

**BRIEF UPDATE ON 802.1aq SPB (M)FIRST INTEROP
Ottawa: 2010/Oct**

We tested 1 emulated version, 1 planning tool and 2 physical versions including ECT/H/W data paths and OA&M.

**We tested against older (pre I2 merge/de-merge) draft:
draft-ashwood-isis-spb-00.txt**

**several format differences and Type values differ from latest:
draft-ietf-isis-ieee-aq-01.txt**

So this is work in progress and additional interops will be scheduled as soon as we get -01 implementations ... likely just before X-mas.

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Srikanth Keesara / Avaya**

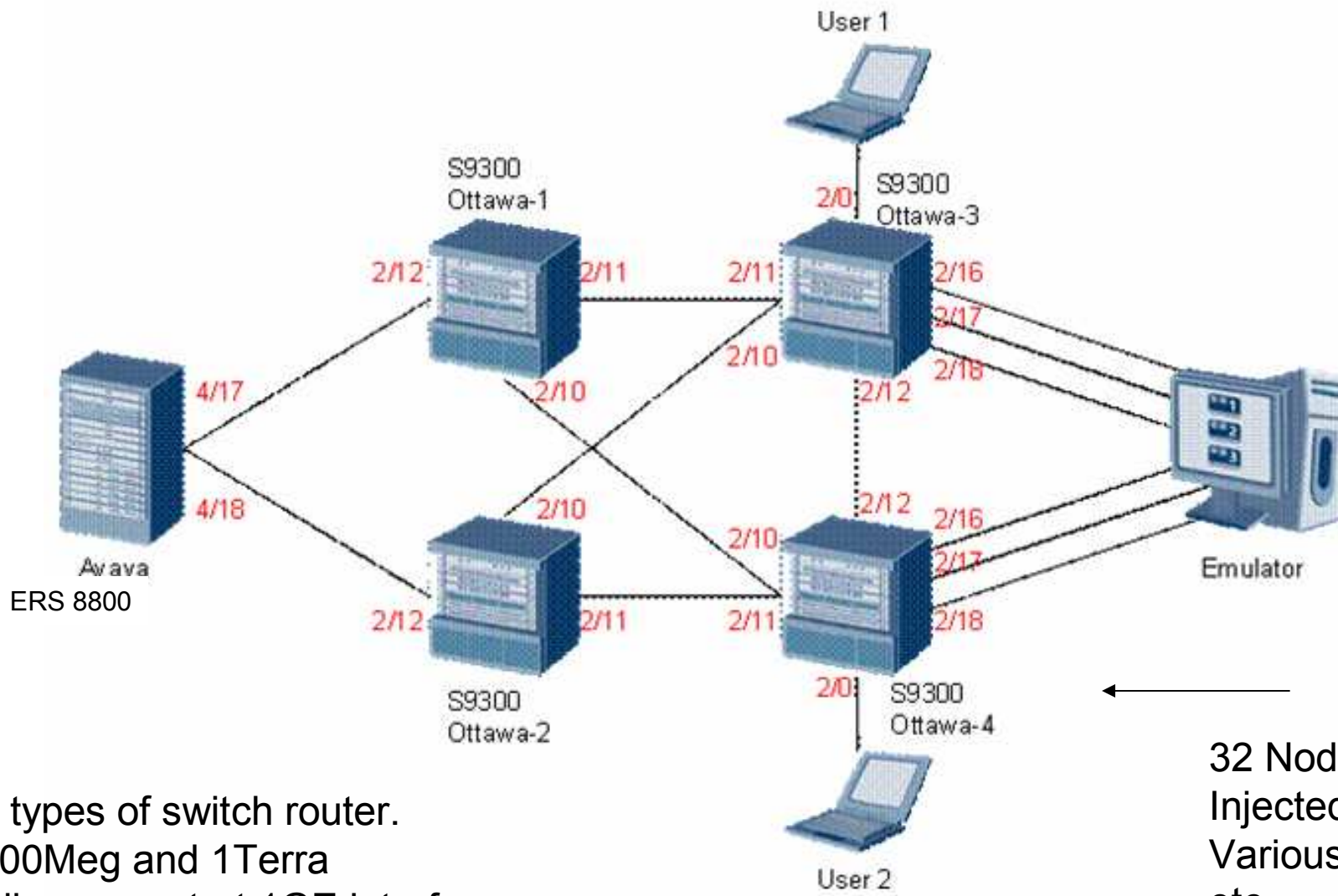
Credits

- Guoli Yin (Huawei)
 - Xiaolan Zhou (Avaya)
 - WuGuangrui (Huawei)
 - Roger Lapuh (Avaya)
 - Jon Vant Erve (Avaya)
 - Zhouke (Huawei)
 - Leifei (Huawei)
 - ChangYue (Huawei)
 - Jerome Chiabaut (Nortel)
-
- Don Fedyk
 - Mick Seaman
 - + rest of 802.1 Interworking participants {Bragg, Allan, Farkas, Unbehagan Etc. etc. }

Issues Encountered

- Protocol related - nothing significant however we expect when we do MCID and Digests in Hello's it will get a bit tricky.
- Issues – only real problem was mis-configuration of B-VIDs which caused adjacency to fail without enough feedback as to cause. Implementation issue.
- Mostly usability type work required but not things relevant to actual protocol.
- OA&M L2-Pings 'just worked' no issues.
- A few crashes here and there .. Our L2 trace routes ☹
- Main issue is to now re-synch on the latest draft and up the scale of the network tests from 30 nodes to several hundred, add failure testing etc.

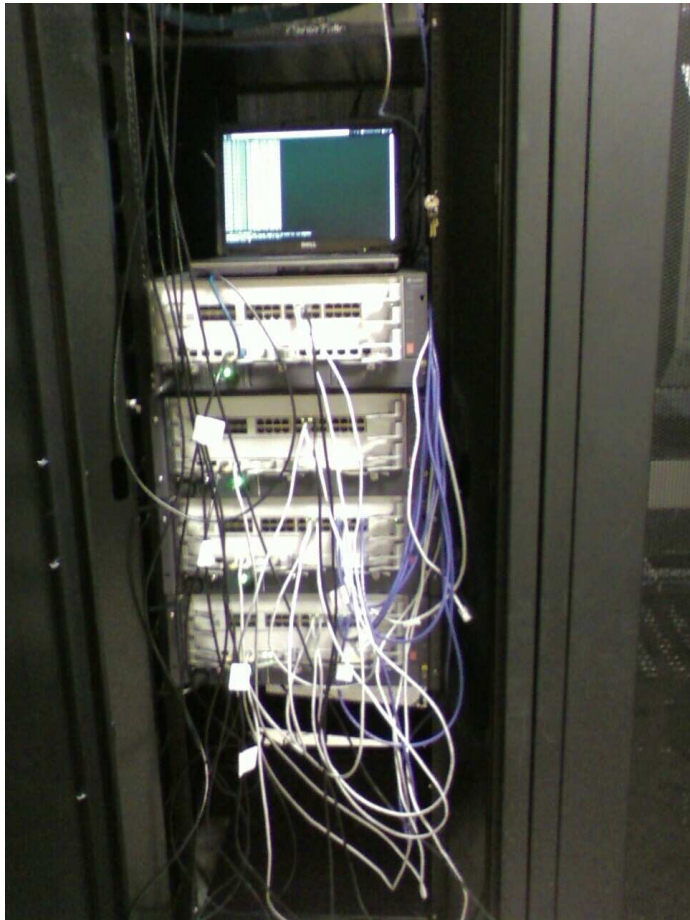
SPBM INTEROP TEST CONFIGURATION



2 types of switch router.
500Meg and 1Terra
All copper pt-pt 1GE interfaces.

←
32 Nodes
Injected
Various ISIDs
etc.

4 Huawei X S9303's
1 x Avaya ERS 8800
32 x Quagga IS-IS instances on Linux

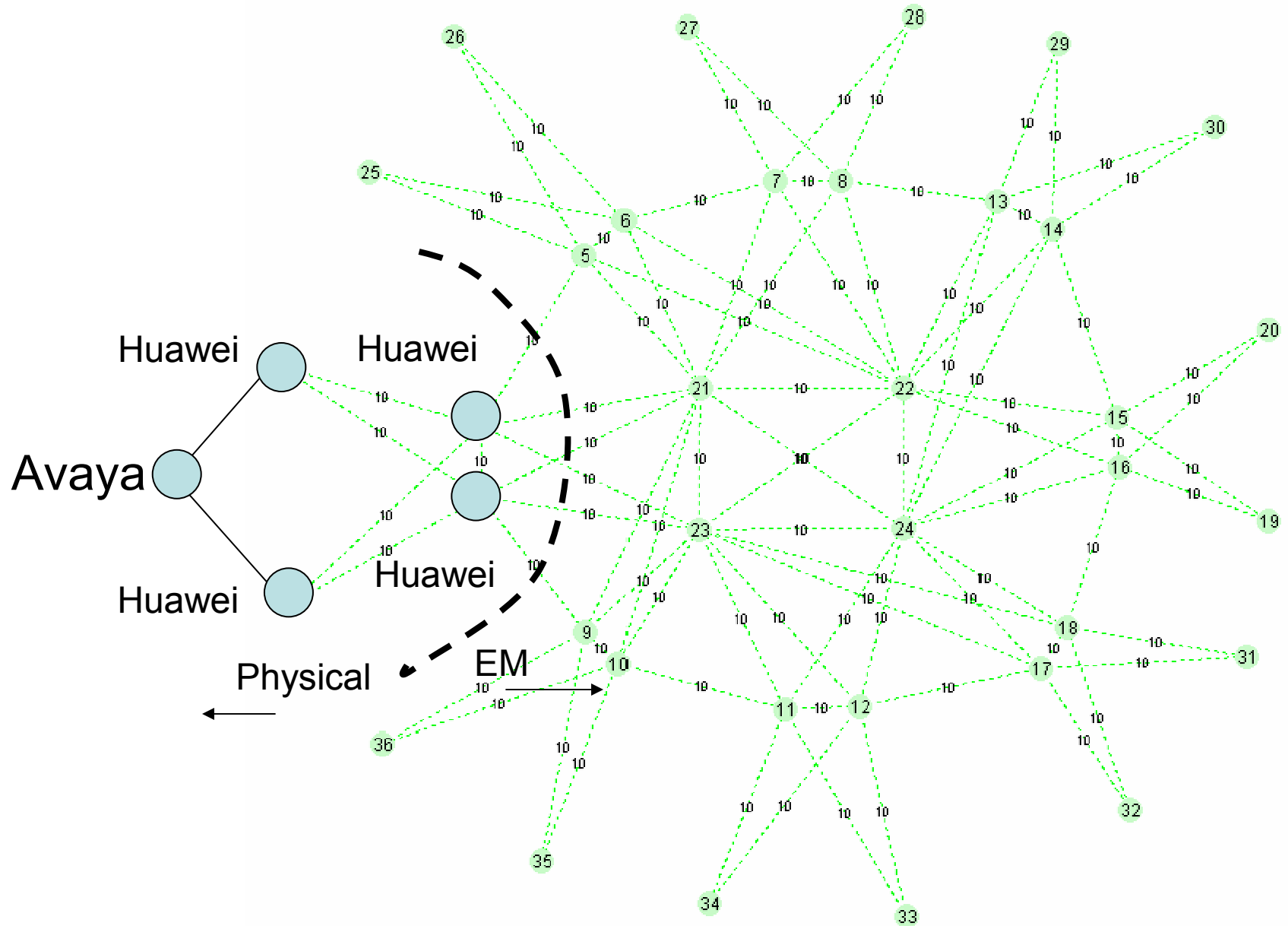


Huawei 4x S9303 + PC Laptop Hosts

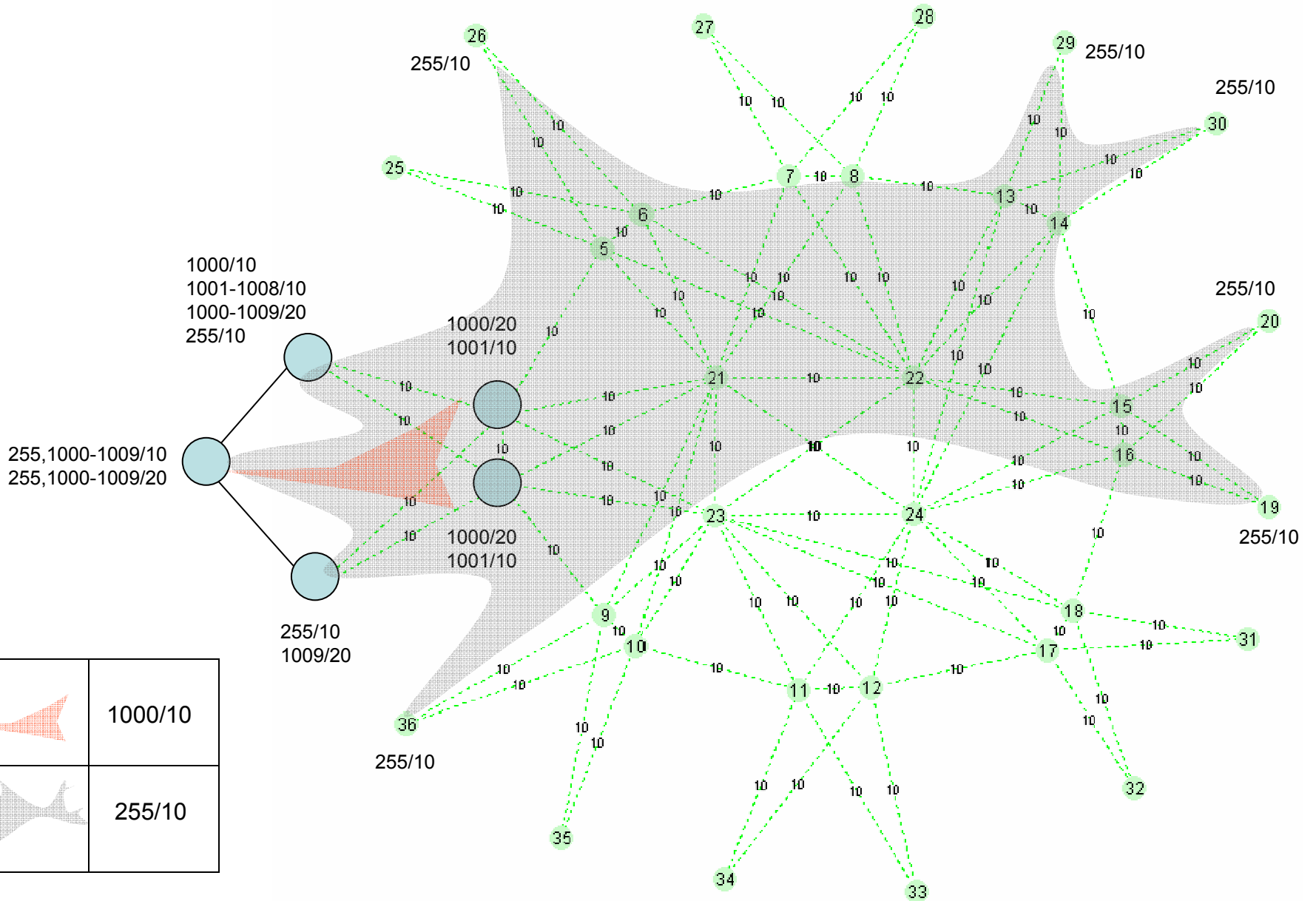


Avaya ERS 8800

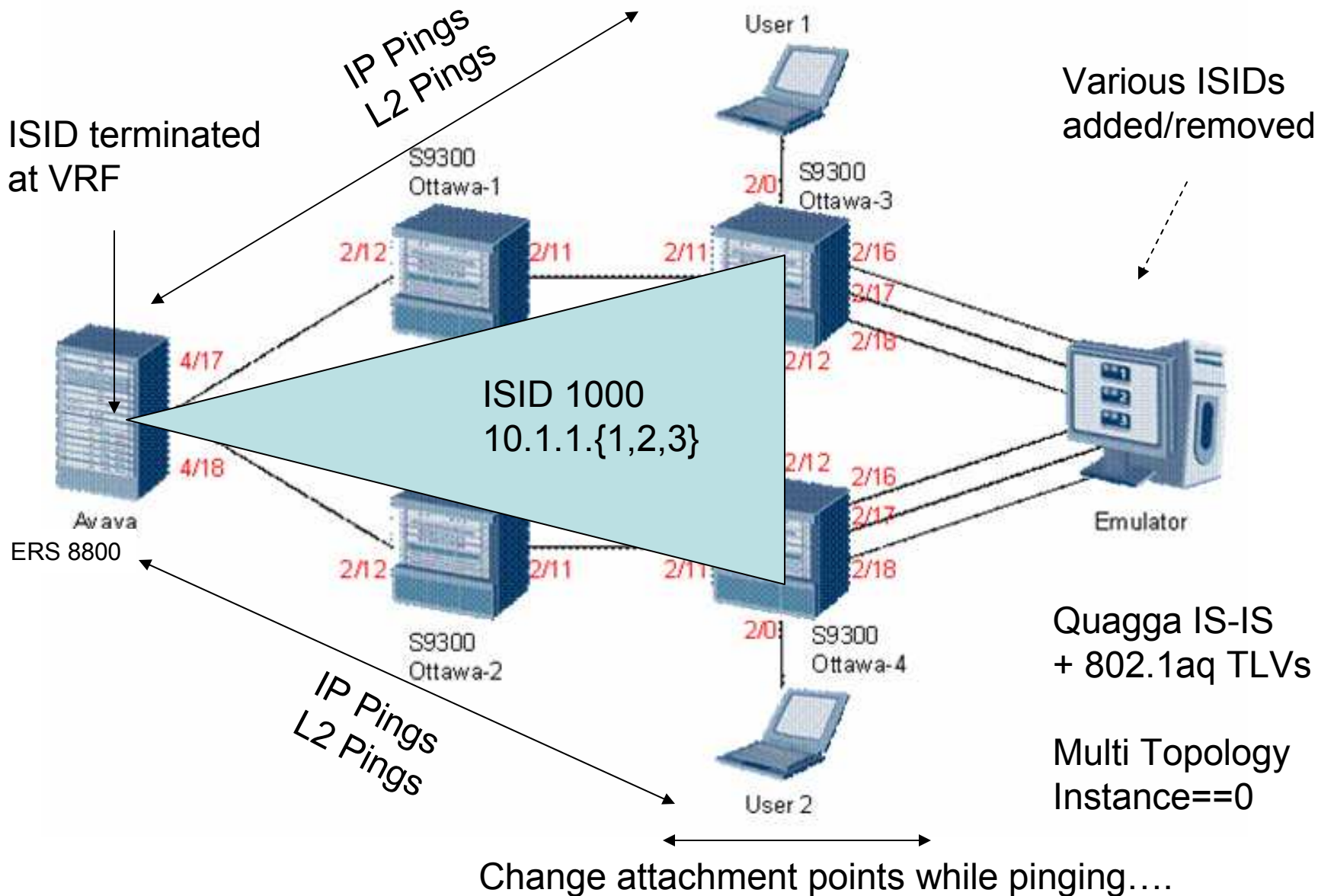
Emulated & Physical Topology



ISID/B-VID distribution

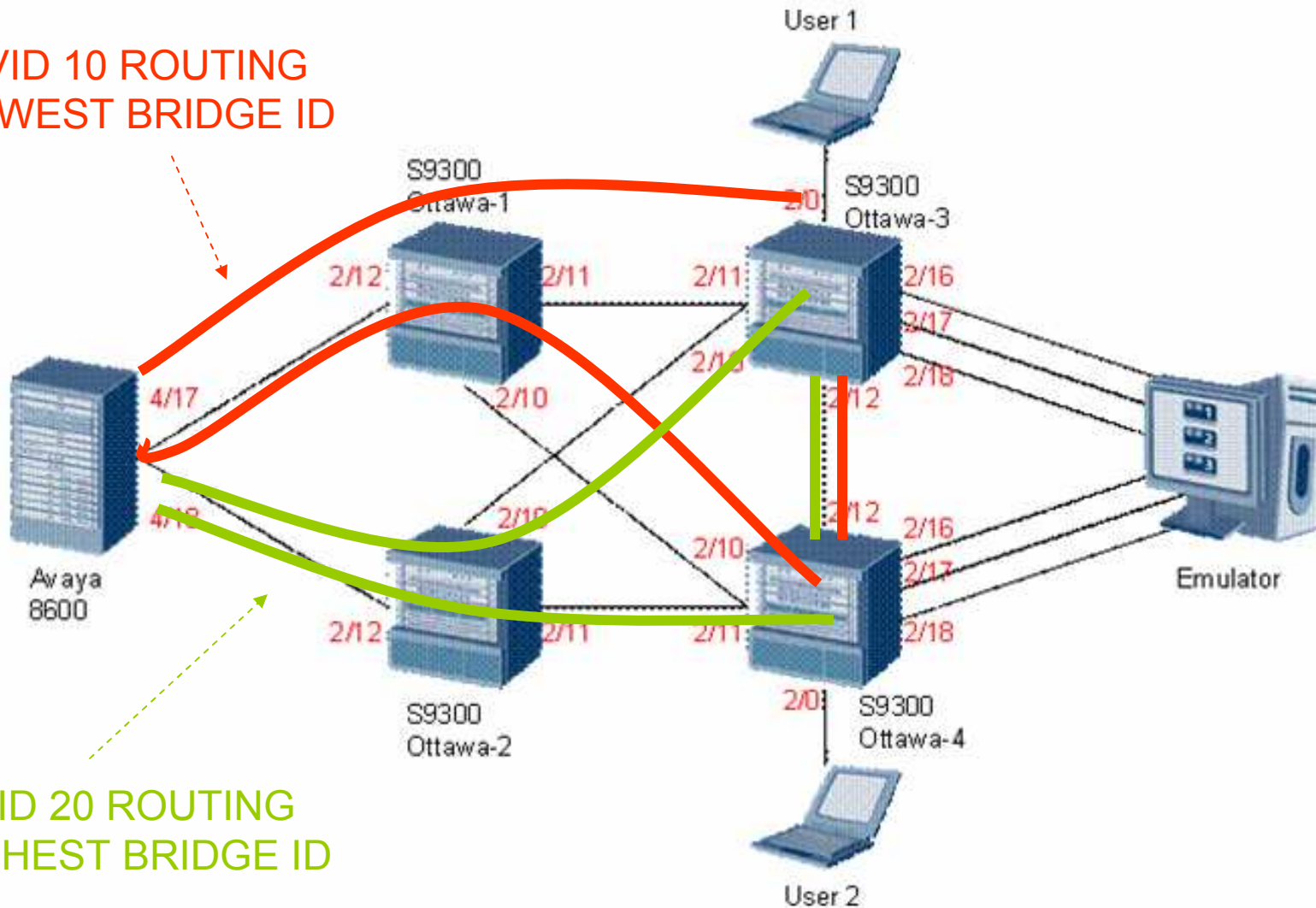


SPBM INTEROP TEST CONFIGURATION



SPBM WITH 2 ECT PATHS ON B-VID 10 & 20

B-VID 10 ROUTING
LOWEST BRIDGE ID



LINK STATE DATABASE 37 BRIDGES – 1xAvaya, 4xHuawei, 32xEm

```

Telnet 10.193.132.48
<ottawa-9300-1>d isis lsdb

Database information for ISIS<1>
-----
Level-1 Link State Database
-----
LSPID                Seq Num      Checksum      Holdtime      Length  ATT/P/OL
-----
ERS-8610.00-00      0x0000001cb  0x2f2f        312           236    0/0/0
$9303-1.00-00*     0x000002c2a  0xc986        16            447    0/0/0
$9303-2.00-00      0x000002bc7  0x6f3f        12            141    0/0/0
$9303-3.00-00      0x00000554b  0x126a        1191          183    0/0/0
$9303-4.00-00      0x0000054e3  0x27b7        1192          183    0/0/0
Instance_5.00-00    0x000000086  0xdaee        788           186    0/0/0
Instance_6.00-00    0x000000084  0x3590        857           186    0/0/0
Instance_7.00-00    0x000000084  0xbdfc        837           186    0/0/0
Instance_8.00-00    0x000000084  0x9b18        973           186    0/0/0
Instance_9.00-00    0x000000083  0xf8ad        815           186    0/0/0
Instance_10.00-00   0x000000084  0x3341        740           187    0/0/0
Instance_11.00-00   0x000000084  0x412f        639           187    0/0/0
Instance_12.00-00   0x000000084  0x68fe        687           187    0/0/0
Instance_13.00-00   0x000000084  0xc5ad        809           187    0/0/0
Instance_14.00-00   0x000000084  0xa6c3        464           187    0/0/0
Instance_15.00-00   0x000000084  0x5623        918           187    0/0/0
Instance_16.00-00   0x000000084  0x89e9        862           187    0/0/0
Instance_17.00-00   0x000000084  0xa7b2        850           187    0/0/0
Instance_18.00-00   0x000000084  0x1242        903           187    0/0/0
Instance_19.00-00   0x000000084  0xe24c        949           125    0/0/0
Instance_20.00-00   0x000000086  0xf43d        630           125    0/0/0
Instance_21.00-00   0x000000086  0x3407        780           287    0/0/0
Instance_22.00-00   0x000000084  0xa07a        459           287    0/0/0
Instance_23.00-00   0x000000087  0x4cc9        539           287    0/0/0
Instance_24.00-00   0x000000093  0xb532        816           287    0/0/0
Instance_25.00-00   0x000000086  0x55ff        674           107    0/0/0
Instance_26.00-00   0x000000084  0xe54a        915           125    0/0/0
Instance_27.00-00   0x000000084  0x57c5        869           125    0/0/0
Instance_28.00-00   0x000000084  0xf325        601           125    0/0/0
Instance_29.00-00   0x000000084  0x8a89        1004          125    0/0/0
Instance_30.00-00   0x000000084  0x8c8c        747           125    0/0/0
Instance_31.00-00   0x000000084  0xb64b        841           125    0/0/0
Instance_32.00-00   0x000000084  0x6796        721           125    0/0/0
Instance_33.00-00   0x000000084  0x16ef        784           125    0/0/0
Instance_34.00-00   0x000000084  0xda27        893           125    0/0/0
Instance_35.00-00   0x000000084  0x5ddc        662           107    0/0/0
Instance_36.00-00   0x000000084  0x67a1        743           125    0/0/0

*(In TLV)-Leaking Route, *(By LSPID)-Self LSP, +-Self LSP(Extended),
ATT-Attached, P-Partition, OL-Overload
<ottawa-9300-1>

```

802.1aq data in LSDB detail (Avaya switch)

Level-1LspID: 00e0.7b82.9fdf.00-00 SeqNum:
0x000000e7 Lifetime: 1005

Chksum: 0xb517 PDU Length: 228

Host_name: ERS-8610

Attributes: IS-Type 1

TLV:1Area Addresses: 1
22.3344

TLV:3End System Neighbors:
Metric: 0
00e07b829fdf (ERS)

TLV:22Extended IS reachability:
Adjacencies: 2
TE Neighbors: 2
4455.6677.0002.00 (<NULL>) Metric:10
SPBM Sub TLV:

Instance: 0
Attr: 0
Metric: 10

← SPB link metric

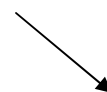
4455.6677.0001.00 (<NULL>) Metric:10
SPBM Sub TLV:
Instance: 0
Attr: 0
Metric: 10

NLPID



TLV:129Protocol Supported: **SPBM**

MT-ID



TLV:180SPBM INSTANCE:
Instance: 0
Attr: 32768

OUI: 01-00-02

← SPSourceID

TLV:183ISID:
Instance: 0
Metric: 0

B-MAC: 00-e0-7b-82-9f-df

BVID:10

Number of ISID's:10

**1000(Both),1001(Both),1002(Both),
1003(Both),1004(Both),1005(Both),
1006(Both),1007(Both)
1008(Both),1009(Both)**

UNICAST FIB – AVAYA SWITCH

```
show isis spbm unicast-fib
```

```
=====
                        SPBM UNICAST FIB ENTRY INFO
=====
```

DESTINATION ADDRESS	BVLAN	SYSID	HOST-NAME	OUTGOING INTERFACE	COST
44:55:66:77:00:01	10	4455.6677.0001	NULL	4/17	10
44:55:66:77:00:01	20	4455.6677.0001	NULL	4/17	10
44:55:66:77:00:02	10	4455.6677.0002	NULL	4/18	10
44:55:66:77:00:02	20	4455.6677.0002	NULL	4/18	10
44:55:66:77:00:03	10	4455.6677.0003	NULL	4/17	20
44:55:66:77:00:03	20	4455.6677.0003	NULL	4/18	20
44:55:66:77:00:04	10	4455.6677.0004	NULL	4/17	20
44:55:66:77:00:04	20	4455.6677.0004	NULL	4/18	20
44:55:66:77:00:05	10	4455.6677.0005	Instance_5	4/17	30
44:55:66:77:00:05	20	4455.6677.0005	Instance_5	4/18	30
44:55:66:77:00:06	10	4455.6677.0006	Instance_6	4/17	40
.....					
44:55:66:77:00:1a	20	4455.6677.001a	Instance_26	4/18	40
44:55:66:77:00:1b	10	4455.6677.001b	Instance_27	4/17	50
44:55:66:77:00:1b	20	4455.6677.001b	Instance_27	4/18	50
44:55:66:77:00:1c	10	4455.6677.001c	Instance_28	4/17	50
44:55:66:77:00:1c	20	4455.6677.001c	Instance_28	4/18	50
44:55:66:77:00:1d	10	4455.6677.001d	Instance_29	4/17	60
44:55:66:77:00:1d	20	4455.6677.001d	Instance_29	4/18	60
44:55:66:77:00:1e	10	4455.6677.001e	Instance_30	4/17	60
44:55:66:77:00:1e	20	4455.6677.001e	Instance_30	4/18	60
44:55:66:77:00:1f	10	4455.6677.001f	Instance_31	4/17	50
44:55:66:77:00:1f	20	4455.6677.001f	Instance_31	4/18	50
44:55:66:77:00:20	10	4455.6677.0020	Instance_32	4/17	50
44:55:66:77:00:20	20	4455.6677.0020	Instance_32	4/18	50
44:55:66:77:00:21	10	4455.6677.0021	Instance_33	4/17	50
44:55:66:77:00:21	20	4455.6677.0021	Instance_33	4/18	50
44:55:66:77:00:22	10	4455.6677.0022	Instance_34	4/17	50
44:55:66:77:00:22	20	4455.6677.0022	Instance_34	4/18	50
44:55:66:77:00:23	10	4455.6677.0023	Instance_35	4/17	40
44:55:66:77:00:23	20	4455.6677.0023	Instance_35	4/18	40
44:55:66:77:00:24	10	4455.6677.0024	Instance_36	4/17	40
44:55:66:77:00:24	20	4455.6677.0024	Instance_36	4/18	40

```
-----
Total number of SPBM UNICAST FIB entries 72
-----
```

2 Equal Cost Paths

MULTICAST FIBS – AVAYA SWITCH

```

show isis spbm multicast-fib
=====
MCAST DA          ISID   BVLAN  SYSID          HOST-NAME      OUTGO
-----
13:00:02:00:00:ff 255    10     00e0.7b82.9fdf ERS-8610       4/18,4/17
13:00:02:00:03:e8 1000   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:e9 1001   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ea 1002   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:eb 1003   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ec 1004   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ed 1005   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ee 1006   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ef 1007   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:f0 1008   10     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:e8 1000   20     00e0.7b82.9fdf ERS-8610       4/18
13:00:02:00:03:e9 1001   20     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ea 1002   20     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:eb 1003   20     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ec 1004   20     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ed 1005   20     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ee 1006   20     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:ef 1007   20     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:f0 1008   20     00e0.7b82.9fdf ERS-8610       4/17
13:00:02:00:03:f1 1009   20     00e0.7b82.9fdf ERS-8610       4/18,4/17
73:00:01:00:00:ff 255    10     4455.6677.0001 S9303-1        4/18
73:00:01:00:03:e8 1000   10     4455.6677.0001 S9303-1
73:00:01:00:03:e9 1001   10     4455.6677.0001 S9303-1
.....
73:00:01:00:03:f0 1008   20     4455.6677.0001 S9303-1
73:00:01:00:03:f1 1009   20     4455.6677.0001 S9303-1
73:00:02:00:00:ff 255    10     4455.6677.0002 S9303-2        4/17
73:00:02:00:03:f1 1009   20     4455.6677.0002 S9303-2
73:00:03:00:03:e9 1001   10     4455.6677.0003 S9303-3
73:00:03:00:03:e8 1000   20     4455.6677.0003 S9303-3
73:00:04:00:03:e9 1001   10     4455.6677.0004 S9303-4
73:00:04:00:03:e8 1000   20     4455.6677.0004 S9303-4
73:00:13:00:00:ff 255    10     4455.6677.0013 Instance_19
73:00:14:00:00:ff 255    10     4455.6677.0014 Instance_20
73:00:1a:00:00:ff 255    10     4455.6677.001a Instance_26
73:00:1d:00:00:ff 255    10     4455.6677.001d Instance_29
73:00:1e:00:00:ff 255    10     4455.6677.001e Instance_30
73:00:24:00:00:ff 255    10     4455.6677.0024 Instance_36

-----
Total number of SPBM MULTICAST FIB entries 51
-----

```

Load Spreading 2 ISIDs to Same set of Receivers on different trees/routes

SOME OF THE MULTICAST FIBS HUAWEI SWITCHES.

```

c:\ Telnet 10.193.132.48
Total unicast fib entries is 72
<ottawa-9300-1>d spb mmac
-----
IN_PORT      UID  BMAC                OUT_PORT
-----
GE2/0/12    10  1300-0200-00ff    GE2/0/11, GE2/0/10
GE2/0/12    10  1300-0200-03e9    GE2/0/11, GE2/0/10
-           10  7300-0100-00ff    GE2/0/11, GE2/0/12, GE2/0/10
-           10  7300-0100-03e8    GE2/0/12
-           10  7300-0100-03e9    GE2/0/11, GE2/0/12, GE2/0/10
-           20  7300-0100-03e9    GE2/0/12
-           10  7300-0100-03ea    GE2/0/12
-           20  7300-0100-03ea    GE2/0/12
-           10  7300-0100-03eb    GE2/0/12
-           20  7300-0100-03eb    GE2/0/12
-           10  7300-0100-03ec    GE2/0/12
-           20  7300-0100-03ec    GE2/0/12
-           10  7300-0100-03ed    GE2/0/12
-           20  7300-0100-03ed    GE2/0/12
-           10  7300-0100-03ee    GE2/0/12
-           20  7300-0100-03ee    GE2/0/12
-           10  7300-0100-03ef    GE2/0/12
-           20  7300-0100-03ef    GE2/0/12
-           10  7300-0100-03f0    GE2/0/12
-           20  7300-0100-03f0    GE2/0/12
-           20  7300-0100-03f1    GE2/0/12, GE2/0/10
GE2/0/11    10  7300-0300-03e9    GE2/0/12
GE2/0/10    10  7300-0400-03e9    GE2/0/12
GE2/0/11    10  7300-1300-00ff    GE2/0/12
GE2/0/11    10  7300-1400-00ff    GE2/0/12
GE2/0/11    10  7300-1a00-00ff    GE2/0/12
GE2/0/11    10  7300-1d00-00ff    GE2/0/12
GE2/0/11    10  7300-1e00-00ff    GE2/0/12
GE2/0/10    10  7300-2400-00ff    GE2/0/12
Total multicast num is 29
<ottawa-9300-1>
  
```

1001
ISID
FROM
8800
ON
1st
ECT

```

c:\ Telnet 10.193.132.48
Login authentication
Username:peter
Password:
Info: The max number of UTY users is 10, and the number
of current UTY users on line is 1.
<ottawa-9300-3>d spb mmac
-----
IN_PORT      UID  BMAC                OUT_PORT
-----
GE2/0/11    10  1300-0200-00ff    GE2/0/16
GE2/0/11    10  7300-0100-00ff    GE2/0/16
GE2/0/10    10  7300-0200-00ff    GE2/0/16
-           20  7300-0300-03e8    GE2/0/10, GE2/0/12
-           10  7300-0300-03e9    GE2/0/11, GE2/0/12
GE2/0/16    10  7300-1300-00ff    GE2/0/11, GE2/0/10
GE2/0/16    10  7300-1400-00ff    GE2/0/11, GE2/0/10
GE2/0/16    10  7300-1a00-00ff    GE2/0/11, GE2/0/10
GE2/0/16    10  7300-1d00-00ff    GE2/0/11, GE2/0/10
GE2/0/16    10  7300-1e00-00ff    GE2/0/11, GE2/0/10
Total multicast num is 10
<ottawa-9300-3>
  
```

```

c:\ Telnet 10.193.132.48
Login authentication
Username:peter
Password:
Info: The max number of UTY users is 10, and the number
of current UTY users on line is 1.
<ottawa-9300-2>d spb mmac
-----
IN_PORT      UID  BMAC                OUT_PORT
-----
GE2/0/12    20  1300-0200-03e8    GE2/0/10, GE2/0/11
-           10  7300-0200-00ff    GE2/0/10, GE2/0/12, GE2/0/11
-           20  7300-0200-03f1    GE2/0/12, GE2/0/11
GE2/0/10    20  7300-0300-03e8    GE2/0/12
GE2/0/11    20  7300-0400-03e8    GE2/0/12
Total multicast num is 5
<ottawa-9300-2>
  
```

1000
ISID
FROM
8800
ON
2nd
ECT

```

c:\ Telnet 10.193.132.48
Info: The max number of UTY users is 10, and the number
of current UTY users on line is 1.
<ottawa-9300-4>d spb mmac
-----
IN_PORT      UID  BMAC                OUT_PORT
-----
GE2/0/10    10  1300-0200-00ff    GE2/0/18
GE2/0/10    10  7300-0100-00ff    GE2/0/18
GE2/0/10    20  7300-0100-03f1    GE2/0/11
GE2/0/11    10  7300-0200-00ff    GE2/0/18
GE2/0/11    20  7300-0200-03f1    GE2/0/10
-           20  7300-0400-03e8    GE2/0/12, GE2/0/11
-           10  7300-0400-03e9    GE2/0/12, GE2/0/10
GE2/0/18    10  7300-2400-00ff    GE2/0/10, GE2/0/11
Total multicast num is 8
<ottawa-9300-4>
  
```

AVAYA SWITCH – LOCAL AND REMOTE LEARNED INFO

```
show vlan info fdb-entry 1001
*****
Command Execution Time: WED OCT 27 11:37:41 2010 UTC
*****
```

```
=====
                          Vlan Fdb
=====
```

VLAN ID	STATUS	MAC ADDRESS	INTERFACE	MONITOR	QOS LEVEL	SMLT REMOTE
1001	learned	00:21:70:b8:18:ed	I-SID-1001	false	1	false
1001	self	00:e0:7b:82:9e:01	Port-cpp	false	1	false

Local →
Computed ↗

2 out of 85 entries in all fdb(s) displayed.

```
show vlan info remote-mac-table 1001
*****
Command Execution Time: WED OCT 27 11:37:47 2010 UTC
*****
```

```
=====
                          Vlan Remote Mac Table
=====
```

VLAN	STATUS	MAC-ADDRESS	DEST-MAC	BVLAN	DEST-SYSNAME	PORTS	SMLTREMOTE
1001	learned	00:21:70:b8:18:ed	44:55:66:77:00:03	10		4/17	false

Remote →

Total number of VLAN Remote MAC entries 1

*PC MAC: 00:21:70:b8:18:ed

L2 Pinging Node 3 to Node 1 – (from Huawei to Huawei)

```
[ottawa-9300-3]cfm enable
[ottawa-9300-3]cfm md md1 level 6
[ottawa-9300-3]ma ma1
[ottawa-9300-3-md-md1-ma-ma1]map vlan 20
[ottawa-9300-3-md-md1-ma-ma1]mep mep-id 1 vlan
[ottawa-9300-3-md-md1-ma-ma1]
```

```
ping mac-8021ag mac 4455-6677-0001
```

```
Pinging 4455-6677-0001 with 144 bytes of data:
```

```
Reply from 4455-6677-0001: bytes = 144, time = 5ms
Reply from 4455-6677-0001: bytes = 144, time = 10ms
Reply from 4455-6677-0001: bytes = 144, time = 5ms
Reply from 4455-6677-0001: bytes = 144, time = 9ms
Reply from 4455-6677-0001: bytes = 144, time = 6ms
```


L2 Pinging: Avaya, Huawei, Huawei & return)

```
# l2ping 20.44:55:66:77:00:03
```

```
Please wait for l2ping to complete or press any key to abort
```

```
----44:55:66:77:00:03 L2 PING Statistics---- 0(68) bytes of data  
1 packets transmitted, 1 packets received, 0.00% packet loss  
round-trip (us) min/max/ave/stdv = 8157/8157/8157.00/ 0.00
```

```
# l2ping 20.44:55:66:77:00:01 burst-count 100
```

```
Please wait for l2ping to complete or press any key to abort
```

```
----44:55:66:77:00:01 L2 PING Statistics---- 0(68) bytes of data  
100 packets transmitted, 100 packets received, 0.00% packet loss  
round-trip (us) min/max/ave/stdv = 2742/1029707/120981.07/  
92233720390022594.56
```

L3 Pinging: Avaya VRF->ISID 1001 -> PC host

```
ping 10.1.1.2 vrf 1001 -s
PING 10.1.1.2: 56 data bytes
64 bytes from 10.1.1.2: icmp_seq=0. time=1.225 ms
64 bytes from 10.1.1.2: icmp_seq=1. time=0.965 ms
64 bytes from 10.1.1.2: icmp_seq=2. time=0.962 ms
64 bytes from 10.1.1.2: icmp_seq=3. time=0.960 ms
64 bytes from 10.1.1.2: icmp_seq=4. time=0.961 ms
64 bytes from 10.1.1.2: icmp_seq=5. time=0.960 ms
...
64 bytes from 10.1.1.2: icmp_seq=13. time=0.962 ms
64 bytes from 10.1.1.2: icmp_seq=14. time=0.979 ms
64 bytes from 10.1.1.2: icmp_seq=15. time=0.959 ms
64 bytes from 10.1.1.2: icmp_seq=16. time=0.959 ms
64 bytes from 10.1.1.2: icmp_seq=17. time=0.959 ms
64 bytes from 10.1.1.2: icmp_seq=18. time=0.954 ms
64 bytes from 10.1.1.2: icmp_seq=19. time=0.946 ms
64 bytes from 10.1.1.2: icmp_seq=20. time=0.955 ms
64 bytes from 10.1.1.2: icmp_seq=21. time=0.944 ms
64 bytes from 10.1.1.2: icmp_seq=22. time=0.947 ms
64 bytes from 10.1.1.2: icmp_seq=23. time=0.948 ms
64 bytes from 10.1.1.2: icmp_seq=24. time=0.949 ms
64 bytes from 10.1.1.2: icmp_seq=25. time=0.948 ms
64 bytes from 10.1.1.2: icmp_seq=26. time=0.947 ms
---10.1.1.2 PING Statistics---
27 packets transmitted, 27 packets received, 0% packet loss
round-trip (ms)  min/avg/max = 0.944/0.967/1.225
```

← 1st learn

← Moved
PC multiple
times ..
to different
attachment
points
(losses not
shown this
trace)

Avaya – show computed SPF from self/B-VID 10

```
show isis spbm unicast-tree 10
```

```
*****
```

```
Command Execution Time: WED OCT 27 11:35:33 2010 UTC
```

```
*****
```

```
Node:4455.6677.0002.00 -> ROOT
```

```
Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.0005.00 (Instance_5) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.0015.00 (Instance_21) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.0018.00 (Instance_24) -> Node:4455.6677.0015.00 (Instance_21) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.0017.00 (Instance_23) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.0016.00 (Instance_22) -> Node:4455.6677.0005.00 (Instance_5) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.000f.00 (Instance_15) -> Node:4455.6677.0016.00 (Instance_22) -> Node:4455.6677.0005.00 (Instance_5) ->
```

```
Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.0014.00 (Instance_20) -> Node:4455.6677.000f.00 (Instance_15) -> Node:4455.6677.0016.00 (Instance_22) ->
```

```
Node:4455.6677.0005.00 (Instance_5) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.0010.00 (Instance_16) -> Node:4455.6677.0016.00 (Instance_22) -> Node:4455.6677.0005.00 (Instance_5) ->
```

```
Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.0013.00 (Instance_19) -> Node:4455.6677.000f.00 (Instance_15) -> Node:4455.6677.0016.00 (Instance_22) ->
```

```
Node:4455.6677.0005.00 (Instance_5) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
.....  
Node:4455.6677.001b.00 (Instance_27) -> Node:4455.6677.0007.00 (Instance_7) -> Node:4455.6677.0015.00 (Instance_21) ->
```

```
Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

```
Node:4455.6677.001c.00 (Instance_28) -> Node:4455.6677.0007.00 (Instance_7) -> Node:4455.6677.0015.00 (Instance_21) ->
```

```
Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

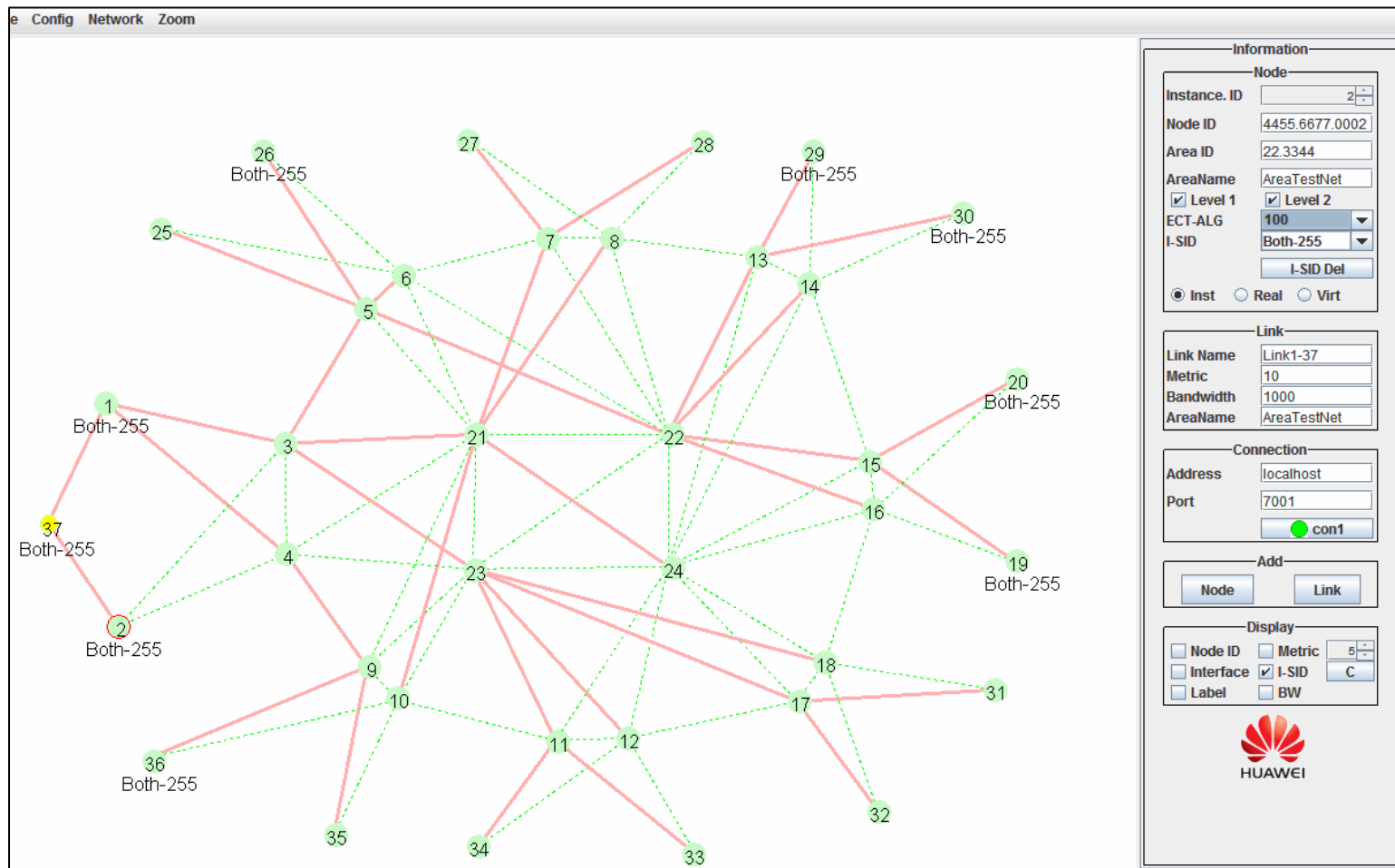
```
Node:4455.6677.001d.00 (Instance_29) -> Node:4455.6677.000d.00 (Instance_13) -> Node:4455.6677.0016.00 (Instance_22) ->
```

```
Node:4455.6677.0005.00 (Instance_5) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

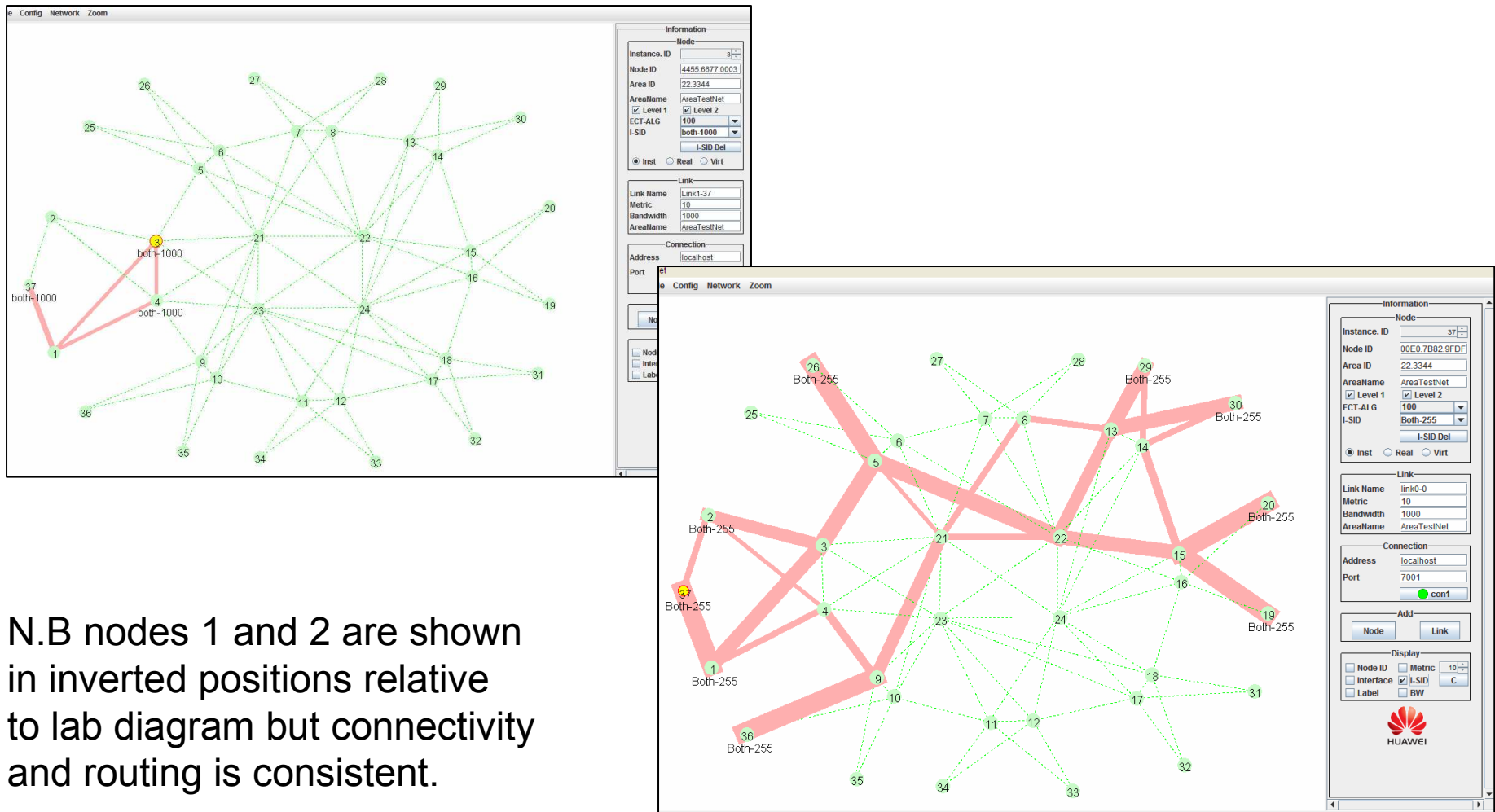
```
Node:4455.6677.001e.00 (Instance_30) -> Node:4455.6677.000d.00 (Instance_13) -> Node:4455.6677.0016.00 (Instance_22) ->
```

```
Node:4455.6677.0005.00 (Instance_5) -> Node:4455.6677.0003.00 -> Node:4455.6677.0001.00 -> ROOT
```

Engineering tool predicted SPF tree B-VID 10 from Avaya
ERS 8800 to all other nodes - same as:
“show isis spbm unicast-tree 10” on previous slide



Engineering tool predicted active topologies for <ISID 255, B-VID10> and <ISID 1000, B-VID 10>



N.B nodes 1 and 2 are shown in inverted positions relative to lab diagram but connectivity and routing is consistent.