Arista 100G Transceivers and Cables: Q&A

What 100G Transceivers and Cables are available from Arista?

Arista supports a full range of copper cables and optical transceivers for 100GbE, compliant to IEEE standards. Arista offers 100G QSFP to QSFP copper cables and Active Optical Cables, to enable short reach options, as well as a wide range of optical transceivers in QSFP form factors for various fiber types and reach requirements.

Product Number	Product Description
QSFP 100GbE Transceivers	
QSFP-100G-SR4	100GBASE-SR4 QSFP transceiver, up to 70m over parallel OM3 or 100m over OM4 multi-mode fiber
QSFP-100G-SWDM4	100GBASE-SWDM4 QSFP transceiver, up to 70m over OM3 or 100m over OM4 duplex multi-mode fiber
QSFP-100G-SRBD	100GBASE-BIDI QSFP transceiver, up to 70m over OM3 or 100m over OM4 duplex multi-mode fiber
QSFP-100G-PSM4	100GBASE-PSM4 40G/100G dual speed QSFP Optics Module, up to 500m over parallel SMF
QSFP-100G-CWDM4	100GBASE-CWDM4 QSFP Optics Module, up to 2km over duplex SMF
QSFP-100G-LRL4	100GBASE-LRL4 QSFP Optics Module, up to 2km over duplex SMF
QSFP-100G-LR4	100GBASE-LR4 QSFP Optics Module, up to 10km over duplex SMF
QSFP-100G-ERL4	100GBASE-ERL4 QSFP Optics Module, up to 40km over duplex SMF
QSFP-100G-DZ2-xx	100G DWDM QSFP transceiver, 2 lambda PAM4, 19x.x0 THz, up to 80km over single-mode fiber
100G QSFP Active Optical Cables	
AOC-Q-Q-100G-3M	100GbE QSFP to QSFP Active Optical Cable, 3m
AOC-Q-Q-100G-5M	100GbE QSFP to QSFP Active Optical Cable, 5m
AOC-Q-Q-100G-7M	100GbE QSFP to QSFP Active Optical Cable, 7m
AOC-Q-Q-100G-10M	100GbE QSFP to QSFP Active Optical Cable, 10m
AOC-Q-Q-100G-15M	100GbE QSFP to QSFP Active Optical Cable, 15m
AOC-Q-Q-100G-20M	100GbE QSFP to QSFP Active Optical Cable, 20m

AOC-Q-Q-100G-25M	100GbE QSFP to QSFP Active Optical Cable, 25m
AOC-Q-Q-100G-30M	100GbE QSFP to QSFP Active Optical Cable, 30m
100G QSFP Twinax Copper Cables	
CAB-Q-Q-100G-1M	100GBASE-CR4 QSFP to QSFP Twinax Copper Cable 1 meter
CAB-Q-Q-100G-2M	100GBASE-CR4 QSFP to QSFP Twinax Copper Cable 2 meter
CAB-Q-Q-100G-3M	100GBASE-CR4 QSFP to QSFP Twinax Copper Cable 3 meter
CAB-Q-Q-100G-5M	100GBASE-CR4 QSFP to QSFP Twinax Copper Cable 5 meter
CAB-Q-4S-100G-1M	100GBASE-CR4 QSFP to 4 x 25GbE SFP Twinax Copper Cable, 1 meter
CAB-Q-4S-100G-2M	100GBASE-CR4 QSFP to 4 x 25GbE SFP Twinax Copper Cable, 2 meter
CAB-Q-4S-100G-3M	100GBASE-CR4 QSFP to 4 x 25GbE SFP Twinax Copper Cable, 3 meter

What is the maximum supported distance for 100G Transceivers and Cables?

The maximum currently supported distance for 100G is 80km with DWDM QSFP. For non-DWDM optics, QSFP-100G-ERL4 supports up to 40km and QSFP-100G-LR4 supports up to 10km. Additional optics may be released in the future to support longer distances.

IEEE 100G standard has defined the following reaches:

IEEE Standard	Supported Distance	Arista Supported Products
100GBASE-ER4	Up to 40km over Single-mode fiber	QSFP-100G-ERL4: Interoperable with 100GBASE-ER4 optics for up to 30km in no-FEC mode
100GBASE-LR4	Up to 10km over Single-mode fiber	QSFP-100G-LR4 QSFP-100G-LRL4 (2km, compliant 100GBASE-LR4)
100GBASE-SR4	Up to 70m over Parallel OM3 Multi-mode fiber and 100m over parallel OM4 Multi-mode fiber	QSFP-100G-SR4
100GBASE-SR10	Up to 100m over Parallel OM3 Multi-mode fiber and 150m over parallel OM4 Multi-mode fiber	MXP ports on 7500E and 7280SE

Other MSA (Multi-Source Agreement) defined 100G QSFP transceivers.

MSA	Supported Distance	Arista Supported Products
SWDM4 MSA	Up to 70m/100m over duplex OM3/OM4 multi-mode fiber	QSFP-100G-SWDM4
CWDM4 MSA	Up to 2km over duplex Single-mode fiber	QSFP-100G-CWDM4
PSM4 MSA	Up to 500m over parallel Single-mode fiber	QSFP-100G-PSM4

What is the difference between QSFP28 and 100G QSFP?

They are the same. The “QSFP” form factor was originally defined for <10G speeds. When it was adopted for 40G, the name became QSFP+ to denote the higher aggregate performance. The same “QSFP” form factor was later adopted for 100G but the electrical interface had to be upgraded to handle 25Gbps/lane. The electrical interface for 100G can handle up to 28Gbps, hence the engineering and industry name is QSFP28. Arista refers to the 100G form factor as “100G QSFP” to avoid any confusion.

Are there any dual speed 40/100G optics to avoid costly replacement when I upgrade?

The SFF committee that standardizes the management interface for 100G QSFP (SFF-8636 specification) has defined a CDR bypass mode, which enables the use of 100G optics at 40G speeds. Currently Arista offers QSFP-100G-CWDM4 and QSFP-100G-PSM4, which can be used in both 40G and 100G modes.

What industry standards are associated with each of the 100G Transceivers and Cables?

The table below summarizes the Arista 100G transceivers and cables and the associated industry standards.

Product Number	Associated Industry Standard
QSFP-100G-SR4	IEEE 100GBASE-SR4
QSFP-100G-SWDM4	SWDM Multi-Source Agreement (MSA): http://www.swdm.org/msa
QSFP-100G-PSM4	100G PSM4 MSA: http://psm4.org/
QSFP-100G-CWDM4	CWDM4 MSA: http://www.cwdm4-msa.org/
QSFP-100G-LRL4	Based on IEEE 100GBASE-LR4, with shorter reach. Compatible with LR4 up to 1km.
QSFP-100G-LR4	IEEE 100GBASE-LR4
QSFP-100G-ERL4	IEEE 100GBASE-ER4
AOC-Q-Q-100G-yM	Based on IEEE 100GBASE-SR4, with pre-terminated cables
CAB-Q-Q-100G-yM	IEEE 100GBASE-CR4

Are there any 100G transceivers that allow the use of standard duplex multi-mode fiber?

Yes – Arista offers two 100G transceivers that operate over duplex multimode fiber: The QSFP-100G-SWDM4, and the QSFP-100G-SRBD (or "BIDI") transceiver.

What is the 100G SWDM4 transceiver?

The Arista QSFP-100G-SWDM4 transceiver provides 100Gbps bandwidth over a standard duplex multi-mode fiber eliminating the need for expensive parallel multi-mode fiber infrastructure and offers a seamless migration path from duplex 10G/40G to 100G. It is supported on all Arista QSFP 100G ports and can be used for links up to 70m of OM3 fiber or up to 100m of OM4 fiber. The SWDM4 Tx port transmits 100G data over 4 x 25Gbps wavelengths, and the Rx port receives data over 4 x 25Gbps wavelengths. The wavelengths are in the "short wavelength" range (850nm – 940nm).

What are the benefits of 100G SWDM4 transceiver?

There are several benefits from using the SWDM4 in 100G environments with multi-mode fiber:

Open Interoperability: The Arista QSFP-100G-SWDM4 transceiver is based on an industry multi-standard agreement (SWDM-MSA) and is interoperable with other 100G SWDM4 transceivers. This avoids the risk of selecting a transceiver type that forces you to continue to use equipment from a single vendor.

Easy Migration to 100G: 100G SWDM4 enables seamless migrations from both 10G and 40G to 100G without major changes to the fiber infrastructure. The widely deployed 10G-SR, 40G-BiDi and 40G-Universal Optics all operate over a single pair of multimode fiber with regular LC termination. The 100G-SWDM4 transceiver also operates over a single pair of multimode fiber and uses the same connector enabling an easy migration, without any need to change the existing cabling or re-terminate.

Consistent Distance: The link distance for 100G SWDM4 is 70m over OM3 the same as for 100G-SR4. The 70m/100m reach with OM3/OM4 fiber is also the same link distance supported by 40G-BiDi optics, which makes the migration from 40G to 100G simple with 100G-SWMD4.

Familiar Tap modules: 100G SWDM4 optics can be tapped using existing 1x2 Tap modules just like 10G-SR and 40G-Universal optics with no change or replacements, avoiding additional cost and complexity.

What is the 100G-SRBD (or "BIDI") transceiver?

Like the QSFP-100G-SWDM4 transceiver described above, the Arista QSFP-100G-SRBD transceiver also provides 100Gbs bandwidth over standard duplex multi-mode fiber. However, unlike the SWDM4 transceiver (which transmits 4 x 25Gbps wavelengths out of the Tx port, and receives 4 x 25Gbps wavelengths on the Rx port), each optical port on the SRBD contains both a transmitter and receiver, running at full duplex 50Gb/s over a single fiber. The two ports of the QSFP-100G-SRBD provide an aggregate 100Gb/s of bandwidth. The QSFP-100G-SRBD is supported on all Arista QSFP 100G ports, and can be used for links up to 70m of OM3m or up to 100m of OM4 multi-mode fiber.

What are the benefits of 100G-SRBD (or "BIDI") transceiver?

The primary benefit of the 100G-SRBD optic is optical compatibility (i.e. interop) with third party 100G BIDI optics. Note that because each port of the 100G BIDI transceiver contains a transmitter and receiver, normal tap modules cannot be used to monitor the traffic.

Both the 100G-SWDM4 and the 100G-SRBD transceivers support 100G over duplex multi-mode fiber. When should each transceiver be used?

For most applications, the QSFP-100G-SWDM4 provides a cost effective 100G solution over duplex multi-mode fiber. For applications that require optical interop with third party 100G BIDI optics, the QSFP-100G-SRBD should be used. The table below summarizes the features of each module

Feature	QSFP-100G-SWDM4	QSFP-100G-SRBD
Link distance over OM3 multi-mode fiber	70m	70m
Link distance over OM4 multi-mode fiber	100m	100m
Optical connector type	LC	LC
Use familiar 1x2 tap modules for monitoring	Yes	No
Interop with third party 100G SWDM4 transceivers, and compliant with the SWDM4 MSA	Yes	No
Interop with third party 100G BIDI transceivers	No	Yes

Are Arista 100G Transceivers interoperable with other 100G transceivers available in the industry?

Yes, as long as the non-Arista 100G transceivers meet the associated industry standard specifications, Arista 100G transceivers are fully interoperable.

Can 100G QSFP interfaces interoperate with SR10 based 100GbE?

No. The 100G QSFP form factor has just 4 electrical lanes, which is not enough to support 10 lanes of 10G electrical interface. A 100G QSFP can only support a 4x10G or 4x25G electrical interface, which can be used as 4x10GbE or 4x25GbE, but not 10x 10GbE.

As a result the 100G QSFP SR4 cannot interoperate with SR10 based 100GbE transceivers. A complex design with a reverse gearbox (4x25G to 10x10G) can achieve this but results in expensive and power hungry optics.

What is the maximum link distance supported in a 100G QSFP form factor?

Arista QSFP-100G-DZ2-xx is a DWDM QSFP transceiver that supports up to 80km over duplex single mode fiber with the use of external amplifiers and dispersion compensators. The Arista QSFP-100G-ERL4 supports link distances up to 40km when the forward error correction (FEC) on the host is used. In the default no-FEC mode, QSFP-100G-ERL4 supports up to 30km link distance over duplex single mode fiber. QSFP-100G-LR4 supports links up to 10km over duplex single mode fiber. Additionally, enabling FEC (or Forward Error Correction) with QSFP-100G-LR4 optics on Arista switches can allow for links beyond 10km with single mode fiber. However, as this is not fully characterized, customers are advised to measure the link distance and optical loss budget before deploying.

What is the maximum power consumption of 100G QSFP transceivers?

This information is increasingly important to determine the system power draw for customers, as the optic power is a high percentage of overall system power.

The table below summarizes the power consumption of Arista 100G QSFP transceivers.

Product Number	Max Power Consumption
QSFP-100G-SR4	3.5W
QSFP-100G-SWDM4	3.5W
QSFP-100G-SRBD	3.5W
QSFP-100G-PSM4	3.5W
QSFP-100G-CWDM4	3.5W
QSFP-100G-LRL4	4.0W
QSFP-100G-LR4	4.5W
QSFP-100G-ERL4	4.5W
QSFP-100G-DZ2-xx	5.0W
AOC-Q-Q-100G-yM	3.5W
CAB-Q-Q-100G-yM	1.5W

What will happen if I plug in 100G QSFP transceivers that consume greater than 3.5W?

All Arista 100G QSFP ports are designed to handle QSFP transceivers that draw up to 4.5W. With the exception of the Arista DWDM QSFP (QSFP-100G-DZ2-xx), if a 100G QSFP draws greater than 4.5W Arista cannot guarantee the performance since there are other dependencies like airflow direction, ambient temperature, elevation etc. The Arista DWDM QSFP consumes up to 5W and is supported on a range of systems with some port restrictions. Refer to the DWDM QSFP datasheet for further details.

As per the most recent SFF standard, if a QSFP optic requires more than 3.5W, it must identify accordingly and draw only up to 3.5W at initial insertion to avoid overloading a host system. The system will then determine if the higher power optic is supported and will enable the high power mode accordingly. If high power optics do not follow the specification caution should be taken to avoid the risk of damage to the equipment.

Which Arista 100G Transceivers and Cables can be used in breakout mode?

Breakout mode refers to running multiple ports at lower speeds. Arista supports the following break-out modes for currently available 100G transceivers.

Product Number	Supported Breakout modes
QSFP-100G-SR4	4x25G to interoperate with 25GBASE-SR. 25G standards are still evolving and care must be taken to use the same forward error correction (FEC) mode on both ends to link-up.
QSFP-100G-PSM4	4x25G to interoperate with 25GBASE-LR. 25G standards are still evolving and care must be taken to use the same forward error correction (FEC) mode on both ends to link-up.
QSFP-100G-CR4	4x 25G (using a 100G QSFP to 25G SFP)

Fiber and Copper Cables

What cable type is needed for 100G Transceivers?

The table below details the connector type of each 100G Transceiver and the cable type to be used.

Product Number	Termination/Connector Type	Fiber Type to be used
QSFP-100G-SR4	MTP-12	Multi-mode Fiber OM3 or OM4
QSFP-100G-SWDM4	Duplex LC	Multi-mode Fiber OM3 or OM4
QSFP-100G-SRBD	Duplex LC	Multi-mode Fiber OM3 or OM4
QSFP-100G-PSM4	MTP-12	Single-mode Fiber
QSFP-100G-CWDM4	Duplex LC	Single-mode Fiber
QSFP-100G-LRL4	Duplex LC	Single-mode Fiber
QSFP-100G-LR4	Duplex LC	Single-mode Fiber
QSFP-100G-ERL4	Duplex LC	Single-mode Fiber
QSFP-100G-DZ2-xx	Duplex LC	Single-mode Fiber

Where can customers buy splitter cables for 4x25G connectivity?

A large number of cabling companies have the MTP-LC multimode fiber breakout cables available and are supplying these in volumes to customers for 40G to 4x10G. The same fiber splitter cable can be used for 100G to 4x25G.

Product Description	Corning P/N	Leviton P/N	Wave2Wave P/N
OM4 MTP12 to 4 LC - Direct connect for 1x QSFP+ SR4 to 4 SFP+ SR, 5m	HE67908QPH-KB005M	FH-FH008MR1624K	51PU-8080P-5M
OM4 MTP12 to 4 LC - Direct connect for 1x QSFP+ SR4 to 4 SFP+ SR, 3m	HE67908QPH-KB003M	FH-FH008MR1024K	51PU-8080P-3M
SM MTP12 to 4 LC - Direct connect for 1x QSFP+ PLRL4 to 4 SFP+ LR, 5m	HE87808GPH-KB005M	FH-AH008MR1624K	51PU-3084P-5M
SM MTP12 to 4 LC - Direct connect for 1x QSFP+ PLRL4 to 4 SFP+ LR, 3m	HE87808GPH-KB003M	FH-AH008MR1024K	51PU-3084P-3M

Can 100G QSFP copper cables be used for 40G?

Yes, Arista 100G QSFP copper cables can be used for 40G, but not vice versa.

Can customers use third party 100G QSFP to QSFP and QSFP breakout cables?

Arista does not restrict the use of third party passive copper cables. These cables need to comply with the associated IEEE specifications, to allow them to be correctly identified and recognized by the Arista switch. Interfaces with cables not recognized correctly will be disabled.

What is the thickness and bend radius of the 100G copper cables?

See below table:

Arista 100G QSFP Copper Cables		
	100G Q-Q	100G Q-4S
Cable Type	Twinax	Twinax
Cable Thickness (Wire AWG)	1, 2, 3 meter cables: 30 AWG 5 meter cables: 26 AWG	1, 2 meter cables: 30 AWG 3 meter cables: 26 AWG
Bend Radius	1, 2, 3 meter cables: 45 mm 5 meter cables: 60 mm	1, 2 meter cables: 45 mm 3 meter cable: 60 mm

What additional resources are available on Transceivers and Cables?

Below is a list of additional resources available on the transceivers and cables page of www.arista.com.

Document	Description
Arista Transceivers Quicklook	Arista's transceiver portfolio, Why use Arista transceivers, cables and interoperability

Datasheet	Detailed specifications and ordering information
Transceiver and Cable Guide	Arista EOS support, physical attributes, laser safety and fiber cleaning instructions
FAQ Documents	100G and 40G Frequently asked questions
Whitepapers	Arista 40G UNIV white paper
Partner Documents	Fiber cabling reference guides and loss budget guidelines from Cabling companies like Corning and Leviton

Port Configuration

Can Arista 100G QSFP ports be used in 40G mode?

Yes, 40GbE QSFP+ transceivers will be detected and enabled upon insertion.

How do you change 100G QSFP ports to support QSFP+ 40GbE transceivers?

```
Configure the desired speed as 40G:
(config)# interface Ethernet1/1
(config-if-Et1/1)# speed forced 40gfull
```

How do you change 100G QSFP ports to support 4x10GbE mode using a QSFP+ transceiver?

```
Configure the desired speed as 10G:
(config)# interface Ethernet1/1 - 4
(config-if-Et1/1-4)# speed forced 10000full
```

How do you change 100G QSFP ports from 100GbE mode to 4x25G mode?

```
Configure the desired speed as 25G:
(config)# interface Ethernet1/1 - 4
(config-if-Et1/1-4)# speed forced 25gfull
```

How do you change 100G QSFP ports back to the default mode?

```
Configure the port to default mode:
(config)# interface Ethernet1/1-4
(config-if-Et1/1)# no speed
```

How do you enable FEC to achieve 40km distance with QSFP-100G-ERL4?

```
Enable FEC for maximum 40km reach
(config-if-Et3/4/1)#error-correction encoding reed-solomon

Disable FEC for IEEE compliance (maximum 30km reach)
(config-if-Et3/4/1)# no error-correction encoding
```