

Product Highlights

System Scale and Performance

- 36x400GbE high performance line card
- 48x100GbE high performance line card
- Scales to up to 576 ports of 400G or 768 ports of 100G MACsec in a 7800R3 system
- Wire speed L2 and L3 forwarding

Wire-speed Encryption

- IEEE 802.1AE MACsec encryption
- 400G/100G wire speed encryption on every port
- Cost and performance optimized for Data Center Interconnect (DCI) and Leaf-Spine to transport massive volumes of traffic securely

Highly Scalable

- Compatible with all 7800R Series systems
- Mix and Match with 100G and 400G
- Deep packet buffer up to 24GB / line card
- Virtual Output Queues per port to eliminate head of line blocking
- Up to 256K MAC addresses
- Up to 2.7M IPv4 Routes with K-Series
- Pluggable optics for pay as you grow

Cloud Grade Routing

- Secure Internet Peering
- Carrier Edge VPN Services
- Next Generation EVPN Services for 5G/ MEC, CIN, & Metro
- Carrier Core transport (LDP, RSVP-TE, SR-TE) and HA with FRR and TI-LFA
- Next Generation timing (PTP and SyncE*)
- Open programmable APIs (JSON-RPC, NETCONF) for provisioning, telemetry, path selection/topology discovery

Virtualization and Provisioning

- CloudVision
- EVPN for next generation DC
- LANZ for microburst detection
- Zero Touch Provisioning(ZTP)
- Accelerated sFlow (RFC3176)
- IEEE 1588 PTP

Arista Extensible Operating System

- Single binary image
- Fine-grained truly modular network OS
- Stateful Fault Containment (SFC)
- Stateful Fault Repair (SFR)
- Full access to Linux shell and tools
- Extensible platform - bash, python, C++, GO, Openconfig

Overview

The phenomenal growth in demand for bandwidth, driven by mobile, video streaming and cloud applications, is driving the need for connecting several geographically separate data centers to maintain seamless content delivery and provide application agility. One of the major challenges for data center operators is to protect the data from passive wire tapping, intrusion and other attacks. To keep up with the global growth of inter-site bandwidth, interconnecting these data centers has to be operationally simple and economically efficient while also ensuring security.

Traditional transport infrastructure cannot meet the density challenge and most existing encryption solutions require additional systems that are expensive to deploy and manage so deploying bulk data center encryption is challenging. The Arista 7800R3 Series 100G and 400G MACsec line cards provides IEEE 802.1AE defined MACsec encryption at wire speed on all ports for the secure transport of data, without compromising on either density or performance.

The Arista high density MACsec solution is integrated to a 7800R3 Series line card delivering un-compromised performance at an efficient cost point and is fully compatible with other 7800R3 Series line cards. It utilizes proven encryption technology to protect traffic for simple, reliable and scalable data center interconnect and for securing links between tiers in leaf and spine data center designs. Flexible 400GbE QSFP-DD and 100GbE QSFP pluggable optics ensures a broad choice of cost effective connections.



Arista 7800R3 Series 48 port 100GbE and 36 port 400GbE line card with MACsec

Arista EOS

All Arista products including the 7800R Series runs the same Arista EOS software, binary image simplifying network administration with a single standard across all switches. Arista EOS is a modular switch operating system with a unique state sharing architecture that cleanly separates switch state from protocol processing and application logic. Built on top of a standard Linux kernel, all EOS processes run in their own protected memory space and exchange state through an in-memory database. This multi-process state sharing architecture provides the foundation for in-service-software updates and self-healing resiliency together with stateful switchover without the loss of data plane forwarding.

Arista EOS enables advanced monitoring and automation capabilities such as Zero Touch Provisioning, LANZ, VM Tracer and Linux based tools to be run natively on the switch.

Highly Scalable and Future Proof Architecture

The Arista MACsec line cards are supported in the Arista 7800R3 Series and compatible with all the available 100G and 400G line card offerings. The following 7800R chassis options are available:

- **7816R** a 16-slot 31RU chassis that supports up to 16 line cards with both AC or DC power options
- **7808R** an 8-slot 16 RU chassis that supports up to 8 line cards with both AC or DC power options
- **7804R** a 4-slot 10 RU chassis that supports up to 4 line cards with both AC or DC power options

The Arista 7800R Series uses a deep buffer virtual output queue (VOQ) architecture that eliminates head-of-line (HOL) blocking and virtually eliminates packet drops even in the most congested network scenarios.

An advanced traffic scheduler fairly allocates bandwidth between all virtual output queues while accurately following queue disciplines including weighted fair queueing, fixed priority, or hybrid schemes. As a result, the Arista 7800R can handle the most demanding data center requirements with ease, including mixed traffic loads of real-time, multicast, and storage traffic while still delivering low latency.

400G and 100G Wire-speed Encryption

The Arista 400G and 100G MACsec line cards have built-in wire-speed encryption on every port. Industry standard IEEE 802.1AE (MAC Security standard, referred to as MACsec) capabilities provide line-rate frame encryption and authentication for all traffic. This removes the need for additional encryption devices which ensures confidentiality as well as provides anti-replay protection and therefore confidence in the integrity of encrypted traffic. MACsec is a link layer encryption technology and operates at the speed of the Ethernet ports, providing high performance without the processing overheads associated with encryption options such as IPSec.

MACsec uses a long-term key to derive session keys used for encryption utilizing the MACsec Key Agreement Protocol per IEEE 802.1X-2010. Long term keys can either be statically defined or derived via RADIUS server(s)*. Data is encrypted using the 128 bit or 256-bit GCM-AES-XPB block cipher suite.

MACsec encryption is a EOS licensed feature and requires a license file to enable the encryption feature. License information is included in the ordering information section of this document.

Line Card Specifications

The 7800R3 Series of line cards build on the capability of the 7280R and 7500R Series with support for FlexRoute, Accelerated sFlow and large scale ACLs. FlexRoute provides scalability to support deployment as a routing platform with Internet scale routing. Algorithmic ACLs provide flexible pattern matching for access control, policy based forwarding and network telemetry. Accelerated sFlow at high density 100G provides visibility and programmatic control of traffic steering with no impact on packet forwarding. All variations of the 7800R3 Series line cards interoperate.

The Arista 400G MACsec line card delivers up to 28.8 Tbps of full duplex bandwidth with 36 ports of 400G QSFP-DD interfaces, with support for 400G or 4x 100G on each port. The 100G MACsec line card delivers up to 9.6 Tbps of bandwidth with 48 ports of 100G QSFP interfaces. Full 400GbE and 100GbE standards support ensures interoperability and future proofing for next generation network architectures. Support for industry standard pluggable optics for both single and multi-mode fiber provide a wide choice of connection options. All QSFP and QSFP-DD ports are capable of operating independently in providing a flexible combination of speeds and operating distances using Arista pluggable optics and cables. All ports are individually configurable for MACsec allowing a flexible combination of encrypted links and standard links.

Each 7800R3 MACsec line card contains dedicated high bandwidth packet memory for approximately 40 msec of traffic buffer per ingress port and virtually eliminating packet drops in congestion scenarios. Line cards connects to all fabric modules in a non-blocking full mesh.

7800R3 Deterministic Network Performance

The Arista 7800R Series uses a deep buffer virtual output queue (VOQ) architecture that eliminates head-of-line (HOL) blocking and virtually eliminates packet drops even in the most congested network scenarios.

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*Not currently supported in EOS

Cloud Grade Routing

The 7800R3 series are key components of Arista's portfolio of Cloud Grade Routing platforms that encompasses a wide choice of fixed and modular systems. Combining Arista EOS's proven and feature rich Service Provider functionality, telemetry and open programmability with industry leading scale, density and power efficiency, the R3 series systems are designed for versatile deployment in a wide variety of open networking environments.

Next generation multi-service environments require flexibility, security and open programmability to leverage the power efficiency and proven scale of cloud networks. The R3 Series routing solutions include large scale layer 2, layer 3 and EVPN based telco and cloud data center designs, low latency MEC overlay fabrics, data center interconnect (DCI) with long haul optics, provider edge networks with scaleable L2 and L3 VPN services, high density 100G/400G traffic engineered MPLS and SR-TE cores, 5G infrastructure and metro-aggregation for the backhaul of E-LINE services.

Enhanced Features for High Performance Cloud Networks

The Arista 7800R delivers a suite of advanced traffic control and monitoring features to improve the agility of modern high performance environments, with solutions for automation, data monitoring, precise timing and next-generation virtualization.

Automating the data center enables customers to dynamically provision computing resources in the most efficient manner while also meeting business needs by maintaining service level agreements (SLAs). Arista EOS automates complex IT workflows and simplifies network operations while reducing or even eliminating downtime. Arista EOS rich automation capabilities not only reduce the human error element in network operations but also enable IT operators to make the network work the way they want.

Arista offers solutions for a variety of approaches to cloud-like network automation. Addressing the needs of the largest public cloud environments as well as applying those lessons learned in the turnkey CloudVision automation offering.

FlexRoute™

The Arista FlexRoute Engine provides support for the full internet routing table, in hardware, with IP forwarding at Layer 3 and with sufficient headroom for future growth in both IPv4 and IPv6 route scale to more than 1.3 million routes. The innovative FlexRoute Engine with its patented algorithmic approach to building layer 3 forwarding tables on Arista R-Series Universal Spine and Leaf platforms is unique to Arista and a key enabler in calling these platforms routers.

7800R3 Accelerated sFlow

sFlow is a powerful tool used commonly by network operators for advanced network telemetry, capacity planning, security analysis and quality of experience monitoring. Traditional sFlow utilizes a system CPU for processing samples of hundreds of thousands of flows. In modern high performance systems, guaranteed high rate sampling requires the capability to both sample and process packet rates of billions of packets per second. With the 7800R3 Series Accelerated sFlow feature the sampling and processing of flow samples into sFlow datagrams is handled via integrated sFlow engines capable of supporting 1:500 sampling rates on full wire speed systems or even higher rates with selective sampling based on triggers and filters. All sFlow v5 information is included in the sFlow records ensuring integration with standard sFlow collection and analysis tools and no loss of key information.

Algorithmic ACLs

Algorithmic ACLs combine both software and hardware to enable more flexible and scalable solutions for access control, policy based forwarding and network telemetry. Combining general purpose memory with advanced software algorithms delivers higher scale, performance and efficiency with lower power and is more cost effective than traditional solutions. Algorithmic ACLs leverage efficient packet matching algorithms that in turn enables flow matching for access control, policy and visibility. The net benefits are a high performance policy engine with both increased functionality and scale in a cost and power efficient solution. Algorithmic ACLs are available on the 7800R3 and 7800R3K Series of linecards.

- Enables IPv4 and IPv6 access control at the same scale
- L4 rule ranges are programmed efficiently without expansion or reduced capacity
- Multiple actions can be performed on a single packet or flow
- User defined filters allow flexible packet classification based on offsets for custom actions
- Supports rich policy with consistent semantics that would exhaust classical resources

7800R3 MACsec Technical Specifications

Line card Module	7800R3K-36DM	7800R3-48CQM	7800R3-48CQM2	7800R3-48CQMS
Interface	36 x QSFP-DD	48 x QSFP100	48 x QSFP100	48 x QSFP100
Max 400G ¹	36	—	—	—
Max 100G ¹	144	48	48	48
Max 40G ¹	36	48	48	48
Max 25G / 10G ¹	288	—	96	96
Packet Buffer	24 GB	8 GB	8 GB	8 GB
MACsec	All Ports	All Ports	All Ports	All Ports
Linecard CPU	No	No	Yes	No
Throughput	14.4 Tbps (28.8 Tbps Full Duplex)		4.8 Tbps (9.6 Tbps Full Duplex)	
Packets per Second	6 Bpps	2 Bpps	2 Bpps	2 Bpps
Weight	22 lbs (10 kg)	20 lbs (9.1 kg)	19.4 lbs (8.81 kg)	19.1 lbs (8.68 kg)
Typical (Max) Power ²	1416 W (1823 W) Excluding Optics	620 W (684 W) Excluding optics	511 W (696 W) Excluding optics	501 W (666 W) Excluding optics
FlexRoute	Yes	Yes	Yes	Yes
Accelerated sFlow	Yes	Yes	Yes	Yes
Chassis Support		DCS-7816, DCS-7808, DCS-7804		
Size (WxHxD)		18.9" x 2.1" x 17.8" (48.1 x 5.4 45.2 cm)		
Minimum EOS Version	4.25.0F	4.23.2F	4.25.2F	4.25.2F

1. Maximum port numbers are uni-dimensional, may require the use of break-outs and are subject to transceiver/cable capabilities

2. Typical power consumption measured at 25C ambient with 50% load on all ports. Excludes optics power as this is a significant variable for 100G and 400G

Line card Resources ¹	7800R3 Series	7800R3K Series	
Profile	L3	L3-XL	L3-XXL
MAC Addresses	224K	256K	197K
IPv4 Host Routes	1.3M	2.1M	2.7M
IPv6 Unicast Host Routes	440K	700K	890K
IPv4 Unicast LPM Routes	1.3M	2.1M	2.7M
IPv6 Unicast LPM Routes	440K	700K	890K
Multicast Routes	128K	128K	128K
ACL Entries	24K	24K	24K

1. Maximum values dependent on shared resources in some cases

Supported Optics and Cables ²

10GBASE-CR	QSFP+ to 4xSFP+: 0.5m-5m lengths
40GBASE-CR4	QSFP+ to QSFP+: 0.5m-5m lengths
40GBASE-AOC	3m to 100m lengths
40GBASE-UNIV	150m OM3 / 150m OM4, 500m SM
40GBASE-SRBD	100m OM3 /150m OM4 Duplex MMF
40GBASE-SR4	100m OM3 /150m OM4 Parallel MMF
40GBASE-XSR4	300m OM3 /400m OM4 Parallel MMF
40GBASE-PLRL4	1km (1km 4x10G LR/LRL)
40GBASE-PLR4	10km (10km 4x10G LR/LRL)
40GBASE-LRL4	1km Duplex SM
40GBASE-LR4	10km Duplex SM
40GBASE-ER4	40km Duplex SM

Environmental Characteristics

Operating Temperature	0 to 40°C (32 to 104°F) ³
Storage Temperature	-40 to 70°C (-40 to 158°F)
Relative Humidity	5 to 95%
Operating Altitude	0 to 10,000 ft, (0-3,000m)

2. For a complete list of transceivers, please refer to the Transceiver Datasheet and check EOS release notes for support

3. Higher power or reduced temperature range optics may reduce system operating temperature to 35°C (95°F)

Supported Optics and Cables ²

100GbE	100G QSFP ports
100GBASE-SR4	70m OM3 / 100m OM4 Parallel MMF
100GBASE-XSR4	150m OM3 / 300m OM4 Parallel MMF
100GBASE-SWDM4	70m OM3 / 100m OM4 Duplex MMF
100GBASE-SRBD	70m OM3 / 100m OM4 Duplex MMF
100GBASE-LR	10km Duplex SM
100GBASE-LR4	10km Duplex SM
100GBASE-LRL4	2km Duplex SM
100GBASE-XCWDM4	10km Duplex SM
100GBASE-CWDM4	2km Duplex SM
100GBASE-FR	2km Duplex SM
100GBASE-DR	500m Duplex SM
100GBASE-PSM4	500m Parallel SM
100GBASE-AOC	1m to 30m lengths
100GBASE-ERL4	40km Duplex SM
400GbE	400G QSFP-DD ports
400GBASE-AOC	QSFP-DD to QSFP-DD: 1m-30m lengths
400GBASE-SR8	100m OM3/4 Parallel MMF
400GBASE-DR4	500m Parallel SM
400GBASE-XDR4	2km Parallel SM
400GBASE-FR4	2km Duplex SM
400GBASE-LR4	10km Duplex SM
400GBASE-PLR4	10km Parallel SM
400GBASE-ZR	120km (with optical amplification)
200GBASE-SR4	100m (QDD-400G-SR8 / QSFP-200G-SR4)
200GBASE-FR4	2km (using QSFP-200G-FR4)

Product Number	Product Description
DCS-7800R3K-36DM-LC	7800R3 Series 36 port 400GbE QSFP-DD with MACsec wirespeed line card, large routes (Spare)
DCS-7800R3K-36DM-LC#	7800R3 Series 36 port 400GbE QSFP-DD with MACsec wirespeed line card, large routes (Ships in chassis)
DCS-7800R3-48CQM-LC	7800R3 Series 48 port 100GbE QSFP100 with MACsec, wirespeed line card (Spare)
DCS-7800R3-48CQM-LC#	7800R3 Series 48 port 100GbE QSFP100 with MACsec, wirespeed line card (Ships in chassis)
DCS-7800R3-48CQM2-LC	7800R3 Series 48 port 100GbE QSFP with Enh MACSec line-card with CPU (Spare)
DCS-7800R3-48CQM2-LC#	7800R3 Series 48 port 100GbE QSFP with Enh MACSec line-card with CPU (Ships in chassis)
DCS-7800R3-48CQMS-LC	7800R3 Series 48 port 100GbE QSFP with Enh MACSec line card (Spare)
DCS-7800R3-48CQMS-LC#	7800R3 Series 48 port 100GbE QSFP with Enh MACSec line card (Ships in chassis)
LIC-MOD-1-MACSEC	MACSEC Encryption License for Arista Modular switches - Encryption with MACSEC capable Linecard

Warranty

Arista MACsec line cards for 7800R3 Series switches and Arista Optical transceivers come with a one-year limited hardware warranty, which covers parts, repair, or replacement with a 10 business day turn-around after the unit is received.

Service and Support

Support services including next business day and 4-hour advance hardware replacement are available. For service depot locations, please see: <http://www.arista.com/en/service>

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