



Avaya Solution & Interoperability Test Lab

Application Notes for the Foundry Networks FastIron SuperX Switch Supporting Power over Ethernet with Avaya Communication Manager, Avaya G11 PSTN Gateway and Avaya IP Telephones – Issue 1.0

Abstract

These Application Notes describe the procedures for configuring the Foundry Networks FastIron SuperX Switch to provide inline Power over Ethernet (PoE) to Avaya 1600/4600/9600 Series IP Telephones. The Avaya IP telephones register to Avaya Communication Manager and the Avaya G11 PSTN Gateway.

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

Power over Ethernet (PoE) allows both power and data to be simultaneously carried over standard Ethernet cables. PoE-enabled Ethernet switches can supply power directly to Ethernet devices, thereby simplifying installation and removing the need for separate power supplies for those devices. The IEEE 802.3af standard defines the mechanisms for Power Sourcing Equipment (PSE), such as PoE-enabled Ethernet switches, to detect, classify, and supply power to Powered Devices (PDs), such as PoE-enabled IP telephones. In the compliance-tested configuration described in these Application Notes, the Foundry Networks FastIron SuperX Switch is configured to supply inline PoE to Avaya PDs.

As illustrated in **Figure 1**, the Avaya PDs covered in these Application Notes include the following:

- Avaya 9600 Series IP Telephones (including the Avaya 9630 IP Telephone with and without SBM24 Button Module and Avaya 9620 IP Telephone with and without GigE Adapter).
- Avaya 4600 Series IP Telephones (including the Avaya 4621SW IP Telephone with and without Avaya Gigabit Ethernet Adapter).
- Avaya 1600 Series IP Telephones (including the Avaya 1616 IP Telephone with and without BM32 Button Module).
- Avaya Quick Edition IP Telephones and Avaya G11 PSTN Gateway.

See **Table 1** for a detailed list of specific models tested.

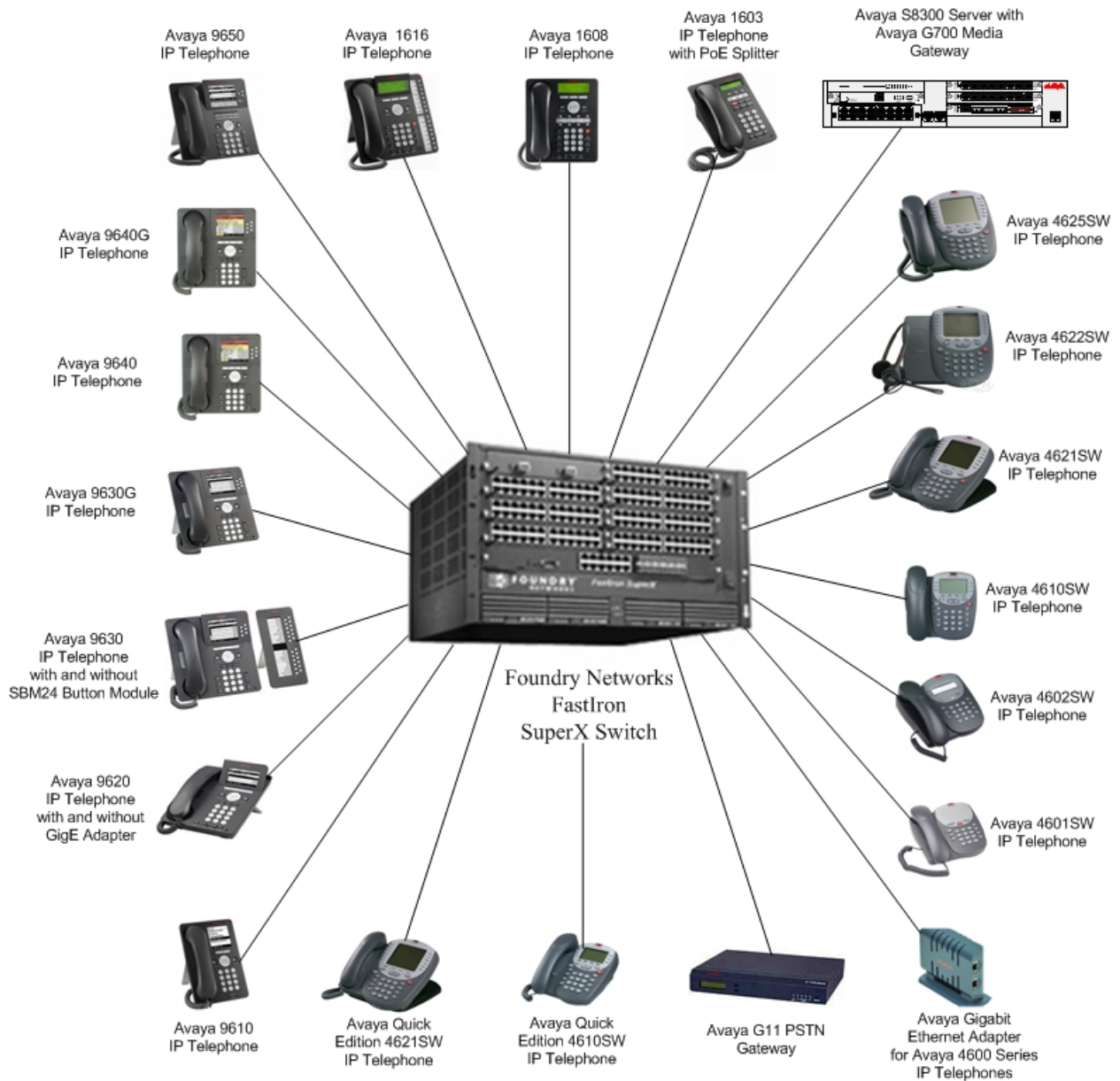


Figure 1: Foundry Networks FastIron SuperX Switch with Avaya Communication Manager, Avaya IP Telephones and Avaya G11 PSTN Gateway

2. Equipment and Software Validated

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

Equipment	Software/Firmware
Avaya S8300 Server with Avaya G700 Media Gateway	Avaya Communication Manger 4.0 (R014x.00.0.730.5)
Avaya 9650 IP Telephone	Avaya one-X™ Deskphone Edition 1.5 (H.323)
Avaya 9640G IP Telephone	Avaya one-X Deskphone Edition 1.5 (H.323)
Avaya 9640 IP Telephone	Avaya one-X Deskphone Edition 1.5 (H.323)
Avaya 9630G IP Telephone	Avaya one-X Deskphone Edition 1.5 (H.323)
Avaya 9630 IP Telephone with and without SBM24 Button Module	Avaya one-X Deskphone Edition 1.5 (H.323)
Avaya 9620 IP Telephone with and without GigE Adapter	Avaya one-X Deskphone Edition 1.5 (H.323)
Avaya 9610 IP Telephone	Avaya one-X Deskphone Edition 1.5 (H.323)
Avaya 1608 IP Telephone	Avaya one-X Value Edition 1.23 (H.323)
Avaya 1616 IP Telephone	Avaya one-X Value Edition 1.23 (H.323)
Avaya 1603 IP Telephone with PoE Splitter	Avaya one-X Value Edition 1.23 (H.323)
Avaya 4625SW IP Telephone	2.8 (H.323)
Avaya 4622SW IP Telephone	2.8 (H.323)
Avaya 4621SW IP Telephone	2.8 (H.323)
Avaya 4610SW IP Telephone	2.8 (H.323)
Avaya 4602SW IP Telephone	2.8 (H.323)
Avaya 4601SW IP Telephone	2.3 (H.323)
Avaya Gigabit Ethernet Adapter for Avaya 4600 Series IP Phone	NA
Avaya G11 PSTN Gateway	3.2.1
Avaya Quick Edition 4610SW IP Telephone	3.2.1 (SIP)
Avaya Quick Edition 4641SW IP Telephone	3.2.1 (SIP)
Foundry Networks FastIron SuperX Switch	4.0

Table 1: Equipment & Software Tested

3. Configure Avaya Communication Manager and Avaya G11 PSTN Gateway

For the compliance-tested configuration, no additional configuration specific to the Foundry SuperX Switch is required on Avaya Communication Manager or Avaya G11 PSTN Gateway. Consult the Avaya configuration manuals [1] & [7] for additional configuration details.

4. Configure the Foundry Networks FastIron SuperX Switch

The configuration covered here is specific to PoE and does not include the configuration of other features available in the Foundry FastIron SuperX Switch. Consult the Foundry FastIron SuperX Switch configuration manual [9] for additional configuration details.

Inline PoE is supported on the Foundry SuperX Switch. By default, PoE is disabled on all ports and must be enabled.

To enable a Foundry FastIron SuperX Switch port to provide inline power, configure the port using following CLI command. This command should be repeated for all ports to which PDs will be connected.

For this example port (interface) 1 was used.

```
FastIron SX Router# config t  
FastIron SX Router(config)# interface e 1/1  
FastIron SX Router(config-if-e1/1)# inline power
```

After entering the above commands, the console will display the following message:

```
FastIron SX Router(config-if-e1/1)# PoE Info: Power enabled on port 1/1.
```

5. Interoperability Compliance Testing

The interoperability testing focused on verifying PoE interoperability with the Foundry FastIron SuperX Switch, Avaya IP telephones and the Avaya G11 PSTN Gateway.

The power tests included verification of the following after each powered device was connected to the switch:

- Successful boot operation.
- For Avaya IP telephones, successful registration with Avaya Communication Manager or Avaya G11 PSTN Gateway.
- For Avaya IP telephones, completion of a test call, and raising speakerphone volume to maximum value.
- Connecting a mix of Avaya IP telephones to the switch, power cycling the switch and verifying successful boot operation of the PDs and registration of the telephones.

5.1. General Test Approach

The general test approach was to:

- Connect the Avaya IP telephones and Avaya G11 PSTN Gateway to ports on the Foundry FastIron SuperX Switch and verify that the PDs successfully booted.
- Verify completion of a test call.
- Power cycle the Foundry FastIron SuperX Switch and verify successful boot operation of the PDs and registration of the telephones.

5.2. Test Results

All Power over Ethernet test cases completed successfully. The Foundry SuperX Switch successfully provided inline power to all of the Avaya IP telephones and to the Avaya G11 PSTN Gateway. **Table 2** lists the IEEE 802.3af class and measured power of the Avaya IP telephones and Avaya G11 PSTN Gateway when connected to the Foundry SuperX Switch. The power listed as measured by the Foundry SuperX Switch is for PDs under idle conditions.

Note: Cable length and impedance affect power usage, so the measurements listed here may vary based on the cable used.

Avaya Powered Device	802.3af Class	Measured Power (W) (Idle)
Avaya 1603 IP Telephone with PoE Splitter	2	4.1
Avaya 1608 IP Telephone	2	3.5
Avaya 1616 IP Telephone	3	5.7
Avaya 4601SW IP Telephone	2	3.0
Avaya 4602SW IP Telephone	2	3.0
Avaya 4610SW IP Telephone	2	3.2
Avaya 4621SW IP Telephone	2	4.8
Avaya 4621SW IP Telephone with Gigabit Adapter	3	9.3
Avaya 4622SW IP Telephone	2	4.7
Avaya 4625SW IP Telephone	3	7.2
Avaya 9610 IP Telephone	2	3.9
Avaya 9620 IP Telephone	2	4.2
Avaya 9620 IP Telephone with GigE Adapter	3	7.2
Avaya 9630 IP Telephone	2	4.5
Avaya 9630G IP Telephone	2	3.6
Avaya 9630 IP Telephone with SBM24 Button Module	2	4.9
Avaya 9640 IP Telephone	2	3.8
Avaya 9640G IP Telephone	2	3.5
Avaya 9650 IP Telephone	2	4.5
Avaya Quick Edition 4610SW IP Telephone	2	3.0
Avaya Quick Edition 4621SW IP Telephone	2	4.5
Avaya G11 PSTN Gateway	0	3.8

Table 2: IEEE 802.3af Class and Measured Power

Table 3 summarizes the maximum output power at the PSE for the IEEE 802.3af classes.

Class	PSE Output Max. Power (W)
0	15.4
1	4.0
2	7.0
3	15.4
4	Reserved-Treat as Class 0

Table 3: IEEE 802.3af Classes

6. Verification Steps

Inline PoE is supported on the Foundry FastIron SuperX Switch. By default, PoE support is disabled on the system and on all ports.

The following steps may be used to verify the configuration for Power over Ethernet:

- To verify detailed information about the power supplied by the Foundry SuperX Switch, enter the command **show inline power detail**. Note the **Consumption**, **Capacity** and the **Voltage** values. A detailed explanation of each field is in **Appendix A**.

```
FastIron SX Router# show inline power detail

Power Supply Data:
+++++

Power Supply #1:
  Firmware Ver:      1.6
  Date:              1/26/7
  H/W Status:       807
  Max Curr:         52.5 Amps
  Voltage :         50.0 Volts
  Capacity:         2600 Watts
  Consumption:      10 Watts

General PoE Data:
+++++

Slot  Firmware
      Version
-----
1     04.0.0

Cumulative Port State Data:
+++++

Slot  #Ports  #Ports  #Ports  #Ports  #Ports  #Ports  #Ports
      Admin-On Admin-Off Oper-On  Oper-Off Off-Denied Off-No-PD Off-Fault
-----
1     5      19      2       22      0        3        0
-----
Total:5      19      2       22      0        3        0

Cumulative Port Power Data:
+++++

Slot  #Ports  #Ports  #Ports      Power      Power
      Pri: 1  Pri: 2  Pri: 3  Consumption Allocation
-----
1     0      0      5       8.357 W    14.0 W
-----
Total:0      0      5       8.357 W    14.0 W
```


- Display an overview of PoE status on all ports by entering the command **show inline power**. Verify that **Admin State** is **On**, **Oper State** is **On**, **Power Consumed** is displayed and observe the **Class** that is obtained. A detailed explanation of each field is in **Appendix B**.

```
FastIron SX Router# show inline power
```

Power Capacity: Total is 2260000 mWatts. Current Free is 2246000 mWatts.

Power Allocations: Requests Honored 16 times

Port	Admin State	Oper State	---Power(mWatts)---		PD Type	PD Class	Pri	Fault/Error
			Consumed	Allocated				
1/1	On	On	4695	7000	802.3af	Class 2	3	n/a
1/2	On	On	3662	7000	802.3af	Class 2	3	n/a
1/3	On	Off	0	0	n/a	n/a	3	n/a
1/4	On	Off	0	0	n/a	n/a	3	n/a
1/5	Off	Off	0	0	n/a	n/a	3	n/a
1/6	On	Off	0	0	n/a	n/a	3	n/a
1/7	Off	Off	0	0	n/a	n/a	3	n/a
1/8	Off	Off	0	0	n/a	n/a	3	n/a
1/9	Off	Off	0	0	n/a	n/a	3	n/a
1/10	Off	Off	0	0	n/a	n/a	3	n/a
1/11	Off	Off	0	0	n/a	n/a	3	n/a
1/12	Off	Off	0	0	n/a	n/a	3	n/a
1/13	Off	Off	0	0	n/a	n/a	3	n/a
1/14	Off	Off	0	0	n/a	n/a	3	n/a
1/15	Off	Off	0	0	n/a	n/a	3	n/a
1/16	Off	Off	0	0	n/a	n/a	3	n/a
1/17	Off	Off	0	0	n/a	n/a	3	n/a
1/18	Off	Off	0	0	n/a	n/a	3	n/a
1/19	Off	Off	0	0	n/a	n/a	3	n/a
1/20	Off	Off	0	0	n/a	n/a	3	n/a
1/21	Off	Off	0	0	n/a	n/a	3	n/a
1/22	Off	Off	0	0	n/a	n/a	3	n/a
1/23	Off	Off	0	0	n/a	n/a	3	n/a
1/24	Off	Off	0	0	n/a	n/a	3	n/a
Total			8357	14000				
Grand Total			8357	14000				

- To verify that Avaya 1600/4600/9600 Series IP Telephones have successfully registered with Avaya Communication Manager, enter **list registered-ip-stations** at the SAT on Avaya Communication Manager. For more information on how to provision Avaya IP telephones please refer to [1]. The screen below lists a subset of the Avaya IP telephones tested in this configuration.

```

Command: list registered-ip-stations

list registered-ip-stations

REGISTERED IP STATIONS

Station Ext/  Set      Product  Prod  Station      Net Gatekeeper  TCP
Orig Port    Type     ID       Rel   IP Address   Rgn  IP Address    Skt
50000        9620    IP_Phone 1.500 192.168.200.116 1    10.1.1.1      y
50001        9620    IP_Phone 2.800 192.168.200.115 1    10.1.1.1      y
50004        9630    IP_Phone 1.500 10.33.1.105   1    10.1.1.1      n
51003        4620    IP_Phone 1.500 10.33.1.104   1    10.1.1.1      n

Command successfully completed
Command:
ESC-x=Cancel Esc-e=Submit Esc-p=Prev Pg Esc-n=Next Pg Esc-h=Help Esc-r=Refresh

```

7. Troubleshooting

If the PD does not power up, check the inline power configuration on the Foundry SuperX Switch. Enter **show inline power** (see Section 6).

1. If “Admin State” is “On” and “Oper State” is “On”, check if there is a limit or priority settings on the port.
2. If “Admin State” is “On” and “Oper State” is “Off”, there may be a priority setting or insufficient available power to power the PD.

The Foundry Networks switch provides up to 15.4W per port. For more information refer to [9].

8. Support

For technical support on Foundry Networks products, consult the support pages at <http://www.foundrynet.com/>.

9. Conclusion

These Application Notes describe the steps for configuring the Foundry Networks FastIron SuperX Switch to provide inline Power over Ethernet to Avaya IP telephones and the Avaya Quick Edition G11 PSTN Gateway. It was verified that PoE was delivered successfully to all Avaya PD's tested.

10. Additional References

The following Avaya product documentation can be found at <http://support.avaya.com>.

- [1] *Administrator Guide for Avaya Communication Manager*, Doc # 03-300509, February 2007
- [2] *Administration for Network Connectivity for Avaya Communication Manager*, Doc # 555-233-504, Issue 12, February 2007
- [3] *Avaya one-X Deskphone Edition for 9600 Series IP Telephones Administrator Guide*, Doc # 16-300698, May 2007
- [4] *Avaya one-X Deskphone Value Edition 1600 Series IP Telephones Installation and Maintenance Guide Release 1*, Doc # 16-601438, June 2007
- [5] *4600 Series IP Telephone Release 2.8 LAN Administrator Guide*, Doc # 555-233-507, February, 2007
- [6] *Avaya one-X Quick Edition Release 3.2.0 Telephone System Administration Guide*, Doc # 16-601412, August 2007
- [7] *Avaya one-X™ Quick Edition Safety and Quick Installation Instructions for: G11 Global Analog Gateway*, 16-601414, Issue 2, May 2007
- [8] *Gigabit Ethernet Adapter For 4600 & 5600 Series IP Phones*, Doc #16-601543, September 2006

The following Foundry Networks product documentation can be found at:
<http://www.foundrynet.com/>.

Foundry Networks FastIron SuperX Switch Manuals

- [9] *Foundry FastIron Configuration Guide- Foundry SuperX Switch Installation and Basic Configuration Guide*, December 2007

Appendix A: Description of Fields for “show power inline detail”

Label	Description
Date	The PoE power supply’s firmware test date in the format mm/dd/yyyy.
H/W Status	The PoE power supply’s hardware status code. This field is used by Foundry Technical Support for troubleshooting.
Max Curr	The PoE power supply’s maximum current capacity.
Voltage	The PoE power supply’s current input voltage.
Capacity	The PoE power supply’s total power capacity (in watts).
Consumption	The total number of watts consumed by PoE power consuming devices and PoE modules in the system, minus any internal or cable power loss.
Ports Admin-On	The number of ports on the Interface module on which the inline power command was issued.
Ports Admin-Off	The number of ports on the Interface module on which the inline power command was not issued.
Ports Oper-On	The number of ports on the Interface module that are receiving inline power from the PoE power supply.
Ports Oper-Off	The number of ports on the Interface module that are not receiving inline power from the PoE power supply.
Ports Off-Denied	The number of ports on the Interface module that were denied power because of insufficient power.
Ports Off-No-PD	The number of ports on the Interface module to which no powered devices are connected.
Ports Off-Fault	The number of ports on the Interface module that are not receiving power because of a subscription overload.
Ports Pri: 1	The number of PoE ports on the Interface module that has a PoE port priority of 1.
Ports Pri: 2	The number of PoE ports on the Interface module that has a PoE port priority of 2.
Ports Pri: 3	The number of PoE ports on the Interface module that has a PoE port priority of 3.
Power Consumption	The total number of watts consumed by both PoE power consuming devices and the PoE module (daughter card) attached to the Interface module.
Power Allocation	The number of watts allocated to the Interface module’s PoE ports. This value is the sum of the ports’ default or configured maximum power levels, or power classes automatically detected by the SuperX.

Appendix B: Description of Fields for “show power inline”

Label	Description
Power Capacity	The total PoE power supply capacity and the amount of available power (current free) for PoE power consuming devices. Both values are shown in milliwatts.
Power Allocations	The number of times the SuperX fulfilled PoE requests for power.
Port	The slot number and port number.
Admin State	Specifies whether or not Power over Ethernet has been enabled on the port. This value can be one of the following: <ul style="list-style-type: none"> • ON – The inline power command was issued on the port. • OFF – The inline power command has not been issued on the port.
Oper State	Shows the status of inline power on the port. This value can be one of the following: <ul style="list-style-type: none"> • ON – The PoE power supply is delivering inline power to the powered device. • OFF – The PoE power supply is not delivering inline power to the powered device. • DENIED – The port is in standby mode (waiting for power) because the SuperX does not currently have enough available power for the port.
Power Consumed	The number of current, actual milliwatts that the powered device is consuming.
Power Allocated	The number of milliwatts allocated to the port. This value is either the default or configured maximum power level, or the power class that was automatically detected by the SuperX.
PD Type	The type of powered device connected to the port. This value can be one of the following: <ul style="list-style-type: none"> • 802.3AF-PD – The powered device connected to this port is 802.3afcompliant. • LEGACY – The powered device connected to this port is a legacy product (not 802.3af compliant). • N/A – Power over Ethernet is configured on this port, and one of the following is true: <ul style="list-style-type: none"> • The device connected to this port is a non-powered device. • No device is connected to this port. • The port is in standby or denied mode (waiting for power).
PD Class	Determines the maximum amount of power a powered device receives. This value can be one of the following: <ul style="list-style-type: none"> • Class0 – Receives 15.4 watts maximum. • Class1 – Receives 4 watts maximum. • Class2 – Receives 7 watts maximum. • Class3 – Receives 15.4 watts maximum. • Unknown – The device attached to the port cannot advertise its class.

Label	Description
Pri	<p>The port's inline power priority, which determines the order in which the port will receive power while in standby mode (waiting for power). Ports with a higher priority will receive power before ports with a low priority. This value can be one of the following:</p> <ul style="list-style-type: none"> • 3 – low priority • 2 – high priority • 1 – critical priority
Total	<p>The total power in milliwatts being consumed by all powered devices connected to the Interface module, and the total power in milliwatts allocated to all powered devices connected to the Interface module.</p>
Grand Total	<p>The total number of current, actual milliwatts being consumed by all powered devices connected to the SuperX, and the total number of milliwatts allocated to all powered devices connected to the SuperX.</p>

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