

802.1aq/SPB - 3rd Interop Overview

Onsite

Edgard Vargas – Alcatel Lucent

Peter Ashwood-Smith - Huawei

John Vant Erve - Avaya

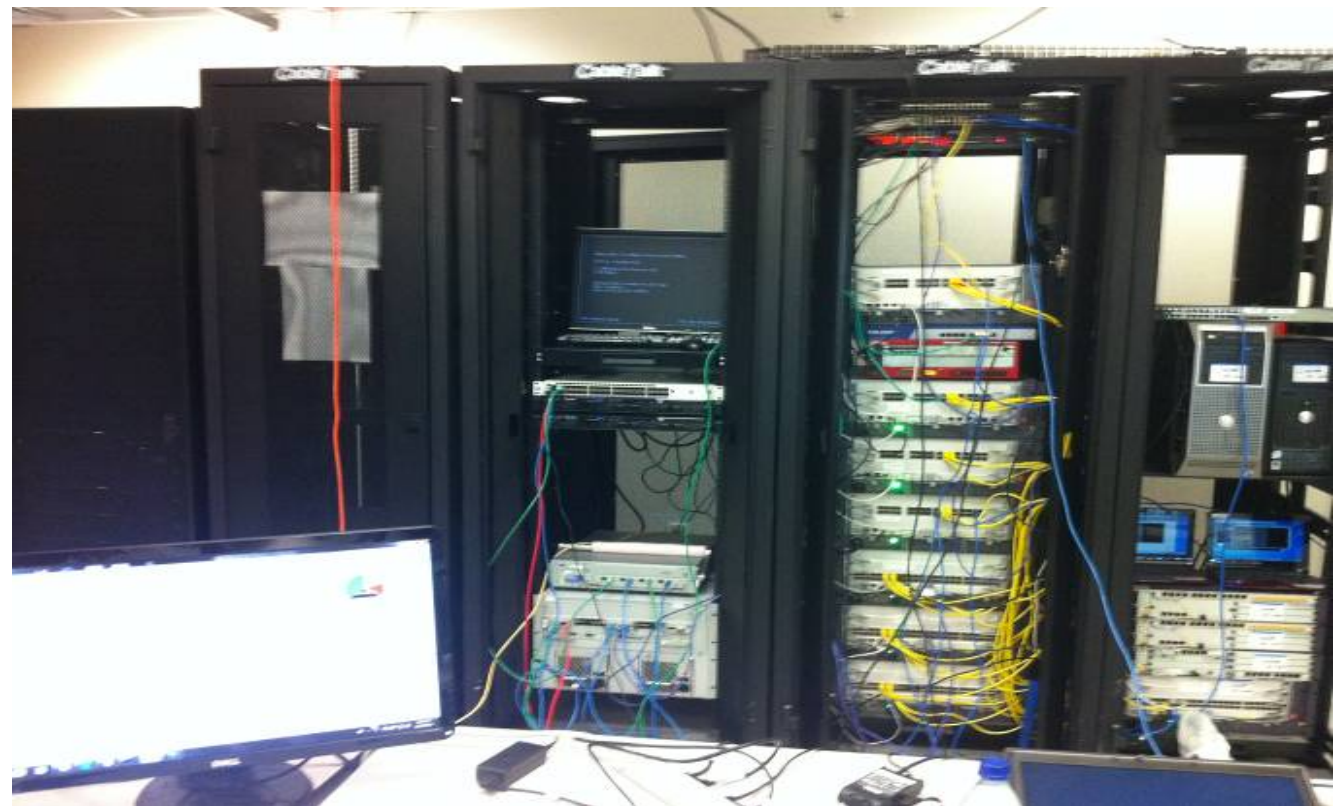
Stephane Vinet - Spirent

Bis Nandy – Solana

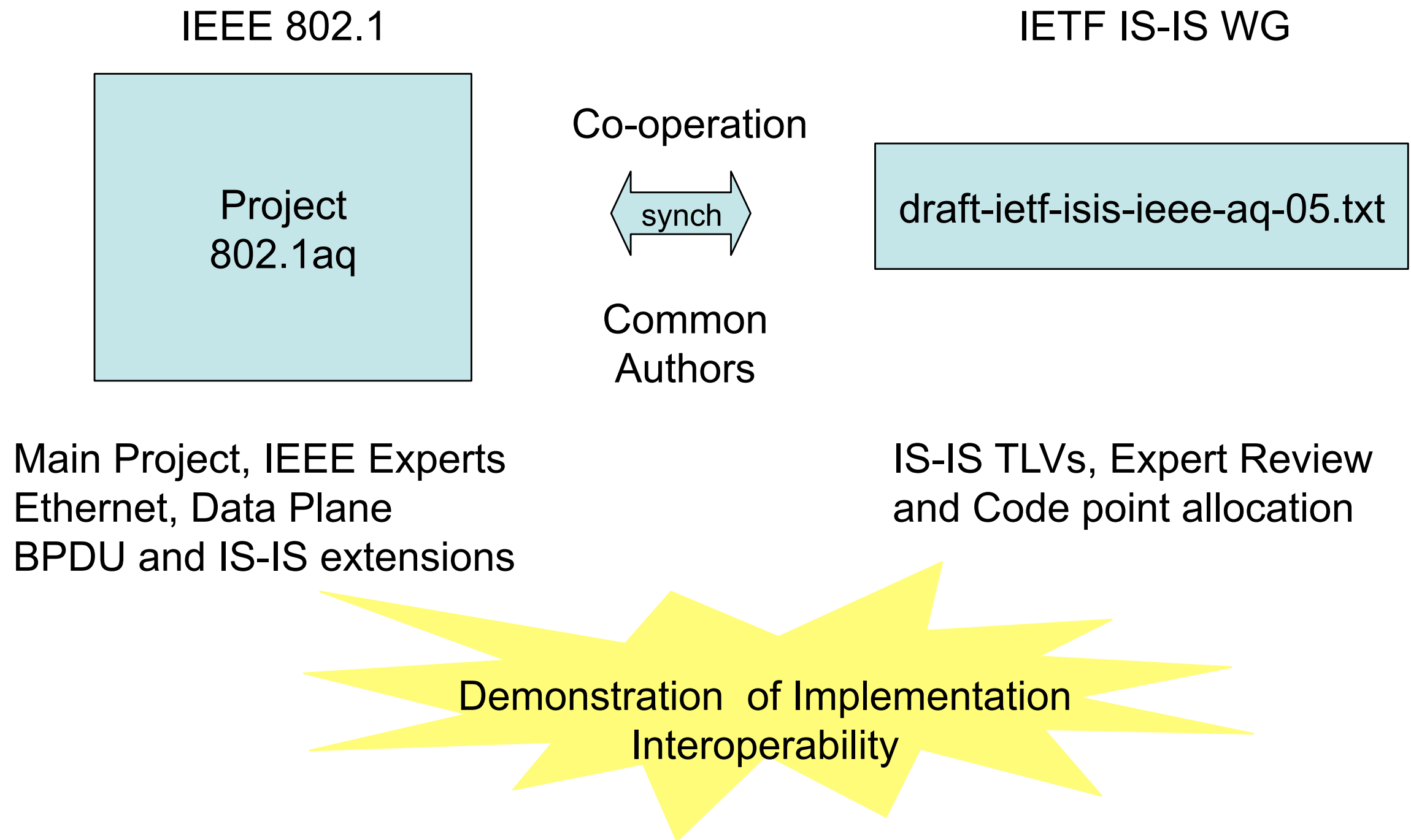
Rup Makkar - Solana

Date

June 27-30 Ottawa/Canada



802.1aq Standardization



802.1aq (SPBm) Interop's

- 1st Interop was 2010 Avaya/Huawei
 - Simple control plane/data/.1ag – 5 nodes.
 - Report available via the wikipedia 802.1aq page.
- 2nd Interop was in January 2011 Avaya/Huawei
 - Full data plane/control/.1ag – 9 nodes including VM moves (report pending..)
- 3rd Interop was in June 2011 Avaya/Huawei/ALU
 - Full control plane/ some .1ag – 187 nodes and 412 links
- 4th Interop will be in a few months

Third Interop Summary (SPBM)

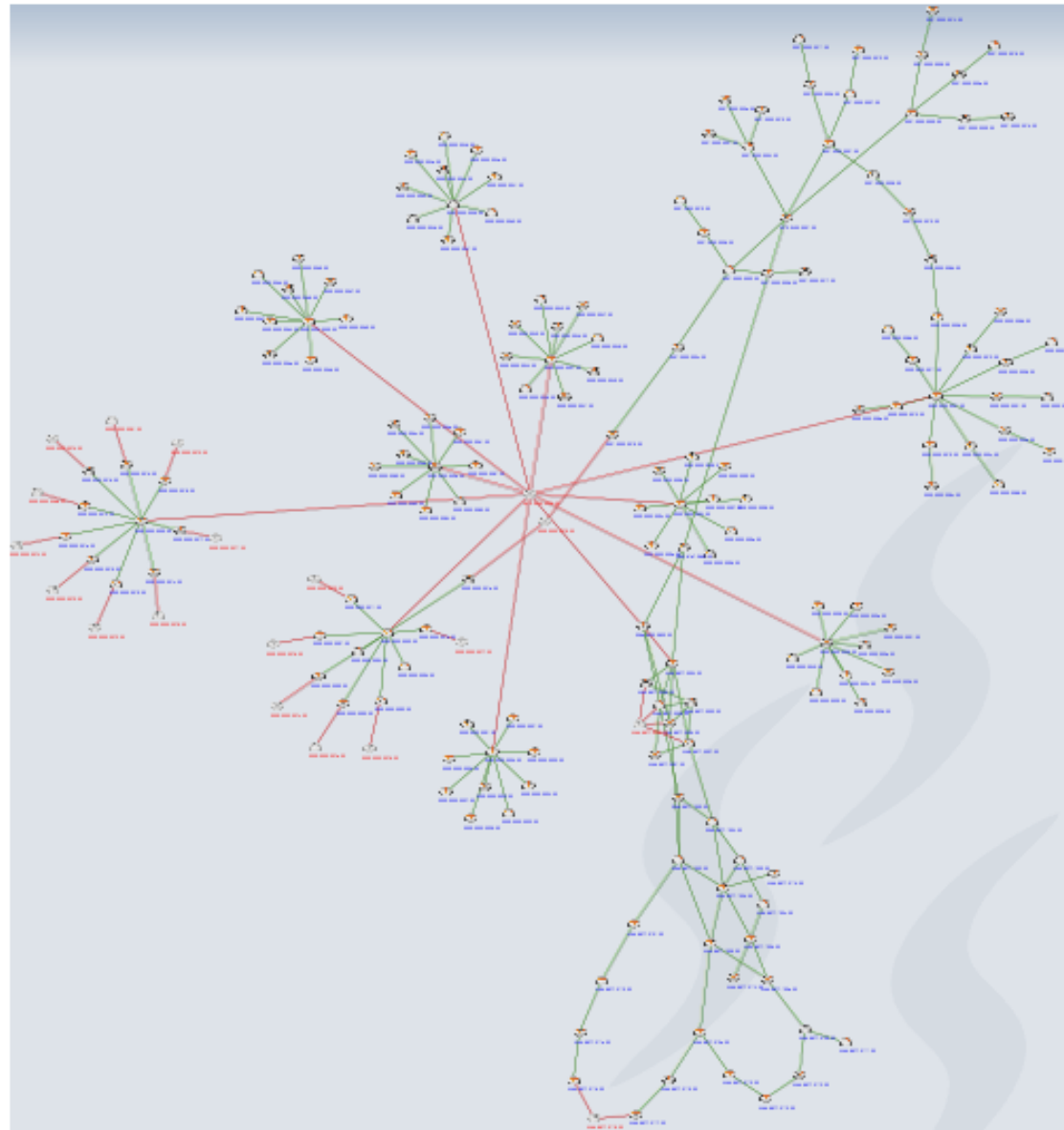
- Based the IETF draft-05 with current IANA code point allocations and the IEEE D4.0 – June 2011.
 - Focus on SPBM mode
 - Brought together 5 vendors products representing 6 independent implementations.
 - 10 real switches
 - 1 high end tester
 - 1 passive network viewer (via NNI)
 - 1 LINUX/Quagga emulator.
-
- Built a IS-IS SPB network with 187 nodes and 412 links.

Actual TLV's Tested

PDU	TLV	sub-TLV	Type	Tested	Comments
IIH					
	NLPID		129	Y	RFC 1195
	MT-Port-Cap		143	Y	Tested MTID# 0 - single topology
		SPB-MCID	4	Y	Digest of all VID/FID mappings
		SPB-Digest	5	N	Topology Diges - Optional
		SPB-B-VID	6	Y	Part of establishing an adjacency, necessary to a common view of the network.
LSP					
	MT-Capability		144	Y	A TLV level identifying the topology (MTID) for all sub TLVs.
		SPB-Inst	1	Y	SPB Instance, Identifies the bridge uniquely, along with the Base VIDs and ECT Algorithms. Must be carried in fragment ZERO LSP.
		SPB-I-OALG	2	N	Instance Opaque ECT, for new ECT algorithms.
		SPBM-SI	3	Y	SPBM Service Identifier, Maps I-Sids in the context of a B-VLAN to a B-MAC.
	Extended-IS-Reachability/MT-Intermediate-System		22/222	Y	Contains the System ID of a neighbor.
		SPB-Metric	29	Y	Link Metric, necessary for distributing cost of links (if not present for an ISIS adjacency, then adjacency may not carry SPB traffic).
		SPB-A-OALG	30	N	Adjacency Opaque ECT, for new ECT algorithms.

These are the proper IANA code points

Simulate a Large Network

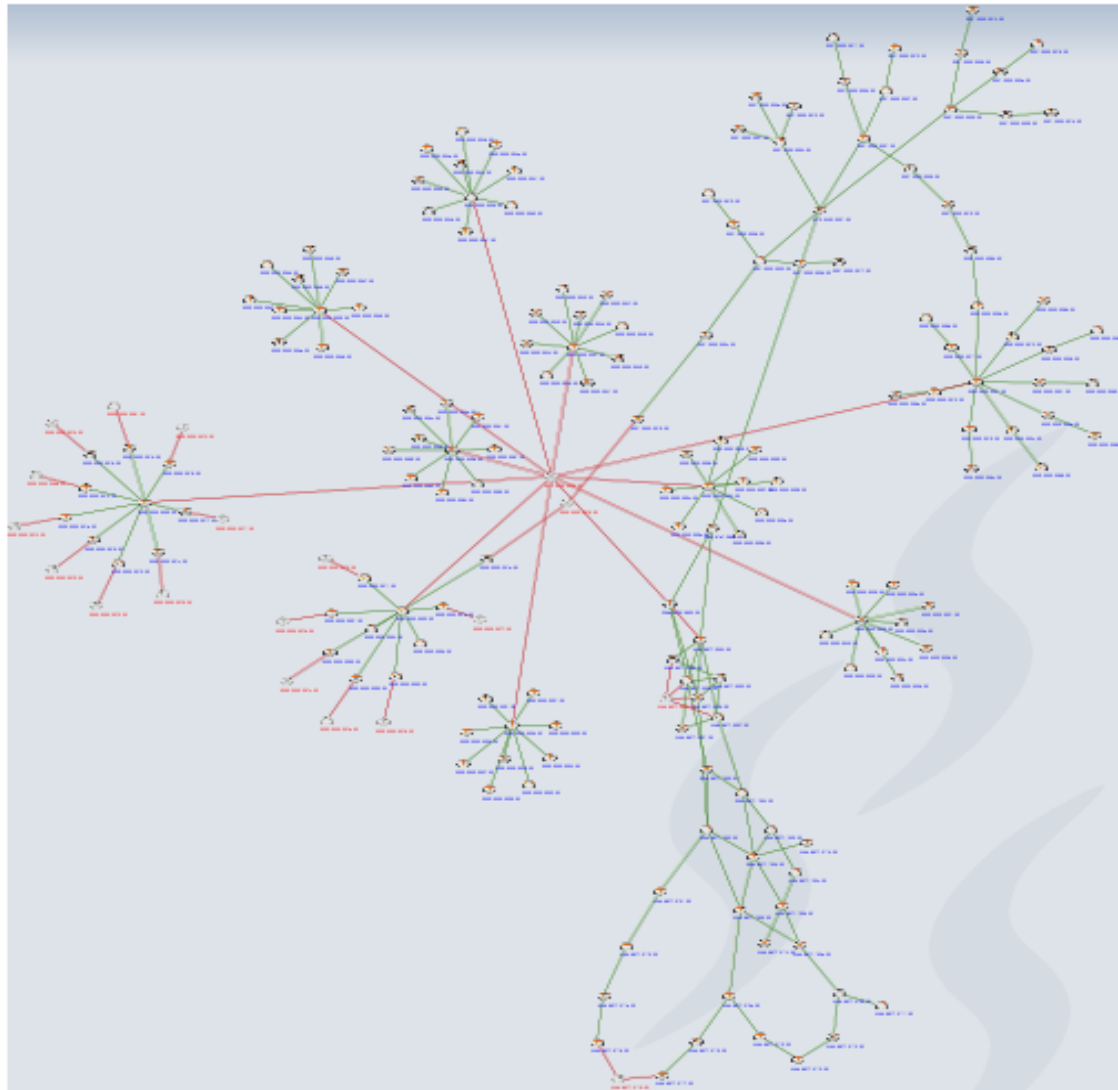


```
<ottawa-s9300-6>d spb status
```

SPB Status:

mode SPBM, nodes 187, links 412, adj 6, ufib
372, mfib 45

Viewer –via passive NNI - Solana



Implemented the hello protocol.

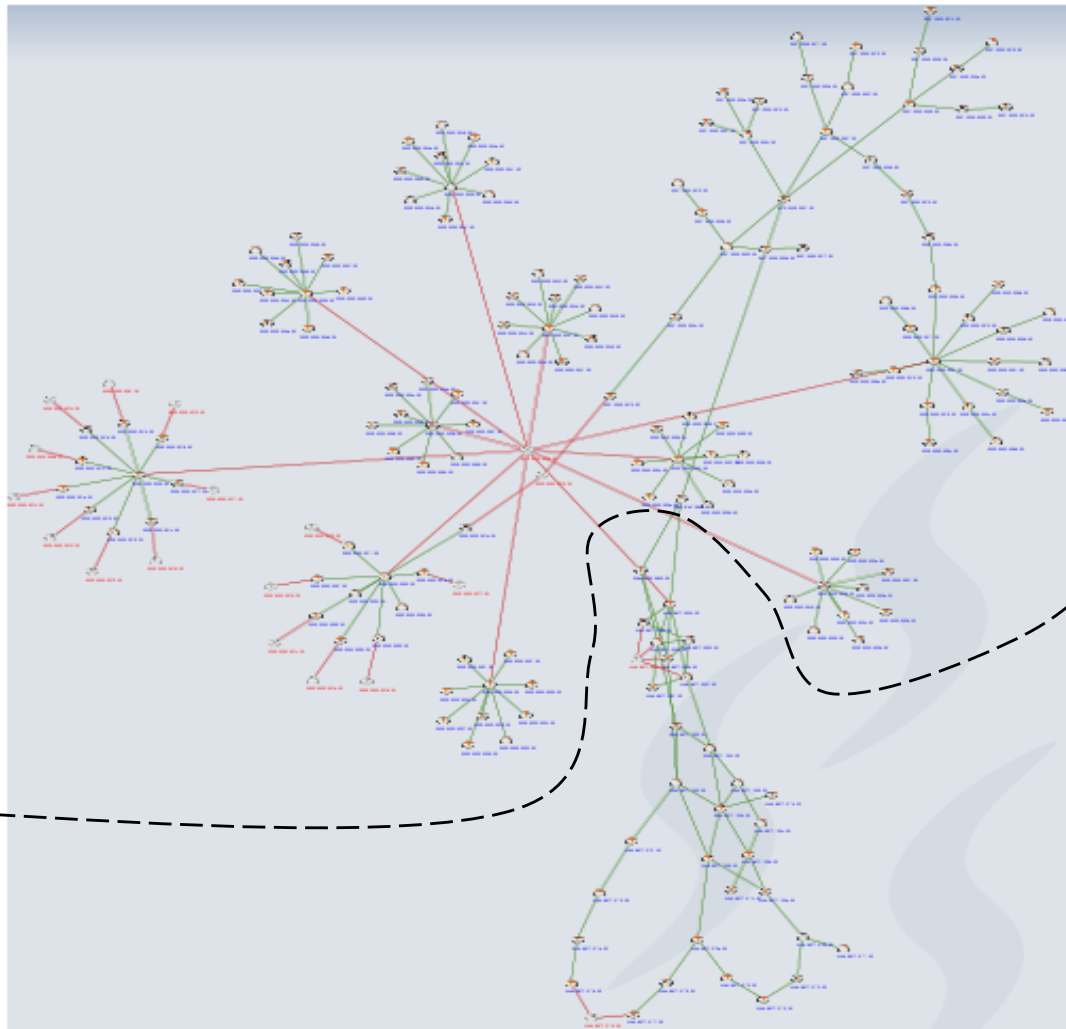
Passive Listen to the IS-IS LSP's
Draw the topology they see.

Automatic network drawing layout.



Network emulator - Spirent

Spirent SPB

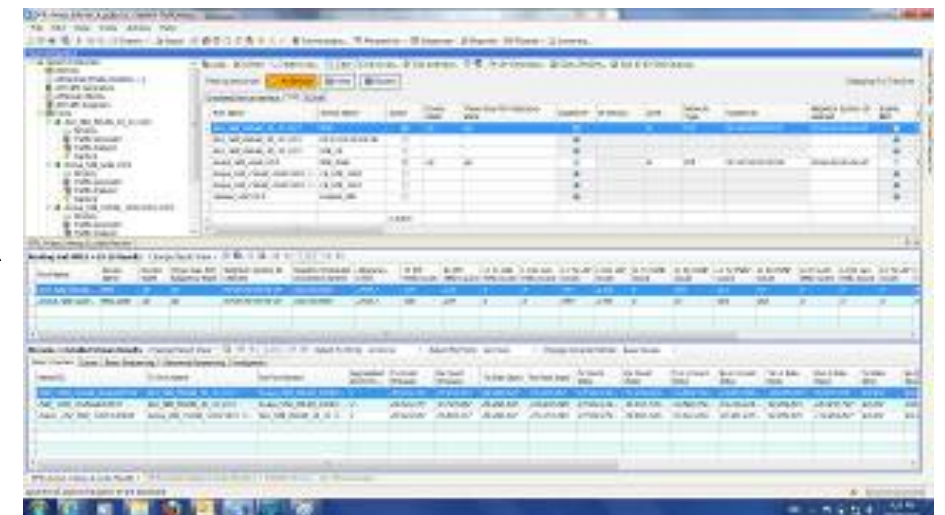


Formed 3 SPBM Adjacencies.

Inject various topologies including ISIDs info.

Injected packets with PBB encapsulation.

Also used as Customer test point for ISID.



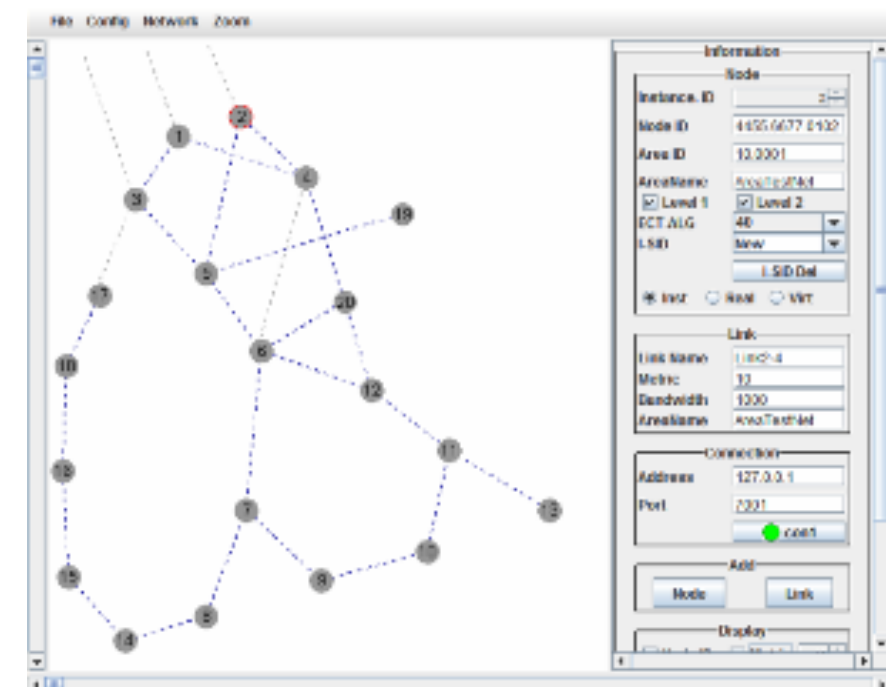
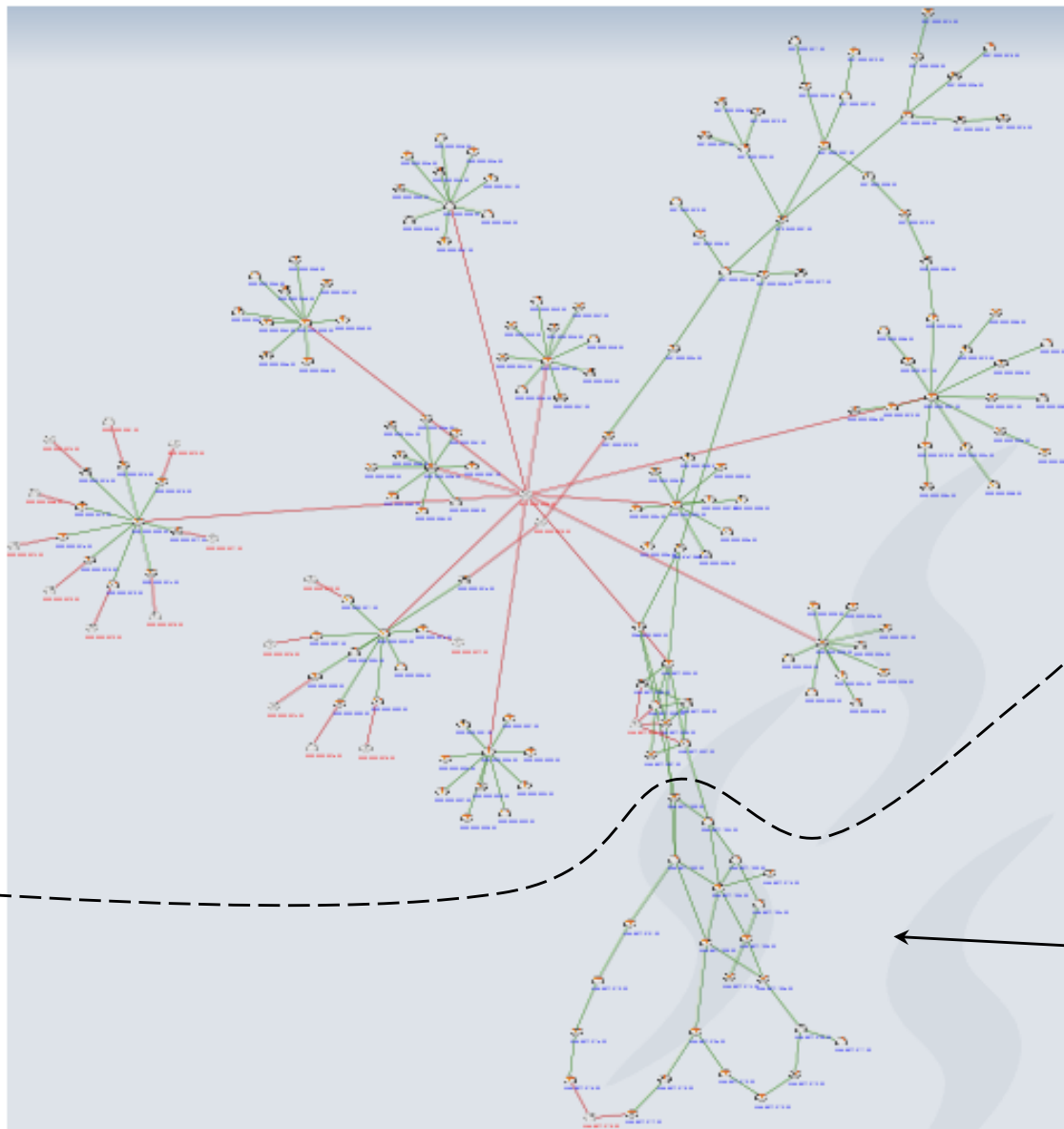
Network emulator - Quagga

Linux/Laptop

Modified Quagga ISIS+Java

Draw picture & inject/change

Quagga



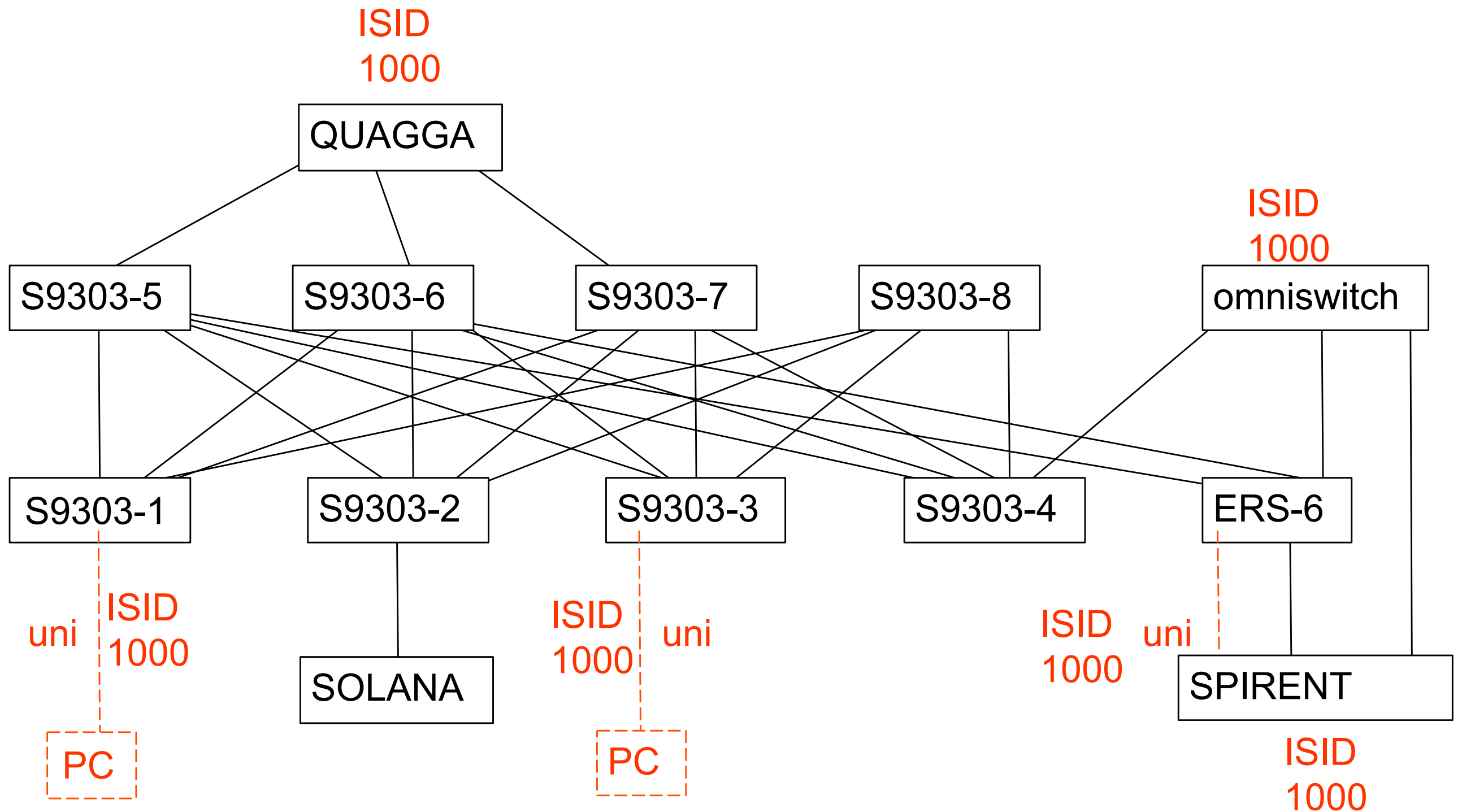
Physical Network



July 18

IEEE Plenary San Francisco
IEEE 802.1

Physical topology



Link State Database

```
<ottawa-s9300-6>d isis lsdb
```

```
Database information for ISIS(1)
```

```
-----
```

```
Level-1 Link State Database
```

LSPID	Seq Num	Checksum	Holdtime	Length	ATT/P/OL
0001.0000.0001.00-00	0x00000066	0xd16	648	202	0/0/0
...					
Instance_2.00-00	0x000000b6	0xa06e	850	209	0/0/0
Instance_3.00-00	0x000000b6	0x85c4	313	269	0/0/0
Instance_4.00-00	0x000000b4	0xcd4f	811	239	0/0/0
Instance_5.00-00	0x000000b6	0xe9e9	1002	275	0/0/0
ERS-6.00-00	0x000001e9	0x28d5	694	324	0/0/0
omniswitch.00-00	0x00000085	0xb9bf	839	176	0/0/0
s9303-1.00-00	0x00000143	0x8961	717	162	0/0/0
s9303-2.00-00	0x0000036f	0x1714	715	219	0/0/0
s9303-3.00-00	0x00000311	0xb5ba	727	200	0/0/0
s9303-4.00-00	0x0000035a	0xbbba	676	219	0/0/0
s9303-5.00-00	0x000003d0	0x7cde	432	183	0/0/0
s9303-6.00-00*	0x000003ce	0x81d8	503	202	0/0/0
s9303-7.00-00	0x000003d3	0xff18	889	183	0/0/0
s9303-8.00-00	0x0000016d	0x15cc	1015	145	0/0/0

← Spirent

← Quagga

← Avaya
Alu

← Huawei

Solana is passive
so no LSP

Filtering Database

```
ERS-6:3/show/isis/spbm# unicast-fib
```

```
*****
```

```
Command Execution Time: THU JUN 30 12:04:29 2011 UTC
```

```
*****
```

```
=====
```

SPBM UNICAST FIB ENTRY INFO

```
=====
```

DESTINATION ADDRESS	BVLAN	SYSID	HOST-NAME	OUTGOING INTERFACE	COST
------------------------	-------	-------	-----------	-----------------------	------

```
-----
```

00:01:00:00:00:03	40	0001.0000.0003	NULL	2/18	70
-------------------	----	----------------	------	------	----

..

00:55:66:77:10:05	41	0055.6677.1005	Instance_5	2/20	40
-------------------	----	----------------	------------	------	----

00:e0:b1:e7:0b:d3	41	00e0.b1e7.0bd3	omniswitch	2/4	100
-------------------	----	----------------	------------	-----	-----

44:55:66:77:00:01	40	4455.6677.0001	s9303-1	2/20	20
-------------------	----	----------------	---------	------	----

44:55:66:77:00:01	41	4455.6677.0001	s9303-1	2/20	20
-------------------	----	----------------	---------	------	----

44:55:66:77:00:02	40	4455.6677.0002	s9303-2	2/20	20
-------------------	----	----------------	---------	------	----

44:55:66:77:00:02	41	4455.6677.0002	s9303-2	2/20	20
-------------------	----	----------------	---------	------	----

44:55:66:77:00:03	40	4455.6677.0003	s9303-3	2/20	20
-------------------	----	----------------	---------	------	----

44:55:66:77:00:03	41	4455.6677.0003	s9303-3	2/20	20
-------------------	----	----------------	---------	------	----

Multicast FDB

```
ERS-6:3/show/isis/spbm# multicast-fib
```

```
*****
```

```
Command Execution Time: THU JUN 30 12:08:33 2011 UTC
```

```
*****
```

```
=====
```

SPBM MULTICAST FIB ENTRY INFO

```
=====
```

MCAST DA	ISID	BVLAN	SYSID	HOST-NAME	OUTGOING-INTERFACES
23:00:0e:00:03:e8	1000	40	0001.0000.000e	NULL	2/20,2/2
...					
03:00:06:00:03:e8	1000	40	00be.b000.0600	ERS-6	2/18,2/20,2/4,2/2
03:00:06:00:03:e9	1001	41	00be.b000.0600	ERS-6	2/18,2/20,2/4,2/2
73:0b:d3:00:03:e8	1000	40	00e0.b1e7.0bd3	omniswitch	2/18,2/20,2/2
73:0b:d3:00:03:e9	1001	41	00e0.b1e7.0bd3	omniswitch	2/18,2/2
73:00:01:00:03:e8	1000	40	4455.6677.0001	s9303-1	2/18,2/4,2/2
73:00:01:00:03:e9	1001	41	4455.6677.0001	s9303-1	2/18,2/2

Shortest Path Next hop

```
6900-X40-A2_14_2_3-> show ip isis spf
```

```
=====
```

```
ISIS Path Table
```

```
=====
```

Node	Interface	Nexthop
0001.0000.0001.00	1/3	0010.9400.0001
0001.0000.0002.00	1/3	0010.9400.0001
0001.0000.0003.00	1/3	0010.9400.0001
....		
4455.6677.011a.00	1/2	00be.b000.0600
4455.6677.011b.00	1/2	00be.b000.0600
4455.6677.1008.00	1/2	00be.b000.0600
4455.6677.1009.00	1/1	4455.6677.0004
4455.6677.100a.00	1/2	00be.b000.0600
4455.6677.100b.00	1/2	00be.b000.0600
4455.6677.100c.00	1/1	4455.6677.0004

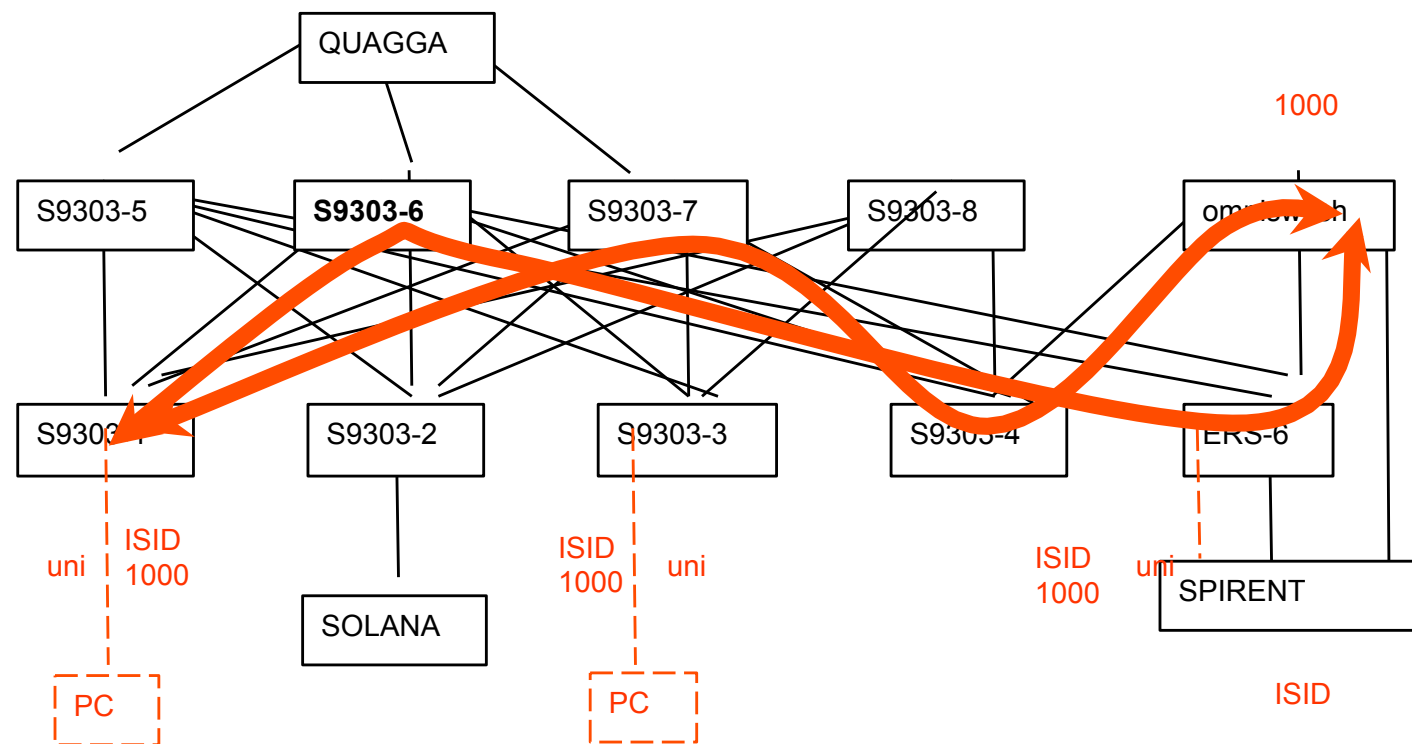
```
-----
```

```
SPF count: 185
```

```
=====
```

Route query for two ECT-ALGORITHMS.

```
<ottawa-s9300-6>d spb uroute s9303-1 omniswitch vlan 41
PATH:
  s9303-1 -> s9303-7 -> s9303-4 -> omniswitch
  s9303-1 -> s9303-7 -> s9303-4 -> omniswitch
<ottawa-s9300-6>
<ottawa-s9300-6>
```

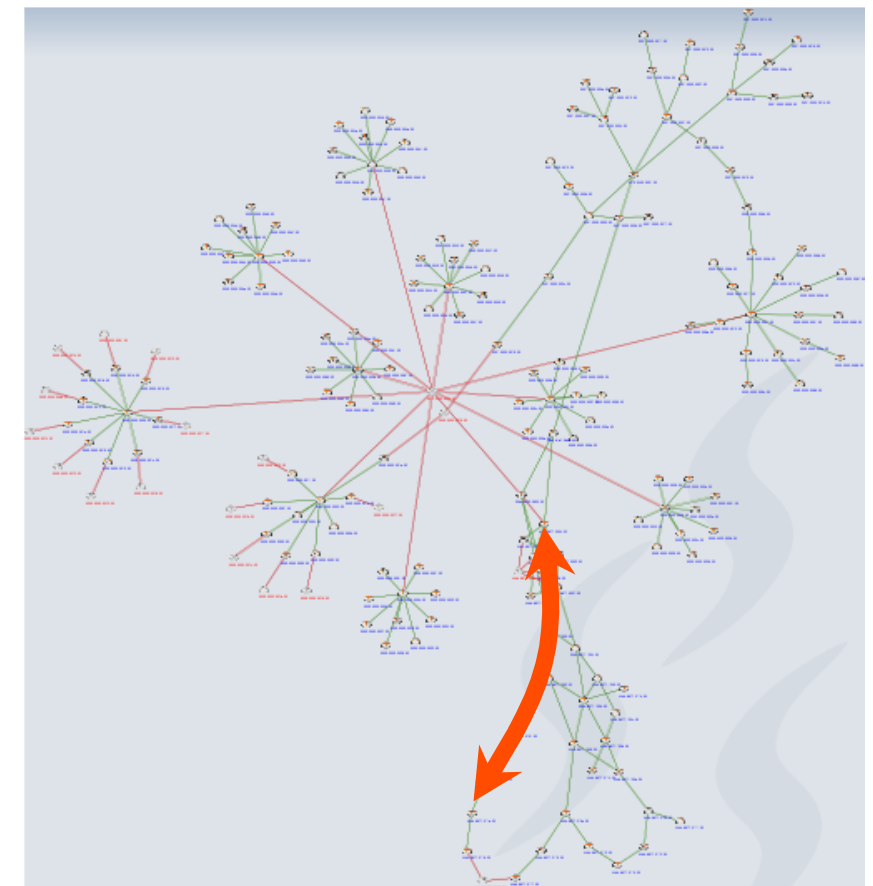
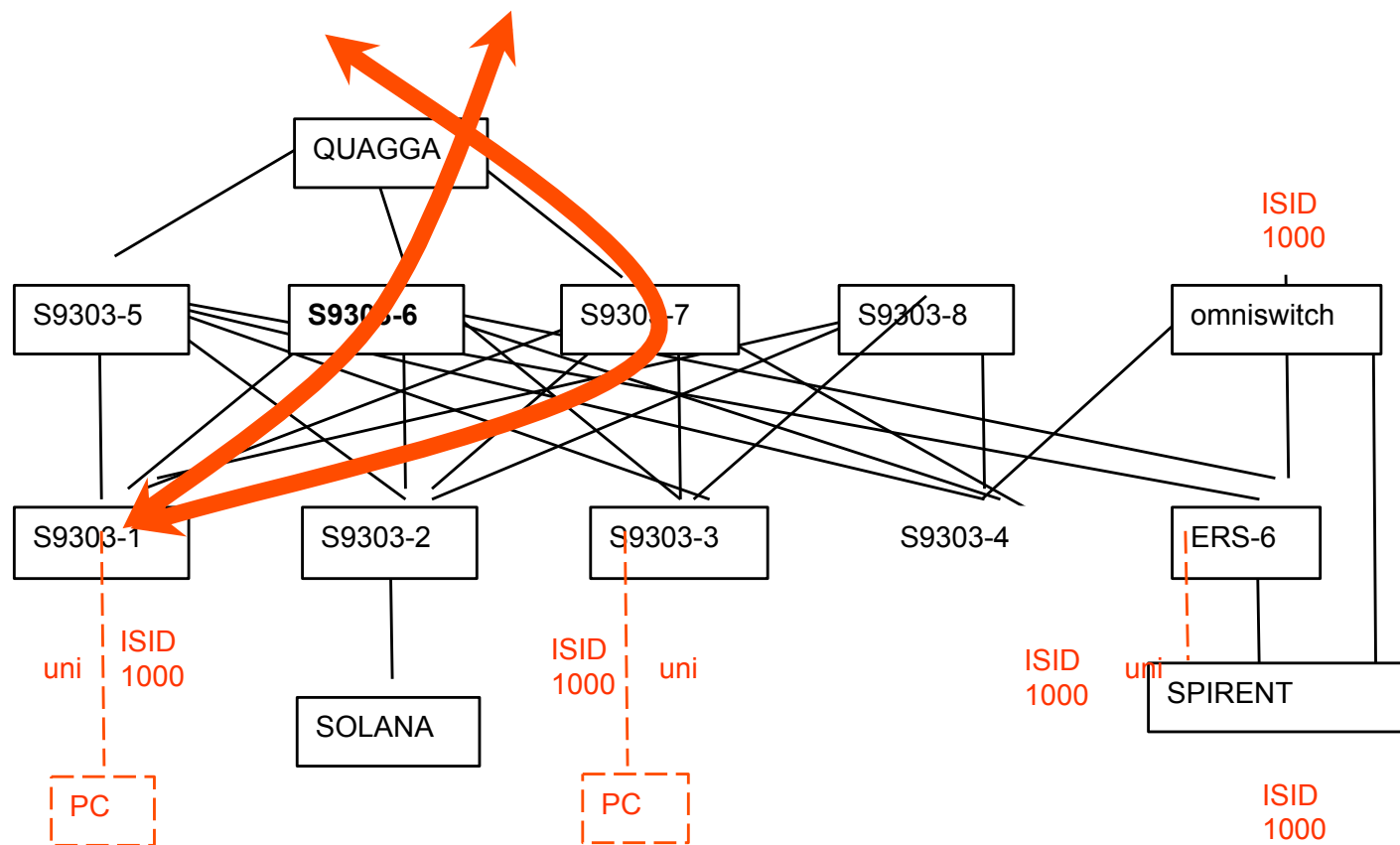


Route query for distant nodes

```
<ottawa-s9300-6>d spb uroute s9303-1 Instance_22 vlan 40
Path:
off-mg-s9300-6>q sdp ntonfe s9303-1 Instance_22 vlan 40
```

```
Path:
Instance_24 -> Instance_23 -> Instance_22
s9303-1 -> s9303-6 -> Instance_5 -> Instance_3 -> Instance_8 -> Instance_14 ->
```

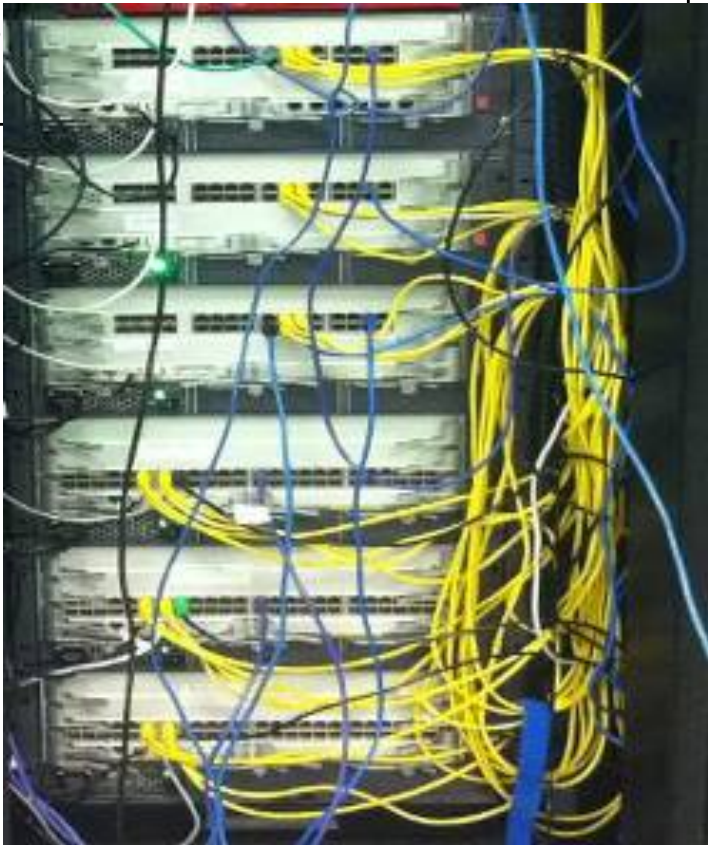
```
<ottawa-s9300-6>d spb uroute s9303-1 Instance_22 vlan 41
```



```
<ottawa-s9300-6>d spb status
SPB Status:
  mode SPBM, nodes 187, links 412, adj 6, ufib 372, mfib 45
  Collision:
<ottawa-s9300-6>d spb status
SPB Status:
  mode SPBM, nodes 187, links 412, adj 6, ufib 372, mfib 45
  Collision:
<ottawa-s9300-6>d isis peer
Peer information for ISIS(1)
System Id      Interface      Circuit Id      State HoldTime Type PRI
-----
s9303-1        GE1/0/10       00000000002    Up    23s    L1    --
s9303-2        GE1/0/11       00000000004    Up    25s    L1    --
s9303-3        GE1/0/12       00000000002    Up    29s    L1    --
s9303-4        GE1/0/13       00000000003    Up    27s    L1    --
```

Huawei

“S9303”



```
*****
Command Execution Time: THU JUN 30 11:36:15 2011 UTC
*****
```

```
=====
                        ISIS Adjacencies
=====
```

INTERFACE	L	STATE	UPTIME	PRI	HOLDTIME	SYSID	HOST-NAME
Port2/18	1	UP	18:24:49	127	25	0010.9400.0008	(null)
Port2/19	1	UP	04:27:27	127	29	4455.6677.0005	s9303-5
Port2/20	1	UP	04:25:41	127	28	4455.6677.0006	s9303-6
Port2/4	1	UP	14:39:30	127	21	00e0.b1e7.0bd3	omniswitch

```
-----
4 out of 4 interfaces have formed an adjacency
-----
```

“ERS-6”



```
6900-X40-A2_14_2_3-> show ip isis adjacency
```

```
=====
```

```
ISIS Adjacency
```

```
=====
```

System ID	Type	State	Hold	Interface	Hostname
4455.6677.0004	L1	UP	27	1/1	s9303-4
00be.b000.0600	L1	UP	25	1/2	ERS-6
0010.9400.0001	L1	UP	28	1/3	None

```
-----
```

```
Adjacency : 3
```

ALU

“omniswitch”



Compliance points

- Test > 2 ECT (but should be easy)
- Do more adjacency rejection tests
- MIBs?
- More .1ag tests

Recommended but not required for compliance

- Align SpSourceID's, MEPID's.
- Align SpSourceID's, MEPID's set by user suggest (ASCII of your OUI) + instance.

Next Steps

and offered use of a transatlantic link.

- More in depth.1ag tests
- IETF interop informational but want to use also to recommend good practices (BCP).
- Perhaps test the MIBs?

Thank-you



Edgard, Peter, John, Stephane, Bis & Rup (not shown)...
and many others of course in 3 different countries.