



Application Notes for configuring NVT Phybridge FLEX24-10G RJ45 extended reach switch with Avaya IP Office™ – Issue 1.0

Abstract

These Application Notes describe the configuration steps required for the NVT Phybridge FLEX24-10G R1.0 extended reach switch to interoperate with Avaya IP Office™ R11.1. In the compliance testing, the NVT Phybridge FLEX24-10G switch leveraged 4-pair CAT6 wiring to provide extended range Ethernet voice path and Power over Ethernet for Avaya IP endpoints registering 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 the NVT Phybridge FLEX24-10G switch and NVT Phybridge FLEX adapters (FLEX-C, FLEX-Link, and FLEX4) used to allow Avaya endpoints to connect with Avaya IP Office™ over 4-pair CAT6 cable. The NVT Phybridge FLEX24-10G switch is a LAN appliance that leverages 4-pair CAT6 wiring to provide extended range Ethernet and Power over Ethernet to Avaya IP endpoints registered to Avaya IP Office™.

The FLEX24-10G switch has a reach of 2000 feet and is capable of delivering power and signalling over CAT6 cable. A FLEX Adapter installed at each IP endpoint carries power and signalling to connected IEEE 802.3af/at compliant end devices. The default FLEX24-10G switch/FLEX Adapter configuration supports IP phones and provides a plug and play solution for replacing a legacy voice network using the existing network cabling plan. A single FLEX24-10G switch powers up to 24 IP phones.

2. General Test Approach and Test Results

The compliance testing focused on interoperability between the NVT Phybridge FLEX24-10G switch and Avaya IP Office™ to ensure that the Avaya IP endpoints (models listed in **Section 4**) can communicate correctly with IP Office over 2000 ft of 4-pair CAT6 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 FLEX24-10G switch. However, the Avaya equipment used TLS over the connection provided by the FLEX24-10G switch.

2.1. Interoperability Compliance Testing

Testing consisted of typical call scenarios involving Avaya endpoints registered to IP Office. The test focused on endpoints connecting over 2000ft of 4-pair CAT6 cable to verify the extended range that the FLEX24-10G switch provides. Local power was not employed for the Avaya IP endpoints.

Using the NVT Phybridge FLEX24-10G switch and the NVT Phybridge adapters, the Avaya IP endpoints should function normally over a CAT6 4 pair cable connected to IP Office. The testing focused on the following areas:

- **Avaya IP endpoint connections over 4-pair CAT6 cable without FLEX adapters** – The Avaya IP endpoints are connected to the Avaya solution over the 4-pair CAT6 cable without any NVT Phybridge equipment. Failure is expected for this scenario.
- **Avaya IP endpoint connections over 4-pair CAT6 cable with FLEX adapters** – The Avaya IP endpoints are connected to the Avaya solution over the 4-pair CAT6 cable with the NVT Phybridge equipment in use to ensure that the IP endpoints can register and work as normal.
- **Basic Calls** – Basic incoming and outgoing calls made using Avaya IP endpoints.
- **Call Hold/Transfer and Conference** – Calls made with transfer and conference.
- **MWI** – Leaving and retrieving messages insuring MWI functionality.
- **Secondary Wired Ethernet Interface** – Ethernet connectivity made through the secondary ports
- **USB ports** – Headset use and power to endpoint USB ports supplied as the endpoints support.
- **Long Duration Calls** – Calls maintained over 1 hour.
- **Serviceability** – FLEX24-10G switch recovery from adverse conditions, such as re-connecting Ethernet cables to the FLEX24-10G switch and re-connecting the FLEX Adapters.

2.2. Test Results

All applicable test cases passed with the following observations noted:

1. The CAT6 ethernet cable used for the extended reach configuration must be solid copper. Lower cost alternatives such as copper clad aluminum (CCA) ethernet cable will not function properly.
2. The Avaya Vantage Endpoints had intermittent USB headset connection problems. The display cycled an 'Insufficient power to USB port' message. This is resolved by setting the endpoint's FLEX PoE port control to **Manual** in the FLEX24-10G administration interface, by using local power with the endpoints, or by using Bluetooth connectivity for the headset.

2.3. Support

Technical support on the NVT Phybridge FLEX24-10G switch can be obtained through the following links:

- Technical Support Hours and Contact Information:
<https://www.nvtPhybridge.com/support-ticket/>
- Email: support@nvtphybridge.com
- Web: <https://www.nvtphybridge.com>

3. Reference Configuration

In the test configuration shown in **Figure 1**, the NVT Phybridge FLEX24-10G switch is connected into the existing Avaya telephony LAN. Avaya IP endpoints are connected to the LAN over 4-pair CAT6 cabling. For each Avaya IP endpoint on the FLEX24-10G switch, one end of the 4-pair CAT6 cable is connected to the NVT Phybridge FLEX24-10G switch and the other end of the cable connects to a NVT Phybridge FLEX adapter. Each FLEX adapter is connected to an Avaya endpoint using a standard CAT5 or 4-pair CAT6 Ethernet cable.

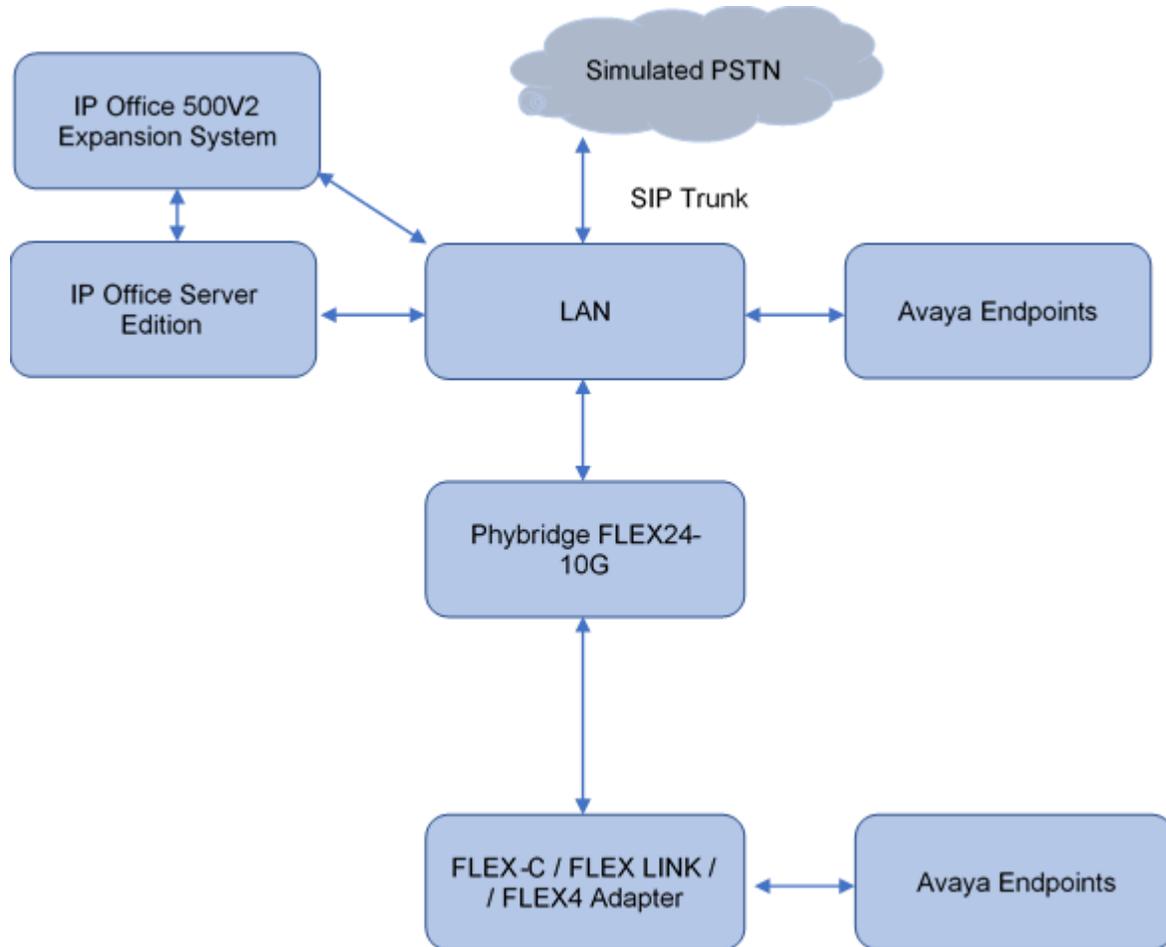


Figure 1: NVT Phybridge FLEX24-10G switch with Avaya IP Office 11.1

4. Equipment and Software Validated

The following equipment and software versions were used in the reference configuration:

Equipment/Software	Release/Version
Avaya IP Office Server Edition running on a Virtual Platform	11.1.0.1.0 Build 95
Avaya IP Office 500 V2	11.1.0.1.0 Build 95
Avaya 1608 H323 Deskphone	HA1608UA1_350B
Avaya 1100 Deskphone	04.04.23.00
Avaya J129 Deskphone	4.0.6.0.8
Avaya J139 Deskphone	4.0.6.0.8
Avaya J179 Deskphone	4.0.6.0.8
Avaya J189 Deskphone	4.0.6.0.8
Avaya Vantage K155	3.0.0.1.0014
Avaya Vantage K175	3.0.0.1.0014
Avaya 9641 H323 Deskphone	6.8.3.04-111919
Phybridge FLEX24 10G Switch	FLEX24-10G ver. 1.0.5347M
Phybridge FLEX4 Adapter	NA
Phybridge FLEX-Link Adapter	NA
Phybridge FLEX-C Adapter	NA

Compliance Testing is applicable when the tested solution is deployed with a standalone IP Office 500 V2 and also when deployed with IP Office Server Edition in all configurations.

5. Configure Avaya IP Office™

No specific configuration is required on IP Office for setup with the FLEX24-10G switch. Interoperability testing uses Avaya IP endpoints registering to IP Office. The Avaya IP endpoints not using the FLEX24-10G are connected to the Avaya network switch with 3 to 6 ft of 4-pair CAT 5E or CAT6 cable. The Avaya endpoints using the FLEX24-10G switch are connected to the FLEX adapters with 3 to 6 ft of 4 pair CAT5E or CAT6 cable. The FLEX adapters are then connected to 2000 ft of 4-pair CAT6 ethernet cable terminating to the FLEX24-10G 24 port switch.

6. Configure NVT Phybridge FLEX24-10G Switch

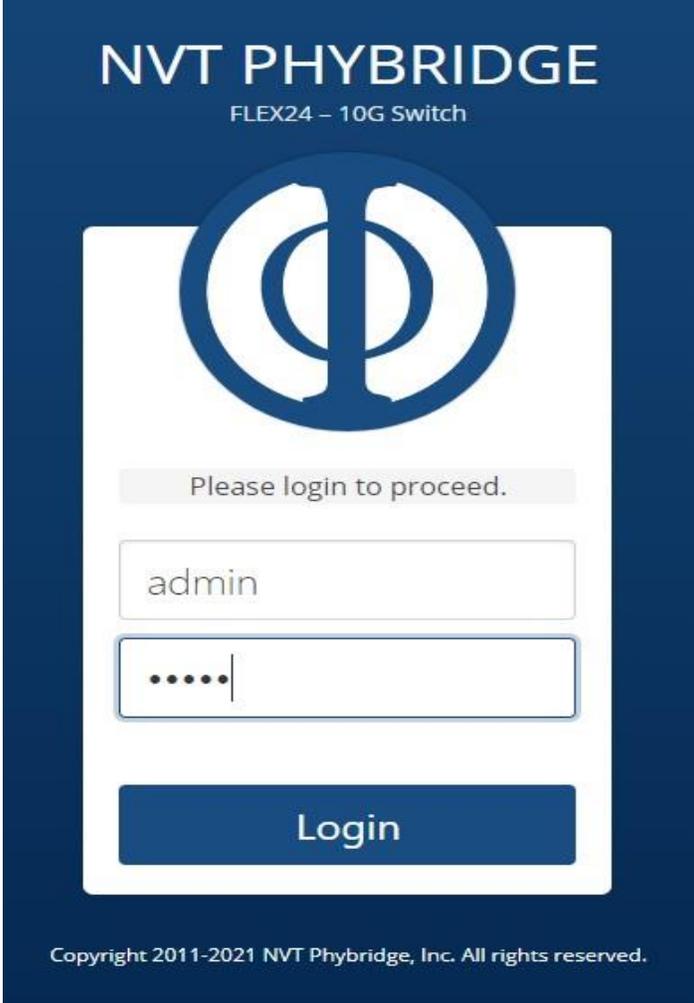
The FLEX24-10G switch configuration requires the following for configuration:

- Set IP address.
- Configure VLAN to use a downlink port connection for network access. Network access is also provided using the uplink ports. Ethernet connectivity used a downlink port for this test.

6.1. Set IP address

The IP address can be set through the uplink/downlink port or the management port.

The default IP address for the uplink/downlink is **192.168.100.1**. Set the IP address of a laptop to **192.168.100.10**. Any suitable address in the **192.168.100** subnet may be used. The administration interface can be accessed via **192.168.100.1**. Log in to the interface with appropriate credentials.



The image shows the login page for the NVT PHYBRIDGE FLEX24 - 10G Switch. The page has a dark blue header with the text "NVT PHYBRIDGE" and "FLEX24 - 10G Switch" below it. A large blue logo is centered in the header. Below the logo, a light gray box contains the text "Please login to proceed." Below this, there are two input fields: the first contains the text "admin" and the second contains five dots, indicating a password field. A blue "Login" button is positioned below the input fields. At the bottom of the page, a small copyright notice reads "Copyright 2011-2021 NVT Phybridge, Inc. All rights reserved."

Administrators can also access configuration via the management port. The IP address for the management interface is **192.168.1.1**. The laptop IP address must be in the **192.168.1** subnet and connected to the management port. Instructions to configure FLEX24 through the management port are in reference **1** listed in **Section 9**.

6.2. Add VLAN for the assigned IP address

Select **VLAN** in the title bar and click on the **VLAN Table** tab. Type **100** in the **Add VLAN** input box. Click **Add**.

The screenshot displays the NVT PHYBRIDGE FLEX24 - 10G configuration interface. The top navigation bar includes 'SYSTEM', 'ETHERNET', 'VLAN', and 'ADMIN'. The 'VLAN Table' tab is active, showing options for 'Trunk VLAN', 'Private VLAN', and 'Port Isolation'. An 'Add VLAN' input field contains the value '100', and an 'Add' button is visible. Below this, three VLAN configurations are listed:

- VLAN 1**: This configuration is active, indicated by a blue background. It shows a grid of ports (1-24) and uplink ports (1-2). The 'Select All' button is active.
- VLAN 1001**: This configuration is inactive, shown with a white background. It shows a grid of ports (1-24) and uplink ports (1-2). The 'Select All' button is inactive.
- VLAN 100**: This configuration is inactive, shown with a white background. It shows a grid of ports (1-24) and uplink ports (1-2). The 'Select All' button is inactive.

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Select **Ethernet** from the title bar and click on the **IP Config** tab. Input **100** in the **Add IP Interface** input box and click **Add**.

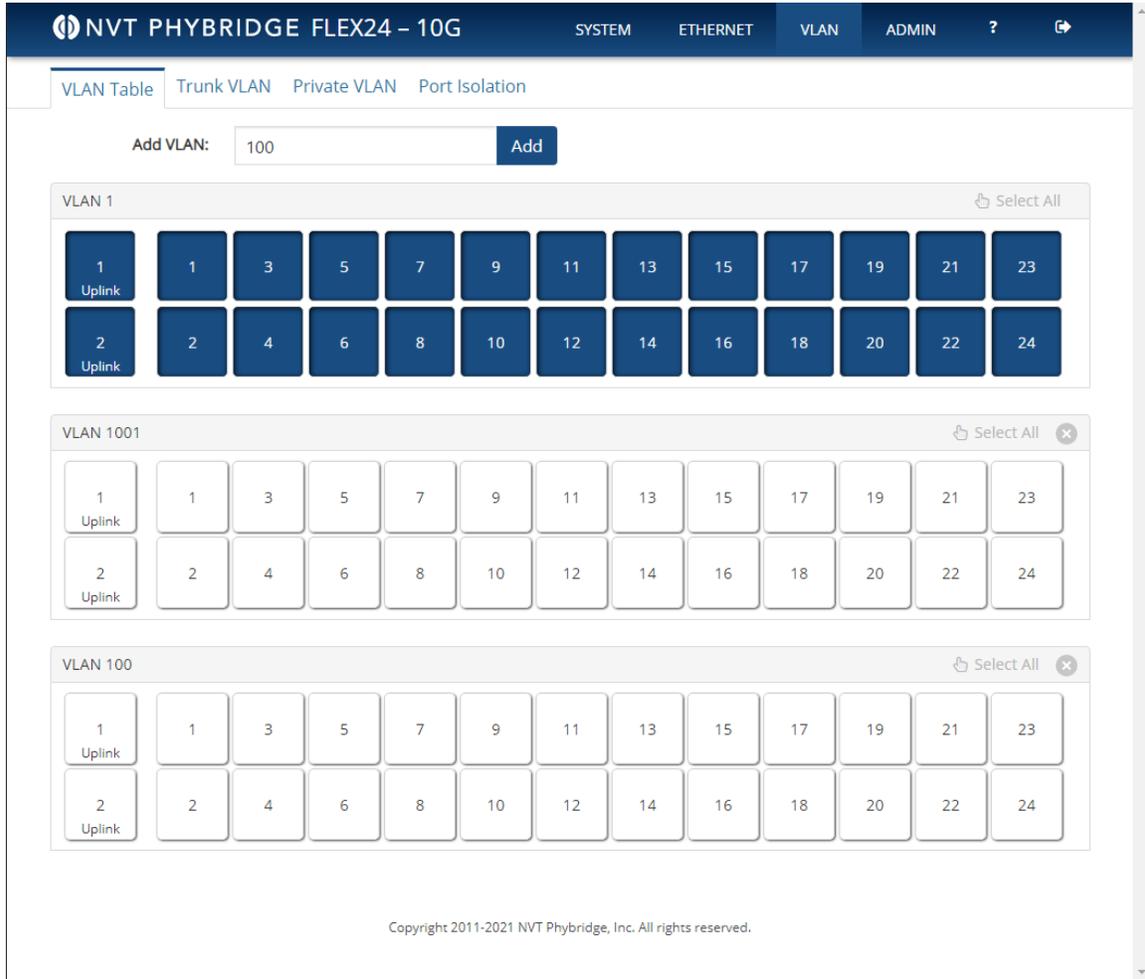
The screenshot shows the configuration page for the NVT PHYBRIDGE FLEX24-10G device. The top navigation bar includes 'SYSTEM', 'ETHERNET', 'VLAN', and 'ADMIN'. The 'IP Config' tab is active, with sub-tabs for 'Uplink Ports', 'Downlink Ports', and 'PoE'. Two VLAN configuration panels are visible: 'VLAN 1' and 'VLAN 1001'. Each panel has fields for 'IP Address / Prefix' (192.168.100.1 / 24 and 192.168.1.1 / 24 respectively), 'IPv6 Address / Prefix' (:: / 0), and a 'DHCP' toggle switch. At the bottom, there are input fields for 'Add IP Interface' (containing 'Enter VLAN ID') and 'Default gateway' (containing 'Enter Gateway IP'), both with 'Add' and 'Apply' buttons.

VLAN 100 displays. For VLAN 100, change the IP address to that planned for the FLEX24-10G and **24** for the 24 bit subnet mask (255.255.255.0). The assigned IP address used for this test is **10.64.10.160**. Click **Apply**.

This screenshot shows the configuration page with the 'VLAN 100' panel selected. The 'IP Address / Prefix' field is now '10.64.10.160 / 24', and the 'DHCP' toggle is turned off. The 'Apply' button is highlighted. The 'Add IP Interface' field at the bottom now contains the number '100'.

6.3. Assign ports to VLAN 100

Select **VLAN** in the title bar and click on the **VLAN** tab. Click on **Select All** for **VLAN 1** and then click on a port in **VLAN 100**. The selected ports should now be in **VLAN 100** box. Click on **Apply Edits**.



Once this is done, connectivity to the web interface is interrupted. Change the laptop IP address from **192.168.100.10** to an address that is in the subnet of the FLEX24 IP set in **section 6.2**. The test configuration uses the **10.64.10** subnet.

Log in to the web interface. Select **Ethernet** from the title bar and click on the **Downlink Ports** tab. For port 1, the connection used to the Avaya ethernet switch, check the **IEEE** checkbox. This allows for a fast connection to be specified for the port. The interoperability test connection speed was 1Gb.

NVT PHYBRIDGE FLEX24 – 10G											
SYSTEM ETHERNET VLAN ADMIN ? ↗											
IP Config Uplink Ports Downlink Ports PoE											
#	IEEE	Speed	Description	MAC Address	Uptime / Downtime	RX Packets		TX Packets		LD	
						Total	Error	Total	Error		
1	<input checked="" type="checkbox"/>	Auto		00:E0:07:05:AC:6F +7	14d 02:06:41	1,013	0	1,744	0	58	
2	<input type="checkbox"/>	Auto				0	0	0	0	0	
3	<input type="checkbox"/>	Auto			49d 22:59:56	0	0	0	0	3	
4	<input type="checkbox"/>	Auto				0	0	0	0	0	
5	<input type="checkbox"/>	Auto			22d 06:50:33	0	0	0	0	27	
6	<input type="checkbox"/>	Auto				0	0	0	0	0	
7	<input type="checkbox"/>	Auto			21d 03:33:14	0	0	0	0	68	
8	<input type="checkbox"/>	Auto				0	0	0	0	0	
9	<input type="checkbox"/>	Auto			0d 05:50:28	0	0	152	0	24	
10	<input type="checkbox"/>	Auto				0	0	0	0	0	
11	<input type="checkbox"/>	Auto				0	0	0	0	0	
12	<input type="checkbox"/>	Auto				0	0	0	0	0	
13	<input type="checkbox"/>	Auto				0	0	0	0	0	

7. Verification Steps

This section provides information verify a proper configuration of the FLEX24-10G switch.

Browse to the IP Address of the FLEX24-10G and log in using valid credentials. Select **SYSTEM** in the title bar and click on the **Overview** tab. The **Ethernet Ports** table should have highlighted ports for the network connection and for any attached endpoints. Here, the network connection is on ethernet port **1** and a connected endpoint is on ethernet port **9**.

The screenshot shows the NVT PHYBRIDGE FLEX24-10G web interface. The top navigation bar includes 'SYSTEM', 'ETHERNET', 'VLAN', and 'ADMIN'. The 'Overview' tab is selected. Below the navigation bar, there are three sub-tabs: 'Overview', 'Performance', and 'Log'. The main content area is divided into two sections: 'System Overview' and 'Ethernet Ports'.

System Overview

Model	FLEX24-10G	Contact	http://www.nvtphybridge...
Product Number	NV-FLX-024-10G	Hostname	FLEX24-10G
Serial Number	912102002F	MAC Address	00:24:63:22:08:F7
Software Version	FLEX24-10G ver. 1.0.5347M	IP Address	192.168.100.1/24 VLAN 1
Uptime	50d 03:55:10	Default Gateway	
Current Time	2020-12-09 18:08 +00:00	PSU Capacity	1002 Watts
Memory	Used: 105 MB Free: 397 MB	PoE Budget	982 Watts @ 56 Volts
Temperature	48° C	Fan Speed	0 RPM

Ethernet Ports

#	Description	PoE	Uptime	Mb/s	#	Description	PoE	Uptime	Mb/s
1		0.0 W	50d 03:54:26	0.06 ^{TX}	13		0.0 W		
2		0.0 W			14		0.0 W		
3		0.0 W			15		0.0 W		
4		0.0 W			16		0.0 W		
5		0.0 W			17		0.0 W		
6		0.0 W			18		0.0 W		
7		0.0 W			19		0.0 W		
8		0.0 W			20		0.0 W		
9		1.0 W	50d 03:54:15	0.00 ^{TX}	21		0.0 W		
10		0.0 W			22		0.0 W		
11		0.0 W			23		0.0 W		
12		0.0 W			24		0.0 W		

Summary: MGMT | Uplink: 10G 1/1 | Uplink: 10G 1/2 | PoE: Used: 1.0W Available: 981.0W

Select **ETHERNET** on the title bar and click on the **Downlink Ports**. The display will show data transmission and the MAC ID of the connected devices.

NVT PHYBRIDGE FLEX24 - 10G											
SYSTEM ETHERNET VLAN ADMIN ? ↻											
IP Config Uplink Ports Downlink Ports PoE											
#	IEEE	Speed	Description	MAC Address	Uptime / Downtime	RX Packets		TX Packets		LD	
						Total	Error	Total	Error		
1	<input checked="" type="checkbox"/>	Auto		00:E0:07:05:AC:6F +6	0d 21:22:14	347,553	0	178,924	0	0	
2	<input type="checkbox"/>	Auto				0	0	0	0	0	
3	<input type="checkbox"/>	Auto				0	0	0	0	0	
4	<input type="checkbox"/>	Auto				0	0	0	0	0	
5	<input type="checkbox"/>	Auto				0	0	0	0	0	
6	<input type="checkbox"/>	Auto				0	0	0	0	0	
7	<input type="checkbox"/>	Auto				0	0	0	0	0	
8	<input type="checkbox"/>	Auto				0	0	0	0	0	
9	<input type="checkbox"/>	Auto		C8:1F:EA:D6:10:93	0d 05:18:52	25,611	0	265,794	0	3	
10	<input type="checkbox"/>	Auto				0	0	0	0	0	
11	<input type="checkbox"/>	Auto				0	0	0	0	0	

Click on the **PoE** tab. The display will show power consumption of the currently connected endpoints.

#	Control	Description	Power Consumption			Maximum Power		
			Current	Watts	Usage	Watts	Date Time	
1	AUTO							
2	AUTO							
3	AUTO							
4	AUTO							
5	AUTO							
6	AUTO							
7	AUTO							
8	AUTO							
9	AUTO		106.00 mA	5.83 W	11.32 %	11.16 W	2020-12-09T18:12:20+00:00	
10	AUTO							
11	AUTO							

Connect an Avaya IP endpoint using a connection through the FLEX24 and FLEX adapter. Make a call and verify two way audio.

8. Conclusion

These Application Notes describe the configuration steps required for NVT Phybridge FLEX24-10G switch to interoperate with Avaya IP Office™. All feature and serviceability test cases were completed with observations noted in **Section 2.2**.

9. Additional References

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

1. *FLEX24-10G Administration Guide*, <https://www.nvtphybridge.com/wp-content/uploads/PDF/FLEX24-10G%20ADMINISTRATION%20GUIDE.pdf>

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

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