

Ethernet Routing Switch 8800 Series Hirschmann<sup>™</sup> Industrial Ethernet Switches

Engineering

>Ethernet Routing Switch 8800 Series with Hirschmann<sup>™</sup> Industrial Ethernet Switches Technical Configuration Guide

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# Abstract

This Technical Configuration Guide describes a solution comprised of Avaya Ethernet Routing Switch 8800 Series switches and Hirschmann<sup>™</sup> Industrial Ethernet switches. During interoperability testing, connectivity was established between the Avaya and Hirschmann<sup>™</sup> switches, and tests that simulated network failures were successfully completed.

Information in this Technical Configuration Guide has been obtained through Avaya Networking interoperability testing and additional technical discussions. Testing was conducted at the Avaya Networking Test Lab.

# Acronym Key

Throughout this guide the following acronyms will be used:

- DIN: Deutsches Institut für Normung (in English German Institute for Standardization)
- EMI: Electromagnetic Interference
- IE: Industrial Ethernet
- IGMP: Internet Group Management Protocol
- LACP: Link Aggregation Control Protocol
- MICE: Mechanical, Ingress, Climatic/Chemical and Electromagnetic
- MLT: MultiLink Trunking
- NEMA: National Electrical Manufacturer Association
- RSTP: Rapid Spanning Tree Protocol
- SMLT: Split MultiLink Trunking
- STP: Spanning Tree Protocol
- VRRP: Virtual Router Redundancy Protocol



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# Conventions

This section describes the text, image, and command conventions used in this document.

# Symbols



Tip – Highlights a configuration or technical tip.



Note – Highlights important information to the reader.



Warning – Highlights important information about an action that may result in equipment damage, configuration or data loss.

# Text

Bold text indicates emphasis.

*Italic* text in a Courier New font indicates text the user must enter or select in a menu item, button or command:

ERS5520-48T# show running-config

Output examples from Avaya devices are displayed in a Lucida Console font:

```
ERS5520-48T# show sys-info
```

Operation Mode:	Switch
MAC Address:	00-12-83-93-в0-00
POE Module FW:	6370.4
Reset Count:	83
Last Reset Type:	Management Factory Reset
Power Status:	Primary Power
Autotopology:	Enabled
Pluggable Port 45:	None
Pluggable Port 46:	None
Pluggable Port 47:	None
Pluggable Port 48:	None
Base Unit Selection:	Non-base unit using rear-panel switch
sysDescr:	Ethernet Routing Switch 5520-48T-PWR
	HW:02 FW:6.0.0.10 SW:v6.2.0.009
	Mfg Date:12042004 HW Dev:H/W rev.02

# AVAYA

# 1. Introduction: Industrial Ethernet

# Harsh environments require robust solutions.

The Avaya-Belden Industrial Ethernet (IE) solution can stand up to environmental settings that have wide temperature ranges, excessively dirty areas, high EMI, or areas where it is not always feasible or possible to use a NEMA-rated enclosure to protect the Ethernet switching equipment. Examples of this include:

- Manufacturing
- Military
- > Mining
- Civil communications infrastructures
- > Railway networks

In the manufacturing environment, Industrial Ethernet will soon completely replace proprietary BUSsystems (fieldbus, Profibus, etc.) that are connecting industrial robots and other manufacturing components. This migration to Ethernet is being driven by the ubiquitous availability and price points of Ethernet. Most, if not all, manufacturing environments already have some form of Ethernet in place – handling the office/backend networks. The ability to leverage this, along with the continually lowering price of Ethernet makes this very attractive as a replacement for the plant floor network.

Avaya and Belden are working together to offer a joint solution of an industrial switching infrastructure that ensures the interoperability and integration between the equipment offered by the two vendors. The Avaya-Belden total solution now encompasses not only the IE network, but also the data center and backend office infrastructure.

# 2. Avaya-Hirschmann<sup>™</sup> Ethernet Switches interoperability testing

This document provides the details of the interoperability testing between the Avaya Ethernet Routing Switches and the Hirschmann<sup>™</sup> Industrial Switches. The various network design scenarios and test cases are also detailed in this document.

The interoperability testing focused primarily on verifying throughput under normal conditions and then simulating various fault conditions to test high availability. The following sections describe the Avaya and Hirschmann<sup>™</sup> switches used in these tests.

# 2.1 Avaya Ethernet switching components

The following Avaya Ethernet switches are part of this solution:

- Avaya Ethernet Routing Switch 8800
- Avaya Ethernet Routing Switch 5650



# 2.1.1 Ethernet Routing Switch 8800

The Avaya Ethernet Routing Switch 8800 (ERS 8800) systems are typically deployed in Switch Clusters to deliver true end-to-end reliability and always-on application access. Available in a wide range of models, these systems are specifically designed to address the critical enterprise requirements of reliability, efficiency, and scalability. The ERS 8800 is also a key component of the Avaya Virtual Enterprise Network Architecture, supporting full-featured network virtualization capabilities for campus cores and data center applications.

As a Layer 2/3 routing switch, the ERS 8800 provides flexibility in many network designs as it can be utilized as a closet switch, aggregation switch, or core switch. The ERS 8800 supports Switch Clustering by using Split Multilink Trunking (SMLT) for active/active uplink connectivity without using any form of spanning tree. However, the ERS 8800 also supports the IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) for those environments where spanning tree is desired.

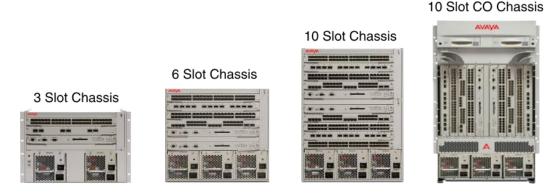


Figure 1 – Avaya ERS 8800

# 2.1.1.1 High Availability

The ERS 8800 supports High Availability (HA) mode within a single chassis when two Switch Fabric/CPU (SF/CPU) modules are installed. With HA enabled, both CPUs are active. The CPUs exchange topology data, so in the event of an SF/CPU failure, the functioning SF/CPU can continue passing traffic with subsecond recovery. In the event of a failure of the master CPU, the backup CPU takes over system control with sub-second convergence and minimal or no interruption to user applications/traffic.



# 2.1.1.2 Switch Clustering – Split MultiLink Trunking (SMLT)

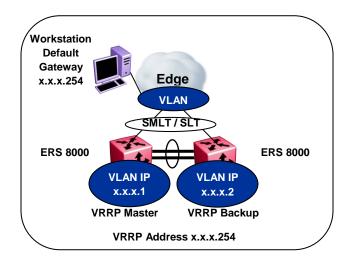
Switch Clustering using Split MultiLink Trunking (SMLT) provides industry-leading performance for resiliency. Providing redundant active-active links without using Spanning Tree allows the ultimate design in a converged environment. Sub-second failover and the simplicity of a network without Spanning Tree reduces TCO and ensures converged applications will function flawlessly. A vital feature of Switch Clustering is its ability to work with any end device (3<sup>rd</sup> party switch, servers, etc.) that supports a form of link aggregation.

Switch Clustering also provides the ability to perform virtual hitless upgrades of the core switches (cluster). With all connections to the cluster dually attached, a single core switch can be taken out of service without interrupting end user traffic. This switch then can be upgraded and brought back into service. By performing the same function on the other switch, after the upgraded switch is back online, the entire cluster has been upgraded without taking a service outage and with minimal interruption to traffic flows on the network.

# 2.1.1.3 VRRP with Backup Master

To allow both VRRP switches to route traffic, Avaya created the Backup Master extension to VRRP, which creates an active-active environment for default routing. With Backup Master enabled on the backup routing switch, the backup router no longer switches traffic to the VRRP Master. Instead the Backup Master routes all traffic received on the Backup Master IP interface according to the switch routing table. This prevents the edge switch traffic from being unnecessarily switched to the other switch in the cluster.

VRRP provides redundancy for end users' default gateway and should be utilized for each VLAN configured that hosts end stations. This VRRP default gateway is for workstations or any edge clients in the edge VLAN, not for the firewall. Along with VRRP, Backup Master should be enabled on the Switch Cluster to provide active-active routing and forwarding of traffic.



# Figure 2 – Avaya ERS 8800 with VRRP Backup Master

# 2.1.2 Ethernet Routing Switch 5650

The Ethernet Routing Switch 5600 (ERS 5600) is a family of stackable Ethernet Layer 2/3 routing switches. For the Avaya-Belden Industrial Ethernet (IE) solution, the Avaya Networking Test Lab used the ERS 5650 in their tests. Like all of the ERS 5600 models, the ERS 5650 provides direct end station connectivity, aggregation for closet connectivity, as well as for servers, network appliances, and other devices. The ERS 5650 provides flexibility in many network designs as it can be utilized as a closet switch, aggregation switch, or as a core switch.

The ERS 5650 supports Switch Clustering by using Split Multilink Trunking (SMLT) for active/active uplink connectivity without the use of any form of spanning tree. However, the ERS 5650 also supports the IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) for those environments where spanning tree is desired.

In the Avaya-Belden Industrial Ethernet (IE) solution, the ERS 8800s perform all of the Layer 3 functions. The ERS 5650s perform the Layer 2 switching to the ERS 8800s *only*. However, the ERS 5650 is perfectly suited to providing the high-performance and highly available connectivity solution in the wiring closet. It has 48 ports of 10/100/1000 plus two 10 Gbps XFP ports. You can combine the ERS 5650 switches into a single stack with each ERS 5650 unit providing two 10GbE XFP ports for high-capacity uplinks to the core of the network.



Figure 3 – ERS 5650



# 2.2 Hirschmann<sup>™</sup> Ethernet switching components

The following Hirschmann<sup>™</sup> Ethernet switches are part of this solution:

- Hirschmann<sup>™</sup> MACH1040
- Hirschmann™ RS30
- Hirschmann™ MS30

# 2.2.1 Hirschmann<sup>™</sup> Ruggedized Switch MACH1040

Hirschmann<sup>™</sup> Ruggedized Switches are designed for high network availability and operational safety in the harshest conditions. The Hirschmann<sup>™</sup> MACH1040\_Gigabit Ethernet Switch operates in the temperature range of -40 to +70 °C, and it has high resistance to shock, vibration, electrical discharge, and magnetic fields. The MACH 1040 also uses the latest energy-saving chip technology, providing an extremely low thermal footprint despite being fan-less.

The MACH1000 is also available in an all-Gigabit version, offering 16 10/100/1000 RJ45/SFP combo ports to provide countless copper/ fiber combinations. These switches are available with Layer 2 or Layer 3 capabilities. The fan-less design and extremely efficient components are optimized for minimal heat generation and high MTBF (mean time between failure). The switches offer sub-10 second boot times and offer PTP IEEE 1588V2 with BC and TC, precision 30ns.

Hirschmann's ruggedized MACH1040 switches provide outstanding performance under extreme conditions with great flexibility. They have been specially designed to handle demanding requirements in applications such as military, power generation and distribution, as well as transportation. The series supports RSTP, MRP, link aggregation, Fast-HIPER-ring, redundant network/ring coupling and many security features.

The Avaya Networking Test Lab used MACH1040 switches in all Layer-2 based test scenarios.







# 2.2.2 Hirschmann<sup>™</sup> Rail Switch RS30

The Hirschmann<sup>™</sup> Rail Switch (RS30) is a compact, managed OpenRail switch that comes in a small footprint. The RS30 is a Layer 2 switch that provides high port-density with speeds up to 1 Gigabit. The switch is Class 1 Div 2 rated, has a redundant media/ring, redundant power inputs, and DIN rail mounts. It also comes with extensive security options and alarming to ensure network integrity.



Figure 5 – RS30

# 2.2.3 Hirschmann<sup>™</sup> Modular MICE Switches

MICE refers to the Mechanical, Ingress, Climatic/Chemical and Electromagnetic noise environment where the switch is going to be installed. The Modular Switch (MS30) offers you maximum flexibility due to the huge variety of media modules and therefore perfectly prepared for the growing network demands of the future. The MS30 is a Layer 2 switch that supports high port-density with speeds up to 1 Gigabit. The switch is Class 1 Div 2 rated, has a redundant media/ring, redundant power inputs, and DIN rail mounts. It comes with extensive security options and alarming to ensure network integrity. The MS30 also supports RSTP 802.1w as well as HIPER-ring, and redundant network/ring coupling.

The Avaya Networking Test Lab used an MS30 switch in all Layer-2 based test scenarios.

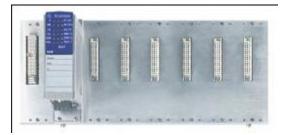


Figure 6 – MS30



# 3. Equipment and software validated

The following equipment and software were used for the sample configuration provided:

Equipment	Software							
Avaya Ethernet Switches								
Avaya Ethernet Routing Switch 8800	Software Release 7.1.3							
Avaya Ethernet Routing Switch 5650	Software Release 6.2.1							
Hirschmann™ Ethernet Switches								
• MACH1040	Software Release 06.0.02							
• RS30	Software Release 06.0.02							
• MS30	Software Release 06.0.02							

# 4. Testing methodology

The Avaya Networking Test Lab conducted comprehensive tests using a methodology that verified connectivity under normal conditions and under various fault conditions. The testing consisted of using PCs connected to the Hirschmann<sup>™</sup> switches (100Mbps Ethernet) and a PC connected to an ERS 5650 (100Mbps Ethernet). Pings were run between all the PCs in both directions. This ensured network connectivity to and through the core of the network.

A steady-state environment was tested where all devices were properly configured and connected as shown in each of the network topology figures. From this steady state, links and switches were failed to simulate network outages. These links and switches were then recovered simulating the restoration of the network. The results of each of these tests are detailed in the tables for each section. Please note that all tests were done simulating a single point of failure in the network. Multiple, simultaneous failures are out of the scope of these tests.

Avaya tested the solution under different scenarios, which are described in the following sections:

- ERS 8800 single connection to Hirschmann<sup>™</sup> switches
- ERS 8800 MLT connection to Hirschmann™ Switches
- ERS 8800 switch cluster connection to Hirschmann<sup>™</sup> Switch



# 5. ERS 8800 single connection to Hirschmann<sup>™</sup> switches

The objective of this test is to establish connectivity between the ERS 8800 and the Hirschmann<sup>™</sup> switches used in this testing.

The following figure represents the topology for this test:

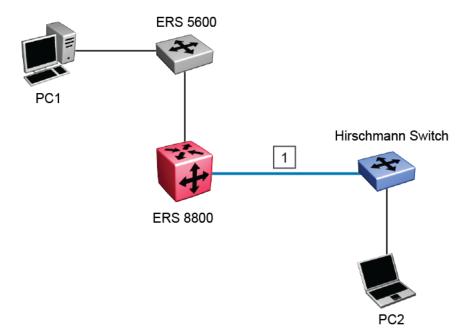


Figure 7 – ERS 8800 Single Connection to Hirschmann<sup>™</sup> Switches

# 5.1 Procedure steps

- 1. Set up a single connection between the ERS 8800 and the Hirschmann<sup>™</sup> MACH1040.
- 2. Test basic interoperability of link auto-negotiation (half/full duplex and 10/100/1000 Mbps).
- 3. Test on both copper and fiber ports.
- 4. Connect the ERS 8800 to the Hirschmann<sup>™</sup> RS30 and repeat steps 2 and 3.
- 5. Connect the ERS 8800 to the Hirschmann<sup>™</sup> MS30 and repeat steps 2 and 3.

**Note:** This test uses Port 2/13 as the connection to the Hirschmann<sup>™</sup> switches. It also uses only one VLAN (VLAN 1000).



# 5.2 Test results

The following table shows the test results:

Test Cases		Test Results								
	MACH1040	RS30	MS30							
Autonegotiation ERS8800 → Hirschmann™ (copper)	Pass	Pass	Pass							
No Autonegotiation ERS8800 → Hirschmann ™ (copper)	Pass	Pass	Pass							
Ping PC1 $\leftrightarrow$ PC2 (both directions, copper)	Pass	Pass	Pass							
Fail Link 1 (remove cable from port)	Pass	Pass	Pass							
Recover Link 1 (plug cable back into port)	Pass	Pass	Pass							
ERS8800 → Hirschmann™ (fiber)	Pass	Pass	Pass							
Ping PC1 $\leftrightarrow$ PC2 (both directions, fiber)	Pass	Pass	Pass							
Fail Link 1 (remove fiber from port)	Pass	Pass	Pass							
Recover Link 1 (plug fiber back into port)	Pass	Pass	Pass							

Multicast Test Cases for MACH1040 only	Test Results	
Multicast stream from PC1 to PC2, IGMPv1	Pass <sup>1</sup>	
Multicast stream from PC1 to PC2, IGMPv2	Pass <sup>1</sup>	
Multicast stream from PC1 to PC2, IGMPv3	Pass <sup>1</sup>	

### Table 1 ERS 8800 Switch Single Connection to Hirschmann™ Switches

### <u>Note</u>

1. The IGMP Querier that's active on the Hirschmann<sup>™</sup> MACH switch allows only the system interface to be the querier. Therefore, for Multicast test cases, Active Querier and IGMP Snooping is enabled on the ERS 8800.



# 5.3 ACLI configuration

The following configuration shows how to configure the ERS 8800 with the ACLI:

```
1 Enter Interface Configuration mode for port 2/13:
```

8800(config)#interface FastEthernet 2/13

### 2 Disable Autonegotiation on port 2/13:

8800(config-if)#speed 100

8800(config-if)#duplex full

### 3 Enable Autonegotiation on port 2/13:

```
8800(config-if)#speed auto
8800(config-if)#duplex auto
```

### 4 Enable IGMPv1 on VLAN 1000:

```
8800(config)#interface vlan 1000
```

```
8800(config-if)#ip igmp
```

```
8800(config-if)#ip igmp snooping
```

```
8800(config-if)#ip igmp version 1
```

```
8800(config-if) #ip igmp mrouter 2/13
```

### 5 Enable IGMPv2 on VLAN 1000:

8800(config-if) #ip igmp version 2

### 6 Enable IGMPv3 on VLAN 1000:

8800(config-if)#ip igmp version 3

### 7 Enter Global Configuration mode:

8800(config-if)#exit

### 8 Configure SSM globally:

8800(config)# ip pim mode ssm

### 9 Configure an SSM channel:

```
8800(config) # ip igmp ssm-map all
```



# 5.4 GUI configuration

The following sections show how to configure the MACH1040 and the ERS 8800 with the GUI.

# 5.4.1 Configuring the MACH1040

I	Disable	e Spanr	ning T	ree on	the M	ACH1040:						
	ning Tre	e - Port								F	ђ ні	RSCH
IST   Guards Port	Stp active	Port State	Port Role	Port Pathcost	Port Priority	Received Bridge ID	Received Port ID	Received Path Cost	Admin Edge Port	Auto Edge Port	Oper Edge Port	Oper PointToPoint
1.1	Г	disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80.01	200022	Г	2	false	false
1.2		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	00 00	0		2	false	false
1.5		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 05	200010		~	false	false
1.6	1	disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	00 00	0		1	false	false
1.7	1	disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	00 00	0	Г	1	false	false
1.8		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 08	200010		1	false	false
1.9	~	disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 09	200010		~	false	false
1.10	1	disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 0a	200022		2	false	false
1.11		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 Ob	200010		~	false	false
1.12		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 0c	200010		~	false	false
1.13		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 0d	200010		~	false	false
1.14		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 0e	200010		2	false	false
1.15		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	00 00	0		~	false	false
1.16		disabled	disabled	0	128	32768 / 00 80 63 c0 04 00	80 10	22		1	false	false
8.2		manualFwd	disabled	0	128	32768 / 00 80 63 c0 04 00	00 00	0			false	true

# 2 Disable Autonegotiation on the MACH1040:

Port	Port Name	Port on	Propagate Connection Error	Automatic Configuration	Manual configuration	Link/ current Settings	Manual Cable Crossing (Auto. Conf. off)	Flow Control
1.1		V		V	100 Mbit/s HDX		disable	V
1.2		~	Γ		1000 Mbit/s FDX	S 20	disable	
1.3		~			1000 Mbit/s FDX	8 Q (	unsupported	
1.4		~			1000 Mbit/s FDX	100 Mbit/s FDX	disable	
1.5		~			1000 Mbit/s FDX		unsupported	
1.6		~			1000 Mbit/s FDX	. se	unsupported	
1.7		V			1000 Mbit/s FDX	S 24	unsupported	
1.8		~	Γ		100 Mbit/s FDX	S 21	enable	
1.9		V	Γ	V	100 Mbit/s FDX	120	enable	
1.10		•	Γ	V	100 Mbit/s FDX	192	enable	2
.11		•	Γ	V	1000 Mbit/s FDX	121	disable	
1.12		<b>V</b>			1000 Mbit/s FDX	12	disable	~
1.13		~			1000 Mbit/s FDX	1	disable	
1.14		~		V	1000 Mbit/s FDX	S 21	disable	
1.15		~	Π	V	1000 Mbit/s FDX	82	disable	
1.16		<b>V</b>			1000 Mbit/s FDX	(12)	enable	Image: A state of the state



# 3 Enable Autonegotiation on the MACH1040:

# avaya.com

# Port Configuration

Port	Port Name	Port on	Propagate Connection Error	Automatic Configuration	Manual configuration	Link/ current Settings	Manual Cable Crossing (Auto. Conf. off)	Flow Control
1.1		<b>V</b>		V	100 Mbit/s HDX	- 124 - T	disable	~
1.2				V	1000 Mbit/s FDX	194	disable	V
1.3		V		V	1000 Mbit/s FDX	1944	unsupported	
1.4		V		V	1000 Mbit/s FDX	100 Mbit/s FDX	disable	~
1.5		V		V	1000 Mbit/s FDX	1.44	unsupported	~
1.6		V		V	1000 Mbit/s FDX	1920	unsupported	~
1.7		V		V	1000 Mbit/s FDX	1920	unsupported	2
1.8		V		V	100 Mbit/s FDX	320	enable	2
1.9		V		V	100 Mbit/s FDX	1920	enable	
1.10		V		V	100 Mbit/s FDX	320	enable	2
1.11		V		V	1000 Mbit/s FDX	122	disable	~
1.12		V		V	1000 Mbit/s FDX	1923	disable	~
1.13		V		V	1000 Mbit/s FDX	1920	disable	~
1.14		V		V	1000 Mbit/s FDX	122	disable	~
1.15		V	Γ	V	1000 Mbit/s FDX	120	disable	1
1.16			Π	2	1000 Mbit/s FDX	122	disable	



# 5.4.2 Configuring the ERS 8800

1

Disable Autonegotiation on port 2/13 from Edit > Port > General > Interface:

INTER	PRISE DE	VICE M	ANAGER								Log	ged in user: GRT -	Log out		
Device Ph	nysical View	🛅 Port 2/	13 General 🗵												
nterface	VRF VLA	N STG	MAC Learning	Rate Limiti	ng CP Limit T	est 🗍 SM	LT PCAP	EAPOL	LACP	VLACP	Remote Mirroring	Mroute Stream Limit	Fdb Protect	NSNA	BPDU Filter
Apply	🤣 Refresh	😟 Help													
	Index:	2/13													
	Name:														
	Descr:	1000Base	TX Port 2/13 M	Name											
	Type:	rc1000Ba	seTX												
	Mtu:	1522													
F	PhysAddress:	00:80:2d:	af:44:4c												
v	/endorDescr:	N/A													
	AdminStatus:		🕞 down 🛛 🤅	testing	]										
	OperStatus:														
	LastChange:														
	LinkTrap:	enable	d 🔘 disab	ed											
Aut	toNegotiate:	🗇 true	false												
A	dminDuplex:	💿 half	I full												
	OperDuplex:	full													
			Conv	iabt @ 2010.	2012 Avaya Inc. /	All slabts	record P		abov 280	0.2.4					
		_					_		_	024		_			
😡 Belde	en in Avaya-Arc	h 😫	ERS8800-1 (vrl	0)	🖄 ERS8800-Configu		Docume 200					? 54% I C	I S I S I S I S I S I S I S I S I S I S	9 🌒 🗞	🏂 10:33 ·

# 2 Enable Autonegotiation on port 2/13 from Edit > Port > General > Interface:

ENTERPRISE DE	EVICE M	ANAGER									Log	iged in user: GR7 -	Log out		
Device Physical View	100 Port 2/	13 General 🗵													
Interface VRF VLA	AN STG	MAC Learning	Rate Limiting	CP Limit	Test	SMLT	PCAP	EAPOL	LACP	VLACP	Remote Mirroring	Mroute Stream Limit	Fdb Protect	NSNA	BPDU Filter
🖌 Apply 🛛 👶 Refresh	🕑 Help														
Index:	2/13														^
Name:															
Descr: 1000BaseTX Port 2/13 Name															
Type:	rc1000Bas	eTX													
Mtu:	1522														
PhysAddress:	00:80:2d:a	af:44:4c													
VendorDescr:	N/A														
AdminStatus:	🖲 up (	🖯 down 🛛 🔘 t	esting												
OperStatus:	up														
LastChange:	1 day, 20h	:17m:09s													
LinkTrap:	🖲 enablei	d 💿 disabled	t												
AutoNegotiate:	true	🗇 false													
AdminDuplex:	A half	🔿 ful													
	I nan														
OperDuplex:	full														<u>×</u>
		Copyrig	ht @ 2010-20:	12 Avaya Ir	nc. All rigi	hts rese	erved. Re	vision nu	mber: 25	024					
🐣 😡 Belden in Avaya-Aro	da 😢	ER58800-1 (vrf 0		ER58800-Cor	figurati						EN	2 48% 14	<b>⊘</b> ™e	V 角 %	🏂 10:26 AM



### 3 Enable IGMPv1 on VLAN 1000 from IP > IGMP > Interface:

ENTE	RPRISE D	EVICE MANA	GER								oggéd in	user: GRT -	Log out	
Device	Physical View	Port 2/13 Gene	ral 🛎 🛅 VLA	Ns 🗵 🛅	IGMP 🗵									
ache	Interface	IGAP Multicast R	outer Discovery	Snoop	Snoop Trace	Groups	IGAP Groups	IGAP Counters	s Static	Access Contro	Send	fer SsmGlobal	SsmChannel	StreamLimit Memb
🗸 Apply	😒 Refresh	🛛 🔂 Copy 🛛 🖺	Paste 🛛 🧲 Un	do 🛛 🔛 E	xport 🛛 🚔 Prir	nt 🥹 Hel	lp							
	IfIndex	Queryinterval	Status	Version	Oper/Version	Querier	QueryMaxR	esponseTime	WrongVe	ersionQueries	Joins	Robustness	LastMembQuer	yintvi FlushAct
VLAN_10	)	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
VLAN_10	00	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
Belden_In	nterop_1000	125	active	1	version1	30.10.0.2	100		0		186205	2	10	none
ist_VLAN	4	125	notinService	2	version2	0.0.0.0	100		0		0	2	10	none
	s : 4 row(s)   1 a	of 1 Page(s)			u							Back	Next Enter pag	ie number: Go
	s : 4 row(s)   1 (	of 1 Page(s)	Copyright (			All rights re	eserved. Revisi	on number: 25	3024			Back	Next Enter pag	e number: Go

# 4

# Enable IGMPv2 on VLAN 1000 from IP > IGMP > Interface:

Device Physical View			1.	1	I.e.		L rein e	I marke	1	11.	. I a at	I and	
sche Interface	IGAP Multicast R	outer Discovery	Snoop	Snoop Trace	Groups	IGAP Groups	IGAP Counters	Static	Access Contro	I Seni	der SsmGloba	I SsmChannel	StreamLimit Member
🗸 Apply 🕴 😂 Refresh	Copy 📔	Paste 🕴 🧲 Ur	do 🛛 🔛 E	xport 🛛 🚔 Prir	nt 🥹 He	lp .							
IfIndex	GueryInterval	Status	Version	<b>OperVersion</b>	Querier	QueryMaxRe	esponseTime	WrongVe	ersionQueries	Joins	Robustness	LastMembQuerylr	tvl FlushAction
/LAN_10	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
/LAN_100	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
Belden_Interop_1000	125	active	2	version2	30.10.0.2	100		0		186205	2	10	none
st_VLAN	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
4													



5

6

# Enable IGMPv3 on VLAN 1000 from IP > IGMP > Interface:

ENTERPRISE DEV	ICE MANAG	GER											
Device Physical View	Port 2/13 Genera	al 🛎 🛅 VLA	Ns 🛎 🛅	IGMP 🗷									
Cache Interface	IGAP Multicast	t Router Discov	ery Sno	op Snoop Tr	ace Grou	ps IGAP Groups IGAP Co	ounters S	Static Access C	ontrol	Sender Ss	mGlobal	SsmChannel	StreamLimit Me
🖊 Apply 🛛 🧐 Refresh 🗌	🗟 Copy   🖺 P	aste 🛛 🧲 Un	do 🛛 🔛 E	oport 🛛 🚔 Pri	nt 🧕 Hel	þ							
Ifindex	QueryInterval	Status	Version	OperVersion	Querier	QueryMaxResponseTime	Wrong	VersionQueries	Joins	Robustnes	s Las	MembQueryIntvi	FlushActi
/LAN_10 1	125	notInService	2	version2	0.0.0.0	100	0		0	2	10		none
/LAN_100 1	25	notInService	2	version2	0.0.0.0	100	0		0	2	10		none
Belden_Interop_1000 1	25	active	3	version3	30.10.0.2	100	0		186203	2	10		none
t_VLAN 1	125	notinService	2	version2	0.0.0.0	100	0		0	2	10		none
tal Rows : 4 row(s)   <b>1 of 1</b>	Page(s)									Bac	ck   Next	Enter page nu	nber: Go
tol Rows : 4 row(s)   1 of 1	Page(s)	Copyright (			All rights re	eserved. Revision number:	25024			Bac		Enter paga nu	

# Configure SSM globally from IP > IGMP > Ssm Global:

ENTERPRISE DE	VICE MANA	GER						Logge	d in user:	GRT - Log	out	
Device Physical View 📗	🛅 Port 2/13 Gener	ral 🗵 🛅 VLANs 🖗	IGMP 🗷									
Frace Groups IGAP	Groups    IGAP Co	ounters Static	Access Control	Sender	SsmGlobal	SsmChannel	StreamLimit Members	StreamLimit	Global	MVR Groups	MVR Vlans	MVR Receivers
🖌 Apply 🛛 🛸 Refresh	😟 Help											
🔽 Dynami												
AdminAction: O none	enableAll	🔘 disableAll										
RangeGroup: 225.1.1.0		(A.B.C.E	))									
RangeMask: 255.255.2	255.0	(A.B.C.I	D)									
		Convright @ 20	10-2012 Avaya I	inc. All right	ts reserved. R	evision numb	av: 25024					
Belden in Avaya-Ard	h 😢 ERS88	800-1 (vrf 0)	🗑 ER58800-Co	nfigurati	Docume Docume	ent1 - Microsof		EN 😰	569	6 J 🖝 🛛 🕻	S≣X⊕ N I	🕽 🚳 🏷 10:36 AN





INTERPRIS	E DEVIC	E MANAGE	R						Logged	l in user:	GRT - <u>Log</u>	out	
Device Physical	View 📔 🎬 P	ort 2/13 General 🗵	VLA	Vs 🗵 🎬 IGN	1P 🗵								
race Groups	IGAP Grou	ps   IGAP Counte	ers Stat	ic 📔 Access Co	ontrol Sender	SsmGlobal	SsmChannel	StreamLimit Members	StreamLimit	Global	MVR Groups	MVR Vlans	MVR Receivers
) Insert 🛛 🤤 🛛	elete 🛛 🧹	Apply 🕴 🥩 Refre	sh 丨 🔂 🗢	opy 🛛 🖺 Pasi	te 🛛 🧲 Undo 🗍	Export	🚔 Print 🛛 🥹 He	lp					
lpMulticastGrp	lpSource	LearningMode	Activity	AdminState									
25.1.1.1	30.10.0.10	static	false	enable									
25.1.1.2	30.10.0.20	static	false	enable									



# 6. ERS 8800 MLT connection to Hirschmann<sup>™</sup> Switches

The objective of this test is to establish advanced Switch-to-Switch multiple connections using MLT. The connections are between the ERS 8800 and the Hirschmann<sup>™</sup> MACH1040 and RS30 switches.

Note: The Hirschmann<sup>™</sup> MICE switch (MS30) does not support Link Aggregation.

The following figure represents the topology for this test.

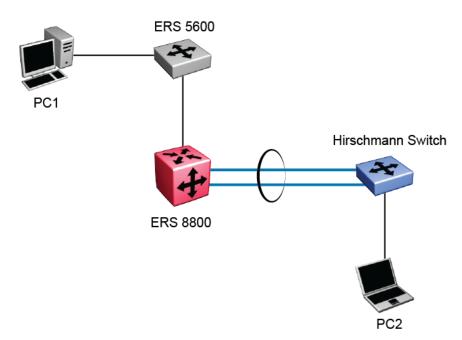


Figure 8 - ERS 8800 MLT and Hirschmann™ Link Aggregation



# 6.1 Procedure steps

- 1. Configure MLT ports on the ERS 8800.
- 2. Configure LACP on the Hirschmann<sup>™</sup> switches.

# 6.2 Test results

The following table shows the test results:

Test Cases	Test Res	ults
Test Cases	MACH1040	R\$30
Autonegotiation ERS8800 → Hirschmann <sup>™</sup> (copper)	Pass <sup>2</sup>	Pass <sup>2</sup>
No Autonegotiation ERS8800 → Hirschmann <sup>™</sup> (copper)	Pass <sup>2</sup>	Pass <sup>2</sup>
Ping PC1 $\leftrightarrow$ PC2 (both directions, copper)	Pass	Pass
Partially fail MLT link (remove cable from port)	Pass	Pass
Recover the failed MLT link (plug cable back into port)	Pass	Pass
ERS8800 → Hirschmann™ (fiber)	Pass	Pass
Ping PC1 $\leftrightarrow$ PC2 (both directions, fiber)	Pass	Pass
Partially fail MLT link (remove cable from port)	Pass	Pass
Recover the failed MLT link (plug cable back into port)	Pass	Pass

Multicast Test Cases for MACH1040 only	Test Results
Multicast stream from PC1 to PC2, IGMPv1	Pass <sup>3</sup>
Multicast stream from PC1 to PC2, IGMPv2	Pass <sup>3</sup>
Multicast stream from PC1 to PC2, IGMPv3	Pass <sup>3</sup>

### Table 2 ERS 8800 Switch MLT and Hirschmann™ Link Aggregation

### <u>Notes</u>

1. When configuring Link Aggregation on Hirschmann<sup>™</sup> switches to interoperate with Avaya MLT, "Allow static link aggregation" must be enabled.

2. If the LAG configured on the Hirschmann<sup>™</sup> MACH switch is not trunked (set 'U' for the trunk as the member of vlan 1000), and the MLT trunk on the ERS 8800 is not configured as 'access' mode, then you won't be able to connect to the network. You have to configure the trunk as 'tagged' mode on the switches on both sides to get connectivity.

3. The IGMP Querier that's active on the Hirschmann<sup>™</sup> MACH switch allows only the system interface to be the guerier. Therefore, for Multicast test cases, Active Querier and IGMP Snooping is enabled on the ERS 8800.



# 6.3 ACLI configuration

The following configuration shows how to configure the ERS 8800 with the ACLI:

Notes: This test uses two copper ports and two fiber ports.

- The copper MLT ports are 2/14 and 2/15.
- The fiber MLT ports are 7/14 and 7/15.
- The MLT name is MLT-20.
- Autonegotiation is always on the Fiber ports.

### 1 Enter Interface Configuration mode and disable Autonegotiation on Copper port 2/14:

```
8800(config)#interface FastEthernet 2/14
8800(config-if)#speed 100
8800(config-if)#duplex full
8800(config-if)#exit
```

### 2 Enter Interface Configuration mode and disable Autonegotiation on Copper port 2/15:

```
8800(config)#interface FastEthernet 2/15
8800(config-if)#speed 100
8800(config-if)#duplex full
8800(config-if)#exit
```

### 3 Create MLT-20 with Copper ports:

8800(config)#mlt 20 name "MLT-20" enable member 2/14-15 learning disable

### 4 Enter Interface Configuration mode and enable Autonegotiation on Copper port 2/14:

```
8800(config)#interface FastEthernet 2/14
8800(config-if)#speed auto
8800(config-if)#duplex auto
8800(config-if)#exit
```

### 5 Enter Interface Configuration mode and enable Autonegotiation on Copper port 2/15:

```
8800(config)#interface FastEthernet 2/15
8800(config-if)#speed auto
8800(config-if)#duplex auto
8800(config-if)#exit
```



### 6 Enter Interface Configuration mode and enable Autonegotiation on Fiber port 7/14:

8800(config)#interface GigabitEthernet 7/14
8800(config-if)#speed auto
8800(config-if)#duplex auto
8800(config-if)#exit

### 7 Enter Interface Configuration mode and enable Autonegotiation on Fiber port 7/15:

8800(config)#interface GigabitEthernet 7/15
8800(config-if)#speed auto
8800(config-if)#duplex auto
8800(config-if)#exit

### 8 Create MLT-20 with Fiber ports:

8800(config)#mlt 20 name "MLT-20" enable member 7/14-15 learning disable

### 9 Enable IGMPv1 on VLAN 1000:

```
8800(config)#interface vlan 1000
8800(config-if)#ip igmp
8800(config-if)#ip igmp snooping
8800(config-if)#ip igmp version 1
8800(config-if)#ip igmp mrouter 7/14-15
8800(config-if)#exit
```

### 10 Enable IGMPv2 on VLAN 1000:

8800(config)#interface vlan 1000
8800(config-if)#ip igmp version 2
8800(config-if)#exit

### 11 Enable IGMPv3 on VLAN 1000:

```
8800(config)#interface vlan 1000
8800(config-if)#ip igmp version 3
8800(config-if)#exit
```

### 12 Configure SSM globally:

8800(config) #ip pim mode ssm

### 13 Configure an SSM channel:

```
8800(config) # ip igmp ssm-map all
```



# 6.4 GUI configuration

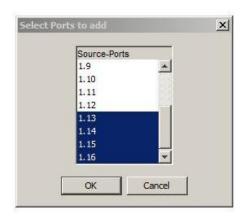
The following sections show how to configure the MACH1040 and the ERS 8800 with the GUI.

Note: This test uses four copper ports and four fiber ports.

- The copper MLT ports are 1/45-1/48.
- The fiber MLT ports are 2/1-2/4.
- MLT 1 is the Copper MLT.
- MLT 2 is the Fiber MLT.
- Autonegotiation is always on the Fiber ports.

# 6.4.1 Configuring the MACH1040

Enable Linl	< Aggre	gation on t	he MACH1040	:			
0	Link A	ggregation					
allov	w static link	aggregation 🔽					
Т	runk-Port	Source-Ports	Name	Active	Link Trap	STP-Mode	Туре
	8.1		<new></new>			on	dynamic
	8.2	1.3, 1.4	<new></new>			off	static





2

# Disable IGMP on the MACH1040:

IG	MP							U
			Operation	1	IGMP Querier		IGMP Settings	
					IGMP Querier activ	re 🗖	Current Querier IP Address	0.0.0.0
			C On (	• Off	Protocol Version	C 1 @ 2 C 3	Max Response Time [s]	10
					Transmit Interval [	s] 60	Group Membership Interval [s	1 260
			Multicasts	3			4.4	
			Known M	i Multicasts Iulticasts	•		To Query Ports C Send To Al	
Port	IGMP enabled	IGMP Forw.	IGMP Automatic	Static Query	Learned Query			
		All	Query Port	Port	Port			
1.1	<b>v</b>		Query Port	Port disable				
1.1 1.2	V	10000			Port			
1.2	<u>र</u> र		Г	disable	Port			
1.2 1.3	<u>র</u> হ		Г	disable disable	Port			
	য য য য			disable disable disable	Port			
1.2 1.3 1.4 1.5	য য য য য र र र र र			disable disable disable disable	Port			
1.2 1.3 1.4	য য য য য য য য য য			disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7	র র র র <u>র</u> র			disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6	র র র র র র <u>র</u>			disable disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9	য য ব য ব য ব য ব য ব য ব য ব য ব য ব য			disable disable disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10	য য ব য য য য য য য য য য য য য য য য য			disable disable disable disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10 1.11	র র র র র র র র র র র র র র র র র			disable disable disable disable disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10 1.11 1.12	র র র র র র র র র ব			disable disable disable disable disable disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10 1.11 1.12 1.13	য য য য য য য য য য য য য য য য য য য			disable disable disable disable disable disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10 1.11 1.12 1.13 1.14	র র র র র র র র র ব			disable disable disable disable disable disable disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10 1.11 1.12 1.13 1.14 1.15	য য ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব			disable disable disable disable disable disable disable disable disable disable disable disable	Port			
1.2 1.3 1.4 1.5 1.6 1.7 1.8	য য ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব			disable disable disable disable disable disable disable disable disable disable disable disable disable	Port			



# 6.4.2 Configuring the ERS 8800

# 1 Disable Autonegotiation on ports 2/14 and 2/15 from Edit > Port > General > Interface: Logged in user: GRT - Log out ENTERPRISE DEVICE MANAGER 👚 Device Physical View 🛛 🔛 VLANS 🕷 🎬 IGMP 🕷 🎬 MLT/LACP 🕷 🎬 Multilink/LACP Trunks - Stats, MLT 20 🌾 📴 Port 2/14,... General 🎕 Interface VRF VLAN MAC Learning CP Limit PCAP EAPOL LACP VLACP Mroute Stream Limit Fdb Protect NSNA BPDU Filter DDIJSFP 🖌 Apply 🛛 🛸 Refresh 🛛 🐻 Copy 🛛 🖺 Paste 🛛 🧲 Undo 🛛 🌄 Export 🛛 🚔 Print 🧐 Help 🚽 Name Descr Type Mtu PhysAddress VendorDescr AdminStatus OperStatus LastChange LinkTrag AutoNegdisite AdminDuplex Oper 1000BaseTX Port 2/14 Name rc1000BaseTX 1... 00.80.2d:af:44:4d NA up up 1 day, 20h:21m:33s enabled false full full 1000BaseTX Port 2/15 Name rc1000BaseTX 1... 00.80:2d:af:44:4e NA up up 1 day, 20h:21m:33s enabled false full full Index Name 2/14 2/15 < Total Rows : 2 row(s) Copyright © 2010-2012 Avaya Inc. All rights reserved. Revision number: 25024 EN 😰 73% 🛛 🖝 🐼 🛒 谷 🕅 🗐 🗐 🏷 10:55 AM 😡 Belden in Avaya-Arch... 🔮 ER58800-1 (vrf 0) - ... 🔮 ER58800-Configurati... 📓 Document 1 - Microsof.

# 2 Create MLT-20 and add ports 2/14-15 from VLAN > MLT/LACP > MultiLink/LACP Trunks:

EN	TERPRI	SE DEVICE MAN	NAGER						Logge	d in user: GR7 - Log	out	
De	vice Physical	I View 🛛 🛅 VLANs 🛞	🛅 IGMP 🛞 🛅 MLT/LA	CP 🗵 🛅 MultiLink/LACP Trur	nks - Stats, MLT 2	0 🗵 🛅 Port 2	/14, Ge	neral 🗵				
ACP	Global VL	ACP Global MultiLin	k/LACP Trunks LACP	Ist/SMLT Stats								
) Ir	isert 🤤 I	Delete 🖌 Apply 😪	🕹 Refresh 🛛 🙀 Copy	🖸 Paste 🛛 🧲 Undo 🛛 🔛 E	xport 🛛 🚔 Prin	t 📔 📴 Grap	h 📰 Is	tMit 🥹 Help				
ld	PortType	Name	PortMembers	VlanldList	MitType	RunningType	Smitild	AggMinLink	IfIndex	MulticastDistribution	ClearLinkAggregate	NIS
	trunk	MLT_ist	4/3	10,100,200,1000,3999	istMLT	normalMLT	0	1	6144	disable	none	true
	trunk	SMLT_to_5600-1	7/30	100	splitMLT	normalMLT	2	1	6145	disable	none	true
	trunk	SMLT_to_5600-2	3/3	200	splitMLT	normalMLT	3	1	6146	disable	none	true
	trunk	SMLT_to_FVV-1	3/1	10,200	splitMLT	normalMLT	4	1	6147	disable	none	true
	trunk	SMLT_to_FW-2	4/1	10,200	splitMLT	normalMLT	5	1	6148	disable	none	true
	trunk	SMLT_to_FVV-1_Copper	7/1	10,200	splitMLT	normalMLT	6	1	6149	disable	none	true
	trunk	SMLT_to_FVV-2_Copper	7/2	10,200	splitMLT	normalMLT	7	1	6150	disable	none	true
0	trunk	toSMLTedge_8600	7/5	10,200	splitMLT	normalMLT	10	1	6153	disable	none	true
10	trunk	MLT-20	2/14-2/15	1000	normalMLT	normalMLT	0	1	6163	disable	none	false
13	access	SMLT-in-VLAN1000	7/27	1000	splitMLT	normalMLT	23	1	6166	disable	none	true
4	trunk	SMLT-to-Belden	2/28,7/28	1000	splitMLT	normalMLT	24	1	6167	disable	none	true
tal F	Rows : 11 row	w(s)   1 of 1 Page(s)								Back Nex	t Enter page number:	Go
			Copyright @ 2010-:	2012 Avaya Inc. All rights r	eserved. Revisi	ion number: 25	024					
		waya-Arch 😢 ER								73%		



# 3 Enable Autonegotiation on ports 2/14 and 2/15 from Edit > Port > General > Interface: NTERPREE DEVICE MANAGER Vertex Mar Vertex Mar</td

# 4

# Enable Autonegotiation on MLT-20 from VLAN > MLT/LACP > MultiLink/LACP Trunks:

	Global VI	ACP Global MultiLink/L		Ist/SMLT Stats								
🔾 In	_				port 🛛 🚔 Prin		_	tMit 🥹 Help	1	1	1	1
ld	PortType	Name	PortMembers	VlanIdList	MitType	RunningType	Smitid	AggMinLink	IfIndex	MulticastDistribution	ClearLinkAggregate	NtS
	trunk	MLT_ist	4/3	10,100,200,1000,3999	istMLT	normalMLT	0	1	6144	disable	none	true
2	trunk	SMLT_to_5600-1	7/30	100	splitMLT	normalMLT	2	1	6145	disable	none	true
3	trunk	SMLT_to_5600-2	3/3	200	splitMLT	normalMLT	3	1	6146	disable	none	true
4	trunk	SMLT_to_FVV-1	3/1	10,200	splitMLT	normalMLT	4	1	6147	disable	none	true
5	trunk	SMLT_to_FVV-2	4/1 7/1	10,200	splitMLT splitMLT	normalMLT	5	1	6148 6149	disable disable	none	true
; ,	trunk	SMLT_to_FVV-1_Copper	7/2	10,200		normalMLT	6	1	6150	disable	none	true
7	trunk trunk	SMLT_to_FW-2_Copper toSMLTedge_8600	7/5	10,200	splitMLT splitMLT	normalMLT	7	1	6153	disable	none	true
20		MLT-20	2/14-2/15	10,200		normalMLT	0	1	6163	disable	none	true faise
23	trunk	ML1-20 SMLT-in-VLAN1000	7/27	1000	normalMLT splitMLT	normalMLT	23	1	6165	disable	none	true
24	access trunk	SMLT-to-Belden	2/28.7/28	1000	spitMLT splitMLT	normalMLT	23	1	6167	disable		
•	trunk	SML1-to-Deidel1	2120,1120	1000	spiumiLi	THUR THREE I	24		0107	uisaule	none	true
			·		·							



# 5 Enable Autonegotiation on fiber ports 7/14 and 7/15 from Edit > Port > General > Interface:

7/14 1000Gbic Part 7/14 Name rcGbicOther 1 00:80.2dtaf.45:13 FINSAR CORP. up up 0 day, 00h:03m:09s enabled true full full	ENTE	ERPRISE DI	EVICE MANAG	EK													
Apply Refresh Copy Paste C Undo Print Prin	Devic	e Physical View	🕅 VLANs 🛎 🕅 IG	IMP 🗵 🛅 M	LT/LACP	• 🗵 🕅 М	ultiLink/LA	CP Trunks	- Stats, ML	.T 20 🛎 🛅 🎬 P	ort 2/14, Gen	eral 🗵	🛅 Port 7/14	, General 🗵			
Index     Name     Descr     Type     Mtu     PhysAndress     VendorDescr     AdminStatus     OperStatus     LastChange     LinkTrap     AutoNegotiate     AdminDuplex     Op       7/14     10000bic Port 7/14 Name     roGbicOther     1     00.80.2dt af 45:13     FNISAR CORP.     up     up     0 day, 00h:03m:03s     enabled     true     full     full     full       7/15     10000bic Port 7/15 Name     rcGbicOther     1     00.80.2dt af 45:14     FNISAR CORP.     up     up     0 day, 00h:03m:11s     enabled     true     full     full     full       7/15     10000bic Port 7/15 Name     rcGbicOther     1     00.80.2dt af 45:14     FNISAR CORP.     up     up     0 day, 00h:03m:11s     enabled     true     full     full       7/15     10000bic Port 7/15 Name     rcGbicOther     1     00.80.2dt af 45:14     FNISAR CORP.     up     up     0 day, 00h:03m:11s     enabled     true     full     full       7/16     10000bic Port 7/15 Name     rcGbicOther     1     00.80.2dt af 45:14     FNISAR CORP.     up     up     0 day, 00h:03m:11s     enabled     true     full     full	Interfa	ce VRF VL	AN MAC Learning	CP Limit	PCAP	EAPOL	LACP	VLACP	Mroute S	Stream Limit	Fdb Protect	NSNA	BPDU Filter	DDI/SFP			
T/14         10000bic Port 7/14 Name         rc6bicOther         1         00.80.2dtaf4513         FNISAR CORP.         up         up         0 day, 00h:03m:01s         enabled         true         full         full <td>🗸 Appł</td> <td>y 🛛 🤣 Refresh</td> <td>📑 Copy 📔 🖺 Pas</td> <td>ste 🛛 🧲 Und</td> <td>• I 📮</td> <td>Export 6</td> <td>📄 Print</td> <td>🕑 Help</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	🗸 Appł	y 🛛 🤣 Refresh	📑 Copy 📔 🖺 Pas	ste 🛛 🧲 Und	• I 📮	Export 6	📄 Print	🕑 Help									
7715         100000bic Port 7715 Name         rcGbicOther         1         00.80/2d/ad/45/14         FINISAR CORP.         up         up         0.day, 00h:03m:11s         enabled         true         full         full           10000bic Port 7715 Name         rcGbicOther         1         00.80/2d/ad/45/14         FINISAR CORP.         up         up         0.day, 00h:03m:11s         enabled         true         full         full           10000bic Port 7715 Name         rcGbicOther         1         00.80/2d/ad/45/14         FINISAR CORP.         up         up         0.day, 00h:03m:11s         enabled         true         full         full           10000bic Port 7715 Name         rcGbicOther         1         00.80/2d/ad/45/14         FINISAR CORP.         up         up         0.day, 00h:03m:11s         enabled         true         full         full	Index	Name	Descr	Туре	Mtu	PhysA	lidress	Vend	orDescr	AdminStatus	OperStatus		LastChange	LinkTrap	AutoNegotiate	AdminDuplex	Oper
tt	7/14	1000Gbid	Port 7/14 Name	rcGbicOther	1	00:80:2d:af	45:13	FINISA	R CORP.	up	up	0 day	00h:03m:09s	enabled	true	full	full
btal Rows : 2 row(s)	7/15	1000Gbic	Port 7/15 Name	rcGbicOther	1	00:80:2d:af	45:14	FINISA	R CORP.	up	up	0 day	00h:03m:11s	enabled	true	full	full
btal Rows : 2 row(s)																	
Copyright © 2010-2012 Avaya Inc. All rights reserved. Revision number: 25024																	
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# Enable Autonegotiation on MLT-20 with fiber ports from VLAN > MLT/LACP > MultiLink/LACP Trunks:

ClearLinkAggregate Nt one true one true one true one true
one true one true
one true
one true
010 000
one true
one true
one true
one true
one fais
one true
one true

6



# 7 Enable IGMPv1 on VLAN 1000 from IP > IGMP > Interface:

ENTERPRIS	E DEVICE MAN	IAGER							La	igged in	user: GRT -	Log out	
Device Physical V	liew 🛛 🛅 Port 2/13 Ge	neral 🛎 🛅 VLA	Ns 🗵 🛅	IGMP 🗵									
ache Interface	e IGAP Multicas	Router Discovery	Snoop	Snoop Trace	Groups	IGAP Groups	IGAP Counters	Static	Access Control	Send	ler SsmGlobal	SsmChannel	StreamLimit Memb
🖊 Apply 🛛 🛸 Re	fresh 🛛 🐻 Copy 🗍	Paste 🛛 🧲 Un	do 🛛 🔛 E	xport 🛛 🚔 Prin	nt 🥹 Hel	þ							
IfIndex	GueryInterva	Status	Version	Oper/Version	Querier	QueryMaxR	esponseTime	WrongVe	ersionQueries	Joins	Robustness	LastMembQuer	yintvi FlushActi
VLAN_10	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
VLAN_100	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
Belden_Interop_100	0 125	active	1	version1	30.10.0.2	100		0		186205	2	10	none
st_VLAN	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
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tal Rows : 4 row(s)	)   1 of 1 Page(s)	Copyright (			All rights ro	eserved. Revisi	ion numberi 25	024			Back	Next Enter pag	ze numbers 🔄 Go

# 8 Enable IGMPv2 on VLAN 1000 from IP > IGMP > Interface:

ENTE	RPRISE I	DEVICE MANA	GER							L.	igged in	user: GRT -	Log out	
Device	e Physical View	Port 2/13 Gene	eral 🛎 🛅 🕅 VLA	Ns 🗵 🛅	IGMP 🛞									
ache	Interface	IGAP Multicast R	outer Discovery	Snoop	Snoop Trace	Groups	IGAP Groups	IGAP Counters	Static	Access Control	Send	ier SsmGlobal	SsmChannel	StreamLimit Membe
/ Apply	🛛 🤣 Refres	sh   🗟 Copy   🖺	Paste 🛛 🧲 Un	do 🛛 🔛 E	Sport 🛛 🚔 Prin	nt 🥹 Hel	p							
	IfIndex	QueryInterval	Status	Version	Oper/Version	Querier	QueryMaxR	esponseTime	Wrong∀e	ersionQueries	Joins	Robustness	LastMembQuer	yintvi FlushActi
LAN_10	0	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
VLAN_10	00	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
Belden_Ir	nterop_1000	125	active	2	version2	30.10.0.2	100		0		186205	2	10	none
st_VLAN	4	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
· · · · · ·	15 : 4 row(s)   1	L of 1 Page(s)			11							Back	Next Enter pag	ze number: Go
· · · · · ·	ss : 4 row(s)   1	L of 1 Page(s)	Copyright 6	2010-20	il 12 Avaya Inc.	All rights re	sserved. Revisi	ion number: 25(	024			Back	Next Enter pag	20 number: Go



# 9 Enable IGMPv3 on VLAN 1000 from IP > IGMP > Interface:

ENTERPRISE DI	EVICE MANAG	ER							Logged in	n user: GRT	- <u>Log</u>	<u>out</u>	
Device Physical View	Port 2/13 General	I 🗵 🛅 VLAI	Ns 🗵 🛅	IGMP 🗵									
Cache Interface	IGAP Multicast	Router Discove	ery Sno	op Snoop Tra	ace Grou	ps IGAP Groups IGAP	Counters	Static Access C	ontrol	Sender Ss	mGlobal	SsmChannel	StreamLimit Mer
🗸 Apply 🛛 🥩 Refresh	🛛 🔂 Copy 🔹 🖺 Pa	iste 🛛 🧲 Uni	do 🛛 🔛 E	xport 🛛 🚔 Prin	nt 🥹 Hel	lp							
Ifindex	Queryinterval	Status	Version	Oper/Version	Querier	QueryMaxResponseTime	Wron	ngVersionQueries	Joins	Robustnes	s La	stMembQueryIntv	1 FlushActio
VLAN_10	125 n	notInService	2	version2	0.0.0.0	100	0		0	2	10		none
VLAN_100	125 n	notInService	2	version2	0.0.0.0	100	0		0	2	10		none
Belden_Interop_1000	125 a	active	3	version3	30.10.0.2	100	0		186203	2	10		none
ist_VLAN	125 n	notinService	2	version2	0.0.0.0	100	0		0	2	10		none
¢													
i Dotal Rows : 4 row(s)   <b>1 o</b>	11 Page(s)									Bac	ck   Next	Enter page nu	
		Copyright ®			All rights re	eserved. Revision number	: 25024			Bac	dk Next	t Enter page nu	

# 10 Configure SSM globally from IP > IGMP > Ssm Global:

ENTERPF	RISE DE'	VICE MAN	IAGER							Logge	d in user:	GRT - Loc	Lout		
Device Physi	ical View 🛛 👔	🖺 Port 2/13 Ge	neral 🗵 📔	VLANs	IGMP 🗵										
+ Trace Grou	ips IGAP (	Groups   IGAP	Counters	Static	Access Control	Sender	SsmGlobal	SsmChannel	StreamLimit Members	StreamLimit	Global	MVR Groups	MVR Vlans	MVR Receive	ers 🔶
🖌 Apply 🛛 🥰	Refresh	😡 Help													
	🔽 Dynamic	Learning													
AdminAction:	🔿 none	enableA	ll 💿 disa	ableAll											
RangeGroup:	225.1.1.0			(A.B.C.D	)										
RangeMask:	255.255.2	55.0		(A.B.C.D	)										
		_		-	LO-2012 Avaya						_				
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# 11 Configure an SSM channel from IP > IGMP > Ssm Channel:

ENTERPR	RISE DEVIC	CE MANAGE	R						Logged	in user:	GRT - Log	Lout	
a Device Physic	cal View 📗 🕮 P	ort 2/13 General 🗵	VLA	Ns 🗵 🛅 IGMP									
Firace Group	ps IGAP Grou	ips    IGAP Counte	ers Stat	tic Access Cont	rol Sender	SsmGlobal	SsmChannel	StreamLimit Members	StreamLimit	Global	MVR Groups	MVR Vlans	MVR Receivers
🔾 Insert 🧲	Delete 🛛 🖌 i	Apply 🛛 🥩 Refres	sh   🗟 o	Copy 🛛 💼 Paste	C Undo	Export	🚔 Print 🛛 🥹 He	þ					
lpMulticastGrp	lpSource	LearningMode	Activity	AdminState									
225.1.1.1	30.10.0.10	static	false	enable									
225.1.1.2	30.10.0.20	static	false	enable									
Total Rows : 2 ro	ow(s)												
		Co	opyright @	0 2010-2012 Av	aya Inc. All ri	ghts reserved	d. Revision numbe	ar: 25024					
🕲 😡 Belden ir	n Avaya-Arch	🛛 🕹 ER58800-1	(vrf 0)	. 🛛 🗐 ERSBBC	0-Configurati.	🔯 Doc	ument1 - Microsof		EN 😰	57%		<u>⊚ ⊒ ⊖ v (</u>	<b>) 🗞 🏷 10:37 AM</b>



# 7. ERS 8800 switch cluster connection to Hirschmann<sup>™</sup> Switch

The objective of this test is to configure two ERS 8800s as a Layer 3 Switch Cluster that aggregates individual Hirschmann<sup>™</sup> switches configured for 802.3ad link aggregation. The connections are between the ERS 8800s and the Hirschmann<sup>™</sup> MACH1040 and RS30 switches.

Note: The Hirschmann<sup>™</sup> MICE switch (MS30) does not support Link Aggregation.

The following figure represents the topology for this test.

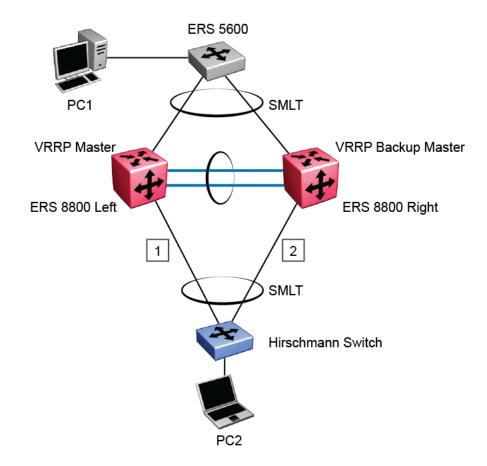


Figure 9 - ERS 8800 Switch Cluster to Individual Hirschmann™ Switches



# 7.1 Procedure steps

The third IE solution design utilized the aggregating individual Hirschmann<sup>™</sup> switches configured for 802.3ad link aggregation (not supported on MICE). Test on both copper and fiber connections. The following represents the topology:

- 1. Configure the ERS 8800s as an L3 Switch Cluster.
- 2. Disable IGMP on the Hirschmann<sup>™</sup> switches.
- 3. Enable LACP on the Hirschmann<sup>™</sup> switches.

# 7.2 Test results

The following table shows the test results:

Test Cases	Test Result					
Test Cases	MACH1040	RS30				
Autonegotiation ERS8800 → Hirschmann™ (copper)	Pass	Pass				
No Autonegotiation ERS8800 → Hirschmann <sup>™</sup> (copper)	Pass	Pass				
Ping PC1 $\leftrightarrow$ PC2 (both directions, copper)	Pass	Pass				
Fail link 1 (remove cable from port)	Pass: 1 ping lost	Pass: 1 ping lost				
Recover link 1 (plug cable back into port)	Pass: 1 ping lost	Pass: 1 ping lost				
Power off ERS8800 Left switch	Pass	Pass				
Power on ERS8800 Left switch	Pass	Pass				
Power off ERS8800 Right switch	Pass	Pass				
Power on ERS8800 Right switch	Pass	Pass				
ERS8800 → Hirschmann™ (fiber)	Pass	Pass				
Ping PC1 $\leftrightarrow$ PC2 (both directions, fiber)	Pass	Pass				
Fail link 2 (remove cable from port)	Pass	Pass				
Recover link 2 (plug cable back into port)	Pass	Pass				
Power off ERS8800 Left switch	Pass: 1 ping lost	Pass: 1 ping lost				
Power on ERS8800 Left switch	Pass	Pass				
Power off ERS8800 Right switch	Pass	Pass				
Power on ERS8800 Right switch	Pass	Pass				

Multicast Test Cases for MACH only	Test Results
Multicast stream from PC1 to PC2, IGMPv1	Pass <sup>1</sup>
Multicast stream from PC1 to PC2, IGMPv2	Pass <sup>1</sup>
Multicast stream from PC1 to PC2, IGMPv3	Pass <sup>1</sup>

### Table 3 ERS 8800 Switch Clustering and Hirschmann™ Link Aggregation

# <u>Note</u>

1. The IGMP Querier that's active on the Hirschmann™ MACH switch allows only the system interface to be the querier. Therefore, for Multicast test cases, Active Querier and IGMP Snooping is enabled on the ERS 8800.



# 7.3 ACLI configuration

For these tests, there are three switches to configure: ERS 8800-Left, ERS 8800-Right, and the MACH1040.

# 7.3.1 ERS 8800-Left

Note: This test designates 8800A as ERS8800-Left.

- IST to 8800-Right is Copper MLT port 4/3, VLAN 3999
- SMLT to ERS 5650 Fiber MLT port 7/27, VLAN 1000
- SMLT to Hirschmann<sup>™</sup> are Copper/Fiber MLT ports 2/28 and 7/28, VLAN 1000
- IP Routing is enabled
- VRRP is enabled

#### 1 Enter Configuration mode and create IST VLAN 3999:

```
8800A (config)#vlan create 3999 name IstVlan type port
8800A (config)#vlan members remove 1 4/3
8800A (config)#vlan members add 3999 4/3
```

### 2 Create Access VLAN 1000

```
8800A (config)#vlan create 2 name To5650Vlan type port
8800A (config)#vlan members remove 1 7/27
8800A (config)#vlan members add 1000 7/27
/27
```

## 3 Create Trunk VLAN 1000

```
8800A (config)#vlan create 3 name ToHirschmannVlan type port
8800A (config)#vlan members remove 1 2/28,7/28
8800A (config)#vlan members add 1000 2/28,7/28
```

## 4 Create IST IP interface, IST MLT, and IST Peer

```
8800A (config)#interface vlan 3999
8800A (config-if)#ip address 12.12.12.2 255.255.255.252
8800A (config-if)#exit
8800A (config)#mlt 1 name IST enable member 4/3
8800A (config)#interface mlt 1
8800A (config-if)#ist enable peer-ip 12.12.12.1 vlan 3999
```



### 5 Create VLAN 1000 IP Interface

```
8800A (config)#interface vlan 1000
8800A (config-if)#ip address 2.2.2.2 255.255.255.0
```

#### 6 Create SMLT-to-ERS5650 MLT

8800A (config)#mlt 23 name SMLT-to-ERS5650 enable member 7/27 learning disable 8800A (config)#interface mlt 23 8800A (config-if)#smlt 23

#### 7 Create SMLT-to-Hirschmann MLT

```
8800A (config)#mlt 24 name SMLT-to-Hirschmann enable member 2/28,7/28 learning disable
8800A (config)#interface mlt 24
8800A (config-if)#smlt 24
```

### 8 Globally Enable IP Routing and VRRP

```
8800A (config)#ip routing
8800A (config)#router vrrp enable
```

#### 9 Enable IP routing and create VRRP for VLAN 1000 IP Interface

8800A (config)#interface vlan 1000
8800A (config-if)#ip routing
8800A (config-if)#ip vrrp address 1000 2.2.2.1
8800A (config-if)#ip vrrp 1000 enable
8800A (config-if)#ip vrrp 1000 backup-master enable

### 10 Error message when enabling PIM with IST enabled

8800A (config)#ip pim enable

- % Cannot modify settings
- % PIM not supported on an IST enabled unit



# 7.3.2 ERS 8800-Right

Note: This test designates 8800A as ERS8800-Left.

- IST to 8800-Right is Copper MLT port 4/3, VLAN 3999
- SMLT to ERS 5650 Fiber MLT port 7/27, VLAN 1000
- SMLT to Hirschmann<sup>™</sup> are Copper/Fiber MLT ports 7/28 and 8/28, VLAN 1000
- IP Routing is enabled
- VRRP is enabled

1

#### Enter Configuration mode and create IST VLAN 3999:

8800A (config)#vlan create 3999 name IstVlan type port 8800A (config)#vlan members remove 1 4/3 8800A (config)#vlan members add 3999 4/3

#### 2 Create Access VLAN 1000

```
8800A (config)#vlan create 2 name To5650Vlan type port
8800A (config)#vlan members remove 1 7/27
8800A (config)#vlan members add 1000 7/27
/27
```

#### 3 Create Trunk VLAN 1000

8800A (config)#vlan create 3 name ToHirschmannVlan type port 8800A (config)#vlan members remove 1 2/28,7/28 8800A (config)#vlan members add 1000 2/28,7/28

#### 4 Create IST IP interface, IST MLT, and IST Peer

```
8800A (config)#interface vlan 3999
8800A (config-if)#ip address 12.12.12.1 255.255.255.252
8800A (config-if)#exit
8800A (config)#mlt 1 name IST enable member 4/3
8800A (config)#interface mlt 1
8800A (config-if)#ist enable peer-ip 12.12.12.2 vlan 3999
```



### 5 Create VLAN 1000 IP Interface

```
8800A (config)#interface vlan 1000
8800A (config-if)#ip address 2.2.2.2 255.255.255.0
```

#### 6 Create SMLT-to-ERS5650 MLT

8800A (config)#mlt 23 name SMLT-to-ERS5650 enable member 7/27 learning disable 8800A (config)#interface mlt 23 8800A (config-if)#smlt 23

#### 7 Create SMLT-to-Hirschmann MLT

```
8800A (config)#mlt 24 name SMLT-to-Hirschmann enable member 2/28,7/28 learning disable
8800A (config)#interface mlt 24
8800A (config-if)#smlt 24
```

### 8 Globally Enable IP Routing and VRRP

```
8800A (config)#ip routing
8800A (config)#router vrrp enable
```

#### 9 Enable IP routing and create VRRP for VLAN 1000 IP Interface

8800A (config)#interface vlan 1000
8800A (config-if)#ip routing
8800A (config-if)#ip vrrp address 1000 2.2.2.1
8800A (config-if)#ip vrrp 1000 enable
8800A (config-if)#ip vrrp 1000 backup-master enable

### 10 Error message when enabling PIM with IST enabled

8800A (config)#ip pim enable

- % Cannot modify settings
- % PIM not supported on an IST enabled unit



1

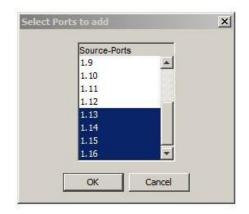
# 7.4 GUI configuration

# Enable Link Aggregation on the MACH1040:

# Link Aggregation

allow static link aggregation 🔽

Туре	STP-Mode	Link Trap	Active	Name	Source-Ports	Trunk-Port
dynan	оп			<new></new>		8.1
sta	off	V	V	<new></new>	1.3, 1.4	8.2





# 2 Disable IGMP on the MACH1040:

l IG	MP							Б
			C On		IGMP Querier IGMP Querier active Protocol Version Transmit Interval [s]	C 1 @ 2 C 3	IGMP Settings Current Querier IP Address Max Response Time [s] Group Membership Interval [s]	0.0.0.0 10 1 260
			- Multicasta Unknown Known M	Multicast	3		To Query Ports C Send To All uery and registered Ports C S	
Port	IGMP enabled	IGMP Forw. All	IGMP Automatic Query Port	Static Query Port	Learned Query Port			
1.1	2	Г	Ē	disable	Г			
1.2	2	Г		disable				
1.3		Г		disable				
1.4		Г		disable				
1.4 1.5	<b>V</b>	Г		disable disable	E E			
	হ	Г						
1,5	<u>র</u> ব			disable				
1,5 1.6 1.7 1.8	য য ব ব ব			disable disable				
1,5 1.6 1.7 1.8 1.9	য <u>য</u> য য য য			disable disable disable				
1,5 1.6 1.7 1.8 1.9 1.10	য য য য য য য য য য			disable disable disable disable disable disable				
1,5 1.6 1.7 1.8 1.9 1.10 1.11	র র র র র ব			disable disable disable disable disable				
1,5 1.6 1.7 1.8 1.9 1.10 1.11 1.12	র র র র র <u>র</u> র			disable disable disable disable disable disable				
1,5 1.6 1.7 1.8 1.9 1.10 1.11 1.12	য য ব য য য য য য য য য য য য য য য য য			disable disable disable disable disable disable disable				
1.5 1.6 1.7 1.8 1.9 1.10 1.11 1.12 1.13	য য য য য য য য য য য য য য য য য য য			disable disable disable disable disable disable disable disable				
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1.5 1.6 1.7 1.8 1.9 1.10 1.11 1.12 1.13 1.14 1.15	য য ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব ব			disable disable disable disable disable disable disable disable disable disable				



1

# 7.5 Configuring the ERS 8800

# Create Copper Port SMLT-24 and add ports 2/28 and 7/28 from VLAN > MLT/LACP > MultiLink/LACP Trunks:

	PRISE DEVICE MA											
Device Phys												
ACP Global	VLACP Global MultiLin	k/LACP Trunks	LACP Ist/SMLT Stats									
🔾 Insert 🛛 🌘	🔵 Delete 🛛 🖌 Apply 🛛 😴	🎖 Refresh 🛛 🙀 C	opy 🛛 🖺 Paste 🗍 🧲 Undo	Export	t 🛛 🚔 Print 👘	📰 Gr	aph 💼 IstMit	🔞 Help	)			
ld PortType	Name	PortMembers	VlanldList	MtType	RunningType	Smitid	AggMinLink	Ifindex	MulticastDistributio	n ClearLinkAggreg	ate NtStgEna	ble
1 trunk	MLT_ist	4/3	10,100,200,1000,3999	istMLT	istMLT	0	1	6144	disable	none	true	4
2 trunk	SMLT_to_5600-1	7/30	100	spitMLT	splitMLT	2	1	6145	disable	none	true	7
3 trunk	SMLT_to_5600-2	3/3	200	spitMLT	splitMLT	3	1	6146	disable	none	true	3
4 trunk	SMLT_to_FW-1	3/1	10,200	spitMLT	normalMLT	4	1	6147	disable	none	true	3
5 trunk	SMLT_to_FW-2	4/1	10,200	spitMLT	normalMLT	5	1	6148	disable	none	true	4
6 trunk	SMLT_to_FW-1_Copper	7/1	10,200	spitMLT	splitMLT	6	1	6149	disable	none	true	7
7 trunk	SMLT_to_FW-2_Copper	7/2	10,200	spitMLT	splitMLT	7	1	6150	disable	none	true	7
10 trunk	toSMLTedge_8600	7/5	10,200	spitMLT	normalMLT	10	1	6153	disable	none	true	7
20 trunk	MLT-20	7/14-7/15	1000	normalMLT	normaMLT	0	1	6163	disable	none	false	
23 access	SMLT-in-VLAN1000	7/27	1000	spitMLT	normalMLT	23	1	6166	disable	none	true	7
24 trunk	SMLT-to-Belden	2/28,7/28	1000	splitMLT	splitMLT	24	1	6167	disable	none	true	2
otal Rows : 11	row(s)   1 of 1 Page(s)	a								Back Next Enter	page number:	Go T
		Copyright ©	2010-2012 Avaya Inc. Al	rights reser	ved, Revision r	umberi	25024					

## Verify the SMLT configuration from VLAN > SMLT > SMLT Info:

2

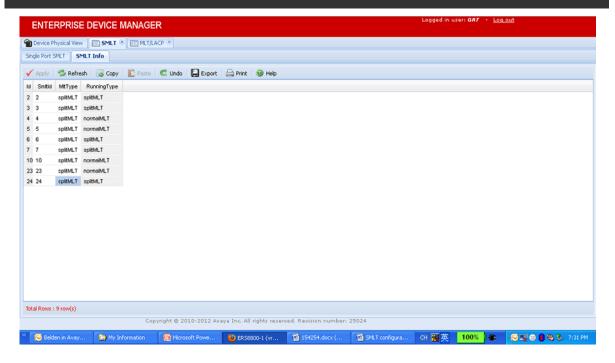
ENTE	RPRISE	E DEVICE I	MANAGEI	R						Logged in u	ser: GRT - Log	out	
Device P	hysical View	SMLT 🛙	s)										
Single Port S		1LT Info											
	_				_	-							_
🖌 Apply	🤣 Refre	sh 🛛 🙀 Copy	🚺 Paste	C Undo	Export Export	🚔 Print	Help						
ld Smitid	MtType	RunningType											
2 2	spltMLT	splitMLT											
3 3	spitMLT	splitMLT											
4 4	spitMLT	normalMLT											
5 5	spltMLT	normalMLT											
6 6	spitMLT	splitMLT											
7 7	spltMLT	splitMLT											
10 10	spltMLT	normalMLT											
23 23	spltMLT	normalMLT											
24 24	spltMLT	splitMLT											
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### 3 Create Fiber Port SMLT-24 and add port 7/28 from VLAN > MLT/LACP > MultiLink/LACP Trunks:

	ical View 👔 SMLT 🛎											
ACP Global	VLACP Global MultiLin	k/LACP Trunks	LACP Ist/SMLT Stats									
🔾 Insert 🛛 🍕	🔵 Delete 🛛 🖌 Apply 🛛 🤤	🌡 Refresh 丨 遏 C	opy 🛛 🖺 Paste 🗍 🧲 Undo	Export	t 🛛 🚔 Print 🗍	📰 Gr	aph 💼 IstMit	😢 Help	)			
d PortType	Name	PortMembers	Vlanklist	MtType	RunningType	Smitid	AggMinLink	Ifindex	MulticastDistribution	ClearLinkAggregate	NtStgEnable	
1 trunk	MLT_ist	4/3	10,100,200,1000,3999	istMLT	istMLT	0	1	6144	disable	none	true	4
2 trunk	SMLT_to_5600-1	7/30	100	splitMLT	spitMLT	2	1	6145	disable	none	true	7
3 trunk	SMLT_to_5600-2	3/3	200	splitMLT	spitMLT	3	1	6146	disable	none	true	1
4 trunk	SMLT_to_FW-1	3/1	10,200	splitMLT	normalMLT	4	1	6147	disable	none	true	3
5 trunk	SMLT_to_FW-2	4/1	10,200	splitMLT	normalMLT	5	1	6148	disable	none	true	4
6 trunk	SMLT_to_FW-1_Copper	7/1	10,200	splitMLT	spitMLT	6	1	6149	disable	none	true	7
7 trunk	SMLT_to_FW-2_Copper	7/2	10,200	splitMLT	spltMLT	7	1	6150	disable	none	true	7
10 trunk	toSMLTedge_8600	7/5	10,200	splitMLT	normalMLT	10	1	6153	disable	none	true	7
20 trunk	MLT-20	7/14-7/15	1000	normalMLT	normalMLT	0	1	6163	disable	none	false	
23 access	SMLT-in-VLAN1000	7/27	1000	splitMLT	normalMLT	23	1	6166	disable	none	true	
24 trunk	SMLT-to-Belden	7/28	1000	splitMLT	spitMLT	24	1	6167	disable	none	true	7
												1
										Back Next Enter page		

## Verify the SMLT configuration from VLAN > SMLT > SMLT Info:



4



## 5 Enable IGMPv1 on VLAN 1000 from IP > IGMP > Interface:

ENTERPRIS	RISE DEVICE MANAGER								La	igged in	user: GRT -	Log out	
Device Physical V	liew 🛛 🛅 Port 2/13 Ge	neral 🛎 🛅 VLA	Ns 🗵 🛅	IGMP 🗵									
ache Interface	e IGAP Multicas	Router Discovery	Snoop	Snoop Trace	Groups	IGAP Groups	IGAP Counters	Static	Access Control	Send	ler SsmGlobal	SsmChannel	StreamLimit Memb
🖊 Apply 🛛 🛸 Re	fresh 🛛 🐻 Copy 🗍	Paste 🛛 🧲 Un	do 🛛 🔛 E	xport 🛛 🚔 Prin	nt 🥹 Hel	þ							
IfIndex	GueryInterva	Status	Version	Oper/Version	Querier	QueryMaxR	esponseTime	WrongVe	ersionQueries	Joins	Robustness	LastMembQuer	yintvi FlushActi
VLAN_10	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
VLAN_100	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
Belden_Interop_100	0 125	active	1	version1	30.10.0.2	100		0		186205	2	10	none
st_VLAN	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
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tal Rows : 4 row(s)	)   1 of 1 Page(s)	Copyright (			All rights ro	eserved. Revisi	ion numberi 25	024			Back	Next Enter pag	ze numbers 🔄 Go

## 6 Enable IGMPv2 on VLAN 1000 from IP > IGMP > Interface:

ENTERPRISE	DEVICE MANA	AGER							L.	igged in	user: GRT -	Log out	
Device Physical Vie	w Port 2/13 Gene	eral 🛎 🔝 VLA	Ns 🗵 🛅	IGMP 🗷				_					
ache Interface	IGAP Multicast R	outer Discovery	Snoop	Snoop Trace	Groups	IGAP Groups	IGAP Counters	Static	Access Contro	Send	ler SsmGlobal	SsmChannel	StreamLimit Membe
🗸 Apply 🛛 🛸 Refr	resh 🛛 🗟 Copy 🗍 🖺	Paste 🛛 🧲 Un	do 🛛 🔛 E	Export 🛛 🚔 Prir	nt 🥹 Hel	p							
lfindex	QueryInterval	Status	Version	Oper/Version	Querier	QueryMaxRe	esponseTime	Wrong∀e	ersionQueries	Joins	Robustness	LastMembQuer	yIntvi FlushActic
/LAN_10	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
VLAN_100	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
Belden_Interop_1000	125	active	2	version2	30.10.0.2	100		0		186205	2	10	none
ist_VLAN	125	notInService	2	version2	0.0.0.0	100		0		0	2	10	none
0	1 of 1 Page(s)			al .							Back	Next Enter pag	e number: 60
tal Rows : 4 row(s)	1 of 1 Page(s)	Copyright			All rights re	sserved. Revisi	on number: 250	024			Back	Next   Enter pag	e number: 📃 Go



## 7 Enable IGMPv3 on VLAN 1000 from IP > IGMP > Interface:

Device Physical View	ice Physical View 🛛 🎬 Port 2/13 General 🛎 😭 VLA											
		eral 🛎 🔝 VLA ast Router Discov		· · · · · · · · · · · · · · · · · · ·	ace Group	DS IGAP Groups IGAP Co	ounters	Static Access C	Instan	Sender Ssm	Global SsmChannel	StreamLimit Mer
	u n				_		ouncers	State Mccoss c		Jerider Josh	alobal samenamer	Ju cancini, Me
Apply Sefresh IfIndex		1		xport 🛛 🚔 Prir					. Internet	Robustness		FlushActic
	QueryInterval	Status	Version 2	Oper/Version	Querier	QueryMaxResponseTime		ngVersionQueries	Joins		LastMembQueryIntvi	
VLAN_10	125		-	version2	0.0.0.0	100	0		0	2	10	none
VLAN_100	125		2	version2	0.0.0.0	100	0		0	2	10	none
Belden_Interop_1000		active	3	version3	30.10.0.2		0		186203		10	none
ist_VLAN	125	notInService	2	version2	0.0.0.0	100	0		0	2	10	none
otal Rows : 4 row(s)   1 c	of 1 Page(s)			H						Back	Next Enter page nu	

# 8 Configure SSM globally from IP > IGMP > Ssm Global:

ENTERPR	RISE DEV	VICE MANA	GER							Logge	d in user:	GRT - Log	out	
Device Physic	cal View 🛛 👔	Port 2/13 Gener	ral 🛎 🛅 🔛 VLA	ANs 🗵 🛅	IGMP 🗵									
← Trace Group	ps IGAP G	Groups    IGAP Co	ounters Sta	atic Acces	ss Control	Sender	SsmGlobal	SsmChannel	StreamLimit Members	StreamLimit	Global	MVR Groups	MVR Vlans	MVR Receivers
🖌 Apply 😒	Refresh	🕑 Help												
	🔽 Dynamic	Learning												
AdminAction:	💿 none	enableAll	🗇 disable/	All										
RangeGroup:	225.1.1.0		(A.	B.C.D)										
RangeMask:	255.255.2	55.0	(A.	B.C.D)										
			Copyright	© 2010-20	)12 Avaya I	nc. All righ	ts reserved. R	evision numb	er: 25024					
🤲 🔀 Belden ir	n Avaya-Arch	😢 ER588	800-1 (vrf 0)	🖻	ER58800-Co	nfigurati	Docum	ent1 - Microsof		EN 🙎	569		9 ₩⊖ ♥	🖲 🗞 🎉 10:36 AM





ENTERPI	RISE DEVICE M	ANAGER					Logged in us	er: GRT - Log out	
1 1/	ical View 🛛 🛅 Port 2/1					. V	Te se Ter	. V	. T
♠ Trace Grou		IGAP Counters Sta		11 1	SsmGlobal SsmChann	u	rs StreamLimit Globa	al MVR Groups MVR	Vlans MVR Receive
				te 🛛 🧲 Undo 📕	🚽 Export 🛛 🔔 Print 🛛 🧕	Help			
IpMulticastGr 225.1.1.1	p IpSource Lea 30.10.0.10 static	rningMode Activity false	AdminState						
225.1.1.2	30.10.0.20 static		enable						
Total Rows : 2 r									

# 8. Conclusion

The Avaya Networking Test Lab verified connectivity under normal conditions where all the devices were configured properly. From this steady-state environment, various tests simulated fault conditions with link and switch failures. These links and switches were then recovered simulating the restoration of the network.

The Avaya-Belden Industrial Ethernet (IE) solution passed all of these tests and confirmed that this solution meets Avaya's quality and interoperability standards.



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