Product Highlights

DWDM Integrated on Switch Line card

- High density DWDM solution for Cloud Data Centers
- Cost and performance optimized for Data Center Interconnect (DCI) to transport massive volumes of traffic through metro or long haul networks.
- Ethernet over DWDM: Transparent to Layer2 and Layer3 applications

Wire-speed Encryption

- IEEE 802.1AE MACsec encryption
- 100G Wire Speed encryption on every port

Metro and Long Haul Applications

- 100G PM-QPSK Modulation: 5000+ km
- 150G PM-8QAM Modulation: 2000 km
- 200G PM-16QAM Modulation: 1000 km
- Robust OSNR and CD tolerance
- 120km of un-amplified reach

Unmatched Density

- 8x200G on a 1RU Line card
- 19.2 Tbps per fiber pair
- 96 channels at 50GHz spacing and 48 channels at 100GHz spacing

Highly Scalable

- Compatible with 10G, 40G and 100G line cards for 7500R Series
- Deep packet buffer (12GB per line card)
- Virtual Output Queues per port to eliminate head of line blocking
- Use of pluggable optics for pay as you grow

Investment protection

- Supports Flex Grid and grid-less tuning operation for future growth
- Future proof 7500 system architecture

Cloud Networking Ready

- 768K MAC address
- Over 1M+ IPv4 Routes

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++

Overview

The phenomenal growth in demand for bandwidth, driven by mobile, video streaming and cloud applications, is driving the need for connecting several geographically dispersed data centers to maintain seamless content delivery and provide application agility. Cost effective high bandwidth data center interconnect can help organizations to meet several business objectives including business continuity and disaster recovery, large scale data transfer for analytics, big data, cluster computing and for scalability of metro data center topologies.

For organizations that own or rent dark fiber, high bandwidth data center interconnect (DCI) based on coherent technology offers significant CapEx and OpEx benefits. An open and programmable DCI solution, like the Arista DWDM line card, decouples the optical interface from the line system components (multiplexers, amplifiers, ROADMs) and can be integrated with existing legacy line systems or any widely available open line system reducing the overall upgrade cost.

The Arista second generation DWDM solution is integrated to a 7500R Series line card offering high-density with un-compromised performance. With Arista's single EOS operating system and a chassis based solution that enables mix and match speed capability for the client interfaces, the overall solution is operationally simple and economically efficient. It utilizes proven coherent optical technology to enable simple, reliable and scalable data center interconnect solutions for both metro and long haul applications

When data leaves the data center premise, one of the major challenges for data center operators is to protect the data from passive wire tapping, intrusion and other attacks. Most of the existing encryption solutions require additional systems that are expensive to deploy and manage. The Arista DWDM line card provides IEEE 802.1AE defined MACsec encryption at wire speed on every port for secure transport of data over distance.

Arista 1.6Tb DWDM Coherent Line card for 7500R Series

Arista EOS

All Arista products including the 7500R 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.

7500R High Availability

The Arista 7500R Series are designed for continuous operation with system wide monitoring of both hardware and software components, simple serviceability and provisioning to prevent single points of failure. The hardware supports high-availability with 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 fan systems provide dynamic temperature control combined with N+1 redundancy. The 7500R Series offer power redundancy that supports both power source and power supply redundancy. The Arista EOS software supports stateful failover between the dual redundant supervisors as well as self-healing stateful fault containment (SFC), stateful fault repair (SFR) and live patching through in-service-software updates to help ensure continuous service.

Highly Scalable and Future Proof Architecture

The Arista DWDM line card with built-in MACsec is supported in the Arista 7500R Series and compatible with all the available 10G, 40G and 100G line card offerings. The following 7500R chassis options are available:

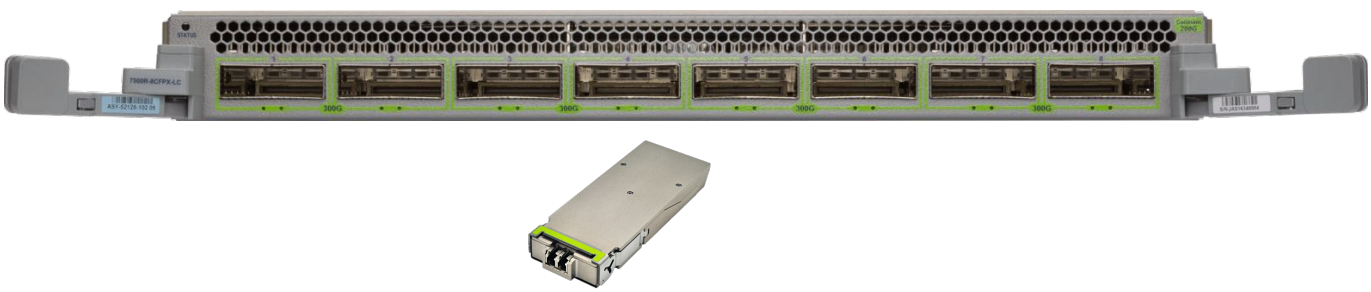
- **7516R** a 16-slot 29 RU chassis that supports up to 16 line cards with both AC or DC power options
- **7512R** a 12-slot 18 RU chassis that supports up to 12 line cards with both AC or DC power options
- **7508R** a 8-slot 13 RU chassis that supports up to 8 line cards with both AC or DC power options
- **7504R** a 4-slot 7 RU chassis that supports up to 4 line cards with both AC or DC power options

The Arista 7500 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 quests while accurately following queue disciplines including weighted fair queueing, fixed priority, or hybrid schemes. As a result, the Arista 7500 can handle the most demanding data center requirements with ease, including mixed traffic loads or real-time, multicast, and storage traffic while still delivering low latency.

100G Wire-speed Encryption

The Arista DWDM line card has built-in 100G wire-speed encryption on every port. Standards-based IEEE 802.1AE (MAC Security standard, hereafter referred to as MACsec) capabilities provide line-rate frame encryption and authentication for traffic transported across DWDM. This optional functionality removes the need for additional intermediate devices and provides encryption which ensures confidentiality as well as provides anti-replay protection and therefore confidence in the integrity of encrypted traffic.

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-XPN block cipher suite.
MACsec encryption is a licensed feature and requires a license file to enable the encryption feature. License information is included in the ordering information section of this document.



7500R Series 8 port 200G Tunable Coherent DWDM line card and ACO-CFP2 optics

Open, Programmable and Scalable platform

The Arista DWDM solution offers a high capacity, high performance platform that is open, scalable and highly programmable. The open architecture enables integration with existing line systems as alien wavelengths to enable cost effective bandwidth expansion. The wavelength, modulation format and the output power are all software tunable making it ideal to work with open-line systems as well as legacy line systems including Optical multiplexers/demultiplexers, Optical amplifiers and reconfigurable optical add-drop multiplexers (ROADMs).

Programmable modulation format provides ultimate flexibility to optimize bandwidth and reach requirements. PM-16QAM modulation provides the highest bandwidth for Metro or Regional applications (up to 1000km). 150G PM-8QAM mode offers 1.2Tb bandwidth with a reach of up to 2000km whereas the 100G PM-QPSK mode can be used for long-haul applications for distances of 5000+ km..
The 7500R platform offers a scalable Data center interconnect solution with the capability to increase DWDM bandwidth by simply adding additional DWDM line cards to the chassis. Client interfaces can be a mix and match of 10GbE, 40GbE and 100GbE with the use of any of the available 7500R line cards. Below table represents the per fiber capacity that can be achieved with the various modulation formats and different channel spacing.

Mode of Operation	Total capacity per Fiber (100GHz Spacing)	Total capacity per Fiber (50GHz Spacing)	Total capacity per Fiber (37.5 GHz Spacing)	Expected Reach
PM-QPSK	**4.8 Tbps**	**9.6 Tbps**	**12.8 Tbps**	5000+ km
PM-8QAM	**7.2 Tbps**	**14.4 Tbps**	**19.2 Tbps**	2000 km
PM-16QAM	**9.6 Tbps**	**19.2 Tbps**	**25.6 Tbps**	1000 km

Feature-rich, simple, high performance solution for Metro and Long Haul applications

The Arista DWDM solution integrates feature rich and high performance layer 2 and layer 3 switching with Coherent DWDM interfaces into a single high-density line card. It reduces complexity and at the same time delivers a cost effective and highly scalable solution with encryption and wire-speed performance for Data Center Interconnects in metro and long haul environments.

Arista DWDM solution can be used in conjunction with passive Optical Mux/DMux devices and in-line amplifiers to support additional bandwidth and extended reaches. With an un-amplified reach of up to 120kms, it is ideal for Metro applications transporting up to 20 Tbps traffic when used with passive multiplexers, and without requiring in-line amplification (Figure 1). With unmatched Optical Signal to Noise ratio (OSNR) performance, it can be used effectively for point to point long-haul applications for over 5,000 km in 100G mode with in-line amplifiers and multiplexers (Figure 2). Higher bandwidth can be achieved using 150G mode and 200G mode. Detailed specification for each operating is on page 3 of this datasheet.

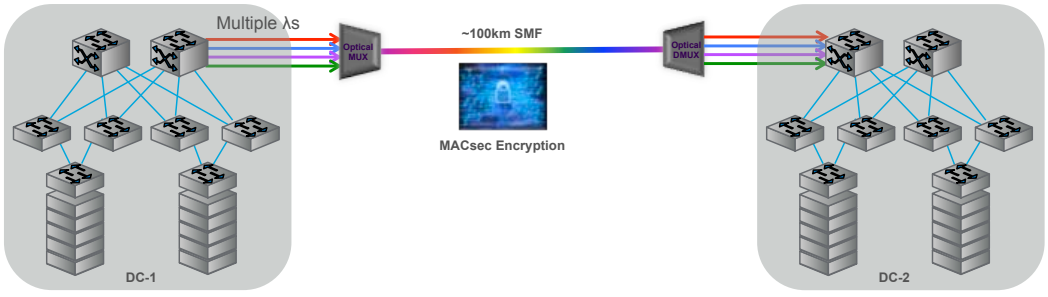


Figure 1: Datacenter Interconnect point-to-point high bandwidth metro application

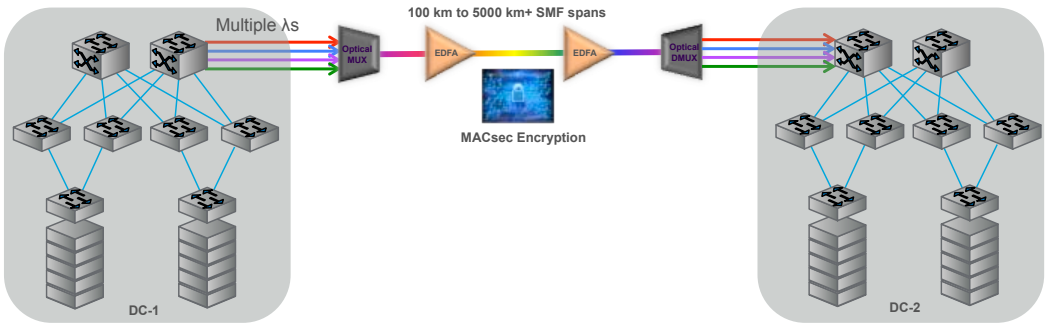


Figure 2: Datacenter Interconnect point-to-point high bandwidth Long-Haul application

EDFA: Erbium-doped fiber amplifier

Line Card Specifications

The Arista DWDM line card delivers 1.6Tb/s of bandwidth with 8 ports of Analog Coherent CFP2. Each port can be operated in 100G, 150G or 200G mode and has integrated advanced modulation, coherent detection and soft decision forward error-correction (SD-FEC) to deliver robust Optical signal to noise ratio (OSNR) and Chromatic dispersion (CD) tolerance performance to meet the requirements of metro and long haul networks.

The Arista DWDM line card contains up to 12GB of packet memory for approximately 40msec of traffic buffer per ingress port and virtually eliminates packet drops in congestion scenarios. Line card connects to all fabric modules in a non-blocking full mesh.

Linecard Module	7500R-8CFPX
Interface	CFPX-200G-DWDM
Max 200G Ports	8
Packet Buffer	12GB
Weight	20.0 lbs (9.1 kg)
Typical Power (Max Power)	900W (1180W)
Physical Dimensions (WxHxD)	17.5" x 1.75" x 23" (44.5 x 4.5 x 58.4 cm)
Chassis Support	DCS-7516N, DCS-7512N, DCS-7508N and DCS-7504N DCS-7508 and DCS-7504
Modulation format and Data Rate/port	PM-QPSK: 100Gbps PM-8QAM: 150Gbps PM-16QAM: 200Gbps
Forward Error Correction (FEC)	SD-FEC
Pre-FEC Bit Error Rate (BER)	3.2 E-02 (with 0.01 uncorrected blocks/second)

Technical Specifications

Mode of Operation	OSNR Sensitivity*	CD Tolerance	Polarization Mode Dispersion (PMD) tolerance (peak)
PM-QPSK	9.8 dB	310 ns/nm	100 ps
PM-8QAM	14.2 dB	45 ns/nm	60 ps
PM-16QAM	16.9 dB	75 ns/nm	60 ps

Analog Coherent CFP2 Specifications

The Arista DWDM Line-card utilizes industry standard Analog Coherent CFP2 (ACO-CFP2) pluggable optics to achieve high density. Pluggable optics enable field replacement and easy trouble shooting which minimize network downtime.

Arista Coherent CFP2 transceivers offer full digital optical monitoring and can be tuned to any wavelength in the ITU-T defined C-band grid. They also support grid tuning for improved spectral efficiency.

Optics Module	CFPX-200G-DWDM
Channel Range (Tunable)	191.2 to 195.95 THz**
Channel Grid	100GHz, 50GHz, Flex Grid & Grid-less
Physical Dimensions (WxHxD)	41.5 x 12.4 x 107.5 mm
Connector Type	Duplex LC Straight
Weight	0.25 lbs (115 gms)
Max power consumption	15 W
Tx Optical output power (Avg)***	0 dBm, +/- 2dB
Tx Optical output power tuning range	0 dBm to -10 dBm
Shuttered output power	- 30 dBm
Rx Optical input power***	-28 to 0 dBm

Environmental Characteristics

Operating Temperature	0 to 40˚C (32 to 104˚F)
Storage Temperature	-40 to 70˚C (-40 to 158˚F)
Relative Humidity	5 to 90%
Operating Altitude	0 to 10,000 ft, (0-3,000m)

Standards Compliance

EMI	FCC Part 15 Class A, ICES-003 Class A, VCCI Class A
Safety	Safety IEC/UL/CSA/EN 60950 CE, UL, cTUVus, TUV Mark
Other	ROHS compliant

*OSNR specification is with back to back configuration and referenced to 0.1nm noise bandwidth

** Default channel at power up: 193.1 THz, 1552.52nm (50GHz grid). Extended Channel range: 191.15 THz to 196.1 THz is available upon request

*** Specifications are for 100G QPSK mode. For 200G 16QAM, Tx power (Avg) is -2dBm, and Rx sensitivity is -26dBm.

Ordering Information

Product Number	Product Description
DCS-7500R-8CFPX-LC#	7500R Series 8 port 200G Tunable Coherent DWDM, with MACsec line card (ships in chassis)
DCS-7500R-8CFPX-LC	7500R Series 8 port 200G Tunable Coherent DWDM, with MACsec line card (spare)
LIC-MOD-1-MACSEC	MACsec Encryption License for Arista Modular switches - Encryption with MACsec capable Linecard
CFPX-200G-DWDM	100G/200G Coherent Tunable CFP2, Linear Interface, DP-QPSK, 8QAM and 16QAM modulation with Gridless tuning and Nyquist Shaping

Arista 100GHz Channel Numbers and Wavelengths (100GHz ITU grid)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	191.2	1567.95	17	192.8	1554.94	33	194.4	1542.14
2	191.3	1567.13	18	192.9	1554.13	34	194.5	1541.35
3	191.4	1566.31	19	193.0	1553.33	35	194.6	1540.55
4	191.5	1565.49	20	193.1	1552.52	36	194.7	1539.76
5	191.6	1564.68	21	193.2	1551.72	37	194.8	1538.97
6	191.7	1563.86	22	193.3	1550.92	38	194.9	1538.18
7	191.8	1563.04	23	193.4	1550.11	39	195.0	1537.39
8	191.9	1562.23	24	193.5	1549.31	40	195.1	1536.61
9	192.0	1561.42	25	193.6	1548.51	41	195.2	1535.82
10	192.1	1560.60	26	193.7	1547.71	42	195.3	1535.03
11	192.2	1559.79	27	193.8	1546.91	43	195.4	1534.25
12	192.3	1558.98	28	193.9	1546.12	44	195.5	1533.46
13	192.4	1558.17	29	194.0	1545.32	45	195.6	1532.68
14	192.5	1557.36	30	194.1	1544.52	46	195.7	1531.90
15	192.6	1556.55	31	194.2	1543.73	47	195.8	1531.11
16	192.7	1555.74	32	194.3	1542.93	48	195.9	1530.33

Arista 50GHz Channel Numbers and Wavelengths (50GHz ITU grid)

Channel Number	Frequency (THz)	Wavelength (nm)
1	191.2	1567.95
2	191.25	1567.54
3	191.3	1567.13
4	191.35	1566.72
5	191.4	1566.31
6	191.45	1565.90
7	191.5	1565.49
8	191.55	1565.08
9	191.6	1564.68
10	191.65	1564.27
11	191.7	1563.86
12	191.75	1563.45
13	191.8	1563.04
14	191.85	1562.64
15	191.9	1562.23
16	191.95	1561.82
17	192.0	1561.42
18	192.05	1561.01
19	192.1	1560.60
20	192.15	1560.20
21	192.2	1559.79
22	192.25	1559.39
23	192.3	1558.98
24	192.35	1558.58
25	192.4	1558.17
26	192.45	1557.77
27	192.5	1557.36
28	192.55	1556.96
29	192.6	1556.55
30	192.65	1556.15
31	192.7	1555.74
32	192.75	1555.34
33	192.8	1554.94
34	192.85	1554.53
35	192.9	1554.13
36	192.95	1553.73
37	193.0	1553.33
38	193.05	1552.92
39*	**193.1**	**1552.52**
40	193.15	1552.12
41	193.2	1551.72
42	193.25	1551.32
43	193.3	1550.92
44	193.35	1550.51
45	193.4	1550.11
46	193.45	1549.71
47	193.5	1549.31
48	193.55	1548.91
49	193.6	1548.51
50	193.65	1548.11
51	193.7	1547.71
52	193.75	1547.31
53	193.8	1546.91
54	193.85	1546.52
55	193.9	1546.12
56	193.95	1545.72
57	194.0	1545.32
58	194.05	1544.92
59	194.1	1544.52
60	194.15	1544.13
61	194.2	1543.73
62	194.25	1543.33
63	194.3	1542.93
64	194.35	1542.54
65	194.4	1542.14
66	194.45	1541.74
67	194.5	1541.35
68	194.55	1540.95
69	194.6	1540.55
70	194.65	1540.16
71	194.7	1539.76
72	194.75	1539.37
73	194.8	1538.97
74	194.85	1538.58
75	194.9	1538.18
76	194.95	1537.79
77	195.0	1537.39
78	195.05	1537.00
79	195.1	1536.61
80	195.15	1536.21
81	195.2	1535.82
82	195.25	1535.43
83	195.3	1535.03
84	195.35	1534.64
85	195.4	1534.25
86	195.45	1533.86
87	195.5	1533.46
88	195.55	1533.07
89	195.6	1532.68
90	195.65	1532.29
91	195.7	1531.90
92	195.75	1531.50
93	195.8	1531.11
94	195.85	1530.72
95	195.9	1530.33
96	195.95	1529.94

* Default channel at power up: 193.1 THz, 1552.52nm (50GHz grid)

Warranty

The Arista DWDM Line card for 7500R 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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