



Application Notes for the Force10 Networks C-Series C300 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 Force10 Networks C-Series C300 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. During compliance testing, Avaya IP Telephones successfully obtained power and transferred data over standard Ethernet cables from the Force10 Networks C-Series C300 Switch.

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 Force10 Networks C-Series C300 (henceforth also referred to in these Application Notes as Force10 C300) Switch is configured to supply inline PoE to Avaya PDs. No configuration specific to the Force10 C300 Switch is required on Avaya Communication Manager or Avaya G11 PSTN Gateway to support this solution

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 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 **Section 2** for a detailed list of specific models tested.

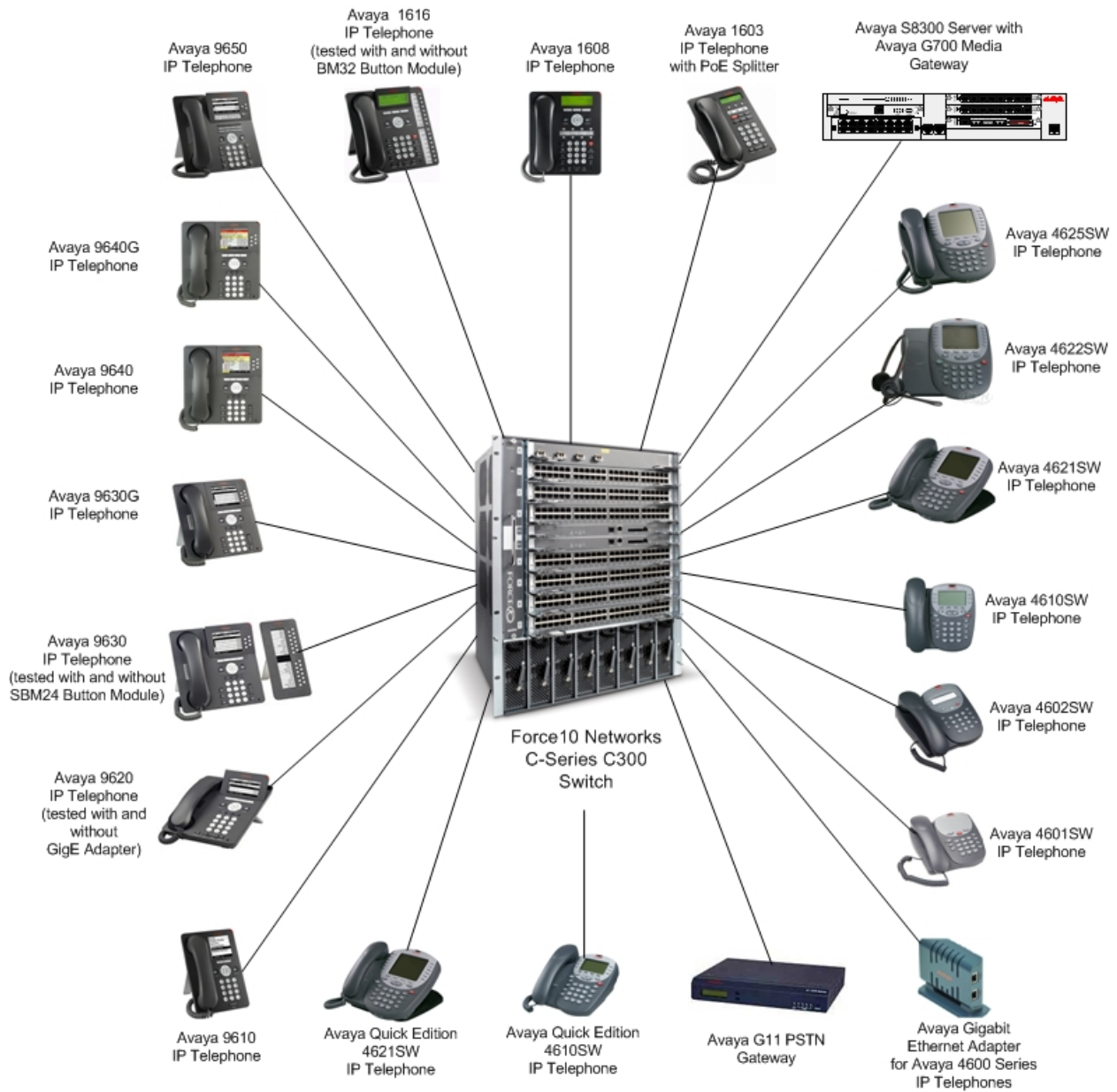


Figure 1: Force10 Networks C-Series C300 with Avaya Communication Manager, Avaya IP Telephones and Avaya G11 PSTN Gateway

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 with and without BM32 Button Module	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 G11 PSTN Gateway	3.2.1
Avaya Quick Edition 4610SW IP Telephone	3.2.1 (SIP)
Avaya Quick Edition 4621SW IP Telephone	3.2.1 (SIP)
Force10 Networks C-Series C300 with LC-CB-GE-48V Line Card	7.5.1.0

Table 1: Equipment and Software/Firmware Validated

3. Configure Avaya Communication Manager

- No configuration specific to the Force10 C300 Switch is required on Avaya Communication Manager or Avaya G11 PSTN Gateway to support this solution
- Consult the Avaya Communication Manager configuration manual [1] for additional configuration details.

4. Configuration of the Force10 Networks C-Series C300 Switch with LC-CB-GE-48V Line Card

The configuration covered here is specific to PoE and does not include configuration of other features available in the Force10 C300 Switch. Consult the Force10 C300 Switch configuration manual [7] for additional configuration details.

Inline Power over Ethernet (PoE) is supported on the Force10 C300 Switch. By default, PoE support is disabled on the system and on all ports.

A minimum of four power supply units (PSU) is required to enable PoE. Three are dedicated to powering the chassis, one of which is redundant, and any remaining PSUs can be allocated to PoE.

Enable PoE on the Force10 C300 Switch. The **power inline auto** command allows the port to determine the amount of power that a Class 1-4 powered device requires, and supply it. For this example port 1/1 was used.

```
Force10> config terminal  
Force10> (conf)# int range gi 1/1  
Force10> (conf-if-gi-7/1)# power inline auto
```

5. Interoperability Compliance Testing

The interoperability testing focused on verifying PoE interoperability between the Force10 C300 Switch, Avaya IP Telephones and the Avaya G11 PSTN Gateway.

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

- Successful boot operation.
- For Avaya IP Telephones, successful registration with Avaya Communication Manager.
- 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 and registration of the devices.

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 Force10 C300 Switch and verify that the PDs successfully booted.
- Verify completion of a test call.
- Power-cycle the Force10 C300 Switch and verify successful boot operation and registration of the devices.

5.2. Test Results

All Power over Ethernet test cases completed successfully. The Force10 C300 Switch successfully provided inline power to all of the Avaya IP telephones and Avaya G11 PSTN Gateway. **Table 1** lists the Avaya-designated IEEE 802.3af class and measured power of the Avaya IP telephones and Avaya G11 PSTN Gateway when connected to the Force10 C300 Switch. The power listed as measured by the Force10 C300 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	4.36
Avaya 1608 IP Telephone	2	4.12
Avaya 1616 IP Telephone	3	5.49
Avaya 1616 IP Telephone with BM32 Button Module	3	6.42
Avaya 4601SW IP Telephone	2	3.19
Avaya 4602SW IP Telephone	2	3.37
Avaya 4610SW IP Telephone	2	3.43
Avaya 4621SW IP Telephone	2	5.05
Avaya 4621SW IP Telephone with Gig Adapter	0	11.73
Avaya 4622SW IP Telephone	2	4.87
Avaya 4625SW IP Telephone	3	9.39
Avaya 9610 IP Telephone	2	4.25
Avaya 9620 IP Telephone	2	4.80
Avaya 9620 IP Telephone with GigE Adapter	3	7.68
Avaya 9630 IP Telephone	2	5.06
Avaya 9630G IP Telephone	2	3.87
Avaya 9630 IP Telephone with SMB24 Button Module	2	5.43
Avaya 9640 IP Telephone	2	4.12
Avaya 9640G IP Telephone	2	3.87
Avaya 9650 IP Telephone	2	4.87
Avaya Quick Edition 4610SW IP Telephone	2	3.31
Avaya Quick Edition 4621SW IP Telephone	2	4.93
Avaya G11 PSTN gateway	0	4.12

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 Power over Ethernet (PoE) is supported on the Force10 C300 Switch with the LC-CB-GE-48V Line Card. By default, PoE support is disabled on the system and on all ports.

6.1. Verify Power over Ethernet From Force10 C300 Switch

- To verify that the required four PSUs are used to run PoE, enter the command **show power supply**. A detailed explanation of each field is in **Appendix B**.

Force10>show power supply			
Power Supply	Model Number	Type	Status
PS0	CC-C300-PWR-AC	AC	Active
PS1	CC-C300-PWR-AC	AC	Active
PS2	CC-C300-PWR-AC	AC	Active
PS3	CC-C300-PWR-AC	AC	Active
PS4	CC-C300-PWR-AC	AC	Absent
PS5	CC-C300-PWR-AC	AC	Absent
PS6	CC-C300-PWR-AC	AC	Absent
PS7	CC-C300-PWR-AC	AC	Absent

- To verify the inline power and total power consumption on the Force10 C300 Switch, enter the command **show power detail**. A detailed explanation of each field is in **Appendix C**.

```
Force10>show power detail
```

Catalog Name	slot Id	Logic Power Consumed (Watts)	Inline Power Allocated (Watts)	Inline Power Consumed (Watts)
E48VB	1	150	30.80	9.43
RPM	0	200	0.00	0.00
CC-C300-FAN	-	100	0.00	0.00

```
Total Inline Power Available: 1478.40 W
Total Inline Power Used : 30.80 W
Total Inline Power Remaining: 1447.60 W
```

- To display an overview of PoE status on all ports, enter to command **show power inline**. A detailed explanation of each field is in **Appendix A**.

```
Force10>show power inline
```

Interface	Admin	Oper	Inline Power Allocated (Watts)	Inline Power Consumed (Watts)	Class
Gi 1/24	auto	on	15.40	2.36	2
Gi 1/25	auto	on	15.40	4.87	2

6.2. Verify Avaya IP Telephone Registration

- To verify that Avaya 1600/4600/9600 Series IP Telephones have successfully registered with Avaya Communication Manager, type **list registered-ip-stations** at the SAT on the Avaya Communication Manager. For more information on how to provision Avaya IP Telephones please refer to the appropriate documents listed in **Section 10**. The screen below lists a subset of the Avaya IP telephones tested in this configuration.

```
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 Force10 C300 Switch by entering the command **show power inline**. Check to see if there is a limit or priority setting on the port. If the output shows that the “Detection Status” is at “Fault”, there may be a priority setting or insufficient available power to power the PD. The Force10 C300 Switch provides up to 15.4W per port. For more information, refer to [7] and [8].

8. Support

For technical support on Force10 Networks products, consult the support pages at <https://www.force10networks.com/>.

9. Conclusion

These Application Notes describe the steps for configuring the Force10 Networks C-Series C300 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*
- [4] *Avaya one-X Deskphone Value Edition 1600 Series IP Telephones Installation and Maintenance Guide Release 1, Doc # 16-601438*
- [5] *4600 Series IP Telephone Release 2.8 LAN Administrator Guide, Doc # 555-233-507*
- [6] *Avaya Quick Edition Release 3.2.0 Telephone System Administration Guide, Doc # 16-601412*

The following Force10 Networks product documentation can be found at <https://www.force10networks.com/>:

- [7] *Force10 Networks C-Series C300 Switch Configuration Guide - 7.5.1.0*
- [8] *Force10 Networks C-Series C300 Switch Command Reference - 7.5.1.0*

Appendix A: Description of fields for “show power inline”

- **Interface** - Displays all PoE-enabled ports.
- **Admin** - Displays the administrative mode of the interface:
 - **auto** indicates that power is supplied according to the requirements of the powered device.
 - **static** indicates that the maximum configured amount of power is supplied to the powered device.
- **Oper** - Displays the status of the powered device: on or off.
- **Inline Power Allocated** - Displays the amount of power allocated to a port.
- **Inline Power Consumed** - Displays the amount of power that a powered device is consuming.
- **Class** - Displays the type of powered device: Class 0, Class 1, Class 2, Class 3, or Class 4.

Classes include:

0: 0.44W to 12.95W

1: 0.44W to 3.84W

2: 3.84W to 6.49W

3: 6.49W to 12.95W

4: reserve

Appendix B: Description of fields for “show power supply”

- **AC Fail - The PSU is unplugged.**
- **Active -The PSU is supplying power to the chassis.**
- **Fail -The PSU has failed.**
- **Absent -The PSU is not installed in the chassis.**
- **Over Current Shutdown - The PSU has turned off due to a high input current condition.**
- **Over Temperature Shutdown - The PSU has turned off due to a high temperature condition.**
- **Over Temperature Warning - The temperature of the PSU is greater than the recommended maximum operating temperature.**
- **OverCurrent Warning - The current being supplied to the PSU is greater than the recommended maximum input current.**
- **Power Off - The PSU is present but not on.**

Appendix C: Description of fields for “show power detail”

- **Catalog Number - Displays the component’s Force10 catalog number.**
- **Slot ID - Displays the slot number in which the line card or RPM is installed.**
- **Logic Power Consumed - Displays the power that the chassis component consumes during basic operation.**
- **Inline Power Allocated - Displays the amount of power allocated to ports for PoE.**
- **Inline Power Consumed - Displays the amount of power that is consumed by connected devices.**

©2008 Avaya Inc. All Rights Reserved.

Avaya and the Avaya Logo are trademarks of Avaya Inc. All trademarks identified by ® and ™ are registered trademarks or trademarks, respectively, of Avaya Inc. All other trademarks are the property of their respective owners. The information provided in these Application Notes is subject to change without notice. The configurations, technical data, and recommendations provided in these Application Notes are believed to be accurate and dependable, but are presented without express or implied warranty. Users are responsible for their application of any products specified in these Application Notes.

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya DevConnect Program at devconnect@avaya.com.