



Avaya Solution & Interoperability Test Lab

Application Notes for configuring NVT Phybridge PoLRE switch with Avaya IP Office R11.0 – Issue 1.0

Abstract

These Application Notes describe the configuration steps required for NVT Phybridge PoLRE switch to interoperate with Avaya IP Office. In the compliance testing, the NVT Phybridge PoLRE switch leveraged CAT3 single-pair telephony wiring to provide dedicated Ethernet voice path and Power over Ethernet to Avaya IP endpoints registered to Avaya IP Office.

Readers should pay attention to **Section 2**, in particular the scope of testing as outlined in **Section 2.1** as well as the observations noted in **Section 2.2**, to ensure that their own use cases are adequately covered by this scope and results.

Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.

1. Introduction

These Application Notes describe a compliance tested configuration consisting of NVT Phybridge PoLRE (Power over Long Range Ethernet) switch and NVT Phybridge Phylink adapters being used to allow Avaya endpoints connect to Avaya IP Office R11.0 over CAT3 cable. The NVT Phybridge PoLRE switch is a LAN appliance that leverages CAT3 single-pair telephony wiring to provide dedicated Ethernet and Power over Ethernet to Avaya IP endpoints registered to Avaya IP Office.

The Avaya IP Office consists of an IP Office Server Edition running on a virtual platform as the primary server with an IP Office IP500 V2 running as the secondary expansion cabinet. Both systems are linked by IP Office Line IP trunks that can enable voice networking across these trunks to form a multi-site network. Each system in the solution automatically learns each other's extension numbers and user names. This allows calls between systems and support for a range of internal call features.

NVT Phybridge PoLRE switch goes beyond traditional PoE. PoLRE switches are specifically designed to allow businesses to optimize their converged LAN platform. The PoLRE switch innovation delivers Ethernet and Power over Ethernet over a single pair of cable with four times the reach of traditional switches. Existing voice infrastructure can be transformed into an IP path with power, ideal for IP telephony deployment. The PoLRE switch provides both power and the availability of uninterrupted bandwidth, with 24-port and 48-port configurations and the ability to scale.

The PoLRE switch has a reach of over 1200 feet (365m) and is capable of delivering power and signalling over a single pair CAT3 cable. A Phylink Adapter is installed at each IP endpoint, carrying the power and signalling to the connected IEEE 802.3af compliant end devices. The default PoLRE switch/Phylink Adapter configuration supports IP phones and provides a plug and play solution for replacing a legacy voice network using the existing network cabling plan. Up to 48 IP phones can be powered from a single PoLRE switch. Other IEEE 802.3af compliant devices can be brought into the network including IP cameras, IP TVs, remote door locks, etc., in addition to IP phones.

2. General Test Approach and Test Results

The compliance testing focused on the interoperability between NVT Phybridge PoLRE switch and Avaya IP Office to ensure that the Avaya IP endpoints (outlined in **Section 4**) can communicate correctly with IP Office over a CAT3 cable.

DevConnect Compliance Testing is conducted jointly by Avaya and DevConnect members. The jointly-defined test plan focuses on exercising APIs and/or standards-based interfaces pertinent to the interoperability of the tested products and their functionalities. DevConnect Compliance Testing is not intended to substitute full product performance or feature testing performed by DevConnect members, nor is it to be construed as an endorsement by Avaya of the suitability or completeness of a DevConnect member's solution.

Avaya recommends our customers implement Avaya solutions using appropriate security and encryption capabilities enabled by our products. The testing referenced in these DevConnect Application Notes included the enablement of supported encryption capabilities in the Avaya products. Readers should consult the appropriate Avaya product documentation for further information regarding security and encryption capabilities supported by those Avaya products.

Support for these security and encryption capabilities in any non-Avaya solution component is the responsibility of each individual vendor. Readers should consult the appropriate vendor-supplied product documentation for more information regarding those products.

For the testing associated with these Application Notes security encryption features were not applicable on the interface between Avaya systems and the NVT Phybridge PoLRE switch. However, the Avaya equipment used TLS over the connection provided by the PoLRE switch.

2.1. Interoperability Compliance Testing

Testing consisted of typical call scenarios involving Avaya endpoints registered to IP Office. The test included 1000ft of CAT3 cable to verify the extended range that the PoLRE switch provides. External call scenarios were also tested with a simulated PSTN connection.

Using the NVT Phybridge PoLRE switch and the NVT Phybridge Phylink adapters the Avaya IP endpoints will be allowed function as they would over a CAT5/6 cable connected to IP Office. The testing focused on the following areas:

- **Connect the Avaya IP endpoints over CAT3 cable without Phylink adapters** – The Avaya IP endpoints are connected to the Avaya solution over the CAT3 cable without any NVT Phybridge equipment.
- **Connect the Avaya IP endpoints over CAT3 cable with Phylink adapters** – The Avaya IP endpoints are connected to the Avaya solution over the CAT3 cable with the NVT Phybridge equipment connected to ensure that the IP endpoints can register and work as normal.
- **Basic Calls** – Basic incoming and outgoing calls using Avaya IP endpoints.
- **Call Hold/Transfer and Conference** – Calls are made with transfer and conference.
- **MWI** – Leaving and retrieving messages and insuring that MWI is maintained correctly.
- **Serviceability tests** – The serviceability testing focused on verifying the ability of the PoLRE switch to recover from adverse conditions, such as disconnecting the Ethernet cables to the PoLRE switch and disconnecting the Phylink Adapters.

2.2. Test Results

All applicable test cases passed successfully.

2.3. Support

Technical support on the NVT Phybridge PoLRE switch can be obtained through the following:

- Technical Support Hours and Contact Information:
<http://www.nvtPhybridge.com/support-ticket/>
- Email: support@nvtphybridge.com
- Web: <http://www.nvtphybridge.com/portfolio-item/polre/#tab-id-1>

3. Reference Configuration

In the test configuration shown in **Figure 1** the NVT Phybridge PoLRE switch is connected into the existing Avaya telephony LAN. Avaya IP endpoints are connected to the LAN over CAT3 cabling. For each Avaya IP endpoint one end of the CAT3 cable is connected to the NVT Phybridge Phylink adapter with an RJ11 connector. Each Phylink adapter is connected using a standard CAT5 or CAT6 Ethernet cable to an Avaya IP endpoint.

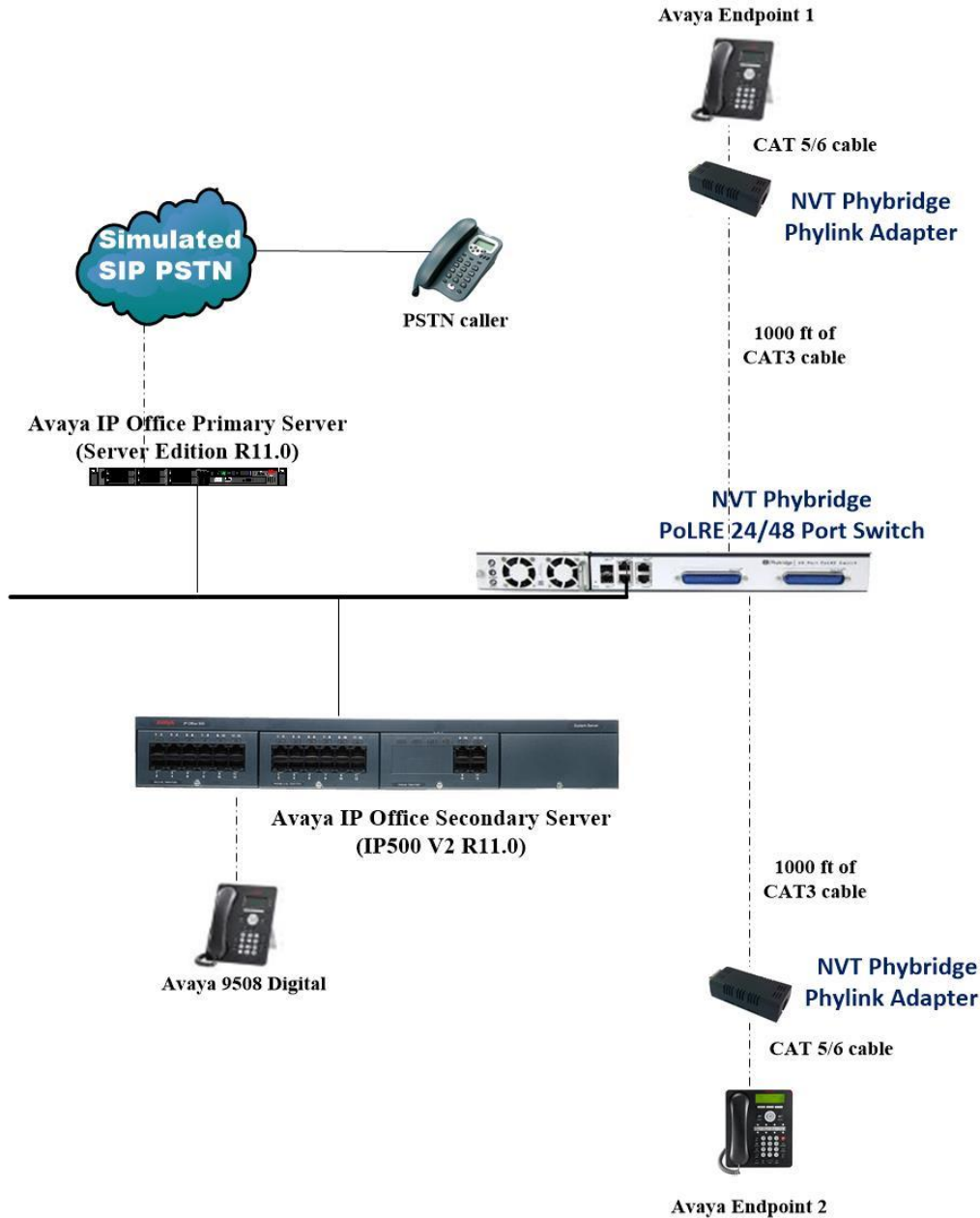


Figure 1: NVT Phybridge PoLRE switch with Avaya IP Office R11.0

4. Equipment and Software Validated

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

Equipment/Software	Release/Version
Avaya IP Office Server Edition running on a Virtual Platform	11.0.0.2.0 Build 23
Avaya IP Office 500 V2	11.0.0.2.0 Build 23
Avaya IP Office Manager running on a Windows 7 PC	11.0.0.2.0 Build 23
Avaya 1608-I H323 Deskphone	1608UA1_350B.bin
Avaya 1603 H323 Deskphone	1603UA1_3110A.bin
Avaya 9641 H323 Deskphone	R6.6115
Avaya J179 H323 Deskphone	R6.7.002U
Avaya 1140e SIP Deskphone	R04.04.28.00
Avaya 1120e SIP Deskphone	R04.04.28.00
Avaya J129 SIP Deskphone	SIP 3.0.0.0.0.20
Avaya 9508 Digital Deskphone	V0.6
NVT Phybridge PolRE Switch	3.4.3
NVT Phybridge Phylink Adapters	1.4

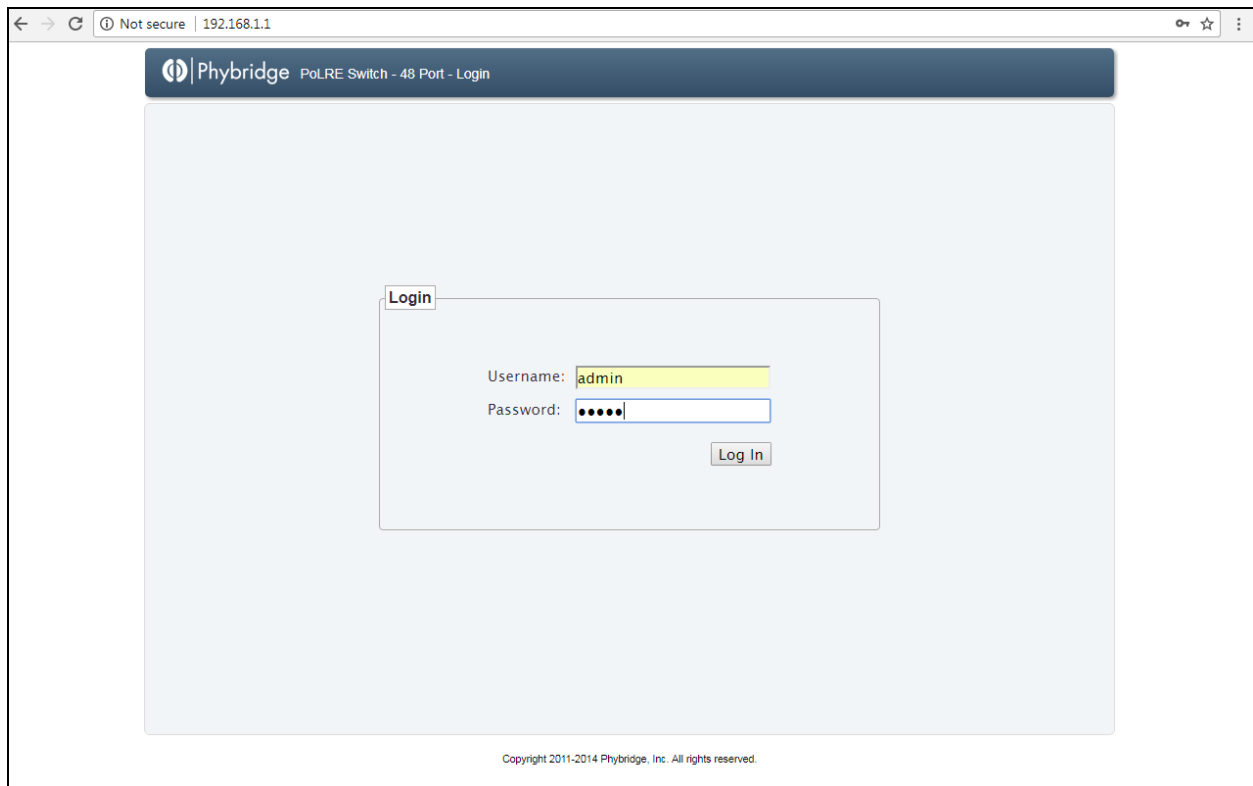
5. Configure Avaya IP Office

No specific configuration is required on IP Office for this setup with NVT Phybridge. The premise for testing is to have a typical setup with Avaya IP endpoints registering to IP Office. The Avaya IP endpoints are connected as normal to the Avaya data switch over CAT3 cable. CAT3 cable was used in this specifically in order to show that Avaya IP endpoints can function over CAT3 using the NVT Phybridge PoLRE 24/48 Port Switch and Phylink adapters. The setup simply requires a fully working Avaya IP Office with working Avaya IP endpoints.

6. Configure NVT Phybridge PoLRE Switch

The NVT Phybridge PoLRE is a managed switch therefore no additional configuration is necessary to connect to the Avaya solution apart from setting the IP address of the PoLRE switch. Log in to the Management port on the PoLRE switch.

- Physically connect a LAN cable from a laptop to the Management port on the PoLRE switch.
- Set the Laptop's IP address to 192.168.1.2.
- Browse to 192.168.1.1.
- Using the appropriate credentials log into the GUI as shown below.



Navigate to the **Ethernet** tab, highlighted below. Set the **IP Address**, **Net Mask** and **Broadcast**. Press **Apply** and **Save Changes**.

The screenshot shows the Phybridge PoLRE Switch GUI. The top navigation bar includes 'SYSTEM', 'ETHERNET' (highlighted in red), 'VLAN', and 'ADMIN'. Below the navigation bar are tabs for 'UPLINK PORTS' and 'DOWNLINK PORTS'. The main content area is divided into three sections:

- Configure GbE Interface:** IP Address: 10.10.40.120, Net Mask: 255.255.255.0, Broadcast: 10.10.40.255. GbE1 Medium: Copper, GbE2 Medium: Copper. An 'APPLY' button is highlighted in red.
- Configure Management Port:** IP Address: 192.168.1.1, Net Mask: 255.255.255.0, Broadcast: 192.168.1.255, Default PVID: 1001. An 'APPLY' button is present.
- Configure IP Route:** Default Gateway: [empty], Interface: GbE. An 'APPLY' button is present.

A 'SAVE CHANGES' button is located at the bottom right of the page.

To check the GBE uplink port status within the PoLRE GUI Management and to review the PoLRE GBE Uplink Port(s) see **Section 7**. Additional information in the setup and configuration of the PoLRE switch can be found in **Section 9** of these Application Notes.

Note that additional services can be turned on / off via the PoLRE GUI Management e.g. VLANs and Services Tab e.g. HTTP, SNMP, LLDP, Telnet. STP, NTP and features such as MAC Port Locking and Turn off and on ports. The integrated command line (CL) can be used by going to the GUI Terminal Tab. Encryption services such as TACACS+ or Radius and HTTPS require PoLRE's enhanced software package. Please contact NVT Phybridge technical support for the enhanced software package and upgrade instructions if required using, <http://www.nvtpybridge.com/support-ticket/>

The only manual intervention required for this solution is to set the IP address of the PoLRE switch and physically bring the PoLRE switch and the Phylink Adapters onto the network, in order to allow each of the Avaya IP endpoints connect to the Avaya solution over 1000ft of CAT3 cable.

6.1. Connect the Amphenol cable to the PoLRE switch

Each Amphenol cable allows up to 24 connections. These cables are connected into the PoLRE switch which is capable of holding two Amphenol cables thus allowing up to 48 CAT3 connections.



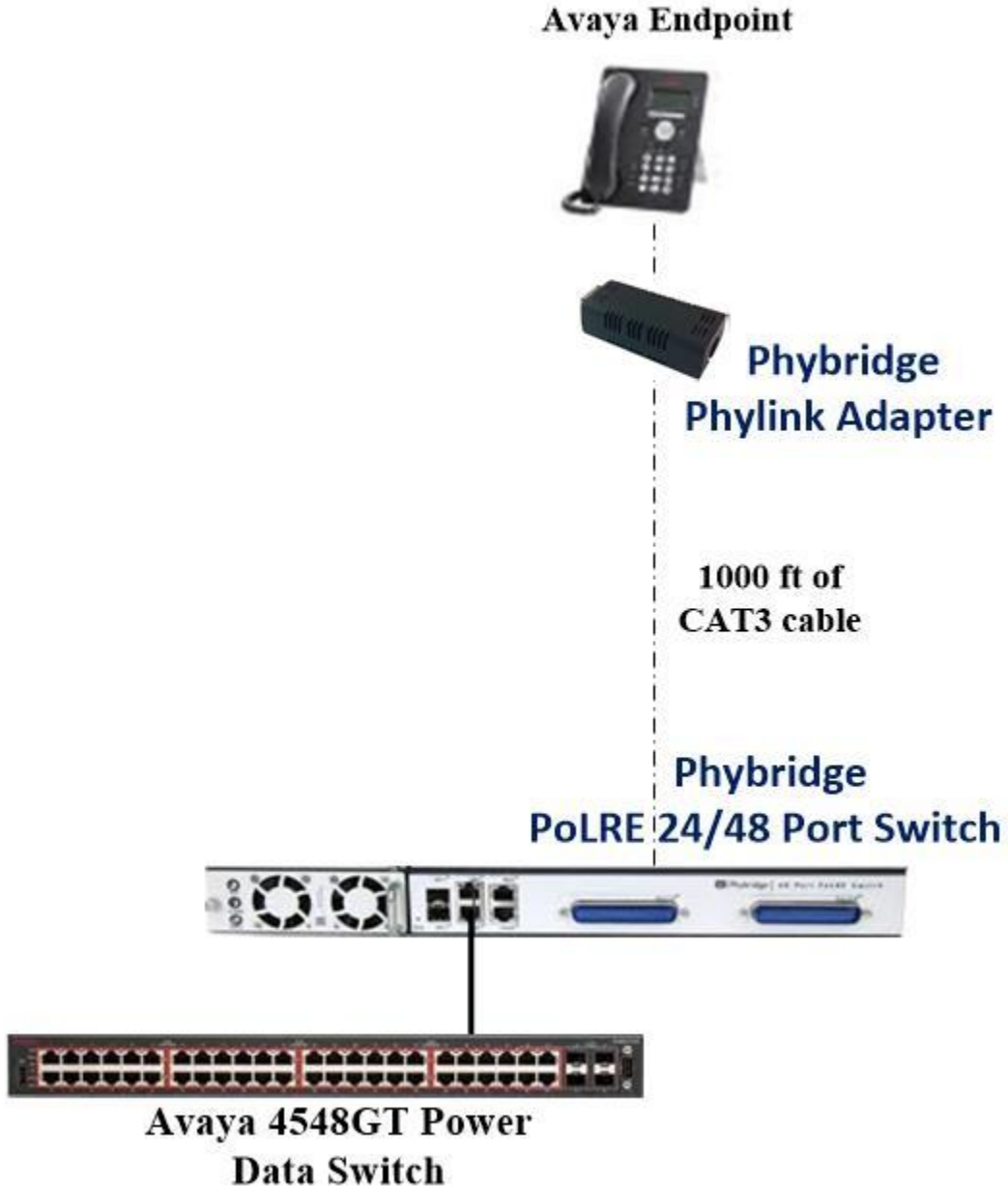
6.2. Connect the Phylink Adapter

The diagram below shows the end of 1000ft of CAT 3 cable. The Phylink adapter is connected at the end of the CAT3 cable and the other end connected to CAT5/6 cable connecting to the Avaya IP endpoint.



6.3. Complete the connection the Avaya Data Network

The following shows the completed connection into the Avaya data network. Each Avaya IP endpoint connected requires a Phylink Adapter connected.



7. Verification Steps

This section provides the tests that can be performed to verify proper configuration of the PoLRE switch.

Browse to the IP Address of the PoLRE and log in using valid credentials the initial screen is an overview of the configuration as shown below.

Click on the **System** tab and within that the **Overview** tab Check that **UPLINK G1** is showing as green and that the number of connected Avaya IP endpoints is shown under **DOWNLINK** as green.

The screenshot displays the Phybridge PoLRE Switch web interface. The top navigation bar includes 'SYSTEM', 'ETHERNET', 'VLAN', and 'ADMIN'. The 'SYSTEM' tab is selected. Below the navigation bar, the 'OVERVIEW' tab is selected. The 'System Overview' section contains the following data:

Model	PoLRE Switch - 48 Port	Host Name	PoLRE
Product Number	PL-048	IP Address	10.10.40.120
Serial Number	2162100029	MAC Address	00:24:63:02:84:37
Up Time	0 Days, 23H:59M:20S	Subnet Mask	255.255.255.0
Current Time	Wed Mar 14 2018 2:52:06 PM	Default Gateway	
CPU Load	0.72	IP Address (mgmt)	192.168.1.1
Memory	Used: 36.631MB Free: 18.317MB	PSE Voltage	54 Volts
Temperature	45 C	PSE Power	Used: 16.167W Free: 1046.583W
Contact	http://www.nvtphybridge.com/support-ticket/ Tel:1-888-901-3633 Mon-Fri 4am-7pm EST		

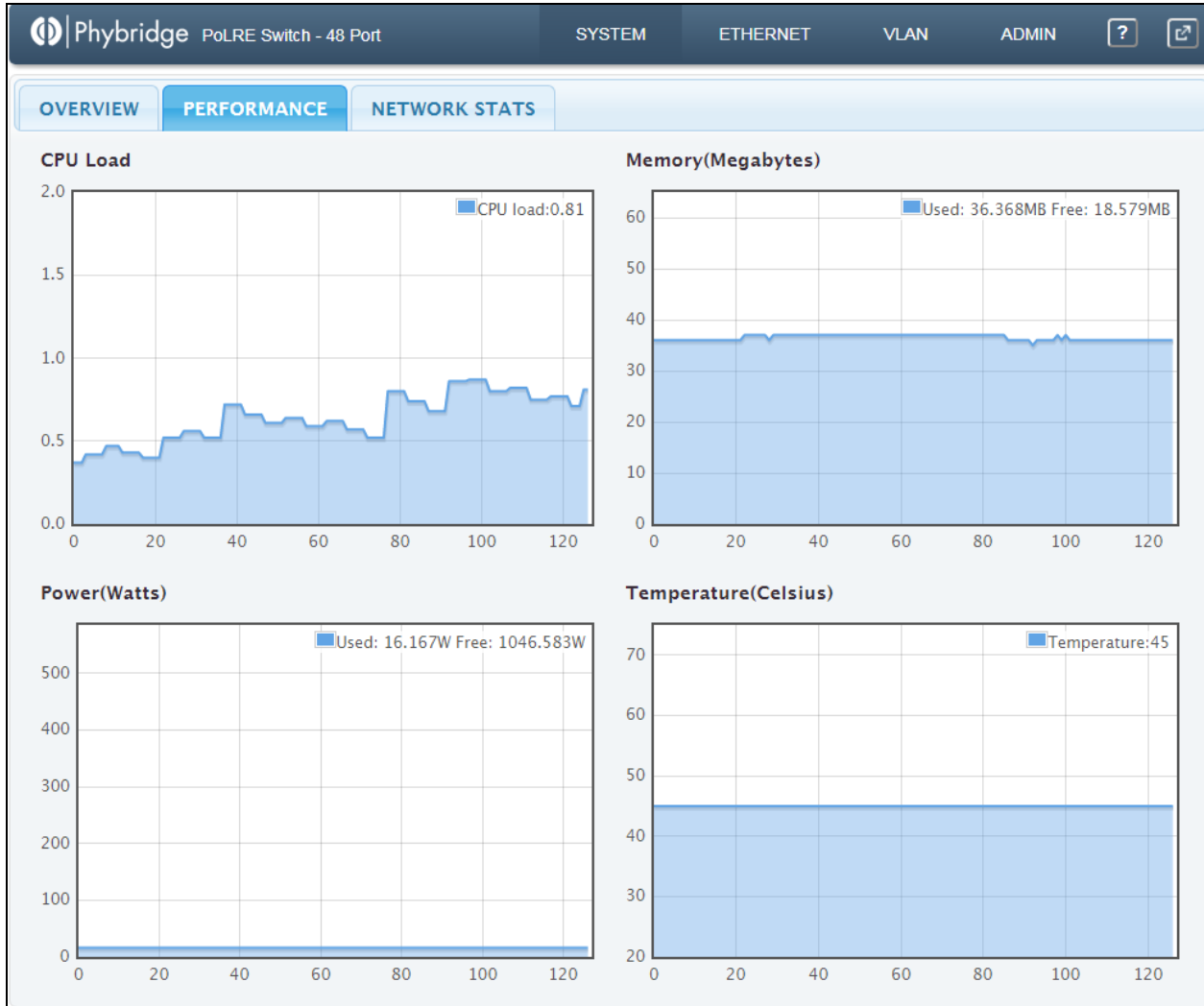
The 'Ethernet Port Status' section shows the following:

UPLINK			DOWNLINK (2 PORTS UP)																							
F1	G1	M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
F2	G2		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

The 'Thresholds and Exceptions' section shows the following:

Wed Mar 14 2018 3:35:18 AM	Maximum CPU Load:1.50
Tue Mar 13 2018 3:17:27 PM	Memory Low Watermark:12218.368KB
Tue Mar 13 2018 3:36:38 PM	Maximum Power Consumed:102.505Watts
Tue Mar 13 2018 2:57:06 PM	Maximum Temperature:45C

Click on the **Performance** tab. The statistics of the PoLRE switch are clearly visible as shown below.



Click on the **Network Stats** tab and the network statistics can be observed as shown below.

Phybridge PoLRE Switch - 48 Port													
SYSTEM				ETHERNET				VLAN				ADMIN	
OVERVIEW			PERFORMANCE			NETWORK STATS							
Port	Link	RX Packets	RX Errors	TX Packets	TX Errors	Port	Link	RX Packets	RX Errors	TX Packets	TX Errors		
GbE1	↑	5782730	0	945212	0	GbE2	↓	0	0	0	0		
1	↑	394047	6	5127354	0	25	↓	0	0	0	0		
2	↓	0	0	0	0	26	↓	0	0	0	0		
3	↓	0	0	0	0	27	↓	0	0	0	0		
4	↓	0	0	0	0	28	↓	0	0	0	0		
5	↓	0	0	0	0	29	↓	0	0	0	0		
6	↓	0	0	0	0	30	↓	0	0	0	0		
7	↓	0	0	0	0	31	↓	0	0	0	0		
8	↓	0	0	0	0	32	↓	0	0	0	0		
9	↑	412706	6	5046640	0	33	↓	0	0	0	0		
10	↓	0	0	0	0	34	↓	0	0	0	0		
11	↓	0	0	0	0	35	↓	0	0	0	0		
12	↓	0	0	0	0	36	↓	0	0	0	0		
13	↓	0	0	0	0	37	↓	0	0	0	0		
14	↓	0	0	0	0	38	↓	0	0	0	0		
15	↓	0	0	0	0	39	↓	0	0	0	0		
16	↓	0	0	0	0	40	↓	0	0	0	0		
17	↓	0	0	0	0	41	↓	0	0	0	0		
18	↓	0	0	0	0	42	↓	0	0	0	0		
19	↓	0	0	0	0	43	↓	0	0	0	0		
20	↓	0	0	0	0	44	↓	0	0	0	0		
21	↓	0	0	0	0	45	↓	0	0	0	0		
22	↓	0	0	0	0	46	↓	0	0	0	0		
23	↓	0	0	0	0	47	↓	0	0	0	0		
24	↓	0	0	0	0	48	↓	0	0	0	0		

Click on the **Ethernet** tab and within that the **Downlink Ports** tab and this will show the MAC addresses of the devices attached.

Phybridge PoLRE Switch - 48 Port SYSTEM **ETHERNET** VLAN ADMIN ?

UPLINK PORTS **DOWNLINK PORTS**

Dongles: 2; Endpoints: 2; 16.170W; 45C

Port	MAC Address	Uptime Days HH:MM:SS	LD	Port	MAC Address	Uptime Days HH:MM:SS	LD
1			7	25			0
2			0	26			0
3			0	27			0
4			0	28			0
5			0	29			0
6			0	30			0
7			0	31			0
8			0	32			0
9	50:CD:22:B4:6C:1A	0 00:23:23	6	33			0
10			0	34			0
11			0	35			0
12			0	36			0
13			0	37			0
14			0	38			0
15			0	39			0
16			0	40			0
17			0	41			0
18			0	42			0
19			0	43			0
20			0	44			0
21			0	45			0
22			0	46			0
23			0	47			0
24			0	48			0

TURN ON ALL | TURN OFF ALL | RESET ALL | LOCK ALL | UNLOCK ALL | MAC ADDR TABLE | SAVE CHANGES

8. Conclusion

These Application Notes describe the configuration steps required for NVT Phybridge PoLRE switch to interoperate with Avaya IP Office. All applicable test cases were completed successful with any observations noted in **Section 2.2**.

9. Additional References

This section references the product documentation relevant to these Application Notes. Documentation for Avaya IP Office can be found at <http://support.avaya.com>.

[1] *Avaya IP Office Manager 11.0*, Release 11.0 Issue 17a August 2018

Documentation for NVT Phybridge products may be found at <http://nvtphybridge.com>

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