

Introduction to Cognitive PoE

750 Series

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- Up to 384 Ports with 60W 802.3bt and Cognitive PoE
- High performance Supervisor modules with 100G and 25G uplinks
- MACsec on all ports for pervasive security and avoid snooping
- Redundancy at all levels

Arista EOS

- Fully programmable, highly modular feature rich single binary software image across all Arista switching products
- High availability with live patching and self healing resilience
- Open and programmable offering full access to Linux shell and tools
- Visibility with streaming telemetry and tools like LANZ and FlowTracker

Extensive Campus Features

- Full wirespeed L2 and L3 with OSPF, BGP and ISIS
- MLAG and LAG at L2 and ECMP for L3 for open standards highly scalable network designs
- IPv4/v6 vrf's, EVPN and VXLAN for segmentation and overlay
- 802.1x Multi host and Auth for device identity

CloudVision

- Simplified network wide workflow automation and orchestration
- Network telemetry for unprecedented visibility into the entire campus
- Compliance dashboard for security, audit and patch management
- Macro-Segmentation Service provides automated and seamless service insertion with integrations by partner security platforms

The modular PoE products from Arista, the 750 series, is one of the most scalable systems for campus and enterprise access. The PoE (Power over Ethernet) capabilities of this chassis is engineered both for both scale and intelligence, collectively referred to as **Cognitive PoE** and is a critical aspect of next generation campus deployment going beyond the cable plant and legacy methods to a software and operational driven approach to make campus network deployments simple, scalable and plug and play.



Figure 1: Arista 750 Series PoE

The 750 Series systems in conjunction with the 720 Series fixed PoE platforms offer a variety of connection options for user desktops, PoE access points, appliances and IoT devices. The Arista cognitive campus architecture encompasses spine, leaf and wireless infrastructure platforms, telemetry and analytics, and a single image EOS that supports an expanding featureset and a partner ecosystem of solutions.

750 Series Overview

Specifically, the 750 Series chassis is built to last for several years and is meant to keep up with the ongoing evolutions in access networks. A few key points in this regard is called out below:

- Each slot is wired directly to the switch card with no midplane. This allows higher B/W line cards allowing applications at the access layer to evolve without worrying about fork-lift upgrades. As new line cards become available these are inserted, without taking a maintenance window.
- The current PoE power level is at 60W per port, conforming to the IEEE 802.3bt specification. Newer line cards with up to 90W capabilities can be added to existing chassis with no need to replace key system elements or upgrade the power system.
- The Power Supplies are fully modular. There are up to ten Power Supply Units (PSUs), each capable of 3,300 W of output. That's a total of 33KW per chassis, allowing for PoE on all ports, and leaving enough headroom for power-supply redundancy.
- With the evolution of the WiFi 6E standard that allows 6GHz spectrum to be used for data transmission the APs are expected to output between 5Gbps and 10Gbps. The 750 series scales independently along B/W and PoE dimensions. In CY 2021 WiFi 6E adoption is expected at scale, and the 750XP series fits the deployment needs extremely well with support for 10G-T PoE ports.

Introducing Cognitive PoE

In this section, we'll look at each building block of the Cognitive PoE features for 750/720P. The three main features are concurrent, continuous and dynamic POE across ports in the cognitive campus addressing the proliferation of users, devices, end-points and IoT systems.

1. Continuous PoE

Continuous PoE refers to how the PoE behavior should be when the system is rebooted, upgraded, or when the software takes a hit, including possible but very rare kernel crashes. The action is configurable on a per physical-port basis. These actions allow some devices to go off (ex. a phone, so that the user doesn't complain of dead line when the switch is upgraded) while other devices, such as security cameras and critical building systems, remain operational, record video and store locally for transmission when the network connectivity is back up again.

There are scenarios where actions beyond S/W upgrade or reboots need to be taken. Such actions include FPGA or some low-level Firmware upgrades. Continuous PoE also allows the 750 series to continue to deliver power even when lower level FPGA or Firmware is upgraded in a hitless manner.

2. Concurrent PoE

Concurrent PoE is designed for the case where PoE is needed on all ports. With the increase in the number of security cameras, sensors and other IoT devices across Enterprises there are cases where power needs to be provided to all these devices across a highly dense deployment.

The Arista 750 has the ability to provide 60W on all ports, across all 384 ports. This aspect allows for operational ease rather than some ports being limited to less than 60W or being part of a budget shared in a port group. When Ethernet cabling is done no distinction needs to be made between wires connecting to different ports. Given that all ports are 60W capable and the system as a whole can deliver power concurrently to all ports a single cable color is all that's needed. This significantly reduces operational errors and the risk of connecting a device to a port that is not provisioned for a full 60W.

3. Dynamic PoE

With Dynamic PoE the 750 Series is able to make more efficient use of the available system power for PoE rather than relying on PoE device classes or LLDP. If a device advertises itself as, say, Class 5, that means that the device can consume up to 45W. Most system implementations automatically reserve 45W of power for the attached device land-locking any unused power and preventing it from being allocated. However, the Class 5 device may actually be consuming much less, for example only 38W. The remaining 7W of power, when combined with savings from other ports, can be freed up and used as PoE budget to power other devices, which otherwise may be denied power due to static reservation. This saving reduces the number of power supplies and power connections by not artificially reserving power that will never be needed.

A natural question to ask is what happens if the class 5 device later on does need higher power? Arista PoE switches support a guard power level, so that this does not force ports to shutdown. In addition EOS allows PoE priority levels for all PoE ports so that a lower priority port can be denied power to favor higher priority devices should a power supply fail or PoE power draw increase unexpectedly. The power priority settings are configurable per physical-port across all interfaces and not per slot.

The port priority capability and Dynamic PoE can only be achieved with accurate measurement at high granularity and in real-time. The high efficiency power supplies can handle momentary surges in demand so that the system has time to shut down the lower priority ports.

The combination of these rich capabilities together integrate and manifest as Cognitive PoE, with control and monitoring from CV (CloudVision). Cognitive PoE is part of the larger Cognitive Management Plane that is driving innovation in campus/enterprise networks.

**In this document it is not intended to be a comprehensive description of all the scaling capabilities in the 750 series of products. Please refer to datasheet and design guides. However, highlighting these key power management capabilities should help provide an understanding of the Cognitive PoE differentiators for campus workspaces and ease of deployment.*

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