isis accept i-sid 30002 route-map "pref180"
exit
isis apply accept vrf shared
  
```

Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
VSP9000-4:1# show ip route vrf shared
```

```
IP Route - VRF shared
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-2	red	10 4051	ISIS	0	IBSV	180
10.1.102.0	255.255.255.0	10.1.102.1	red	0 202	ISIS	0	IB	180
10.10.1.0	255.255.255.0	10.10.1.2	-	1 1001	LOC	0	DB	0

```
VSP9000-3:1# show ip route vrf shared
```

```
IP Route - VRF shared
```

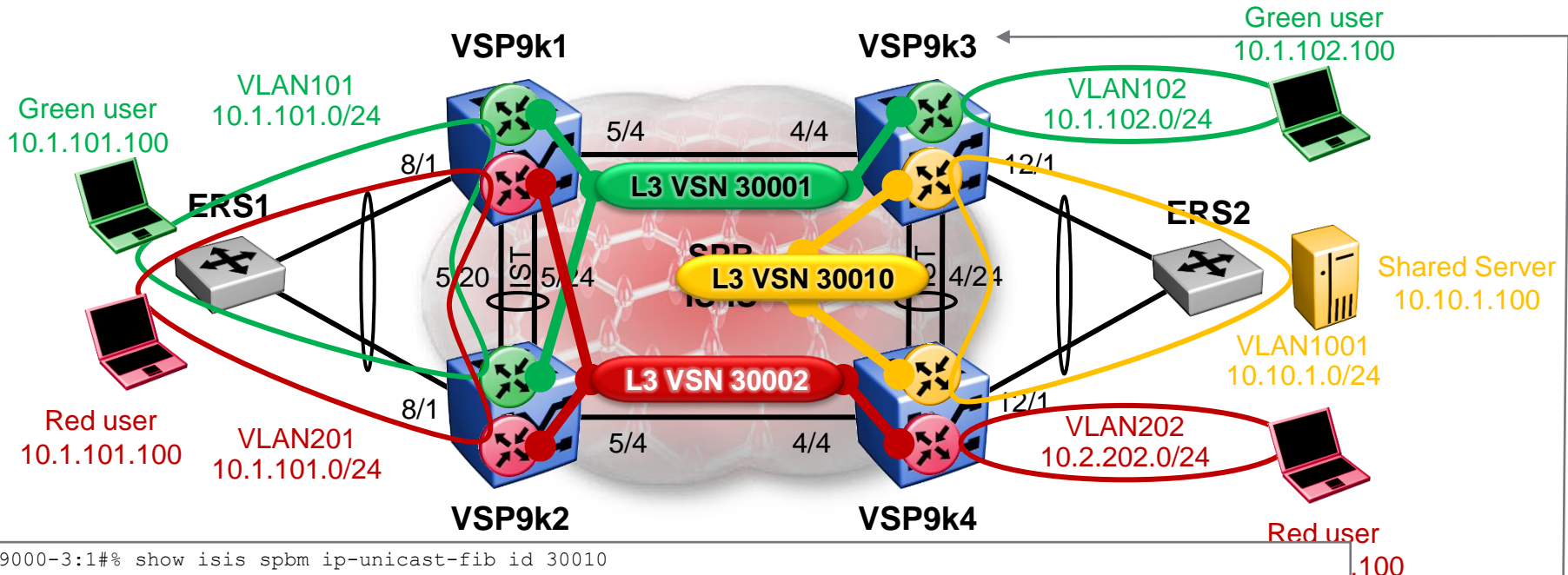
DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-1	30002	10 4051	ISIS	0	IBSV	180
10.1.102.0	255.255.255.0	VSP9000-4	30002	10 4051	ISIS	0	IBSV	180
10.10.1.0	255.255.255.0	10.10.1.1	-	1 1001	LOC	0	DB	0

- Success!
- Note
pref=180



Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
VSP9000-3:1# show isis spbm ip-unicast-fib id 30010
```

```
=====
SPBM IP-UNICAST FIB ENTRY INFO
=====
```

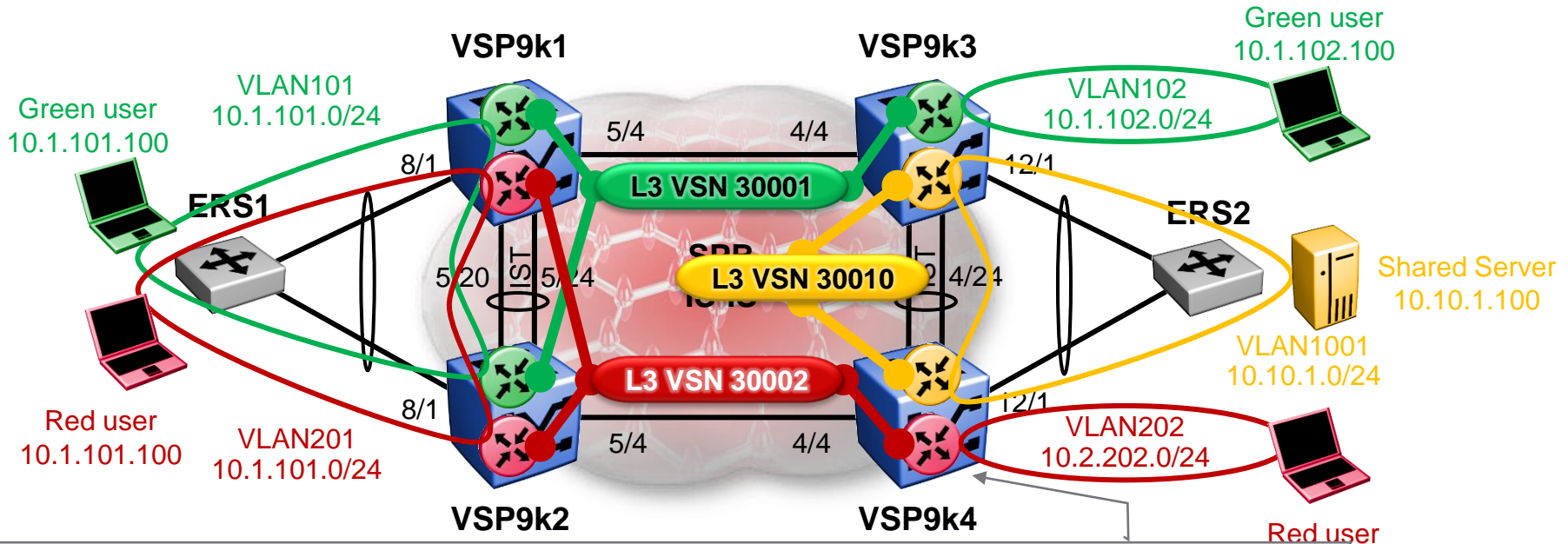
VRF	VRF ISID	DEST ISID	Destination	NH BEB	OUTGOING VLAN	SPBM INTERFACE	SPBM COST	PREFIX COST	IP ROUTE PREFERENCE
shared	30010	30001	10.1.101.0/24	VSP9000-1	4051	4/4	10	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-1	4052	4/4	10	1	200
shared	30010	30002	10.1.101.0/24	VSP9000-1	4051	4/4	10	1	180
shared	30010	30002	10.1.101.0/24	VSP9000-1	4052	4/4	10	1	180
shared	30010	30001	10.1.101.0/24	VSP9000-2	4051	4/4	20	1	200
shared	30010	30001	10.1.101.0/24	VSP9000-2	4052	IST	20	1	200
shared	30010	30002	10.1.101.0/24	VSP9000-2	4051	4/4	20	1	180
shared	30010	30002	10.1.101.0/24	VSP9000-2	4052	IST	20	1	180
shared	30010	30001	10.1.102.0/24	VSP9000-3	102	Local	0	1	200
shared	30010	30002	10.1.102.0/24	VSP9000-4	4051	IST	10	1	180
shared	30010	30002	10.1.102.0/24	VSP9000-4	4052	IST	10	1	180
shared	30010	30010	10.10.1.0/24	VSP9000-4	4051	IST	10	1	7
shared	30010	30010	10.10.1.0/24	VSP9000-4	4052	IST	10	1	7

Installed routes are highlighted



Inter VRF-L3VSN route redistribution

Overlapping subnets / Control which route to accept



```
VSP9000-4:1# show isis spbm ip-unicast-fib id 30010
=====
SPBM IP-UNICAST FIB ENTRY INFO
=====
VRF      VRF   DEST      OUTGOING  SPBM   PREFIX  IP ROUTE
VRF      ISID  ISID      Destination  NH BEB  VLAN  INTERFACE  COST  COST  PREFERENCE
-----
shared  30010 30001     10.1.101.0/24  VSP9000-1  4051 4/4      20    1    200
shared  30010 30001     10.1.101.0/24  VSP9000-1  4052 IST      20    1    200
shared  30010 30002     10.1.101.0/24  VSP9000-1  4051 4/4      20    1    180
shared  30010 30002     10.1.101.0/24  VSP9000-1  4052 IST      20    1    180
shared  30010 30001     10.1.101.0/24  VSP9000-2  4051 4/4      10    1    200
shared  30010 30001     10.1.101.0/24  VSP9000-2  4052 4/4      10    1    200
shared  30010 30002     10.1.101.0/24  VSP9000-2  4051 4/4      10    1    180
shared  30010 30002     10.1.101.0/24  VSP9000-2  4052 4/4      10    1    180
shared  30010 30001     10.1.102.0/24  VSP9000-3  4051 IST      10    1    200
shared  30010 30001     10.1.102.0/24  VSP9000-3  4052 IST      10    1    200
shared  30010 30002     10.1.102.0/24  VSP9000-4  202 Local    0    1    180
shared  30010 30010     10.10.1.0/24  VSP9000-3  4051 IST      10    1    7
shared  30010 30010     10.10.1.0/24  VSP9000-3  4052 IST      10    1    7
```

Installed routes are highlighted



ISIS Accept policies

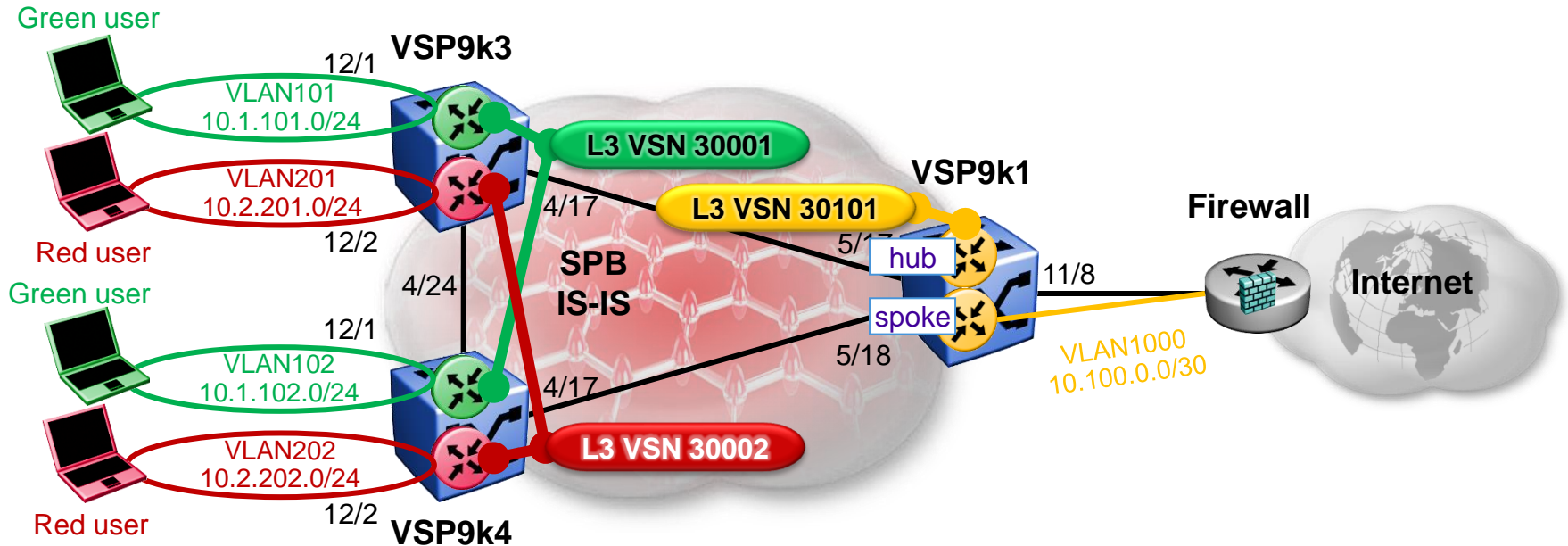
Last tested with: 4.1.1.0 GA

Example use #4
Inter-L3VSN route redistribution
Shared Firewall / Internet Access

In v3 of this deck, this test has been re-run with software 4.1.1.0 GA and gen2 IO card 9048XS-2 in VSP9k1 slot 5. The original slides tried to use 2 IP interfaces on the Firewall but this was found to be unworkable, so now a new approach is used which uses a single IP interface on the Firewall.



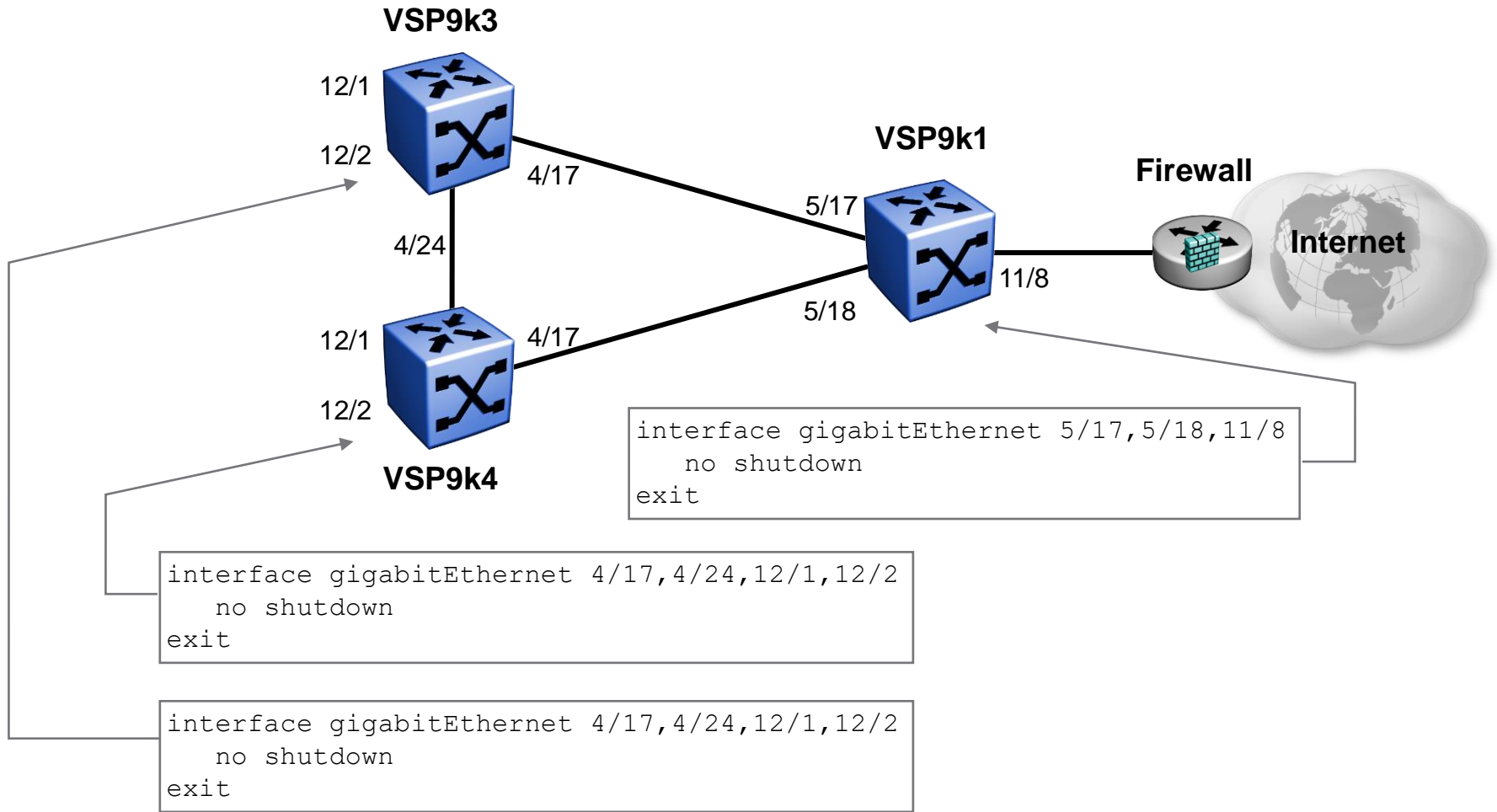
Shared Internet Firewall



- Green and red users cannot communicate together
- Both green and red users need to share the Internet Firewall, which supplies a default route
- However must ensure that green and red users are not allowed to communicate by following the default route to the orange VRF where Firewall connected
- So we need to split the Firewall VRF into 2 VRFs; one supplies the default route; the other accepts all green and red subnets
- A single IP interface must be used on the Firewall (Firewalls need to see statefull traffic ingressing and egressing the same IP interface)

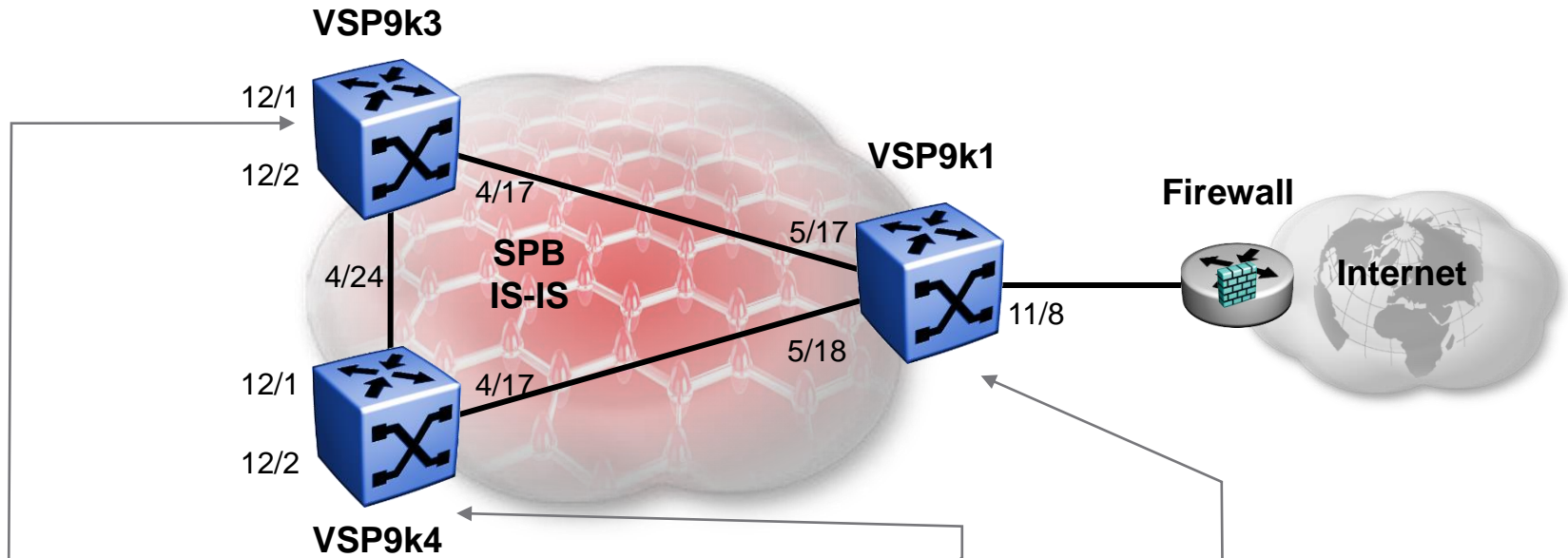
Shared Internet Firewall

Interfaces used



Shared Internet Firewall

SPB Global Config

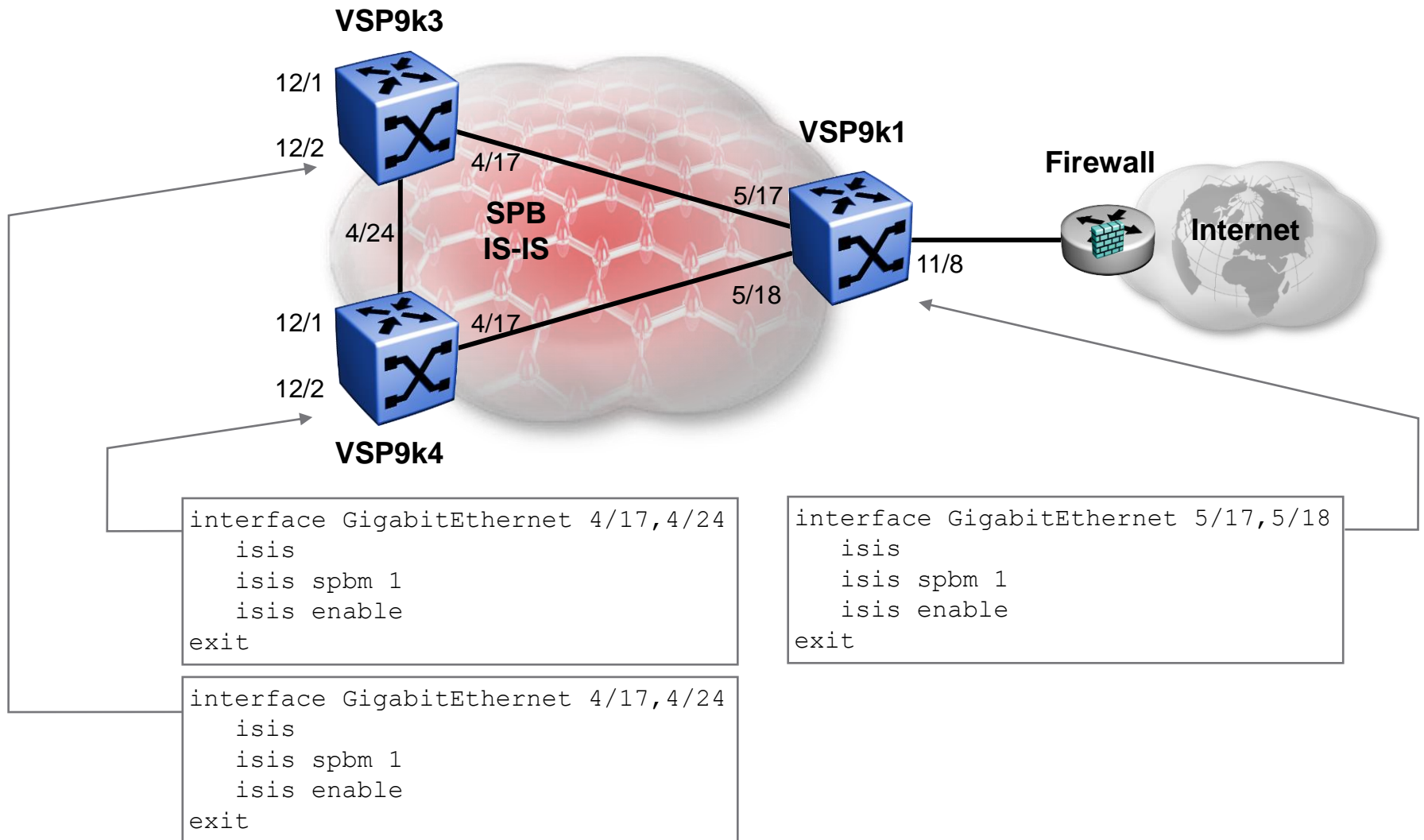


```
interface loopback 1
 ip address 10.0.0.93/255.255.255.255
exit
spbm
router isis
 system-id 00bb.0000.9300
 manual-area 49.0000
 ip-source-address 10.0.0.93
 spbm 1
 spbm 1 nick-name 0.00.93
 spbm 1 b-vid 4051-4052 primary 4051
 spbm 1 ip enable
exit
vlan create 4051 name "B-VLAN-1" type spbm-bvlan
vlan create 4052 name "B-VLAN-2" type spbm-bvlan
router isis enable
cfm spbm mepid 93
cfm spbm enable
```

```
interface loopback 1
 ip address 10.0.0.94/255.255.255.255
exit
spbm
router isis
 system-id 00bb.0000.9400
 manual-area 49.0000
 ip-source-address 10.0.0.94
 spbm 1
 spbm 1 nick-name 0.00.94
 spbm 1 b-vid 4051-4052 primary 4051
 spbm 1 ip enable
exit
vlan create 4051 name "B-VLAN-1" type spbm-bvlan
vlan create 4052 name "B-VLAN-2" type spbm-bvlan
router isis enable
cfm spbm mepid 94
cfm spbm enable
```

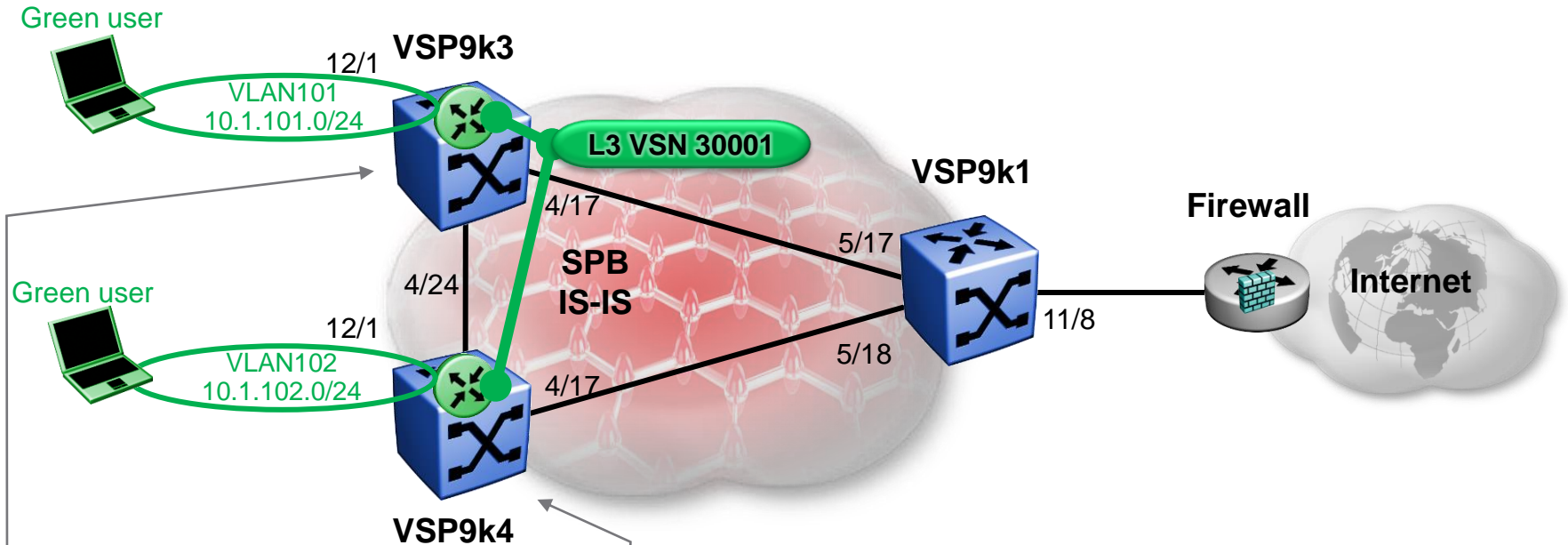
```
interface loopback 1
 ip address 10.0.0.91/255.255.255.255
exit
spbm
router isis
 system-id 00bb.0000.9100
 manual-area 49.0000
 ip-source-address 10.0.0.91
 spbm 1
 spbm 1 nick-name 0.00.91
 spbm 1 b-vid 4051-4052 primary 4051
 spbm 1 ip enable
exit
vlan create 4051 name "B-VLAN-1" type spbm-bvlan
vlan create 4052 name "B-VLAN-2" type spbm-bvlan
router isis enable
cfm spbm mepid 91
cfm spbm enable
```

Shared Internet Firewall SPB Interface Config



Shared Internet Firewall

Green VSN Config



```

ip vrf green vrfid 1
vlan create 101 type port-mstprstp 0
vlan members add 101 12/1
interface vlan 101
    vrf green
    ip address 10.1.101.1 255.255.255.0
exit
router vrf green
    ipvpn
    i-sid 30001
    ipvpn enable
    isis redistribute direct
    isis redistribute direct enable
exit
isis apply redistribute direct vrf green
    
```

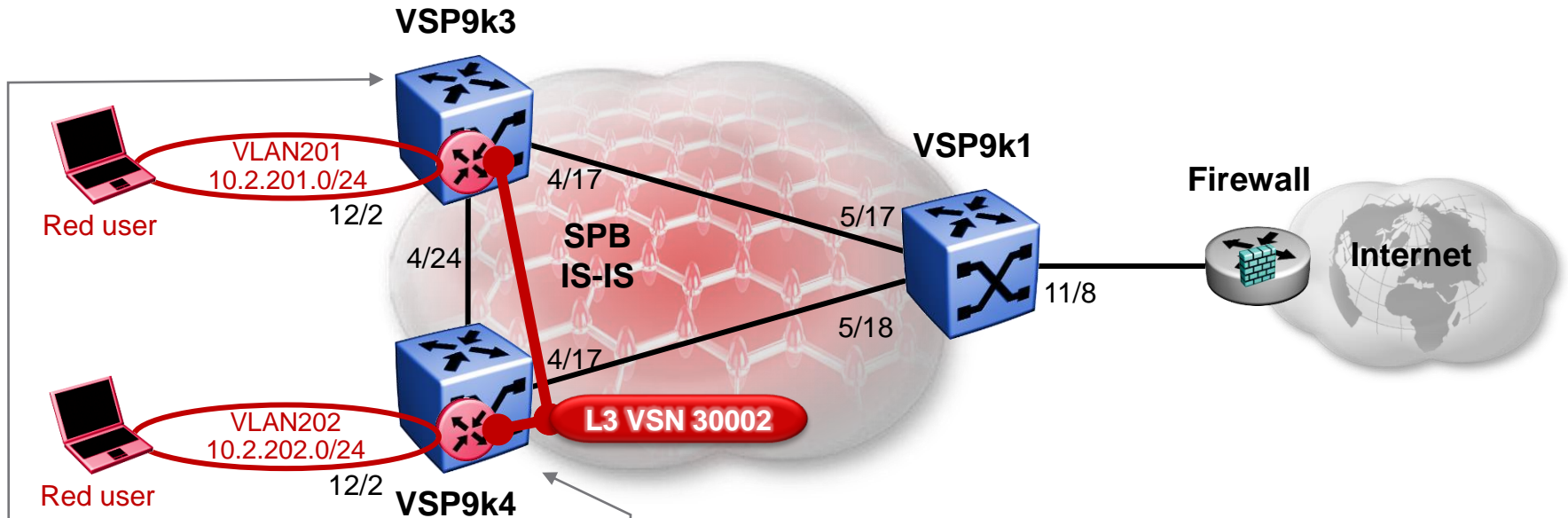
```

ip vrf green vrfid 1
vlan create 102 type port-mstprstp 0
vlan members add 102 12/1
interface vlan 102
    vrf green
    ip address 10.1.102.1 255.255.255.0
exit
router vrf green
    ipvpn
    i-sid 30001
    ipvpn enable
    isis redistribute direct
    isis redistribute direct enable
exit
isis apply redistribute direct vrf green
    
```



Shared Internet Firewall

Red VSN Config



```

ip vrf red vrfid 2
vlan create 201 type port-mstprstp 0
vlan members add 201 12/2
interface vlan 201
vrf red
ip address 10.2.201.1 255.255.255.0
exit
router vrf red
ipvpn
i-sid 30002
ipvpn enable
isis redistribute direct
isis redistribute direct enable
exit
isis apply redistribute direct vrf red
  
```

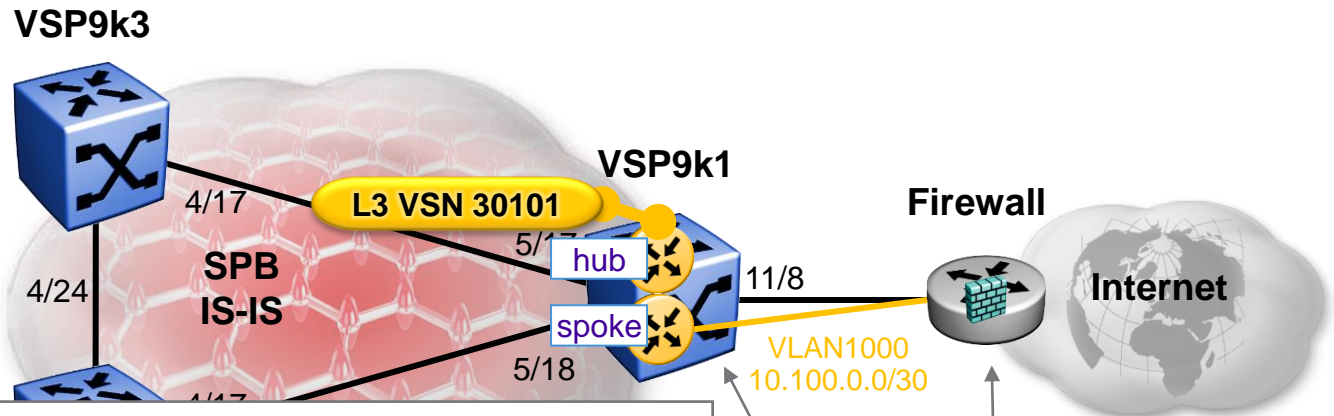
```

ip vrf red vrfid 2
vlan create 202 type port-mstprstp 0
vlan members add 202 12/2
interface vlan 202
vrf red
ip address 10.2.202.1 255.255.255.0
exit
router vrf red
ipvpn
i-sid 30002
ipvpn enable
isis redistribute direct
isis redistribute direct enable
exit
isis apply redistribute direct vrf red
  
```



Shared Internet Firewall

Firewall VSN Config



```

ip vrf fw-hub vrfid 101
ip vrf fw-spoke vrfid 102
vlan create 1000 type port-mstprstp 0
interface gigabitEthernet 11/8
    encapsulation dot1q
exit
vlan members remove 1 11/8
vlan members add 1000 11/8
interface vlan 1000
    vrf fw-spoke
    ip address 10.100.0.1 255.255.255.252
exit
router vrf fw-hub
    ip route 0.0.0.0 0.0.0.0 10.100.0.2 weight 10 next-hop-vrf fw-spoke
    ipvpn
    i-sid 30101
    ipvpn enable
    isis redistribute static
    isis redistribute static enable
exit
isis apply redistribute static vrf fw-hub
  
```

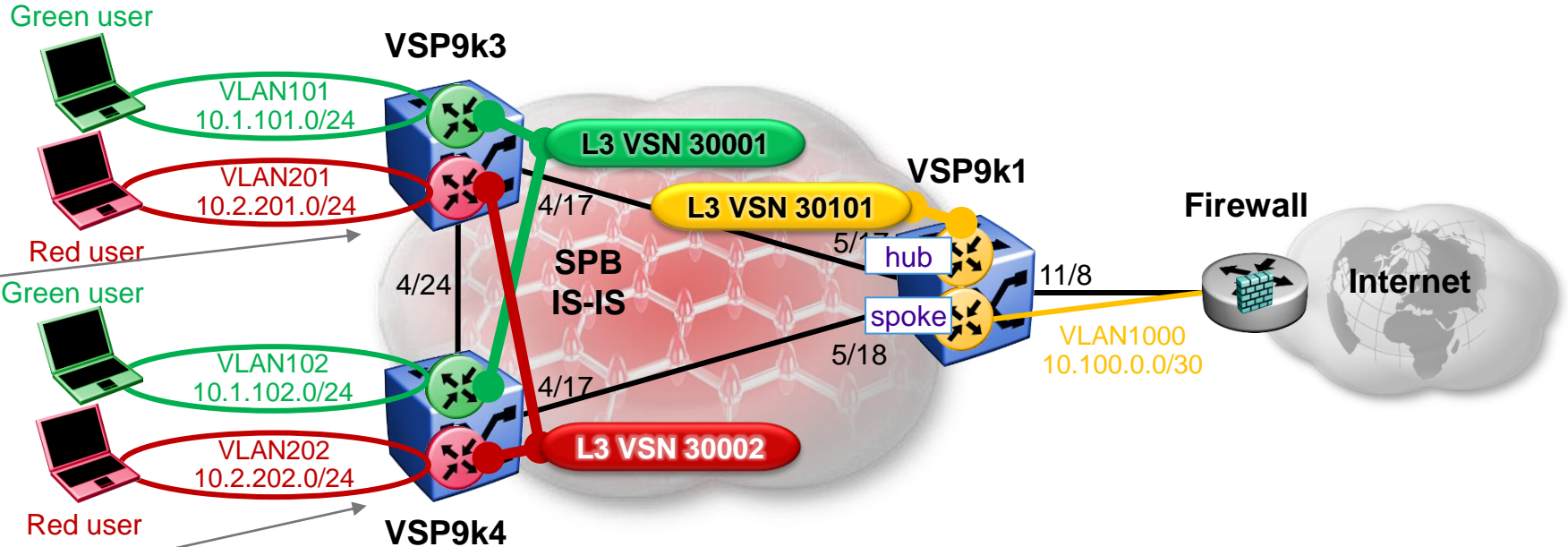
```

interface vlan 1000
    ip address 10.100.0.2 255.255.255.252
exit
  
```

- VRF Hub has the default route so we need it to be L3VSN so that we can pick up the default route elsewhere in the Fabric

Shared Internet Firewall

Checking Green VSN routes



```
VSP9000-4:1# show ip route vrf green
```

```
IP Route - VRF green
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	VSP9000-3	green	10 4051	ISIS	0	IBSV	7
10.1.102.0	255.255.255.0	10.1.102.1	-	1 102	LOC	0	DB	0

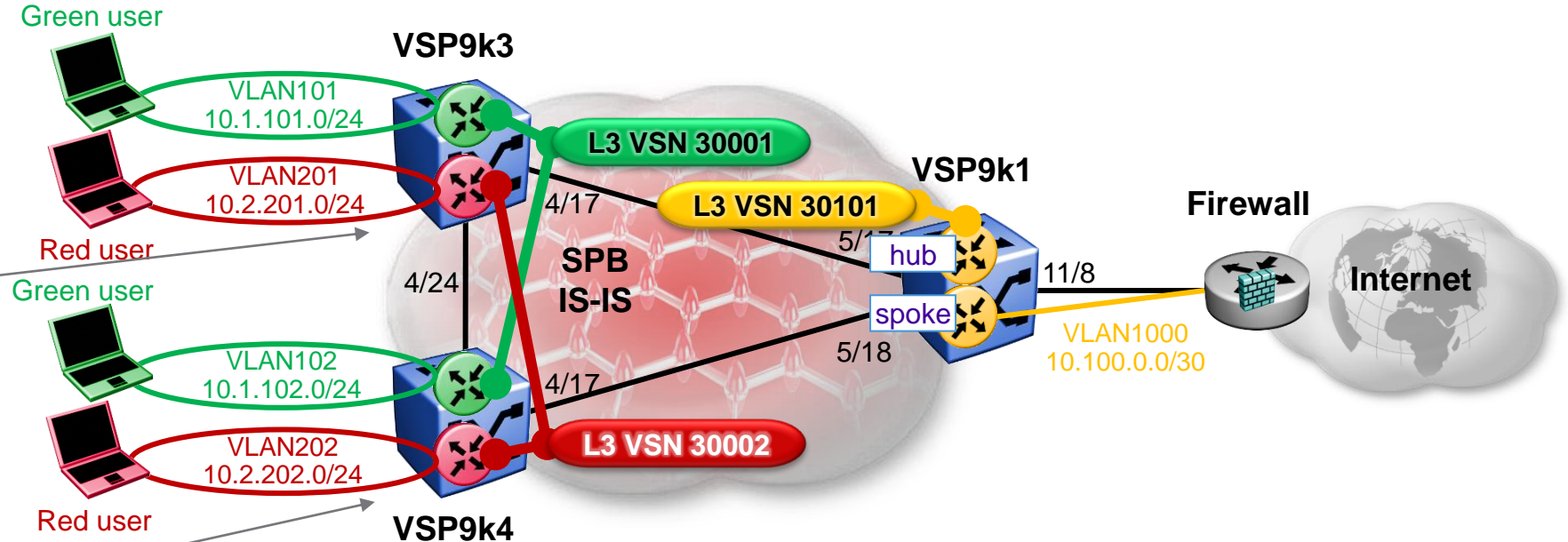
```
VSP9000-3:1# show ip route vrf green
```

```
IP Route - VRF green
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.1.101.0	255.255.255.0	10.1.101.1	-	1 101	LOC	0	DB	0
10.1.102.0	255.255.255.0	VSP9000-4	green	10 4051	ISIS	0	IBSV	7

Shared Internet Firewall

Checking Red VSN routes



```
VSP9000-4:1# show ip route vrf red
```

```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	VSP9000-3	red	10 4051	ISIS	0	IBSV	7
10.2.202.0	255.255.255.0	10.2.202.1	-	1 202	LOC	0	DB	0

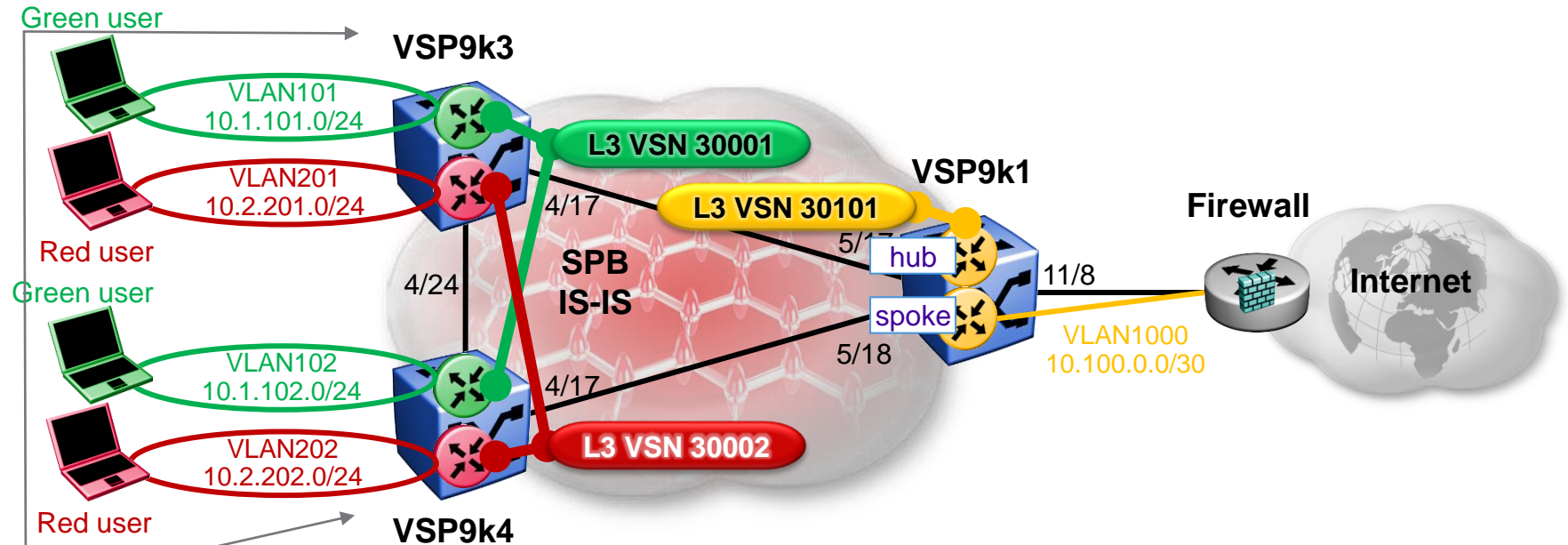
```
VSP9000-3:1# show ip route vrf red
```

```
IP Route - VRF red
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
10.2.201.0	255.255.255.0	10.2.201.1	-	1 201	LOC	0	DB	0
10.2.202.0	255.255.255.0	VSP9000-4	red	10 4051	ISIS	0	IBSV	7

Shared Internet Firewall

Accept default route into Green & Red VSNs



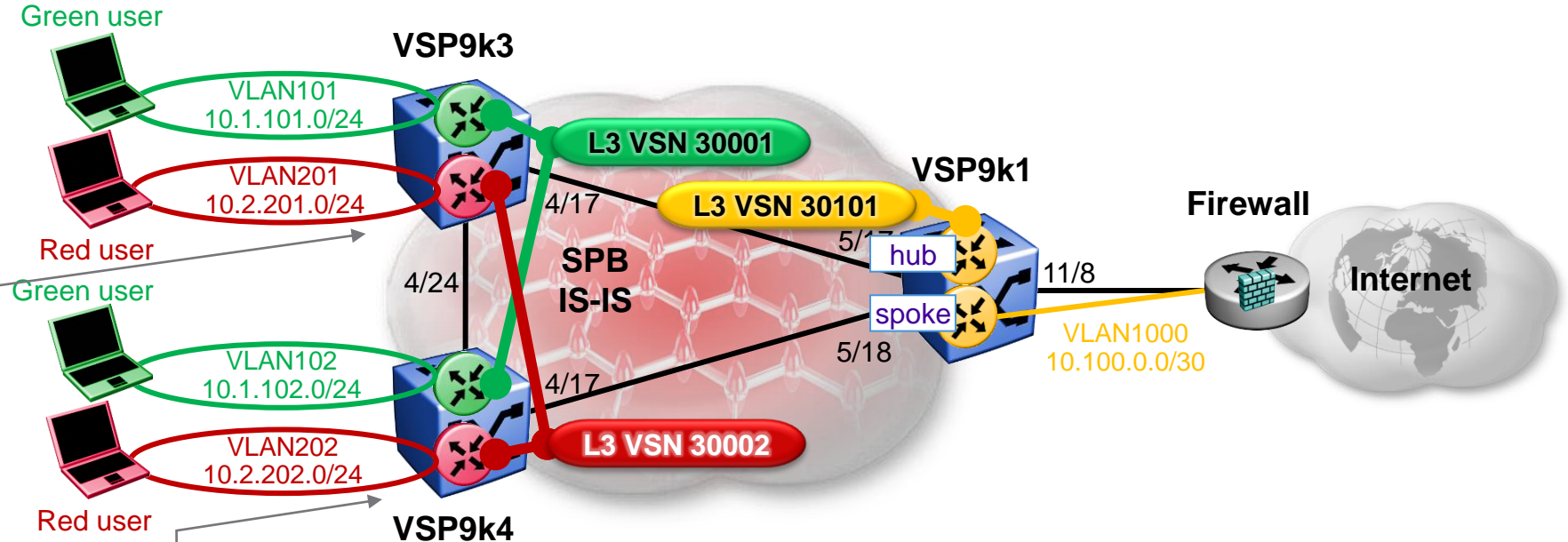
```

router vrf green
  isis accept i-sid 30101 enable
exit
isis apply accept vrf green

router vrf red
  isis accept i-sid 30101 enable
exit
isis apply accept vrf red
  
```

Shared Internet Firewall

Checking Green VSN Routes



```
VSP9000-4:1#% show ip route vrf green
```

IP Route - **VRF green**

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-1	30101	10	4051	ISIS 0		IBSV 200	
10.1.101.0	255.255.255.0	VSP9000-3	green	10	4051	ISIS 0		IBSV 7	
10.1.102.0	255.255.255.0	10.1.102.1	-	1	102	LOC 0		DB 0	

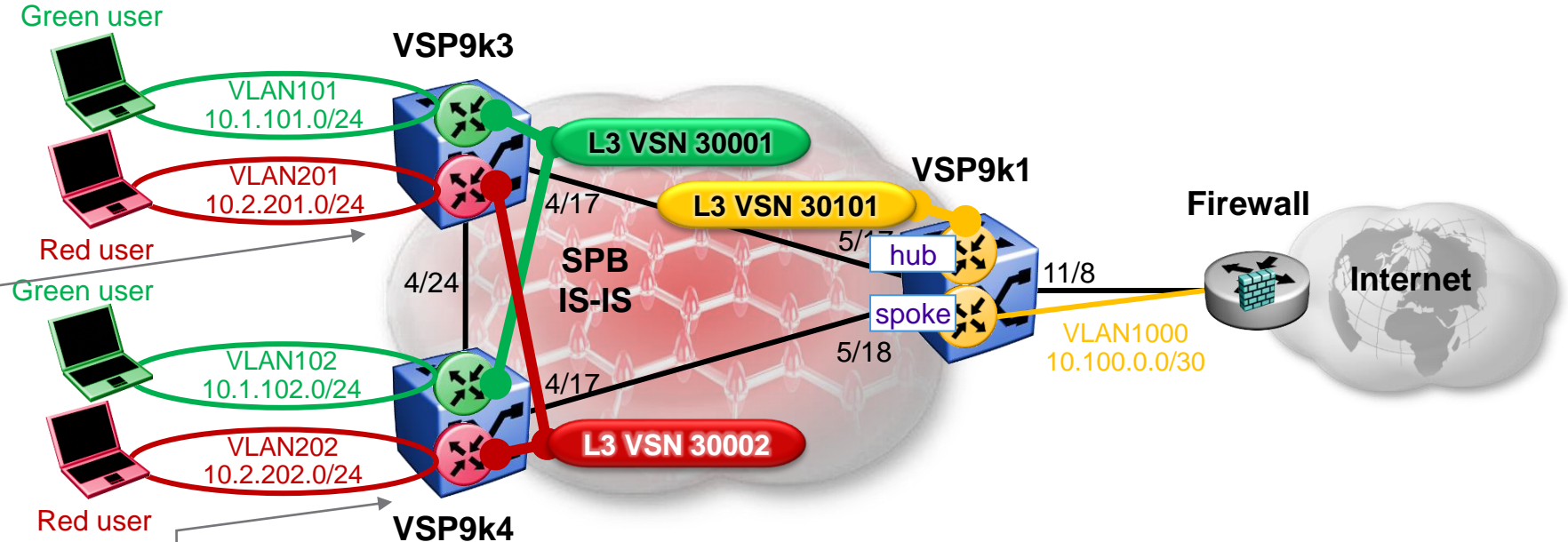
IP Route - **VRF green**

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-1	30101	10	4051	ISIS 0		IBSV 200	
10.1.101.0	255.255.255.0	10.1.101.1	-	1	101	LOC 0		DB 0	
10.1.102.0	255.255.255.0	VSP9000-4	green	10	4051	ISIS 0		IBSV 7	



Shared Internet Firewall

Checking Red VSN Routes



```
VSP9000-4:1#% show ip route vrf red
```

IP Route - **VRF red**

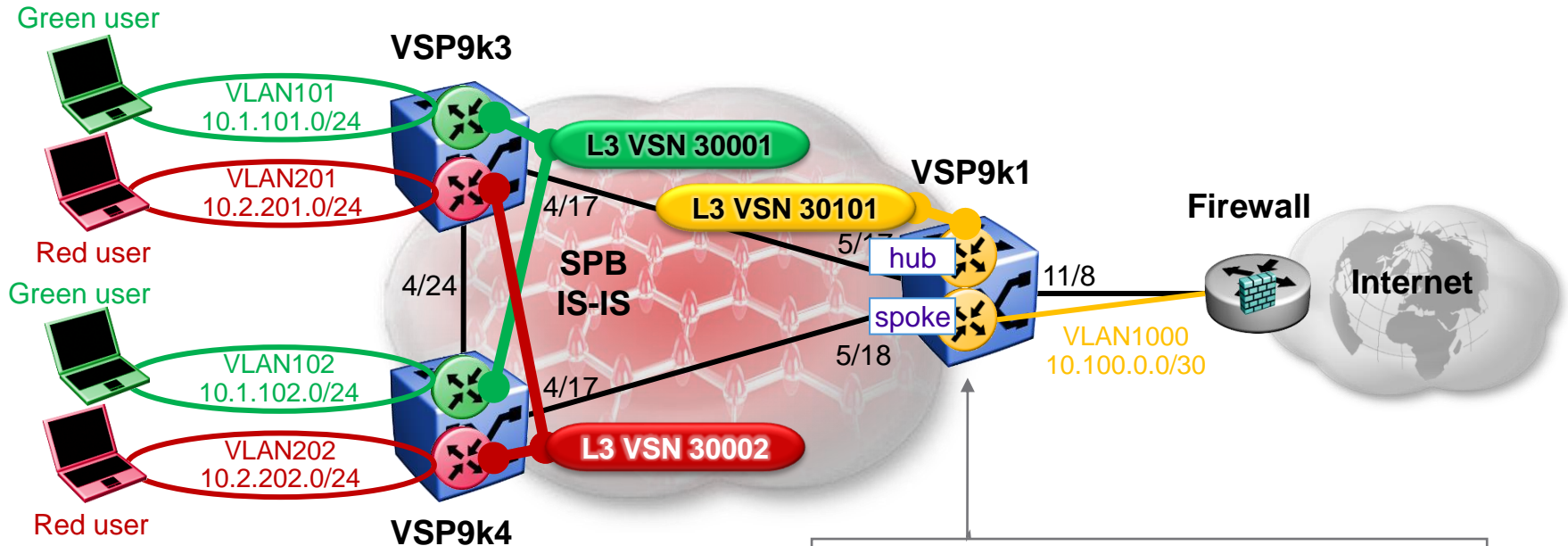
DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-1	30101	10	4051	ISIS 0		IBSV 200	
10.2.201.0	255.255.255.0	VSP9000-3	red	10	4051	ISIS 0		IBSV 7	
10.2.202.0	255.255.255.0	10.2.202.1	-	1	202	LOC 0		DB 0	

IP Route - **VRF red**

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-1	30101	10	4051	ISIS 0		IBSV 200	
10.2.201.0	255.255.255.0	10.2.201.1	-	1	201	LOC 0		DB 0	
10.2.202.0	255.255.255.0	VSP9000-4	red	10	4051	ISIS 0		IBSV 7	

Shared Internet Firewall

Accept Green & Red subnets into VRF FW-Spoke

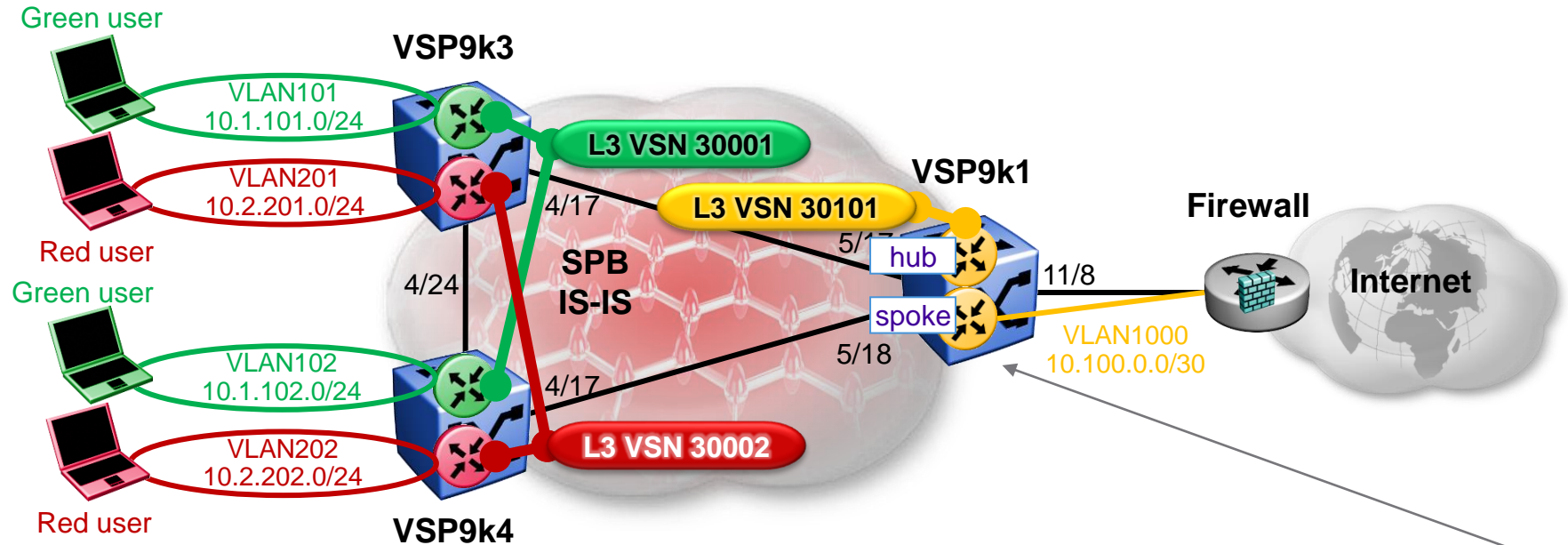


- In order to ISIS Accept IP routes, we need ISIS (IPVPN) to be enabled on the VRF
- In order to enable IPVPN an I-SID needs to be assigned
 - So in this case I-SID 30102 will not actually be used to advertise any IP routes

```
router vrf fw-spoke
  ipvpn
  i-sid 30102
  ipvpn enable
  ip isid-list users 30001
  ip isid-list users 30002
  isis accept isid-list users enable
exit
isis apply accept vrf fw-spoke
```

Shared Internet Firewall

Checking VRF FW-Spoke Routes



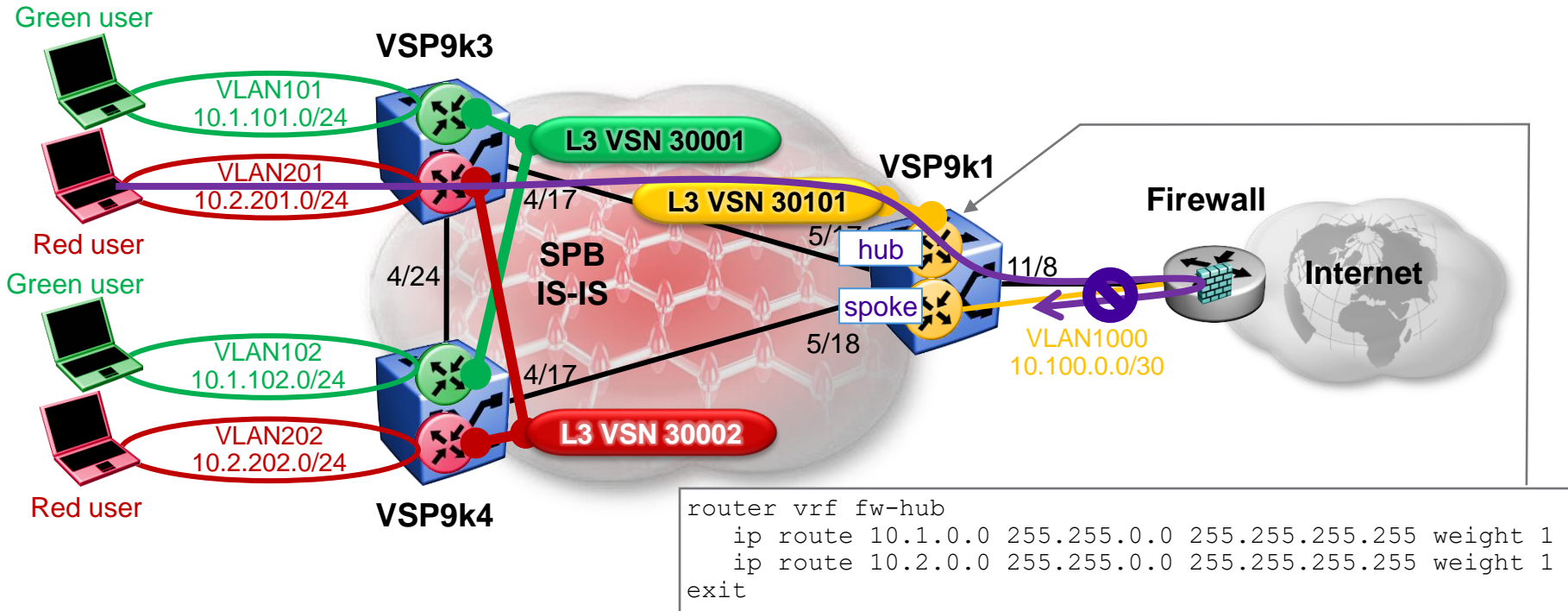
```
VSP9000-1:1#% show ip route vrf fw-spoke
```

IP Route - **VRF fw-spoke**

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE PROT AGE TYPE PRF
10.1.101.0	255.255.255.0	VSP9000-3	30001	10 4051 ISIS 0 IBSV 200
10.1.102.0	255.255.255.0	VSP9000-4	30001	10 4051 ISIS 0 IBSV 200
10.2.201.0	255.255.255.0	VSP9000-3	30002	10 4051 ISIS 0 IBSV 200
10.2.202.0	255.255.255.0	VSP9000-4	30002	10 4051 ISIS 0 IBSV 200
10.100.0.0	255.255.255.252	10.100.0.1	-	1 1000 LOC 0 DB 0

Shared Internet Firewall

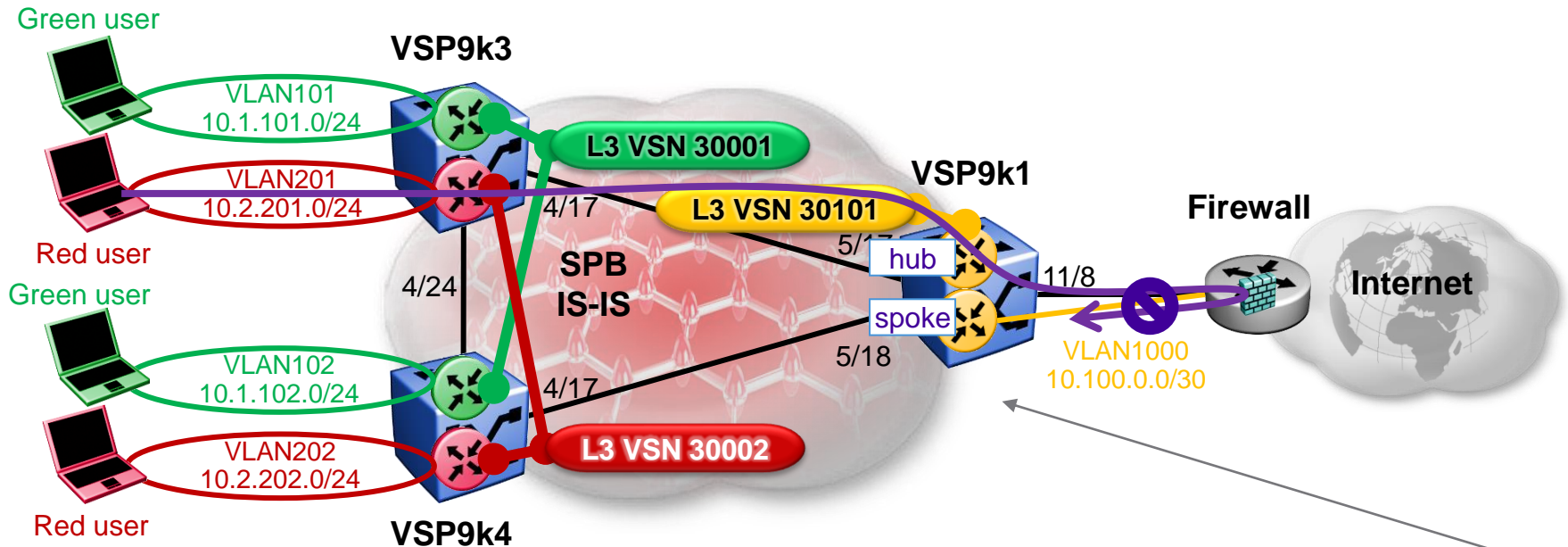
Spoke – Spoke Routing considerations cont.



- To be 100% safe, you could also configure a black-hole static route on the Fw-Hub VRF such that any packet received from the Fabric (from Green or Red VSNs because it followed the default route) should be dropped if its IP destination corresponds to a Green or Red VSN subnet
 - Note: Although this will not work for Green/Red VRFs co-located on the same BEB as the FW-Hub VRF, as the default route they import will carry with it the next-hop IP of the Firewall

Shared Internet Firewall

Checking VRF FW-Hub Black-Hole Routes



```
VSP9000-1:1#% show ip route vrf fw-hub
```

```
IP Route - VRF fw-hub
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	10.100.0.2	fw-spoke	10 1000	STAT	0	IB	5
10.1.0.0	255.255.0.0	255.255.255.255	-	1 0	STAT	0	IB	5
10.2.0.0	255.255.0.0	255.255.255.255	-	1 0	STAT	0	IB	5

- Next-hop IP 255.255.255.255 = black-hole route

Using static routes over SPB ISIS

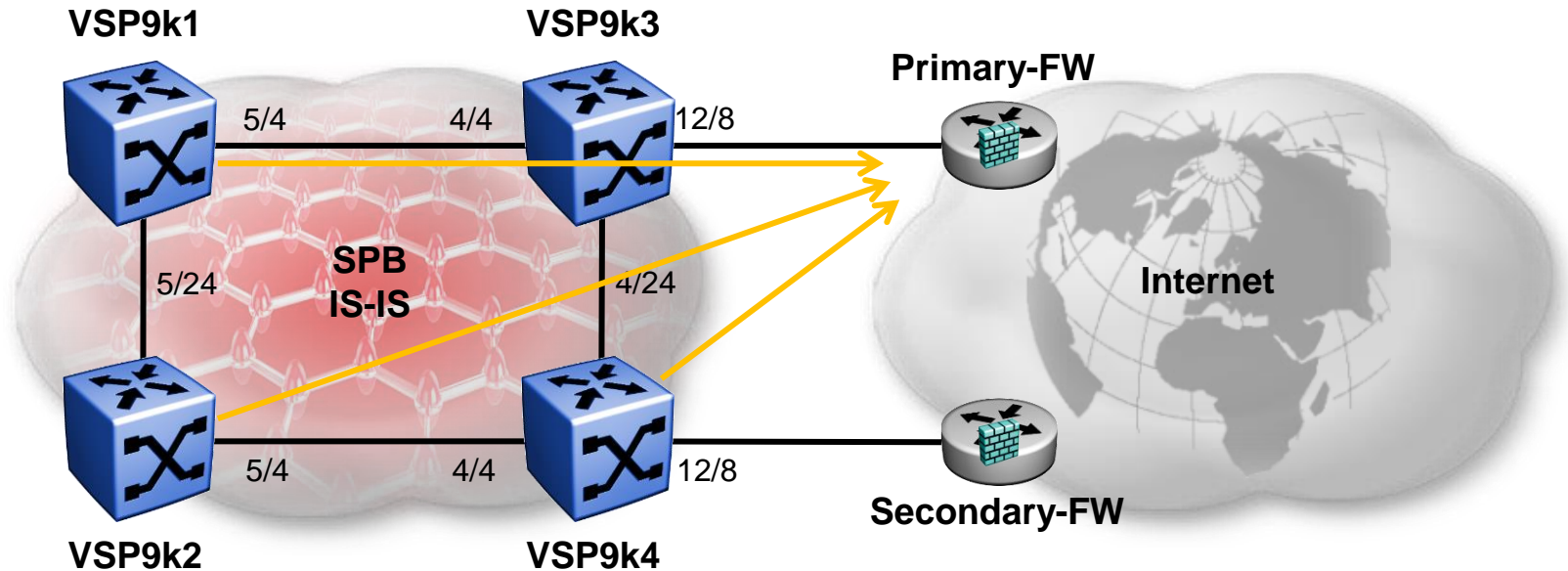
Last tested with: 4.0.0.0_B037

Example use #5



Forcing SPB traffic to a Primary FW

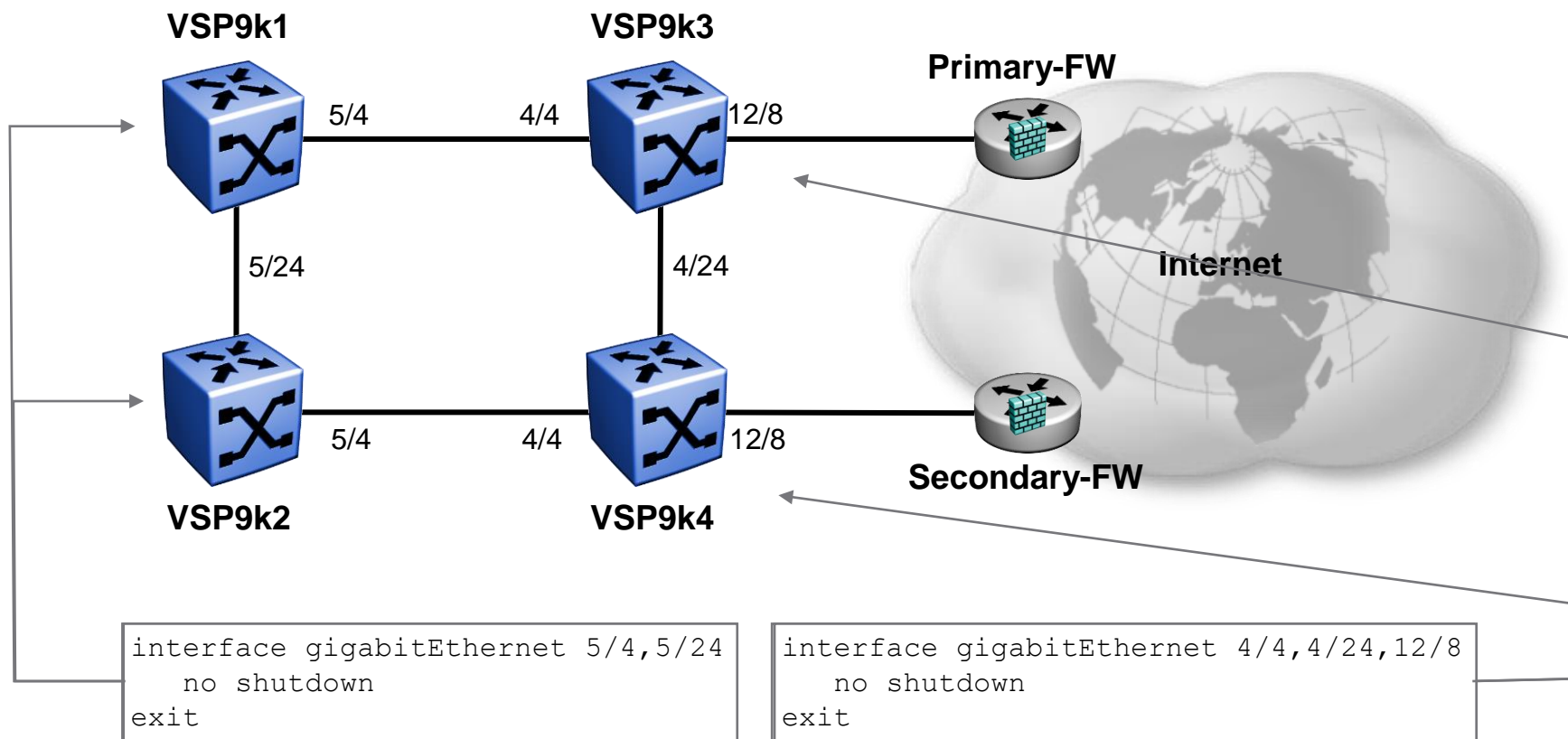
Goal



- Both VSP9k3 & VSP9k4 have a static route pointing to their connected Firewall
- Both VSP9k3 & VSP9k4 redistribute this static route into ISIS
- We want SPB Fabric to always follow default route to Primary-FW
 - Only follow default route to Secondary-FW if Primary-FW fails
- Challenge: from VSP9k2 the default route to Primary-FW is not the shortest path default route
- NOTE: The config using non-local static routes used in this section only works on GRT

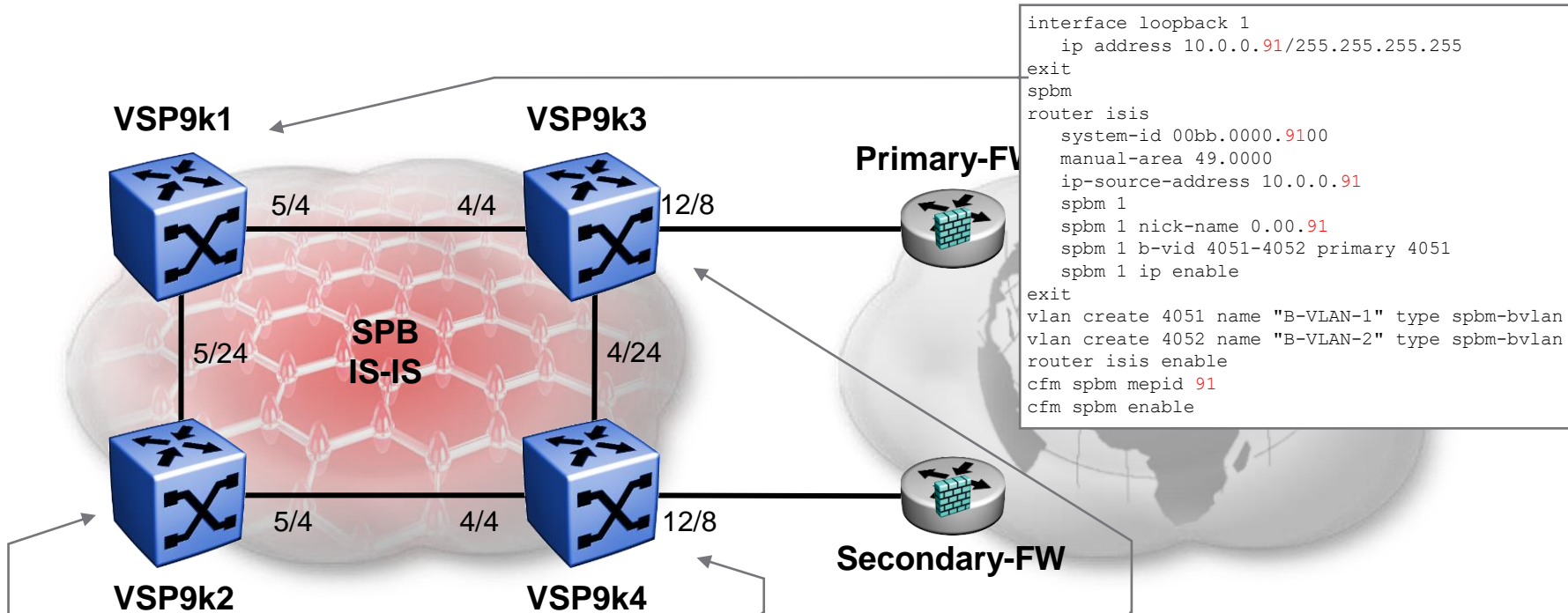
Forcing SPB traffic to a Primary FW

Interfaces used



Forcing SPB traffic to a Primary FW

SPB Global Config



```

interface loopback 1
  ip address 10.0.0.91/255.255.255.255
exit
spbm
router isis
  system-id 00bb.0000.9100
  manual-area 49.0000
  ip-source-address 10.0.0.91
  spbm 1
  spbm 1 nick-name 0.00.91
  spbm 1 b-vid 4051-4052 primary 4051
  spbm 1 ip enable
exit
vlan create 4051 name "B-VLAN-1" type spbm-bvlan
vlan create 4052 name "B-VLAN-2" type spbm-bvlan
router isis enable
cfm spbm mepid 91
cfm spbm enable
  
```

```

interface loopback 1
  ip address 10.0.0.92/255.255.255.255
exit
spbm
router isis
  system-id 00bb.0000.9200
  manual-area 49.0000
  ip-source-address 10.0.0.92
  spbm 1
  spbm 1 nick-name 0.00.92
  spbm 1 b-vid 4051-4052 primary 4051
  spbm 1 ip enable
exit
vlan create 4051 name "B-VLAN-1" type spbm-bvlan
vlan create 4052 name "B-VLAN-2" type spbm-bvlan
router isis enable
cfm spbm mepid 92
cfm spbm enable
  
```

```

interface loopback 1
  ip address 10.0.0.94/255.255.255.255
exit
spbm
router isis
  system-id 00bb.0000.9400
  manual-area 49.0000
  ip-source-address 10.0.0.94
  spbm 1
  spbm 1 nick-name 0.00.94
  spbm 1 b-vid 4051-4052 primary 4051
  spbm 1 ip enable
exit
vlan create 4051 name "B-VLAN-1" type spbm-bvlan
vlan create 4052 name "B-VLAN-2" type spbm-bvlan
router isis enable
cfm spbm mepid 94
cfm spbm enable
  
```

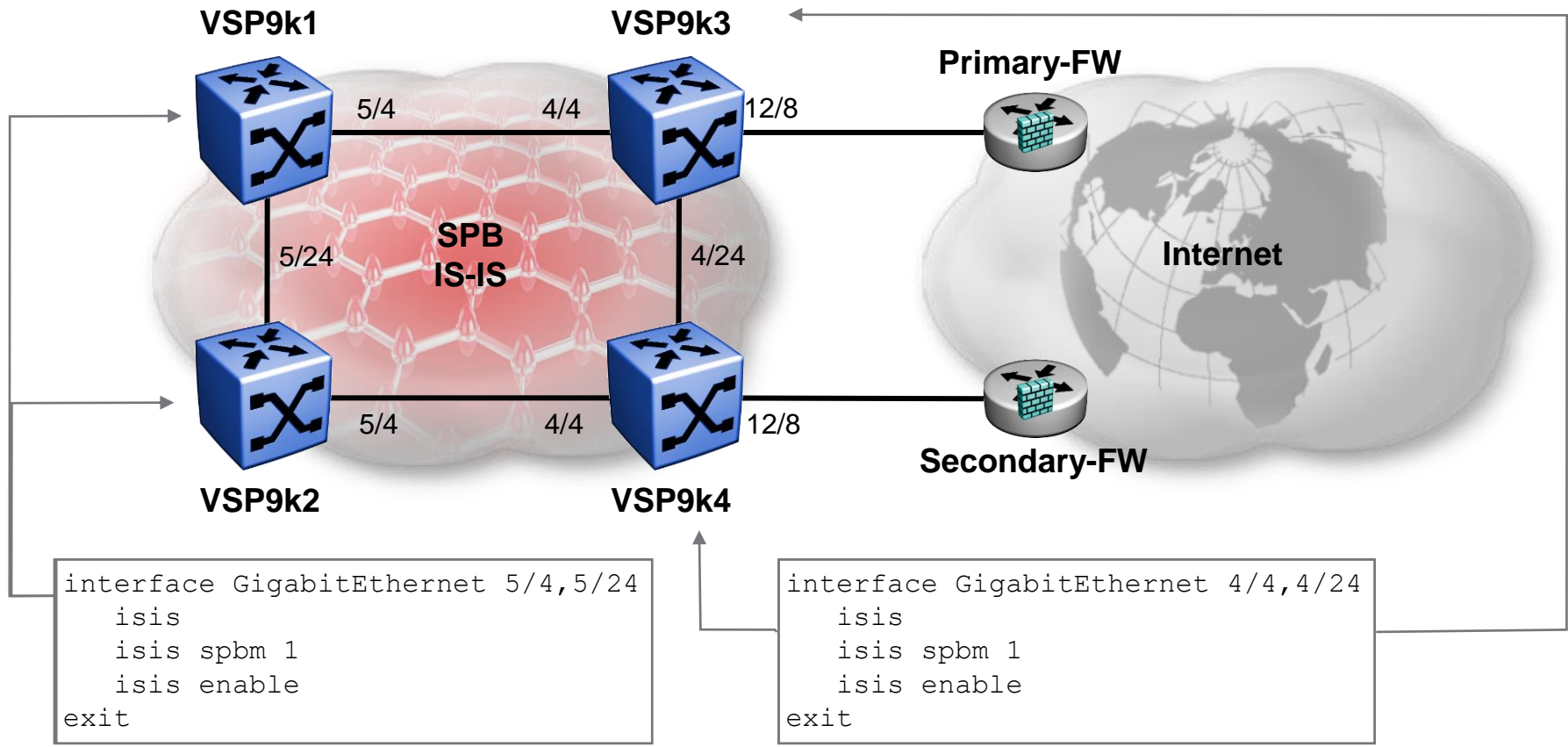
```

interface loopback 1
  ip address 10.0.0.93/255.255.255.255
exit
spbm
router isis
  system-id 00bb.0000.9300
  manual-area 49.0000
  ip-source-address 10.0.0.93
  spbm 1
  spbm 1 nick-name 0.00.93
  spbm 1 b-vid 4051-4052 primary 4051
  spbm 1 ip enable
exit
vlan create 4051 name "B-VLAN-1" type spbm-bvlan
vlan create 4052 name "B-VLAN-2" type spbm-bvlan
router isis enable
cfm spbm mepid 93
cfm spbm enable
  
```



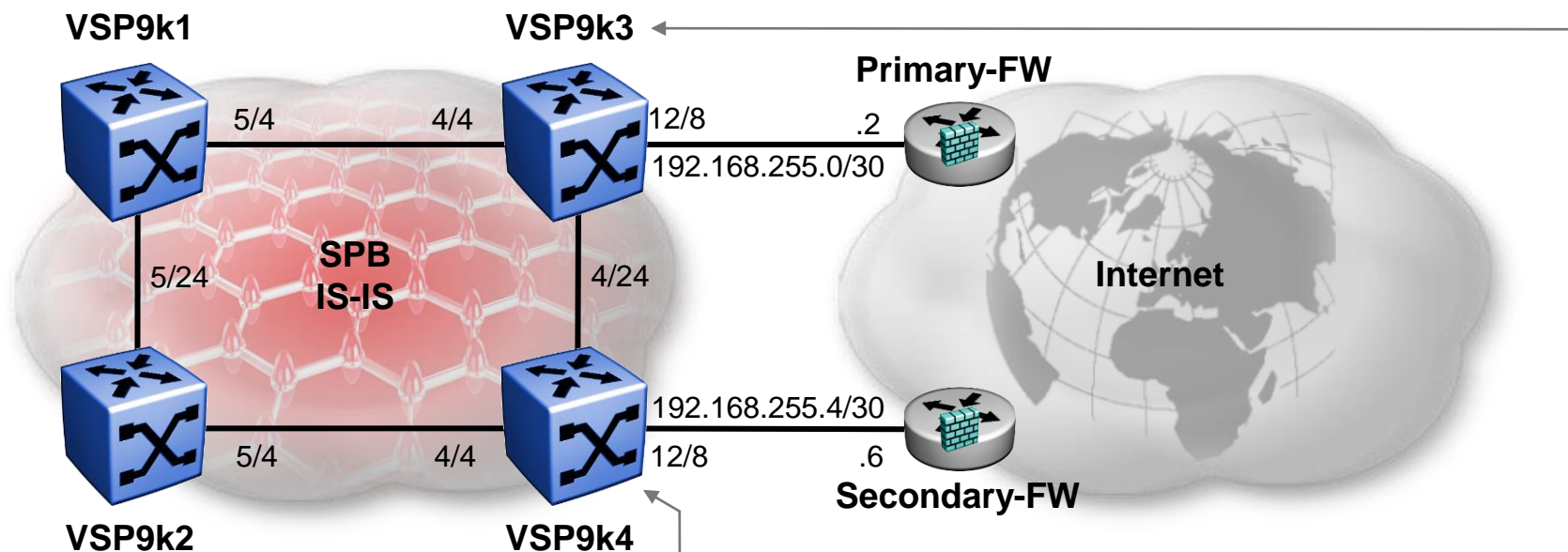
Forcing SPB traffic to a Primary FW

SPB Interface Config



Forcing SPB traffic to a Primary FW

ISIS Redistribution on BEBs connected to FWs

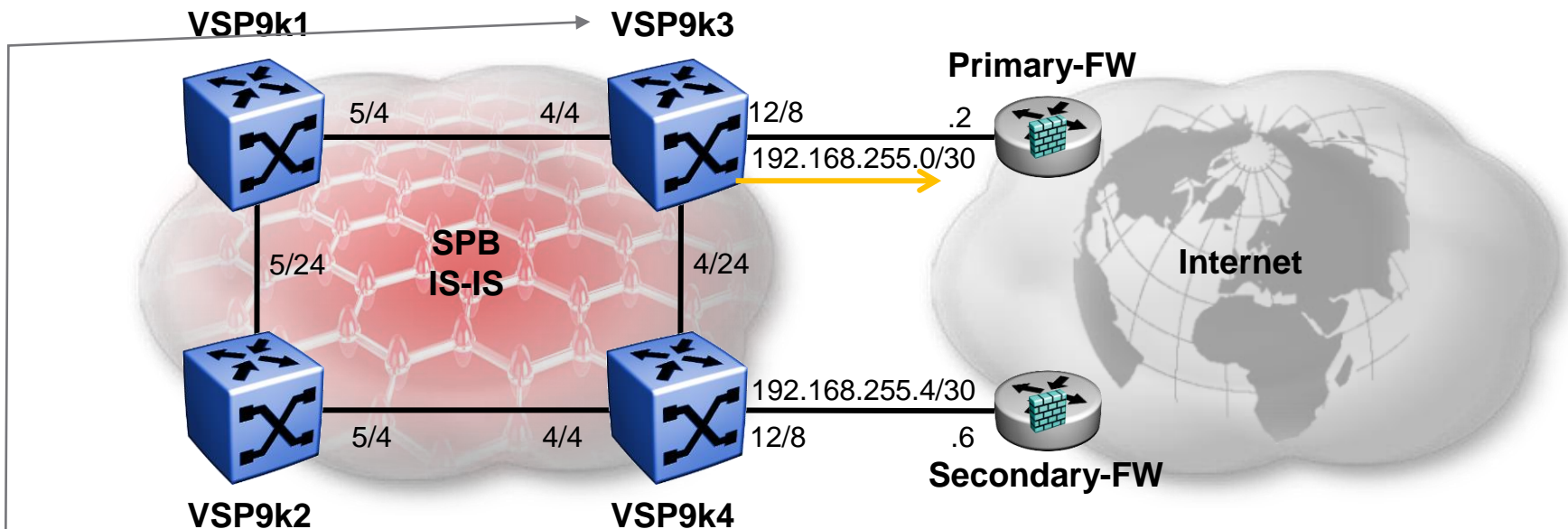


```
vlan members remove 1 12/8
interface gigabitEthernet 12/8
    no spanning-tree mstp force-port-state enable
exit
interface GigabitEthernet 12/8
    brouter vlan 3901 subnet 192.168.255.5/30
exit
ip route 0.0.0.0 0.0.0.0 192.168.255.6 weight 200
router isis
    redistribute direct
    redistribute direct enable
    redistribute static
    redistribute static enable
exit
isis apply redistribute direct
isis apply redistribute static
```

```
vlan members remove 1 12/8
interface gigabitEthernet 12/8
    no spanning-tree mstp force-port-state enable
exit
interface GigabitEthernet 12/8
    brouter vlan 3901 subnet 192.168.255.1/30
exit
ip route 0.0.0.0 0.0.0.0 192.168.255.2 weight 100
router isis
    redistribute direct
    redistribute direct enable
    redistribute static
    redistribute static enable
exit
isis apply redistribute direct
isis apply redistribute static
```

Forcing SPB traffic to a Primary FW

Checking IP routes



```
VSP9000-3:1#% show ip route
```

```
IP Route - GlobalRouter
```

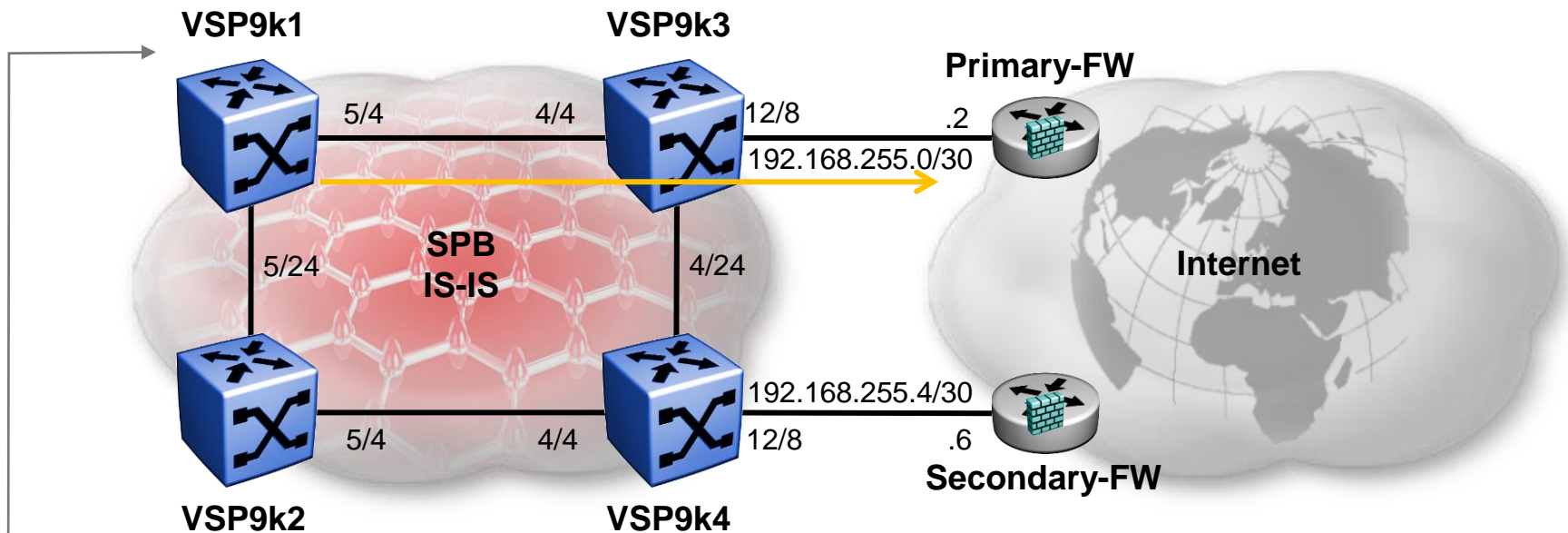
DST	MASK	NEXT	NH VRF/ISID	INTER COST	FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	192.168.255.2	GlobalRouter	100	12/8	STAT 0		IB	5
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.93	255.255.255.255	10.0.0.93	-	1	0	LOC	0	DB	0
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.0	255.255.255.252	192.168.255.1	-	1	12/8	LOC	0	DB	0
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7

▪ OK, so far so good



Forcing SPB traffic to a Primary FW

Checking IP routes



```
VSP9000-1:1#% show ip route
```

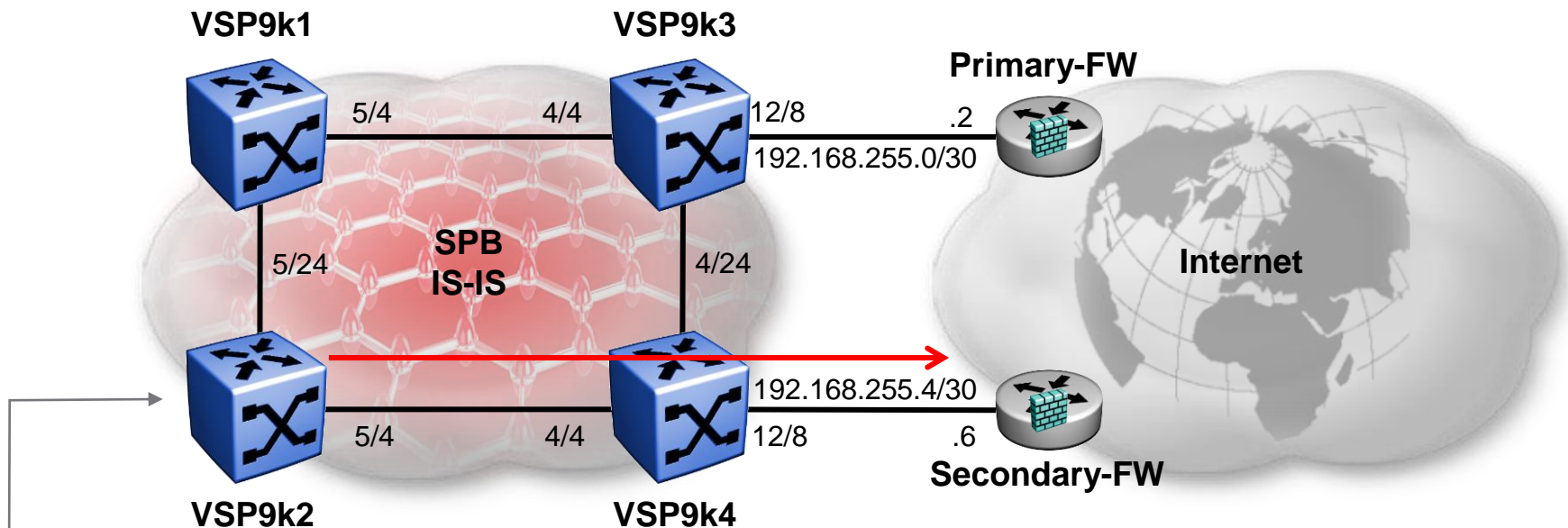
```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.91	255.255.255.255	10.0.0.91	-	1	0	LOC	0	DB	0
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.93	255.255.255.255	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7
192.168.255.0	255.255.255.252	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7

- OK, so far so good

Forcing SPB traffic to a Primary FW

Checking IP routes



```
VSP9000-2:1#% show ip route
```

```
IP Route - GlobalRouter
```

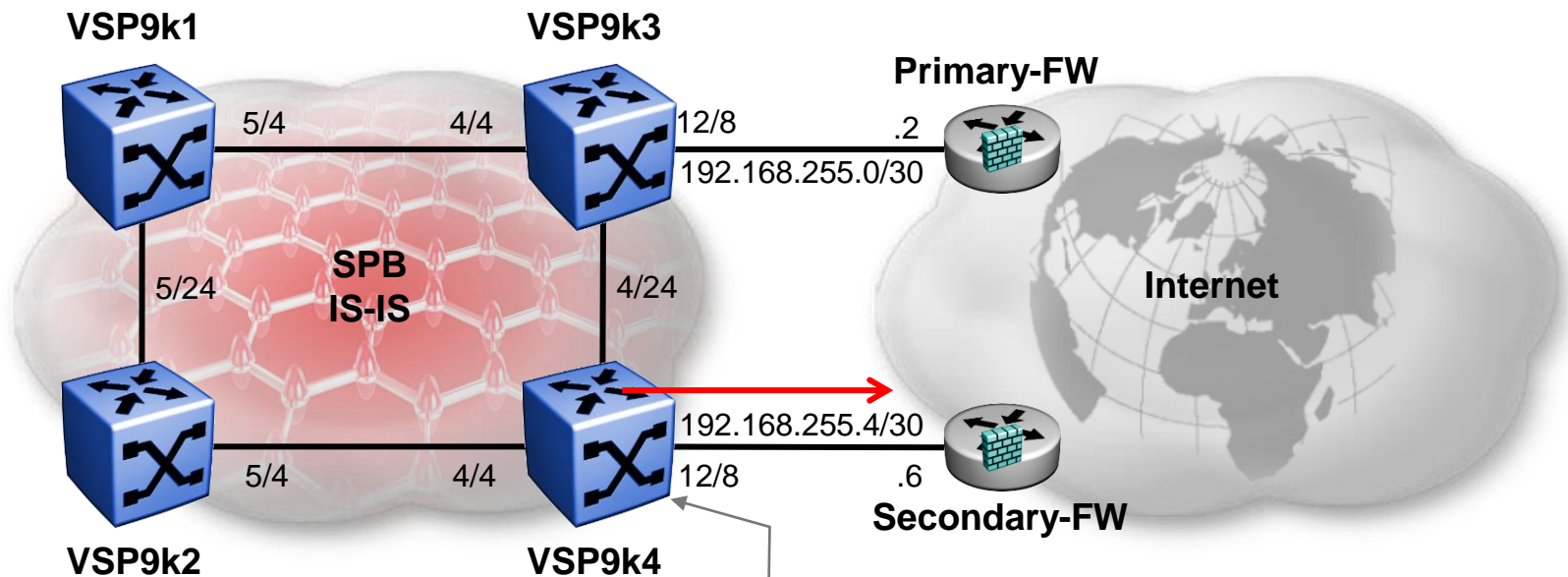
DST	MASK	NEXT	NH VRF/ISID	INTER COST	FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	10.0.0.92	-	1	0	LOC	0	DB	0
10.0.0.93	255.255.255.255	VSP9000-3	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.0	255.255.255.252	VSP9000-3	GlobalRouter	20	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7

- VSP9k2 is pointing at Secondary-FW; this is not what we wanted



Forcing SPB traffic to a Primary FW

Checking IP routes



```
VSP9000-4:1#% show ip route
```

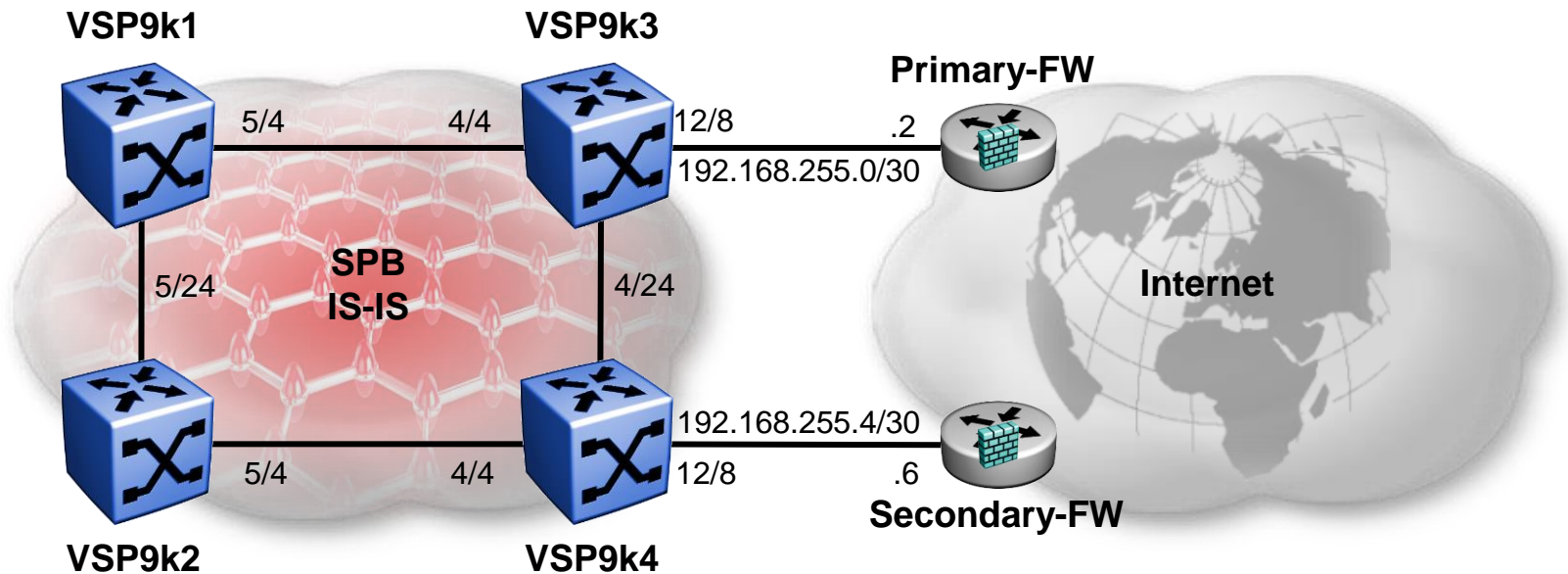
```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST	FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	192.168.255.6	GlobalRouter	200	12/8	STAT	0	IB	5
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.93	255.255.255.255	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	10.0.0.94	-	1	0	LOC	0	DB	0
192.168.255.0	255.255.255.252	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	192.168.255.5	-	1	12/8	LOC	0	DB	0

- VSP9k4 is pointing at Secondary-FW; this is not what we wanted

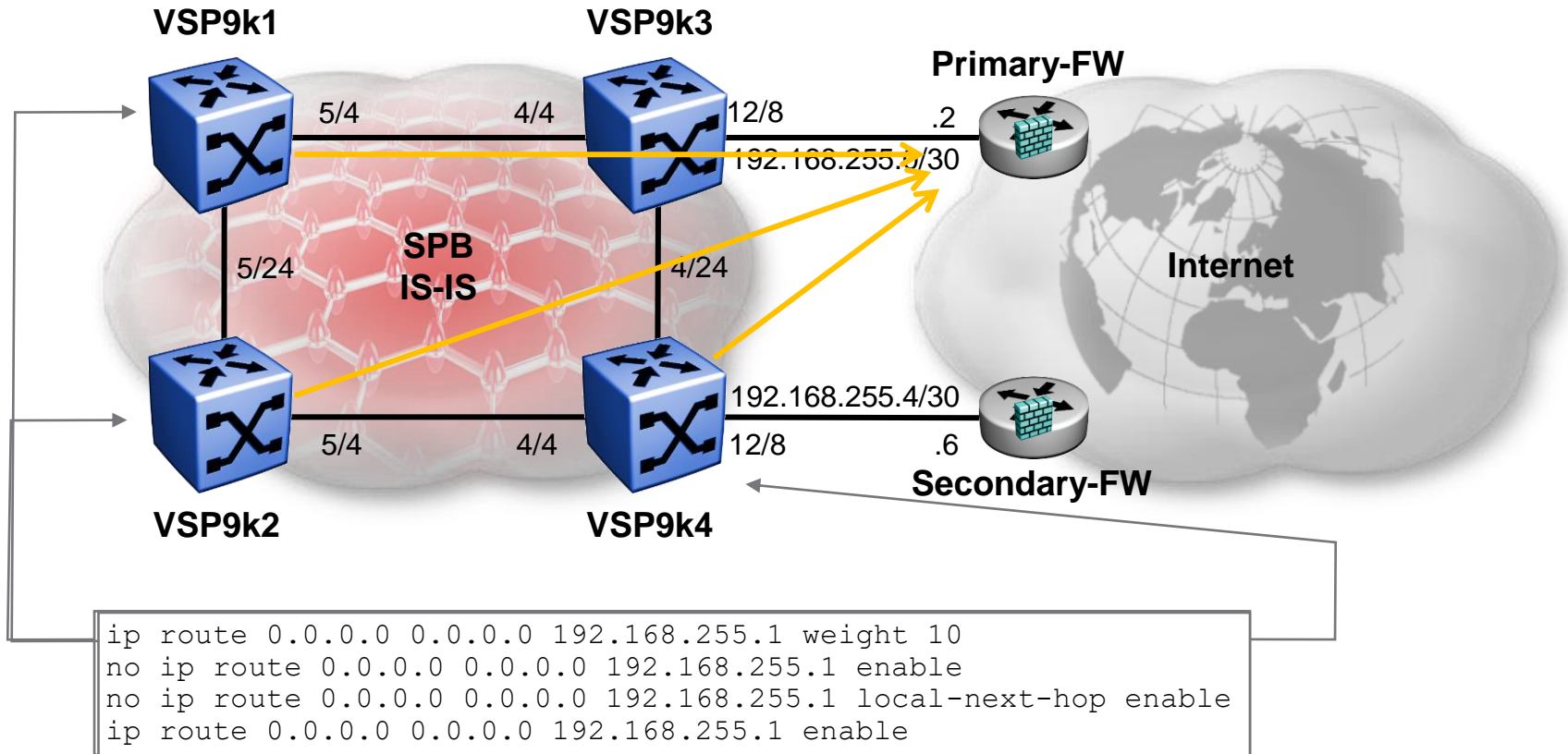
Forcing SPB traffic to a Primary FW

External/Internal type routes



- In a future software release it will be possible to mark SPB IS-IS IP routes as one of 2 possible types:
 - Internal : These routes will always be preferred over External routes; between Internal routes, the route with the lowest SPB path cost will be preferred and the external route metric is only used as a tie breaker (current default behaviour of SPB IP)
 - External : With these, if we learn the same route twice as External, then the route with the lowest external metric is preferred.
 - In this example, we would simply configure VSP9k3 & VSP9k4 to redistribute their default static route as an External type route, with VSP9k3 using a lower external metric
- As this is not possible today, the following slides will demonstrate an alternative approach based on non-local static routes (NOTE: this works only in GRT)

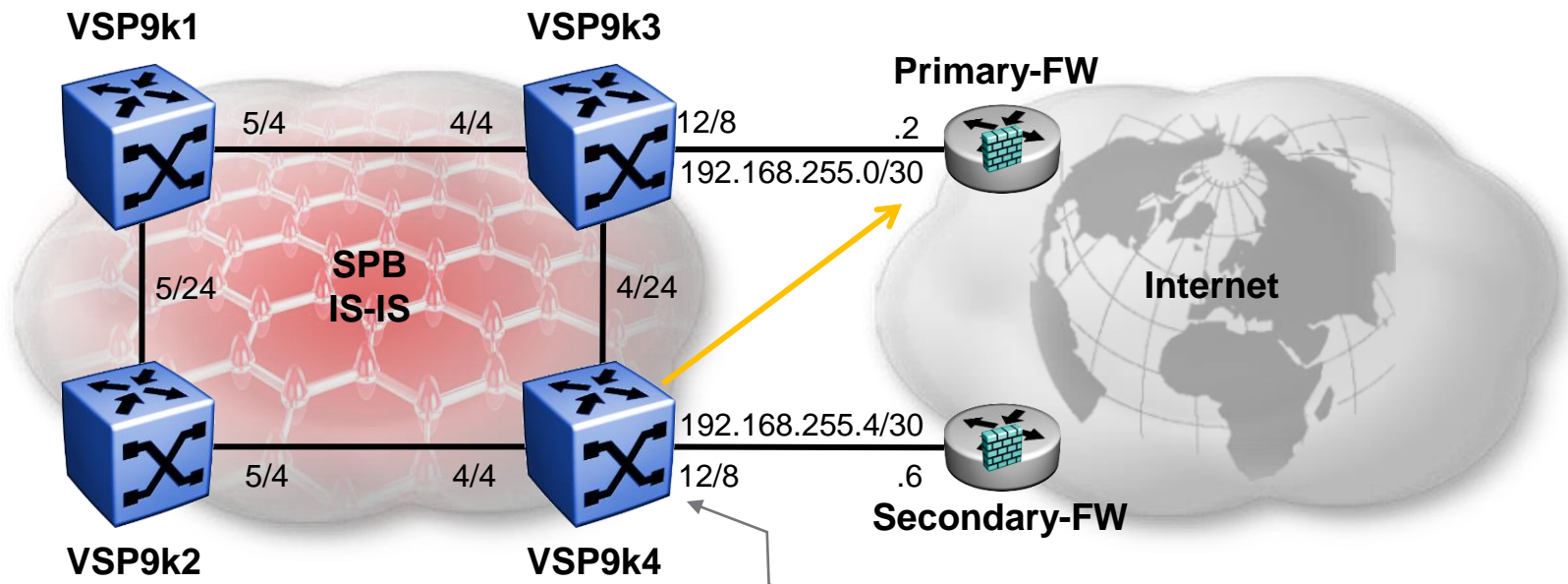
Forcing SPB traffic to a Primary FW Using Non-local static routes



- We need this non-local static route on all BEBs except VSP9k3
- Use the IP address on VSP9k3's connection to the Primary-FW as the next-hop IP
 - This will ensure that these routes de-activate if that link or the Primary-FW fails

Forcing SPB traffic to a Primary FW

Checking IP routes



```
VSP9000-4:1#% show ip route
```

```
IP Route - GlobalRouter
```

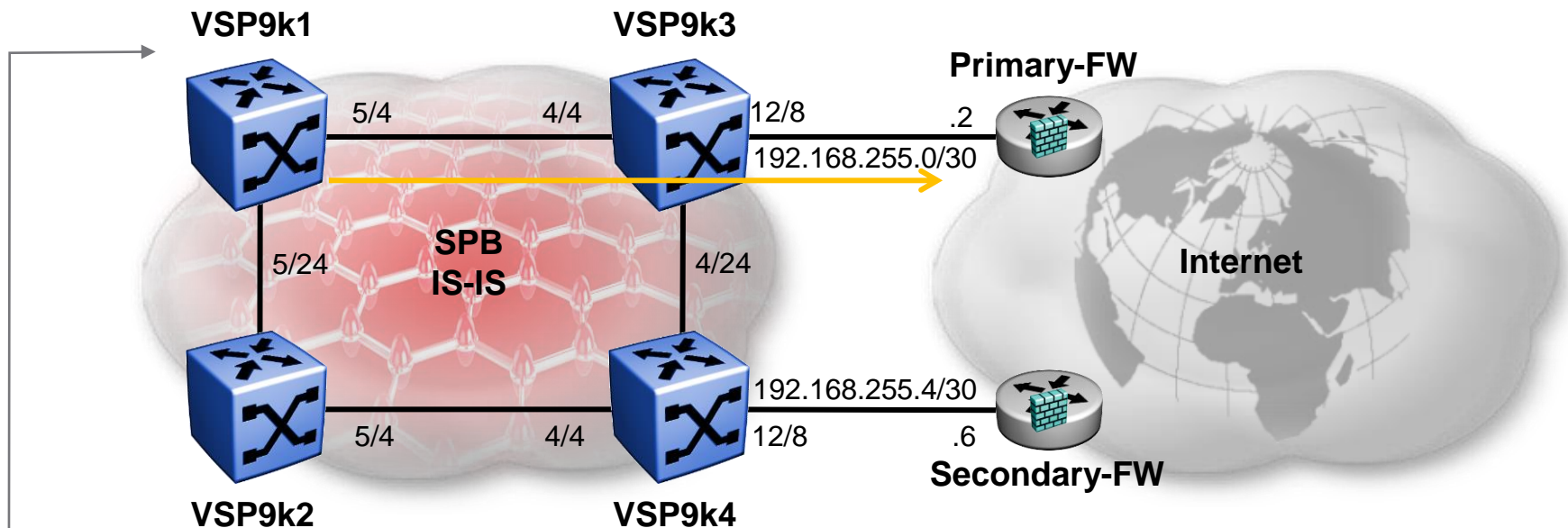
DST	MASK	NEXT	NH VRF/ISID	INTER COST	FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-3	GlobalRouter	10	4051	STAT 0		IBS	5
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.93	255.255.255.255	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	10.0.0.94	-	1	0	LOC	0	DB	0
192.168.255.0	255.255.255.252	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	192.168.255.5	-	1	12/8	LOC	0	DB	0

- Design objective achieved !



Forcing SPB traffic to a Primary FW

Checking IP routes



```
VSP9000-1:1#% show ip route
```

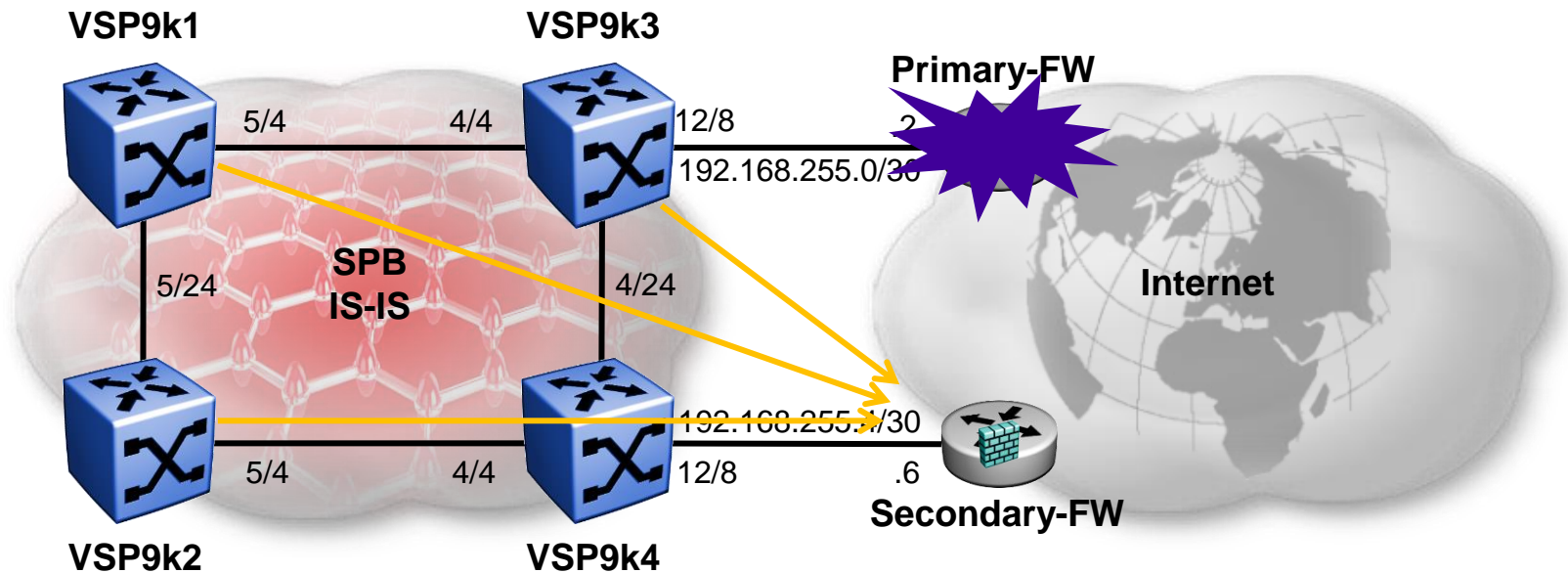
```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	INTER COST	FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-3	GlobalRouter	10	4051	STAT 0		IBS	5
10.0.0.91	255.255.255.255	10.0.0.91	-	1	0	LOC	0	DB	0
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.93	255.255.255.255	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7
192.168.255.0	255.255.255.252	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7

- Design objective achieved !

Forcing SPB traffic to a Primary FW

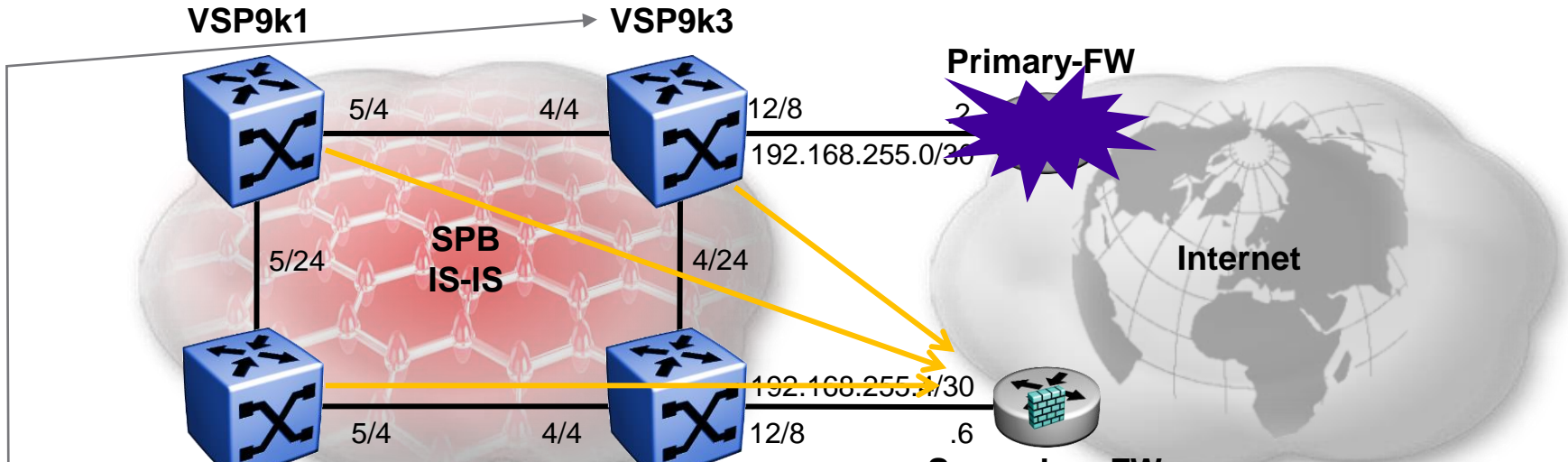
Primary-FW failure



- If the Primary-FW link on port 12/8 goes down
 - Local default static route on VSP9k3 will immediately go down
 - Non-local default static route on other VSP9ks will also immediately go down
 - Sub-second failover
- If VSP9k3 was an ERS8800 we could also use BFD to detect failure of the Primary-FW even if no link down on port 12/8
 - But BFD is not yet supported on VSP9000

Forcing SPB traffic to a Primary FW

Primary-FW failure



```
VSP9000-3:1# show ip route
```

```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.93	255.255.255.255	10.0.0.93	-	1	0	LOC	0	DB	0
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7

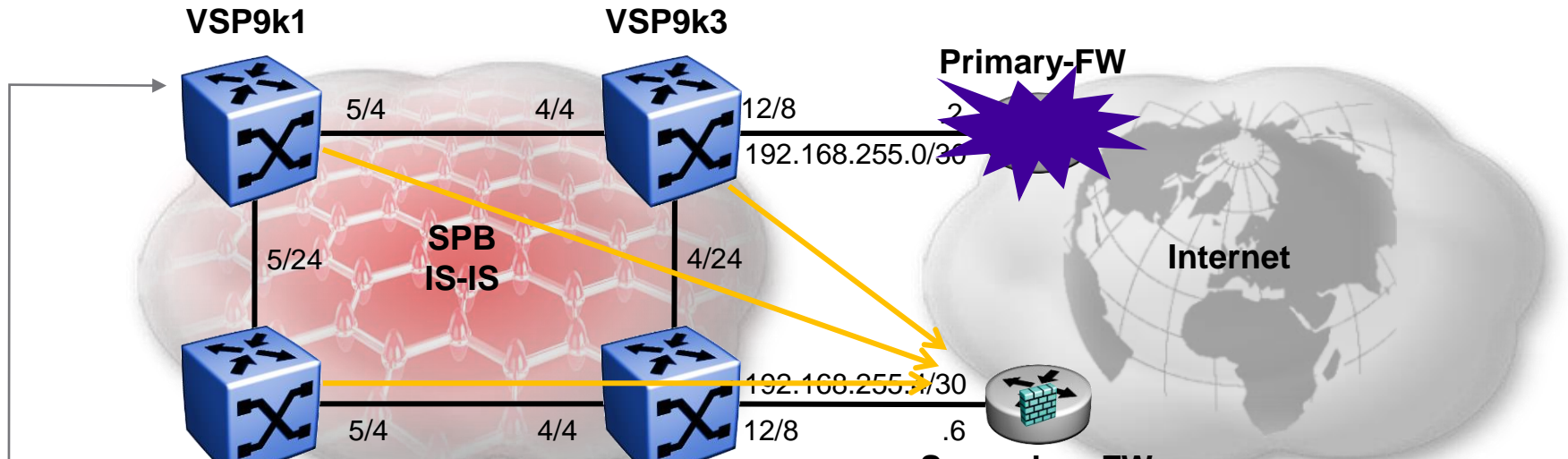
```
VSP9000-3:1# show ip route static
```

```
IP Static Route - GlobalRouter
```

DEST	MASK	NEXT	NH-VRF	COST	PREF	LCLNHOP	STATUS	ENABLE
0.0.0.0	0.0.0.0	192.168.255.2	GlobalRouter	100	5	TRUE	INACTV	TRUE

Forcing SPB traffic to a Primary FW

Primary-FW failure



```
VSP9000-1:1# show ip route
```

```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.91	255.255.255.255	10.0.0.91	-	1	0	LOC	0	DB	0
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.93	255.255.255.255	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7

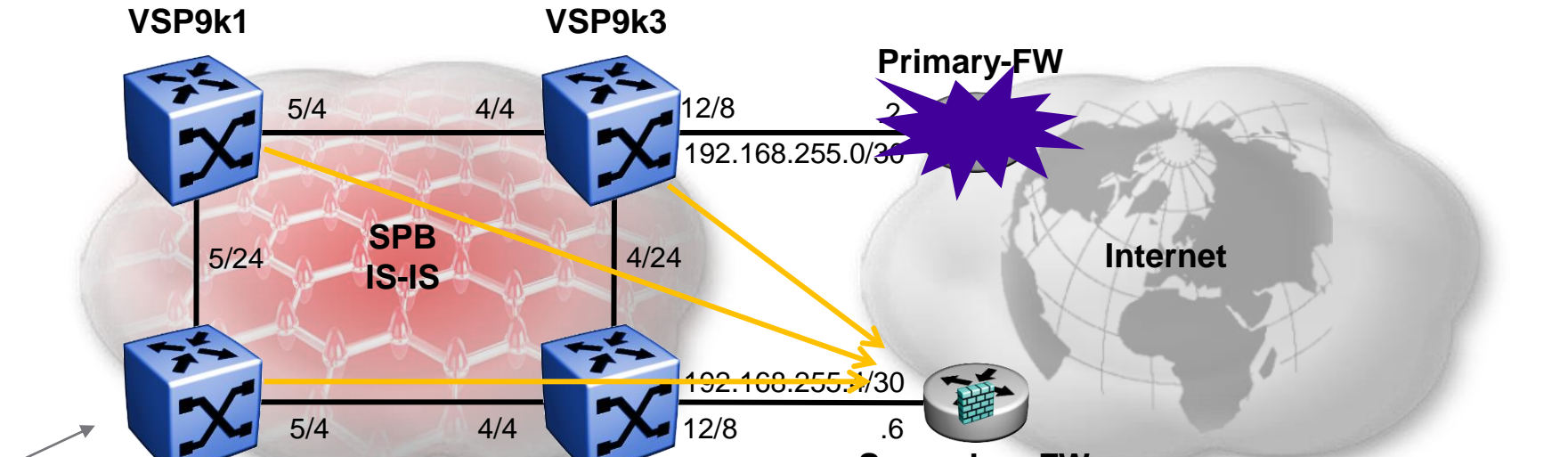
```
VSP9000-1:1# show ip route static
```

```
IP Static Route - GlobalRouter
```

DEST	MASK	NEXT	NH-VRF	COST	PREF	LCLNHOP	STATUS	ENABLE
0.0.0.0	0.0.0.0	192.168.255.1	GlobalRouter	10	5	FALSE	INACTV	TRUE

Forcing SPB traffic to a Primary FW

Primary-FW failure



```
VSP9000-2:1# show ip route
```

```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	10.0.0.92	-	1	0	LOC	0	DB	0
10.0.0.93	255.255.255.255	VSP9000-3	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7

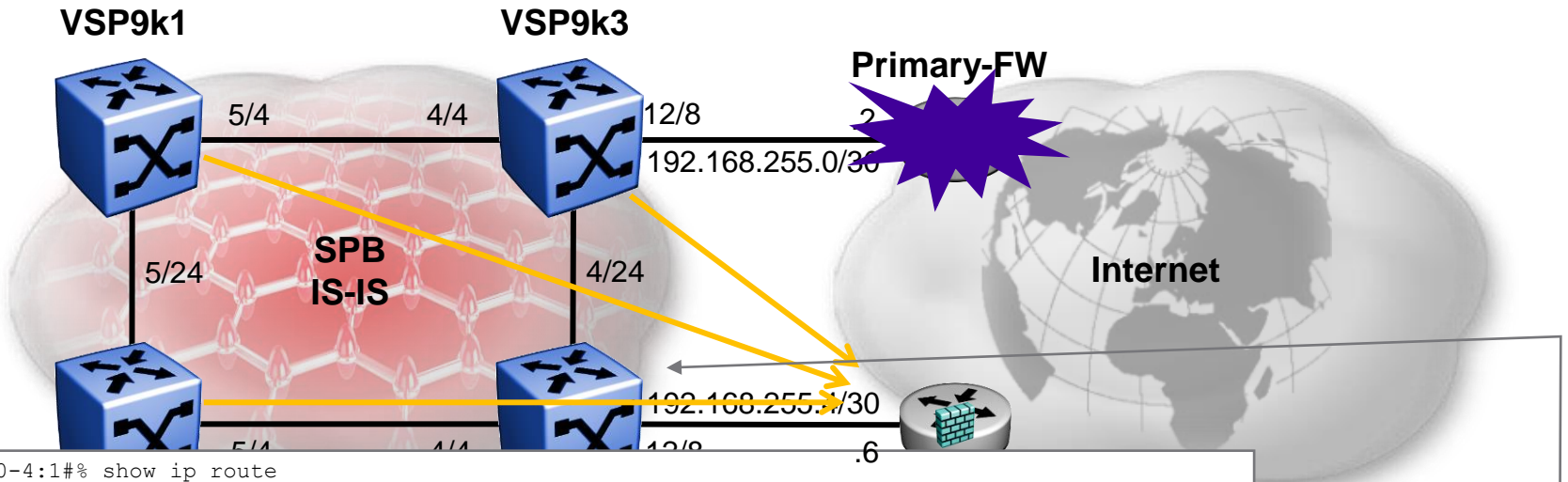
```
VSP9000-2:1# show ip route static
```

```
IP Static Route - GlobalRouter
```

DEST	MASK	NEXT	NH-VRF	COST	PREF	LCLNHOP	STATUS	ENABLE
0.0.0.0	0.0.0.0	192.168.255.1	GlobalRouter	10	5	FALSE	INACTV	TRUE

Forcing SPB traffic to a Primary FW

Primary-FW failure



```
VSP9000-4:1# show ip route
```

IP Route - GlobalRouter

DST	MASK	NEXT	NH VRF/ISID	INTER COST	FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	192.168.255.6	GlobalRouter	200	12/8	STAT	0	IB	5
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.93	255.255.255.255	VSP9000-3	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	10.0.0.94	-	1	0	LOC	0	DB	0
192.168.255.4	255.255.255.252	192.168.255.5	-	1	12/8	LOC	0	DB	0

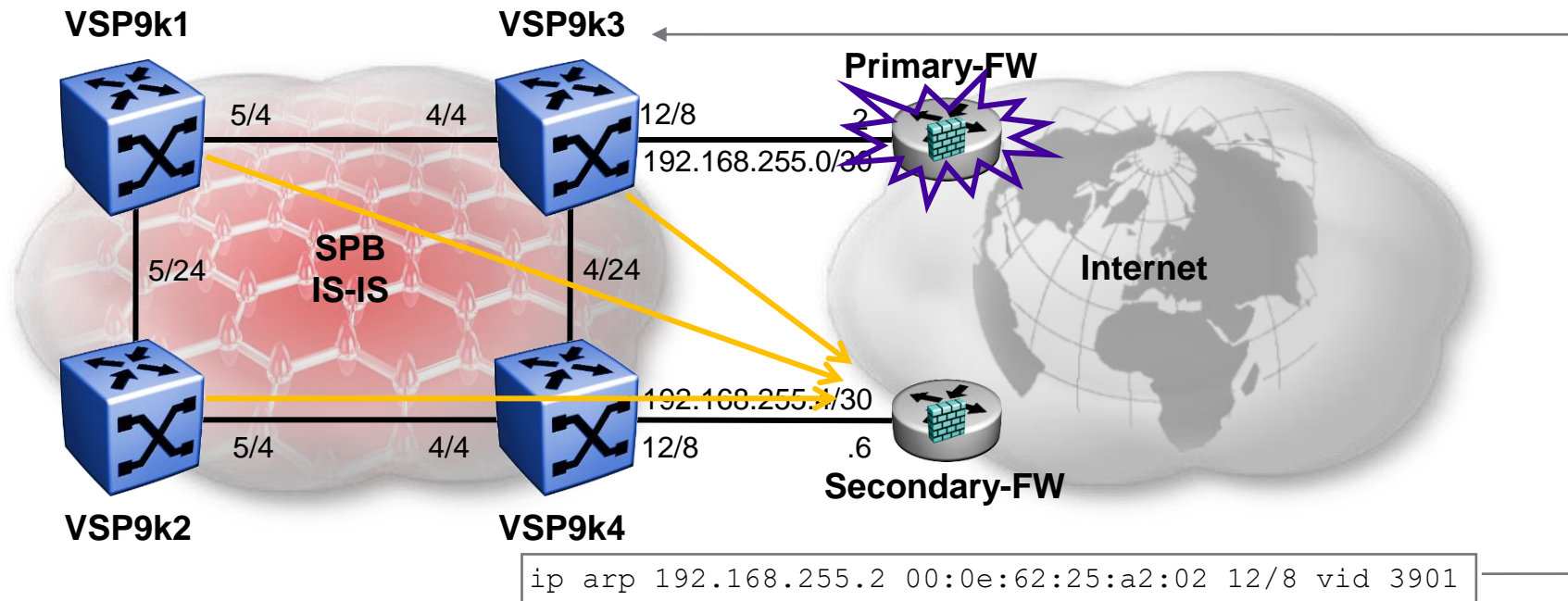
```
VSP9000-4:1# show ip route static
```

IP Static Route - GlobalRouter

DEST	MASK	NEXT	NH-VRF	COST	PREF	LCLNHOP	STATUS	ENABLE
0.0.0.0	0.0.0.0	192.168.255.1	GlobalRouter	10	5	FALSE	INACTV	TRUE
0.0.0.0	0.0.0.0	192.168.255.6	GlobalRouter	200	5	TRUE	ACTIVE	TRUE

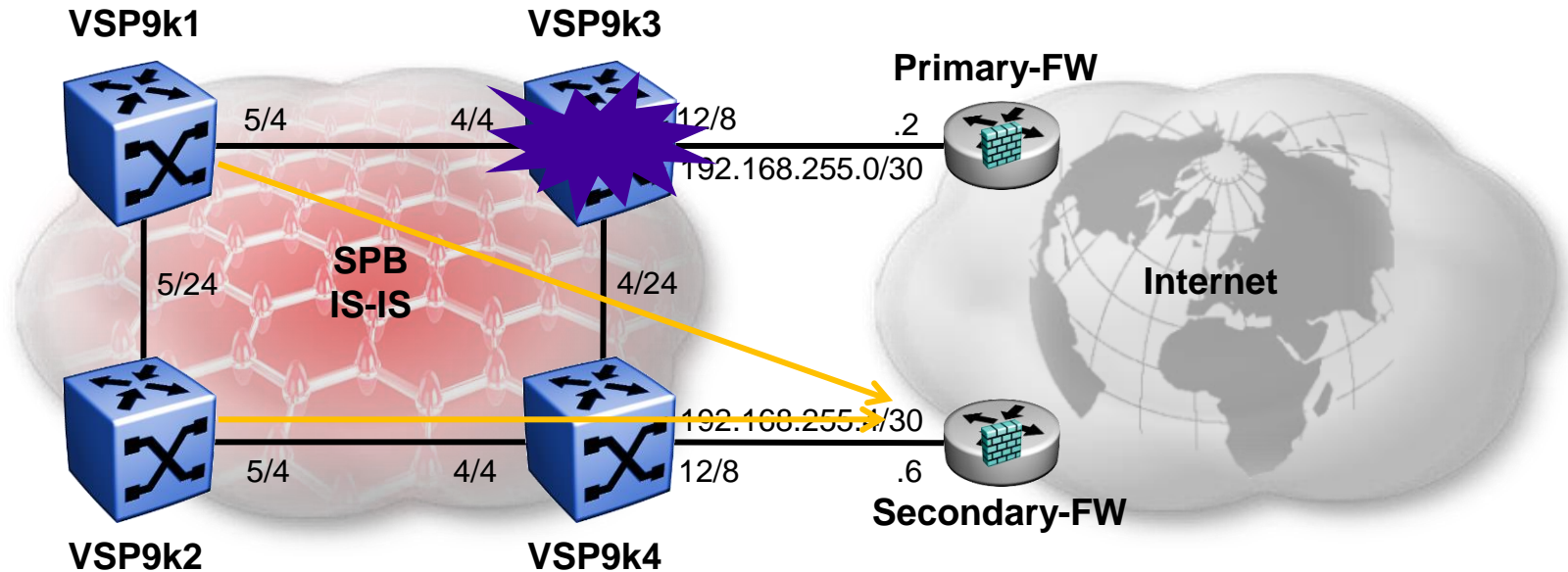
Forcing SPB traffic to a Primary FW

Primary-FW recovery



- NOTE, on recovery, when the Primary-FW link on port 12/8 comes back up, there can be up to a 30 seconds delay between VSP9k3's IP interface 192.168.255.1 coming up (this will activate the non-local static routes on the other VSP9ks) and the default static route to the Primary-FW becoming active again (which requires VSP9k3 to re-ARP for 192.168.255.2)
- During this time traffic following the default route will be dropped
- Configuring on VSP9k3 a static ARP entry for 192.168.255.2 solves this and sub-second failover can be achieved on recovery as well

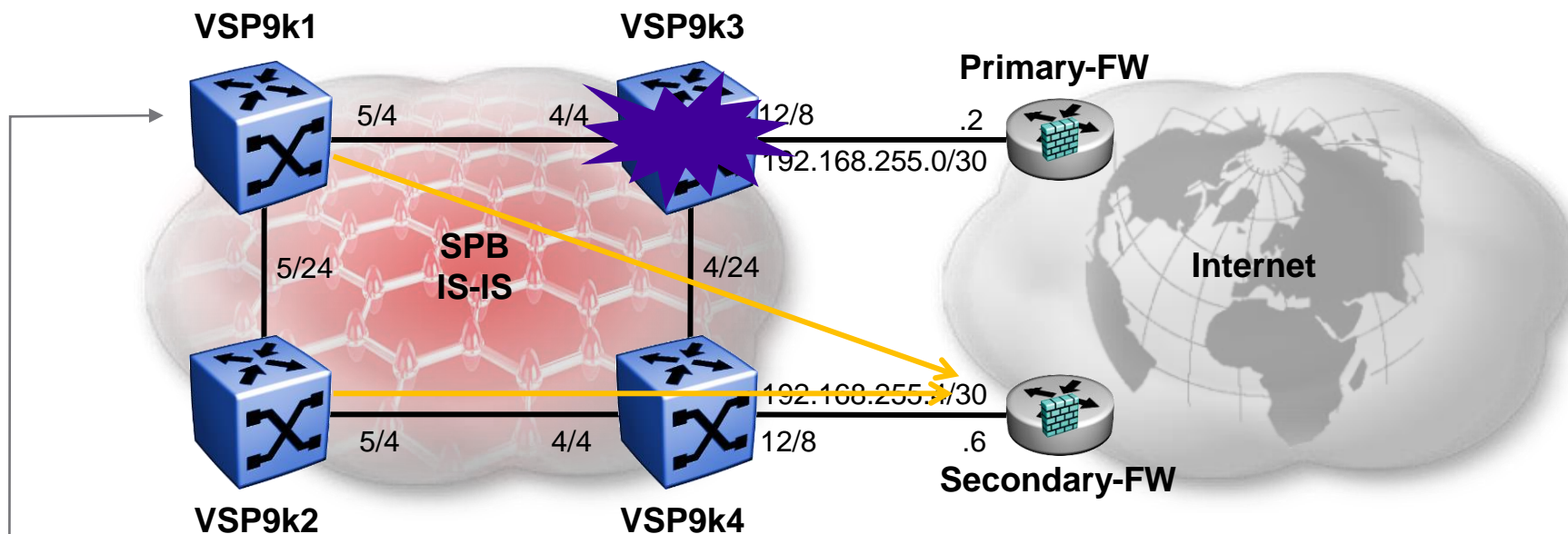
Forcing SPB traffic to a Primary FW VSP9k3 failure



- If the VSP9k3 BEB fails, it will stop announcing network 192.168.255.0/30
- Which will result in all other nodes de-activating their non-local default static-route and following instead the remaining default route announced by VSP9k4
 - ▶ Sub-second failover (failure & recovery)

Forcing SPB traffic to a Primary FW

VSP9k3 failure



```
VSP9000-1:1#% show ip route
```

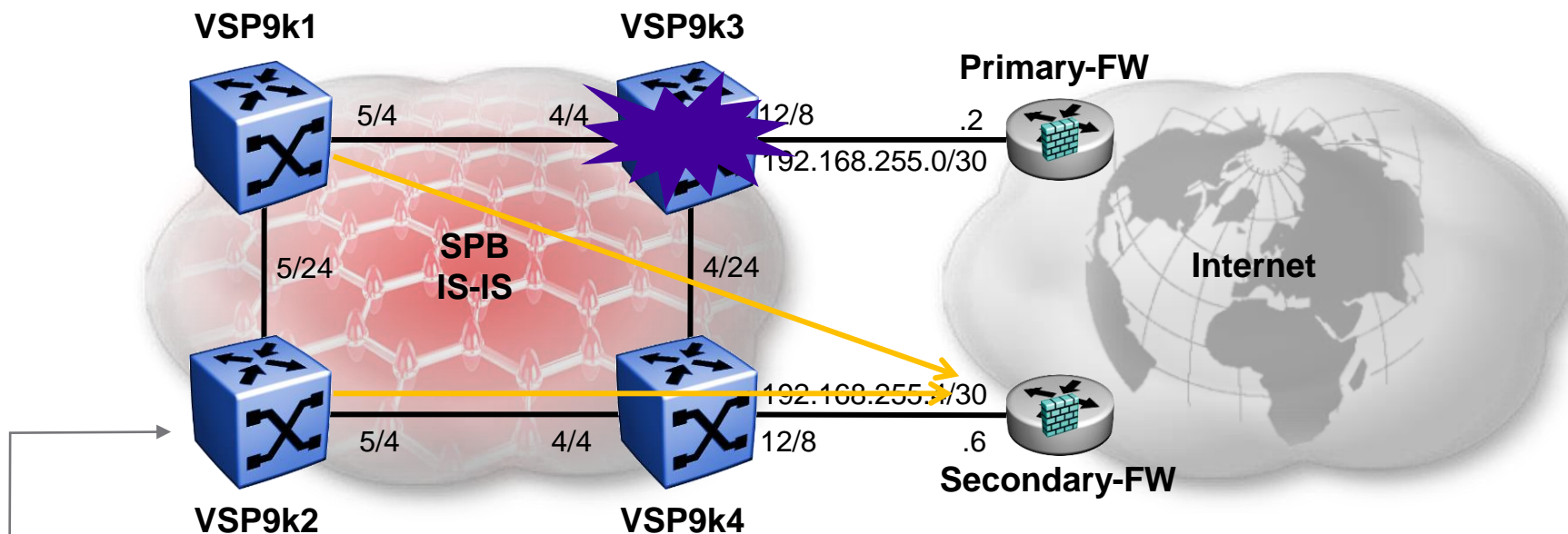
```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.91	255.255.255.255	10.0.0.91	-	1	0	LOC	0	DB	0
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	20	4051	ISIS	0	IBS	7



Forcing SPB traffic to a Primary FW

VSP9k3 failure



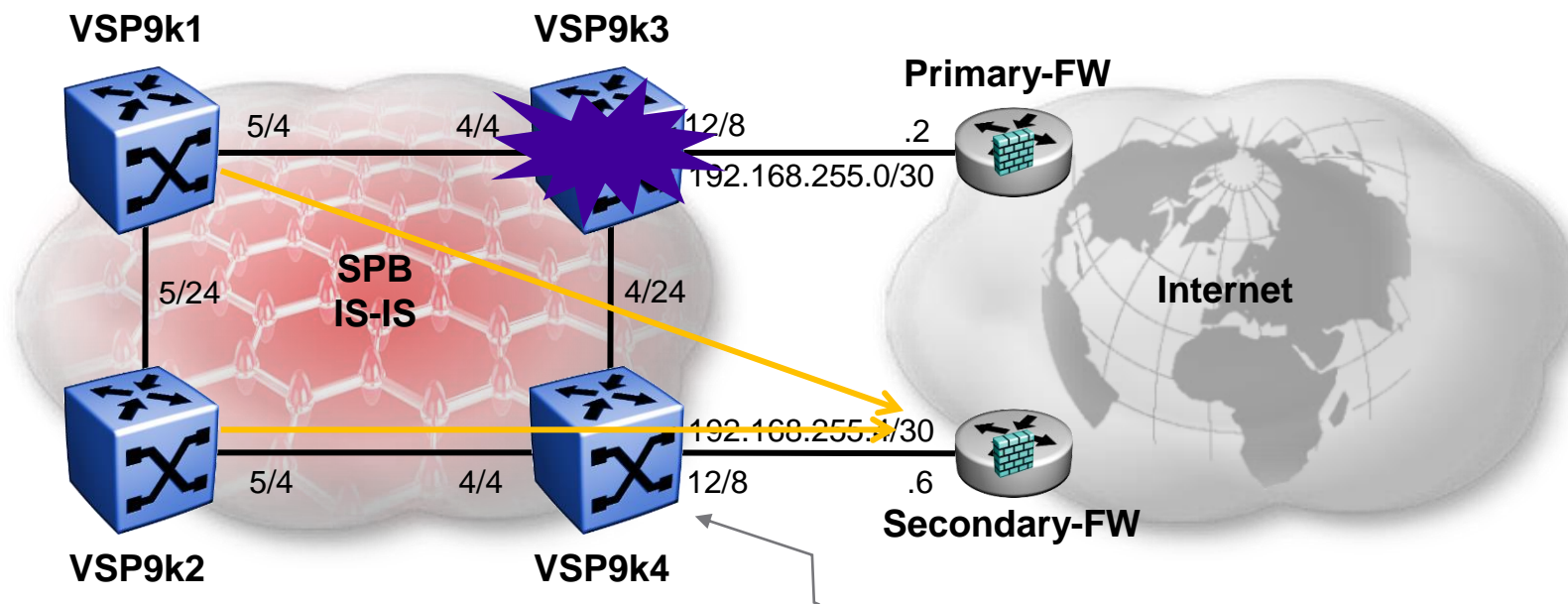
```
VSP9000-2:1#% show ip route
```

```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	10.0.0.92	-	1	0	LOC	0	DB	0
10.0.0.94	255.255.255.255	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7
192.168.255.4	255.255.255.252	VSP9000-4	GlobalRouter	10	4051	ISIS	0	IBS	7

Forcing SPB traffic to a Primary FW

VSP9k3 failure



```
VSP9000-4:1#% show ip route
```

```
IP Route - GlobalRouter
```

DST	MASK	NEXT	NH VRF/ISID	COST	INTER FACE	PROT	AGE	TYPE	PRF
0.0.0.0	0.0.0.0	192.168.255.6	GlobalRouter	200	12/8	STAT	0	IB	5
10.0.0.91	255.255.255.255	VSP9000-1	GlobalRouter	20	4051	ISIS	0	IBS	7
10.0.0.92	255.255.255.255	VSP9000-2	GlobalRouter	10	4051	ISIS	0	IBS	7
10.0.0.94	255.255.255.255	10.0.0.94	-	1	0	LOC	0	DB	0
192.168.255.4	255.255.255.252	192.168.255.5	-	1	12/8	LOC	0	DB	0



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