Arista 7500R series: Q&A

What are the Arista 7500R Series platforms?

The Arista 7500R Series are purpose built modular switches that deliver the industry's highest performance with up to 150Tbps of system throughput to meet the needs of the largest scale data centers. They combine a flexible VoQ architecture, ultra deep buffers, and large L2 and L3 resources to deliver high density systems with advanced features for network monitoring, precision timing and network virtualization for scalable and deterministic network performance while simplifying designs and reducing Opex.

What are the key advantages of the Arista 7500R Series?

The 7500R is purpose built for high performance and lossless data center environments. Expanding on the qualities of the existing 7500 Series, the next generation 7500R grows in power efficiency, performance, scalability, features, and flexibility. Keys to the 7500R's evolution are:

- Standards based high density switch with support for over 2,300 10Gb and 25Gb Ethernet ports - 2,304 x 10G / 25G, 576 x 40G / 100G Ethernet interfaces
- Investment protection, providing seamless forward migration and interop for existing 7500 Series customers
- Scalable L2 and L3 table resources allow deployment flexibility in both large L2 and L3 environments and internet peering with any workload suitability
- Deep buffers with over 500MB per 100G port protecting against packet loss in mission critical networks
- One EOS Image, saving time and operational investments
- Comprehensive L2 and L3 feature set for open multi-vendor networks with no proprietary lock-in
- Streaming network state and high rate sFlow for advanced analytics with CloudVision
- Network–wide virtualization platform for next generation cloud bursting with wire-speed VXLAN routing
- Unique monitoring and provisioning features – LANZ, DANZ, AEM, PTP, ZTP, VM Tracer, VXLAN, and eAPI
- NEBS compliance and DC power supplies designed for service provider environments
- MACsec on 100GbE interfaces, integrated with 7500R Series features and deep buffers for DCI solutions
- Coherent 200G DWDM with long haul optics for DCI up to 6,000km (in 100G mode)

What are the focus markets of the 7500R?

The 7500R capabilities address the requirements for modern networking and rich multi-media content delivery requiring a lossless forwarding solution in a compact and energy efficient form factor.

The 7500R can be deployed in a wide range of open networking solutions including large scale layer 2 and layer 3 cloud designs, Service Provider NFV, Internet Peering and Internet Exchanges, Overlay networks, Content delivery, virtualized or traditional enterprise data center networks and secure data center interconnect. Deep packet buffers and large routing tables allow for Internet peering applications. The broad range of systems, interfaces types and density choice provides deployment flexibility.

With front-to-rear airflow, redundant and hot swappable supervisor, power, fabric and cooling modules the system is purpose built for high availability and continuous operations.

Why are deep buffers required?

Today's cloud data applications, including Hadoop, Big Data, Search or Storage, are distributed applications running on server clusters with many-to-many communication patterns. The key to achieving predictable performance for these distributed applications is to provide consistent network bandwidth and latency to the various traffic flows since in most cases it is the slowest flow or query completing last that determines the overall performance. Without sufficient packet buffer memory in the switches, network bandwidth is allocated grossly unfairly among different flows, resulting in unpredictable completion times for distributed applications. In heavily loaded networks, query completion times are dramatically shorter with big buffer switches compared to small buffer switches. Below is a link to Arista whitepaper on why big data needs big buffers provides additional details. https://www.arista.com/assets/data/pdf/Whitepapers/BigDataBigBuffers-WP.pdf

What are the key features of the 7500R?

The Arista 7500R 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.

Feature	Benefit
Ultra Deep Buffers	Up to 32GB of packet memory per switch virtually eliminating packet drops in congestion scenarios
FlexRoute™ Engine	Provides the flexible scalability to support deployment as a routing platform with Internet scale routing up to 2M routes
sFlow acceleration	Enables high rate sampling up to 1:1000, that provides for advanced network monitoring and traffic engineering solutions with granular control
AlgoMatch™	Efficient packet matching algorithm that enables flow matching for access control, policy and visibility
DANZ Tap Aggregation	10/40/100G Tap Aggregation with best-in-class performance and high density up to 48 100G Tap/Tool ports
Latency Analyzer (LANZ)	Microsecond granularity on port utilization using buffering watermarks to provide immediate feedback and precision monitoring
Wirespeed VXLAN Routing	Seamless integration between VXLAN and L2/L3 environments, physical and virtualized networks
IEEE 1588 PTP	Build and scale accurate timing solutions with sub-microsecond accuracy
128-way ECMP and MLAG	Improve network scalability and balance traffic across large-scale leaf-spine designs or server load balancers
Network Wide Virtualization	Multi-vendor API Support with eAPI, VXLAN and NSX, and other encapsulation techniques
Data Center Interconnect	With support for MACsec encryption on 100GbE ports the 7500R is ideal for high bandwidth and cost effective solutions for DCI. Coherent Optics extend the reach to thousands of kilometers

Can the 7500R hold full Internet BGP table?

Yes, the 7500R 7280R can hold a full copy of the internet in the forwarding tables leveraging Arista FlexRoute. There is sufficient capacity for table size growth of approximately 50% from today's Internet providing several years of investment protection.

How is FlexRoute useful?

The Arista 7500R Series **FlexRoute** engine provides the flexible scalability to support deployment as a routing platform with Internet scale routing. Arista FlexRoute along with EOS NetDB enables innovation not natively available in merchant chipsets

What is the benefit of 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. All members of the 7500R Series enable sFlow utilizing the high performance CPU. Within modern high performance systems, traffic sampling requires the capability to both sample and process packet rates of hundreds of millions of packets per second. With the 7500R Series Accelerated sFlow feature the sampling and processing of flow samples into sFlow datagrams is handled via integrated sFlow engines capable of generating up to 1.6Mpps of sFlow data, and of supporting 1:1000 sampling rates on of 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.

What is AlgoMatch and which 7500R line cards support AlgoMatch?

AlgoMatch is a unique Arista innovation combining software and hardware to implement access control lists to achieve higher scale. AlgoMatch utilizes a more efficient packet matching algorithm that in turn enables flow matching for access control, policy and visibility that is more flexible.

Product Number	Product Description
DCS-7500R2AK-36CQ-LC	7500R2 Series 36 port 100GbE QSFP100 AlgoMatch, 2M routes, wirespeed line card
DCS-7500R2A-36CQ-LC	7500R2 Series 36 port 100GbE QSFP100 AlgoMatch wirespeed line card
DCS-7500R2AK-48YCQ-LC	7500R2 Series 48 port 10/25GbE SFP+ and 2 port 100GbE QSFP AlgoMatch, 2M routes, wirespeed line card
DCS-7500R2AM-36CQ-LC	7500R2 Series 36 port 100GbE QSFP100 with AlgoMatch and MACsec wirespeed line card

What is Latency Analyzer (LANZ)?

LANZ provides a unique real-time high precision monitoring of buffer utilization, micro-bursts, and network hotspots before congestion leads to drops. LANZ allows for proactive planning of capacity upgrades or topology changes.
LANZ (Latency Analyzer) is an advanced monitoring feature available on Arista 7500R and 7280R Series.

Arista 7500R Series LANZ provides the ability to track utilization of deep VOQ buffers, providing the user with an understanding of which destination interfaces are most congested and how much data is being en-queued and its sources.

What features are part of Latency Analyzer (LANZ)?

LANZ refers to the set of latency analyzer features available with the Arista 7500R series of devices.
- Per Queue per Port Reporting - allows reporting and configuration for every egress port and all VoQs
- Congestion Lifecycle Monitoring – tracks congestion events end-to-end, providing Start-Time, Duration and Maximum Queue Length
- Drop Monitoring - report on lost traffic occurring through severe congestion events
- Per VoQ Buffer Monitoring - reports on VoQ buffer usage in addition to interface queues
- Data Capture - capture and mirror packets that were involved in congestion events
- Local Analysis – provides a local database of congestion records
- Export data - LANZ Streaming allows for real-time streaming of data in an open Google Protocol Buffer (GPB) encoded TCP stream.

What is VXLAN?

VXLAN is a multi-vendor industry-supported network virtualization technology that enables much larger networks to be built at layer 2 without the inherent scale issues that underpin large layer 2 networks. It uses a VLAN-like encapsulation technique to encapsulate layer 2 Ethernet frames within IP packets at layer 3 and as such is categorized as an 'overlay' network.

VXLAN provides solutions to a number of underlying issues with layer 2 network scale, namely:
- Enables large layer 2 networks without increasing the fault domain
- Scale beyond 4K VLANs.
- Enables layer 2 connectivity across multiple physical locations or pods
- Potential ability to localize flooding (unknown destination) and broadcast traffic to a single site
- Enables large layer 2 networks to be built without every device having to see every other MAC address

From a virtual machine perspective, VXLAN enables VMs to be deployed on any server in any location, regardless of the IP subnet or VLAN that the physical server resides in.

VXLAN is an industry-standard method of supporting a layer 2 overlay across layer 3 boundaries. As multiple vendors support VXLAN there are subsequently a variety of ways VXLAN can be deployed: as a software feature on hypervisor-resident virtual switches, on firewall and load-balancing appliances and on VXLAN hardware gateways built into L3 switches.

The 7500R Series platforms are able to natively encapsulate and decapsulate VXLAN packets without recirculation.

What advantages does VXLAN provide over building large L2 networks?

Large Layer 2 broadcast and failure domains can be eliminated and traded for more stable L3 networks supporting greater scale, better multipathing and millisecond convergence. In addition, previous scalability limitations due to MAC address table exhaustion and limited VLAN tags (4K VLANs) are replaced with the VXLAN header allowing for up to 16 million customer segments.

Why is PTP (IEEE 1588) in the switch important?

PTP is a useful solution wherever accurate synchronization of measured events is important to enable correlation. Traditionally, high precision environments have deployed dedicated time distribution networks, which consist of an overlay network of co-axial cabling and dedicated hardware, required in each client machine. These networks are expensive to scale and require significant additional cable infrastructure. The ability of PTP to offer scalable, hierarchical in-band time distribution is very attractive to simplify deployments, lower costs and limit GPS antenna sprawl.

What EOS licenses are available and what features require them?

The Arista EOS feature set is designed to provide flexibility both in the choice of the appropriate feature functionality and in the software consumption model. The EOS licenses are tiered by both feature set and platform.

The Arista official licensing page provides the latest information on various license options for platforms and features.

What are the high availability features of 7500R?

The Arista 7500 Series was designed specifically for high availability from both a software and hardware perspective to prevent single points of failure. Key high availability features include:
- Hardware support for hot swap of all components with redundant supervisors, power supplies, fabric and cooling modules

- Fabric N+1 redundancy provides zero loss of performance with deterministic degradation and integrated fans that provide dynamic temperature control combined with N+1 redundancy.
- Dual Supervisors for redundancy of hardware and software
- Power supply and grid redundancy – protection against power supply failure or grid failure in a dual feed environment
- EOS Zero Touch Provisioning (ZTP)
- Self-healing software with Stateful Fault Repair (SFR)
- Smart System Upgrade (SSU)
- Stateful Fault Containment (SFC) and live patching through in-service-software updates
- Multi-chassis LAG for active/active L2 multipathing
- 128-way MLAG and 128-way ECMP routing for all-active L2 and L3
- Chassis health tracker monitoring all data-plane elements inside the chassis

What are the different models in the Arista 7500 Series?

The Arista 7500R is available in 4 different models as shown in below table

Model	Line Card Slots	Rack Units
7504R	4	7
7508R	8	13
7512R	12	18
7516R	16	29

What line cards are available with the 7500R?

There are wide selections of line cards that are available for the 7500R Series. In addition, all existing 7500E series line cards will work with the 7500R systems. The table below provides the list of line cards currently available for the 7500R.

7500R Series Line card	Product Description
DCS-7500R-36CQ	7500R Series 36 port 100GbE QSFP100 wirespeed line card
DCS-7500R2-36CQ	7500R2 Series 36 port 100GbE QSFP100 wirespeed line card
DCS-7500R2A-36CQ	7500R2 Series 36 port 100GbE QSFP100 AlgoMatch wirespeed line card
DCS-7500R2AK-36CQ	7500R2 Series 36 port 100GbE QSFP100 AlgoMatch, 2M routes, wirespeed line card
DCS-7500RM-36CQ	7500R Series 36 port 100GbE QSFP100 with MACsec, wirespeed line card
DCS-7500R2M-36CQ	7500R2 Series 36 port 100GbE QSFP100 with MACsec, wirespeed line card
DCS-7500R2AM-36CQ	7500R2 Series 36 port 100GbE QSFP100 with AlgoMatch and MACsec, wirespeed line card
DCS-7500R-8CFPX	7500R Series 8 port 200G Tunable Coherent DWDM, with MACsec line card
DCS-7500R-36Q	7500R Series 36 port 40GbE QSFP+ (6 port 100GbE) wirespeed line card
DCS-7500R-48S2CQ	7500R Series 48 port 1/10GbE SFP+ and 2 port 100GbE QSFP wirespeed line card
DCS-7500R2AK-48YCQ	7500R2 Series 48 port 10/25GbE SFP+ and 2 port 100GbE QSFP AlgoMatch, 2M routes, wirespeed line card

What investment protection does the 7500R Series offer?

The 7500R Series continues the investment protection from the original 7500 Series.

- Original 7508 and 7504 systems can be upgraded to the next generation offering seamless migration to high density 100GbE
- 7500E and 7500R line cards interoperate, with backward compatibility
- 7500R line cards and 7500E fabric modules interoperate
- 7500E line cards and 7500R fabric modules interoperate
- Optional upgrades of fabric modules provide higher system capacity
- Optional upgrade of supervisors increases control plane performance

What interface types and port speeds are available on 7500R?

7500R platforms support a wide range of interface types and are capable of multiple speeds providing ultimate deployment flexibility. The table below shows the port-types and maximum number of interfaces for each speed for the Arista 7500R Series.

Line Card	Port Type	Max 10G interfaces	Max 25G interfaces	Max 40G interfaces	Max 50G interfaces	Max 100G interfaces
7500R-36CQ	36 ports of 100G QSFP	144	144	36	72	36
7500R2-36CQ	36 ports of 100G QSFP	144	144	36	72	36
7500R2A-36CQ	36 ports of 100G QSFP	144	144	36	72	36
7500R2AK-36CQ	36 ports of 100G QSFP	144	144	36	72	36
7500RM-36CQ	36 ports of 100G QSFP	-	-	36	-	36
7500R2M-36CQ	36 ports of 100G QSFP	-	-	-	-	36
7500R2AM-36CQ	36 ports of 100G QSFP	-	-	-	-	36
7500R-8CFPX	8 ports of Analog Coherent CFP2	-	-	-	-	8x200G
7500R-36Q	36 ports of 40G QSFP+	96	24	36	12	6
7500R-48S2CQ	48 ports of 10G SFP+ 2 ports of 100G QSFP	56	8	2	4	2

How scalable is the 7500R?

The 7500R is a highly scalable platform with support for both large L2 and L3 tables, combined with ECMP and LAG scale. 7500R Series line cards are available with different resource capabilities as shown below.

Resources*	7500R	7500R2	7500R2A	7500R2AK
MAC Addresses	768K	768K	768K	768K
IPv4 Host Routes	768K	768K	768K	768K
IPv6 Unicast Host Routes	768K	768K	768K	768K
IPv4 Unicast LPM Routes	Over 1M	1.3M	1.3M	2M+
IPv6 Unicast LPM Routes	1M	1.3M	1.3M	2M+
Multicast Routes	Up to 768K	Up to 768K	Up to 768K	Up to 768K
ACL Entries per forwarding Engine	24K	24K	24K	24K

* Max values dependent on shared resources in some cases

What is MACsec?

MACsec (Media Access Security) is a MAC security standard and is defined by IEEE 802.1AE. It is used to encrypt data at the MAC layer so that anyone attempting to tap into the network cannot read the data. There is an increasing desire to encrypt any data that leaves the physical building due in part to public disclosures and concerns over data privacy. The 4 line cards below provide wire speed 100G MACsec encryption on every port.

7500R MACsec Linecard	Product Description
DCS-7500RM-36CQ	7500R Series 36 port 100GbE QSFP100 with MACsec, wirespeed line card
DCS-7500R2M-36CQ	7500R2 Series 36 port 100GbE QSFP100 with MACsec, wirespeed line card
DCS-7500R2AM-36CQ	7500R2 Series 36 port 100GbE QSFP100 with AlgoMatch and MACsec, wirespeed line card
DCS-7500R-8CFPX	7500R Series 8 port 200G Tunable Coherent DWDM, with MACsec line card

What is the 7500R DWDM Line Card

The 7500R-8CFPX is an 8 port 200G DWDM line card that supports up to 2x100GbE per port for a maximum of 1.6Tbps bandwidth and can transport Ethernet over DWDM to distances beyond 5000 km.
It supports 802.1AE defined MACsec on every port. The line card supports wirespeed encryption of all packets using AES-128 or AES-256 bit encryption. The line card is fully compatible with all other 7500R Series line cards and leverages Analog Coherent CFP2 optics for long distance transmission.

The 7500R DWDM line card has the following key benefits:
- DWDM solution for Cloud Data Centers integrated with 7500R for high density and performance
- Cost and performance optimized for Data Center Interconnect to transport massive volumes of traffic through metro or long haul networks over 5,000kms
- Programmable modulation formats for reach and bandwidth optimization
- Secure transport of data over distance with MACsec encryption eliminating additional intermediate devices
- Ethernet over DWDM: Transparent to Layer2 and Layer3 applications
- Supports Flex Grid operation for future expansion

Is there native 25G support on 7500R platforms?

Yes, the 7500R Series has support for IEEE specification compliant native 25G SFP. A wide range of 25G SFP optics and transceivers can be used in combination with the 7500R2 10/25G line card to connect to 25G leaf switches or devices. Additionally QSFP 100G 7500R2 series line cards are also fully compliant to the IEEE 25G specification and can be used in 4x25G break-out mode.

What are the options for support?

Arista A-Care Service Options are designed to provide you with world-class support. A-Care service offerings are available 24x7x365 with advance replacement options to minimize any network downtime. All A-Care Service options include full access to bug fixes and software downloads. For more information about A-Care Service options go to Arista Customer Support

Where do I get more information on the Arista 7500R series?

For more information please go to www.arista.com or contact us at sales@arista.com.

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