

Arista 400G Transceivers and Cables: Q&A

What are the benefits of moving to 400G technology?

Arista’s 400G platforms allow data centers and high-performance computing environments to address growing needs for higher bandwidth at lower cost and power per gigabit. Key benefits include:

- Increase switching bandwidth per RU by a factor of 4. Migrating from 100G to 400G systems increases the bandwidth per RU from 3.2-3.6T to 12.8-14.4T / RU.
- Enable higher density 100G ports using optical or copper breakouts. A 32 port 1RU 400G system enables 128 100GE ports / RU. This enables a single Top of Rack (TOR) leaf switch to connect to multiple racks of servers or Network Interface Cards (NICs).
- Reduce the number of optical fiber links, connectors and patch panels by a factor of 4 when compared to 100G platforms for the same aggregate bandwidth.
- Enable 2-4X lower cost and power / bit, reducing capex and opex.

What 400G Transceivers and Cables are available from Arista?

Arista supports a full range of 400G optical transceivers, Active Optical Cables (AOCs) and Direct Attach Copper cables (DACs), compliant to IEEE standards and industry Multi Source Agreements (MSAs).

Arista offers 400G systems and transceivers in both OSFP and QSFP-DD form factors (a detailed comparison of OSFP and QSFP-DD form factors is contained later in this document). The tables below summarize the 400G connectivity options supported.

400G Optical Transceivers		
OSFP Part No.	QSFP-DD Part No.	Product Description
OSFP-400G-SR8	-	400GBASE-SR8 transceiver, up to 100m over parallel multi-mode OM4 fiber (MMF).
OSFP-400G-DR4	QDD-400G-DR4	400GBASE-DR4 transceiver, up to 500m over parallel single mode fiber (SMF). The 400G-DR4 can break out to 4 x 100G, and interop with 4 x 100G-DR QSFPs.
OSFP-400G-XDR4	QDD-400G-XDR4	400GBASE-XDR4 “eXtended reach DR4” transceiver, up to 2km over parallel SMF. The 400G-XDR4 can break out to 4 x 100G, and interop with 4 x 100G-FR QSFPs.
OSFP-400G-FR4	QDD-400G-FR4	400GBASE-FR4 transceiver, up to 2km over duplex SMF.
OSFP-400G-2FR4	-	2 x 200GBASE-FR4 transceiver, up to 2km over two pairs of duplex SMF. The 2FR4 transceiver can break out to 2 x 200G, and interop with 2 x 200G-FR4 QSFP transceivers.

400G AOC (Active Optical Cables)		
OSFP Part Number	QSFP-DD Part No.	Product Description
AOC-O-O-400G-1M	AOC-D-D-400G-1M	400G AOC, 1 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
AOC-O-O-400G-3M	AOC-D-D-400G-3M	400G AOC, 3 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
AOC-O-O-400G-5M	AOC-D-D-400G-5M	400G AOC, 5 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
AOC-O-O-400G-7M	AOC-D-D-400G-7M	400G AOC, 7 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
AOC-O-O-400G-10M	AOC-D-D-400G-10M	400G AOC, 10 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
AOC-O-O-400G-15M	AOC-D-D-400G-15M	400G AOC, 15 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
AOC-O-O-400G-20M	AOC-D-D-400G-20M	400G AOC, 20 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
AOC-O-O-400G-25M	AOC-D-D-400G-25M	400G AOC, 25 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
AOC-O-O-400G-30M	AOC-D-D-400G-30M	400G AOC, 30 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)

400G DACs (Direct Attach Cables)		
OSFP Part Number	QSFP-DD Part No.	Product Description
OSFP to OSFP and QSFP-DD to QSFP-DD Cables		
CAB-O-O-400G-1M	CAB-D-D-400G-1M	400G Passive DAC, 1 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
CAB-O-O-400G-2M	CAB-D-D-400G-2M	400G Passive DAC, 2 meter (OSFP to OSFP, or QSFP-DD to QSFP-DD)
CAB-O-O-400G-3M	CAB-D-D-400G-2.5	400G Passive DAC, 3 meter (OSFP to OSFP), or 2.5 meter (QSFP-DD to QSFP-DD)
OSFP or QSFP-DD to 8x 50G SFP		
CAB-O-8S-400G-1M	CAB-D-8S-400G-1M	400G Passive DAC, 1 meter (OSFP or QSFP-DD to 8x 50G SFP)
CAB-O-8S-400G-2M	CAB-D-8S-400G-2M	400G Passive DAC, 2 meter (OSFP or QSFP-DD to 8x 50G SFP)
CAB-O-8S-400G-3M	CAB-D-8S-400G-2.5	400G Passive DAC, 3 meter (OSFP to 8x 50G SFP), or 2.5 meter (QSFP-DD to 8x 50G SFP)
OSFP or QSFP-DD to 4x 100G QSFP with 2 x 50G lanes		
CAB-O-4Q-400G-1M	CAB-D-4Q-400G-1M	400G Passive DAC, 1 meter (OSFP or QSFP-DD to 4x 100G QSFP with 2 x 50G lanes per QSFP)
CAB-O-4Q-400G-2M	CAB-D-4Q-400G-2M	400G Passive DAC, 2 meter (OSFP or QSFP-DD to 4x 100G QSFP with 2 x 50G lanes per QSFP)
CAB-O-4Q-400G-3M	CAB-D-4Q-400G-2.5	400G Passive DAC, 3 meter (OSFP to 4x 100G QSFP with 2 x 50G lanes), or 2.5 meter (QSFP-DD to 4x 100G QSFP with 2 x 50G lanes)
OSFP or QSFP-DD to 2x 200G QSFP		
CAB-O-2Q-400G-1M	CAB-D-2Q-400G-1M	400G Passive DAC, 1 meter (OSFP or QSFP-DD to 2x 200G QSFP)
CAB-O-2Q-400G-2M	CAB-D-2Q-400G-2M	400G Passive DAC, 2 meter (OSFP or QSFP-DD to 2x 200G QSFP)
CAB-O-2Q-400G-3M	CAB-D-2Q-400G-2.5	400G Passive DAC, 3 meter (OSFP to 2x 200G QSFP), or 2.5 meter (QSFP-DD to 2x 200G QSFP)

What do the letters OSFP and QSFP-DD stand for?

The OSFP stands for an “Octal Small Form-factor Pluggable”. It is described as an “Octal” module because the electrical interface of an OSFP connector consists of 8 electrical lanes, running at 50Gb/s each, for a total of bandwidth of 400Gb/s.

The QSFP-DD stands for a “Quad Small Form-factor Pluggable (QSFP) – Double Density (DD)”. The QSFP-DD connector also has 8 electrical lanes. The QSFP-DD form factor is similar to the QSFP form factor, except a second row of electrical contacts has been added to the QSFP connector in order to increase the number of high speed electrical lanes from 4 (in a QSFP) to 8 (in a QSFP-DD).

Can I plug in an OSFP module into a QSFP-DD port, or a QSFP-DD module into an OSFP port?

No – the OSFP and the QSFP-DD are two physically distinct form factors. If you have an OSFP system, then OSFP optics and cables must be used. If you have a QSFP-DD system, then QSFP-DD optics and cables must be used.

Can I have an OSFP on one end of a 400G link, and a QSFP-DD on the other end?

Yes – the OSFP and QSFP-DD describe the physical form factor of the module. As long as the Ethernet media types are the same (i.e. both ends of the link are 400G-DR4, or 400G-FR4 etc), OSFP and QSFP-DD modules will interop with each other.

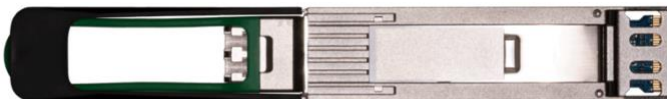
Can I plug in a QSFP module into an OSFP port?

Yes. A QSFP (40G or 100G) module can be inserted into an OSFP port by using a simple, completely passive, mechanical adapter. This adapter is available from Arista, with part number ADPT-O-Q-100G. The adapter, and the adapter with a QSFP plugged into it, are shown below.

OSFP to QSFP adapter (ADPT-O-Q-100G)



OSFP to QSFP adapter, with a 100G QSFP plugged in



When using a QSFP module in an OSFP port, the OSFP port must be configured for a data rate of 100G (or 40G), instead of 400G.

Can I plug in a 100G QSFP module into a QSFP-DD port?

Yes. A QSFP (40G or 100G) module can also be inserted into a QSFP-DD port (without a mechanical adapter). When using a QSFP module in an QSFP-DD port, the QSFP-DD port must be configured for a data rate of 100G (or 40G), instead of 400G.

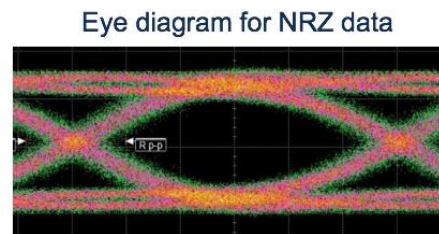
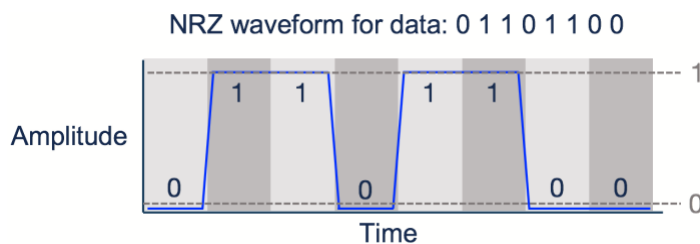
What do the suffixes “SR8, DR4, FR4 and 2FR4” stand for?

The letters are reach specifications, and the number refers to the number of optical channels:

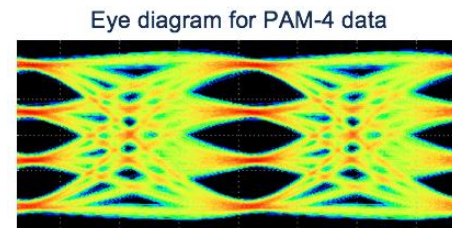
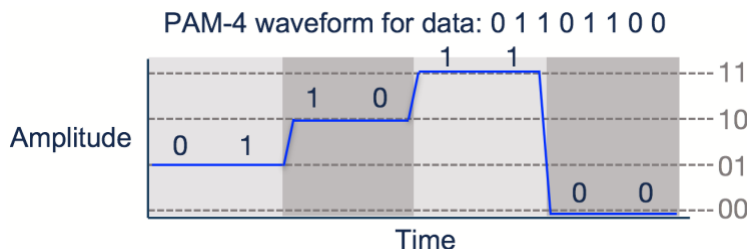
- i) **SR8:** “SR” refers to 100m reach using multi-mode fiber, and “8” implies there are 8 optical channels. Each of the 8 optical channels from an SR8 module are carried on separate fibers, resulting in a total of 16 fibers (8 Tx and 8 Rx). Each optical channel operates at 50Gb/s. The SR8 module uses an MPO-16 connector to connect to 8 fiber pairs.
- ii) **DR4:** “DR” refers to 500m reach using single-mode fiber, and “4” implies there are 4 optical channels. Each of the 4 optical channels from a DR4 module are carried on separate fibers, resulting in a total of 8 fibers (4 Tx and 4 Rx). Each optical channel operates at 100Gb/s. The DR4 module uses an MPO-12 connector to connect to 4 fiber pairs.
- iii) **FR4:** “FR” refers to 2km reach using single-mode fiber, and “4” implies there are 4 optical channels. Unlike the DR4 and SR8, all of the 4 optical channels from an FR4 are multiplexed onto one fiber, resulting in a total of 2 fibers from the module (1 Tx and 1 Rx). Each optical channel operates at 100Gb/s. The FR4 module uses a duplex LC connector to connect to a single fiber pair.
- iv) **2FR4:** The “2FR4” refers to 2 x 200G-FR4 links, and has a reach of 2km using single-mode fiber. Each of the 200G FR4 links has 4 optical channels, multiplexed onto one fiber pair (1 Tx and 1 Rx per 200G link). A 400G-2FR4 module has 2 of these links, resulting in a total of two pairs of single mode fiber (or 4 fibers total), and a total of 8 optical channels. Each optical channel operates at 50Gb/s. The 2FR4 module uses a dual CS connector to connect to 2 fiber pairs.

What does it mean when an electrical or optical channel is PAM-4 or NRZ?

NRZ stands for “Non Return to Zero” modulation, and describes an electrical or optical data channel where there are only two allowed amplitude levels (or symbols), with one amplitude level representing a digital ‘1’ and the other level representing a digital ‘0’. This is the predominate modulation scheme for transmitting data up to 25Gb/s, and is the simplest way to transmit digital data. The diagram below shows an example of an NRZ waveform, along with an ‘eye diagram’ for NRZ data. An eye diagram is simply a way of viewing a modulation scheme with each bit value superimposed on each other.



PAM-4 stands for Pulse Amplitude Modulation – 4, where ‘4’ refers to the number of different amplitude levels (or symbols) of the electrical or optical signal carrying the digital data. In this case, each amplitude level (or symbol) represents two bits of digital data. This enables a PAM-4 waveform to transmit twice as many bits as a NRZ waveform at the same symbol (or “toggle”) rate. The diagram below shows an example of a PAM-4 waveform, along with an eye diagram for PAM-4 data.

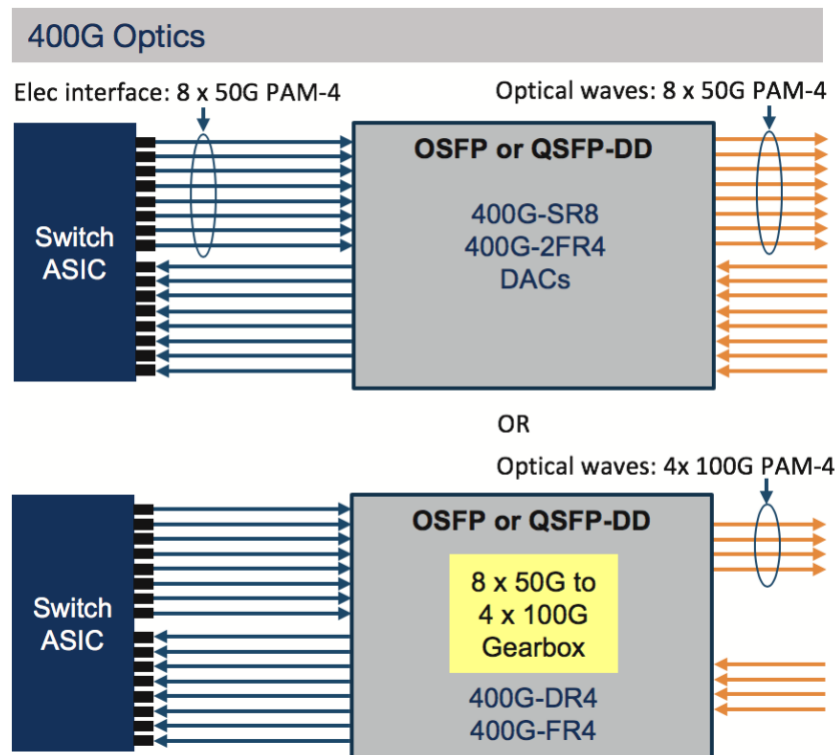


When a signal is referred to as “25Gb/s NRZ” or “25G NRZ”, it means the signal is carrying data at 25 Gbit / second with NRZ modulation. When a signal is referred to as “50G PAM-4”, or “100G PAM-4” it means the signal is carrying data at a rate of 50 Gbit / second, or 100 Gbit / second, respectively, using PAM-4 modulation.

What is the reach, fiber type, connector, and optical modulation for each 400G transceiver type?

The table below summarizes the key parameters for the different 400G transceivers supported in Arista’s platforms. Note that in all of the transceivers listed below, the electrical connector interface is always 8 x 50Gb/s PAM-4 (for a total of 400Gb/s). The optical signals however could be 8 x 50Gb/s PAM-4, or 4 x 100Gb/s PAM-4, depending on the type of module. For the modules that have 4 x 100Gb/s PAM-4 optical lanes, a gearbox chip inside the module converts the 8 x 50Gb/s PAM-4 electrical signals (from the board) to 4 x 100Gb/s PAM-4 signals required to modulate the optical signals. This is illustrated in the diagram below the table.

OSFP Part Number	QSFP-DD Part No.	Reach	Fiber type	Optical connector	No. of Fiber pairs	Optical waves per fiber	Optical modulation
OSFP-400G-SR8	-	100m	Parallel MMF	MPO-16 Angled Connector (APC)	8	1	50G PAM-4
OSFP-400G-DR4	QDD-400G-DR4	500m	Parallel SMF	MPO-12 Angled Connector (APC)	4	1	100G PAM-4
OSFP-400G-XDR4	QDD-400G-XDR4	2km	Parallel SMF	MPO-12 Angled Connector (APC)	4	1	100G PAM-4
OSFP-400G-FR4	QDD-400G-FR4	2km	SMF	LC	1	4	100G PAM-4
OSFP-400G-2FR4	-	2km	SMF	2 x CS	2	4	50G PAM-4



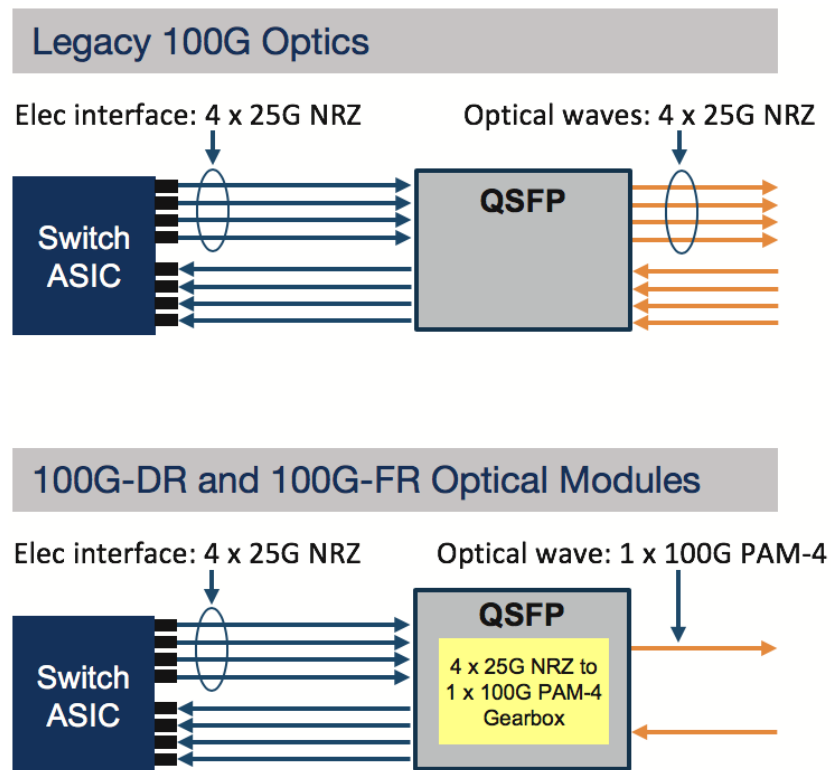
What are the 100G-DR and 100G-FR QSFP transceivers?

The 100G-DR and 100G-FR transceivers are 100G QSFP modules that can be plugged into any Arista 100G QSFP port. The part numbers for these parts are **QSFP-100G-DR** and **QSFP-100G-FR**.

The electrical connector interface is 4 x 25G NRZ – the same as all existing ‘legacy’ 100G QSFP modules. The optical output of a 100G-DR or 100G-FR module however is a single 100Gbit/s PAM-4 optical signal. The 100G-DR and 100G-FR modules includes a gearbox chip to convert the 4 x 25G NRZ electrical signals to a 1 x 100G PAM-4 optical signal. This is in contrast to legacy QSFP100 modules (such as a CWDM4 or LR4 100G module), which have 4 x 25G NRZ optical wavelengths multiplexed onto one fiber.

Because of the different optical modulation scheme, 100G-DR and 100G-FR modules will not interoperate with legacy 100G modules (such as CWDM4, LR4 etc), but they will interop with 400G-DR4 and 400G-XDR4 modules using breakout cables. The 100G-DR will also interop with the 100G-FR, over a distance of 500m.

The difference between legacy 100G QSFP module, and a 100G-DR / FR module is illustrated below.



The 100G-DR module has a reach of 500m over SMF, and is designed to interoperate with a 400G-DR4 transceiver using a breakout cable. Each 400G-DR4 module can connect to 4 x 100G-DR modules.

The 100G-FR module has a reach of 2km over SMF, and is designed to interoperate with a 400G-XDR4 module using a breakout cable. Each 400G-XDR4 module can connect to 4 x 100G-FR modules.

What does QSFP28, QSFP56 and SFP56 mean? What nomenclature should be used to describe the different types of QSFP and SFP ports?

The emergence of PAM-4 signaling has increased the types of interfaces available in QSFP and SFP form-factors. The table below summarizes how Arista describes each media type.

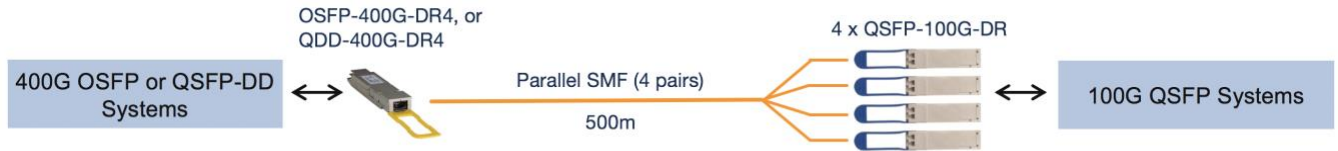
Arista Port / Module name	Other industry names	No. of Elec. lanes	Modulation	Comments
QSFP+ or 40G QSFP	QSFP+	4	10G NRZ	The QSFP was originally defined for <10G speeds. When it was adopted for 40G, it was called a QSFP+.
100G QSFP	QSFP28	4	25G NRZ	The "28" in QSFP28 refers to the max data rate (28Gb/s) each electrical lane can handle.
50G QSFP	50G QSFP28	2	25G NRZ	A 50G QSFP uses 2 out of the 4 available electrical lanes on a QSFP connector, with each lane running at 25Gb/s NRZ. It is used on some NICs and servers. No Arista products have 50G QSFP ports, but 100G QSFP ports can be connected to third party 50G QSFP ports using a copper breakout cable (DAC).
200G QSFP	QSFP56	4	50G PAM-4	A 200G QSFP uses 4 x 50Gb/s PAM-4 elec lanes. "56" refers to the the max data rate (56Gb/s) each elec interface can handle. No current Arista products have 200G QSFP ports, but 400G ports can be connected to 200G QSFP ports using fiber or copper breakout cables (see sections below for breakout options).
50G SFP	SFP56	1	50G PAM-4	A 50G SFP that uses 1 x 50Gb/s PAM-4 elec lanes. This interface may be present on future NICs and servers. No current Arista products have 50G SFP ports, but a 400G port can be connected to 50G SFP ports using fiber or copper breakout cables (see sections below for breakout options)
25G SFP	SFP28	1	25G NRZ	The "28" refers to the maximum data rate on the single electrical lane, with 25G being the Ethernet rate
10G SFP or SFP+	SFP+	1	10G NRZ	SFPs were originally designed for < 10G speeds. When it was adopted for 10G, it became known as an SFP+.

How can I break out a 400G optic to connect to 100G QSFP ports on existing platforms?

There are a few different ways to do this, summarized below.

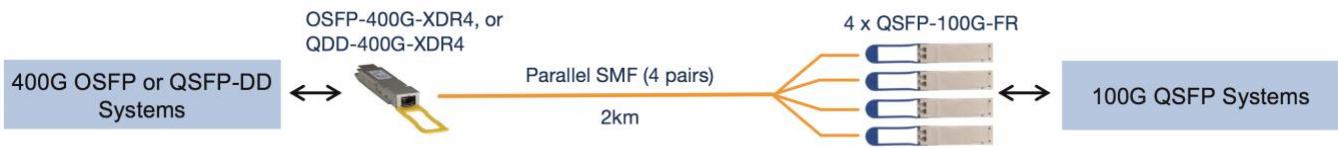
i) **OSFP-400G-DR4 (or QDD-400G-DR4) to 4 x QSFP-100G-DR over 500m SMF.**

The QSFP-100G-DR can plug into any Arista 100G QSFP port. Connect up to 4 x QSFP-100G-DRs to a single OSFP-400G-DR4 (or QDD-400G-DR4) using a single mode breakout cable.



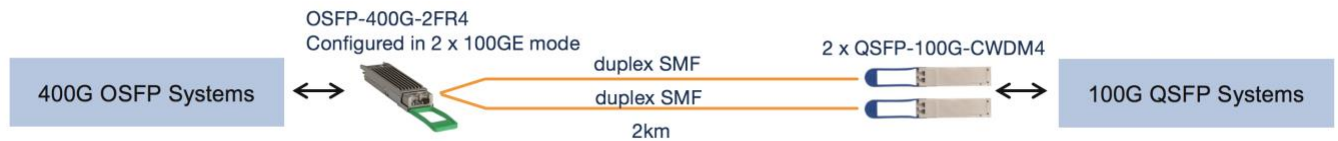
ii) **OSFP-400G-XDR4 (or QDD-400G-XDR4) to 4 x QSFP-100G-FR over 2km SMF:**

The QSFP-100G-FR can plug into any Arista 100G QSFP port. Connect up to 4 x QSFP-100G-FRs to a single OSFP-400G-XDR4 (or QDD-400G-XDR4) using a single mode breakout cable.



iii) **OSFP-400G-2FR4 to 2 x QSFP-100G-CWDM4 over 2km SMF:**

If an OSFP port is configured for 2 x 100G (i.e. 200G total bandwidth), the OSFP-400G-2FR4 module can be used to connect to 2 x QSFP-100G-CWDM4 transceivers over duplex single mode fibers. Configuring an OSFP port for 200G total bandwidth means each of the 8 electrical lanes to/from the OSFP operate at 25Gb/s NRZ, which is the same modulation format used in legacy 100G QSFP ports.



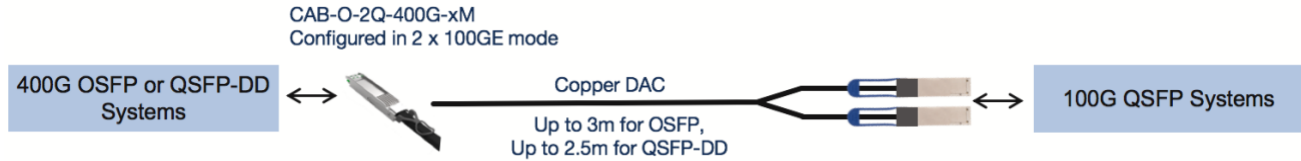
iv) **OSFP-400G-SR8 to 2 x QSFP-100G-SR4 QSFPs over 100m MMF:**

If an OSFP port is run at 200G total bandwidth, the OSFP-400G-SR8 module can be used to connect to 2 x QSFP-100G-SR4 transceivers using a multimode breakout cable.



v) **Passive DAC breakout cable using CAB-O-O-2Q (or CAB-D-D-2Q)**

If the OSFP or QSFP-DD port is run at 200G total bandwidth, a passive DAC breakout cable can be used to connect an OSFP or QSFP-DD port into 2x 100G QSFP ports.



What other breakout options are possible?

The tables below summarize the breakout options for 400G OSFP and QSFP-DD ports. In the tables below, the term “near end” transceiver refers to the transceiver / cable plugged into the OSFP or QSFP-DD port, and the “remote end” refers to the “broken out” transceiver / cable connected to the QSFP or SFP port. For completeness, these tables include breakouts to the 100G QSFP ports already described above.

Breakout options using OSFP or QSFP-DD optical modules

Near end port	Near end port config	Fiber type	No. of fiber pairs	No. of waves per fiber	Optical Modulation	Remote end
OSFP-400G-SR8	2 x 100G*	Parallel MMF, 100m	8	1	25G NRZ	2 x QSFP-100G-SR4
OSFP-400G-DR4 or QDD-400G-DR4	4 x 100G	Parallel SMF, 500m	4	1	100G PAM-4	4 x QSFP-100G-DR
OSFP-400G-XDR4 or QDD-400G-XDR4	4 x 100G	Parallel SMF, 2km	4	1	100G PAM-4	4 x QSFP-100G-FR
OSFP-400G-2FR4	2 x 200G	2 x duplex SMF, 2km	2	4	50G PAM-4	2 x Third party 200GBASE-FR4 QSFP modules **
	2 x 100G*	2 x duplex SMF, 2km	2	4	25G NRZ	2 x QSFP-100G-CWDM4

* The OSFP / QSFP-DD port is configured for an aggregate bandwidth of 200G (instead of 400G).

** These optics are not available as Arista branded optics. These breakout options are provided for cases where breakouts to non-Arista equipment are needed.

Breakout options using OSFP or QSFP-DD copper DACs

Near end port	Near end port config	Electrical Modulation	Reach	Remote port
CAB-O-2Q-400G-xM or CAB-D-2Q-400G-xM	2 x 200G	50G PAM-4	1m, 2m, 3m (OSFP) 1m, 3m, 2.5m (QSFP-DD)	2 x Third party 200G QSFP ports ***
	2 x 100G*	25G NRZ	1m, 2m, 3m (OSFP) 1m, 3m, 2.5m (QSFP-DD)	2 x 100G QSFP ports
	2 x 40G**	10G NRZ	1m, 2m, 3m (OSFP) 1m, 3m, 2.5m (QSFP-DD)	2 x 40G QSFP ports
CAB-O-4Q-400G-xM or CAB-D-4Q-400G-xM	4 x 100G	50G PAM-4	1m, 2m, 3m (OSFP) 1m, 3m, 2.5m (QSFP-DD)	4 x Third party 100G QSFP ports, using 2 x 50G PAM-4 lanes per port ***
	4 x 50G	25G NRZ	1m, 2m, 3m (OSFP) 1m, 3m, 2.5m (QSFP-DD)	4 x Third party 50G QSFP ports ***
CAB-O-8S-400G-xM or CAB-D-8S-400G-xM	8 x 50G	50G PAM-4	1m, 2m, 3m (OSFP) 1m, 3m, 2.5m (QSFP-DD)	8 x Third party 50G SFP ports ***
	8 x 25G*	25G NRZ	1m, 2m, 3m (OSFP) 1m, 3m, 2.5m (QSFP-DD)	8 x 25G SFP ports
	8 x 10G**	10G NRZ	1m, 2m, 3m (OSFP) 1m, 3m, 2.5m (QSFP-DD)	8 x 10G SFP ports

* The OSFP / QSFP-DD port is configured for an aggregate bandwidth of 200G (instead of 400G).

** The OSFP / QSFP-DD port is configured for an aggregate bandwidth of 80G (instead of 400G).

*** No current Arista products have these ports. These breakout options are provided for cases where breakouts to non-Arista equipment are needed.

What is the maximum supported distance for 400G Transceivers and Cables?

The maximum distance currently supported by Arista's 400G transceivers is 2km over SMF, using either the 400G-FR4 or 400G-2FR4 modules. For up to 10km reach, the 400G-LR4 specification will be supported.

For copper DACs, a max length of 3m is supported for OSFP cables, and a max length of 2.5m is supported for QSFP-DD cables.

For DWDM links, Arista will provide future support for OSFP 400G-ZR coherent modules capable of closing 120km DWDM links. The OSFP 400G-ZR module could be plugged into any Arista OSFP port, allowing coherent DWDM directly from the switch, eliminating the requirement for expensive optical transport equipment.

What industry standards are associated with each of the 400G Transceivers and Cables?

The table below summarizes the Arista 400G transceivers and cables and the associated industry standards.

Product Number	Associated Industry Standard
CAB-O-O-400G-xM, and CAB-D-D-400G-xM	There is no official IEEE standard for 400G over copper, however the implementation is often referred to as 400G-CR8, and follows the electrical specifications of 200GBASE-CR4, as per IEEE 802.3cd
OSFP-400G-SR8	400GBASE-SR8, as defined in IEEE802.3cm. Breaks out to 8 x 50G-SR, as defined in IEEE 802.3cd
OSFP-400G-DR4, and QDD-400G-DR4	400GBASE-DR4, as defined in IEEE 802.3bs. Breakout to 100G-DR (IEEE 802.3cd)
OSFP-400G-XDR4, and QDD-400G-XDR4	No official standard, but similar to DR4, but with 2km reach, and designed to interop with 100G-FR, as defined in the 100G Lambda MSA.
OSFP-400G-FR4, and QDD-400G-FR4	400-FR4, as defined in the 100G Lambda MSA. http://100glambda.com/
OSFP-400G-2FR4	2 x 200GBASE-FR4, as defined in IEEE 802.3bs
QSFP-100G-DR	100GBASE-DR, as defined in IEEE 802.3cd
QSFP-100G-FR	100G-FR, as defined in the 100G Lambda MSA http://100glambda.com/

What is the maximum power consumption of 400G OSFP and QSFP-DD transceivers?

The power consumption of 400G client transceivers will range from 7W to 15W per port. Coherent DWDM transceivers may draw up to as much as 20W per port. Refer to the transceiver data sheet for power consumption values of individual modules.

What are the pros and cons of using OSFPs or QSFP-DDs?

Arista platforms will support both the OSFP and the QSFP-DD form factors – in other words, Arista will provide OSFP compatible hardware, and QSFP-DD compatible systems. The table below summarizes the differences (and similarities) between the two form factors.

Feature	OSFP	QSFP	Comments
36 x 400G ports in 1RU (enabling 14.4T in 1RU)	Yes	Yes	
Up to 20W thermal capacity	Yes	No	<p>The OSFP has been designed with an integrated heatsink to allow for greater thermal capacity. Increased thermal capacity provides the following advantages:</p> <ul style="list-style-type: none"> • Lower technical risk in supporting fully filled systems over the full temperature range. • Able to support coherent DWDM optics (400G-ZR), that may draw between 15W – 20W of power. <p>By installing platforms with OSFP ports now, a customer will have the option of using longer reach DWDM optics in the future. This can save significant expense by eliminating the need for expensive, dedicated optical transport systems.</p> <ul style="list-style-type: none"> • Easier to handle in the field due to a lower case temperature than an equivalent QSFP-DD.
Backwards compatible with 100G QSFPs	Yes	Yes	QSFP modules can be used in an OSFP port using a passive OSFP-QSFP adapter. QSFP modules can be used in a QSFP-DD port without using a passive adapter.
Forwards compatible with 800G systems	Yes	No	<p>The OSFP has been designed with 800G support in mind. Future 800G OSFP systems will be able to accept existing 400G OSFP modules.</p> <p>The QSFP-DD has not been designed for 800G, and is unlikely to be able to support the thermal or signal integrity requirements of 800G modules.</p>
Max copper DAC length	3m	2.5m	The DAC cable length for the QSFP-DD is less than the OSFP because of the mechanical limitations of terminating a 26 gauge DAC cable into the smaller sized QSFP-DD module.

What type of optical connectors do the 400G-DR4, 400G-XDR4, 400G-SR8 and 400G-2FR4 transceivers use?

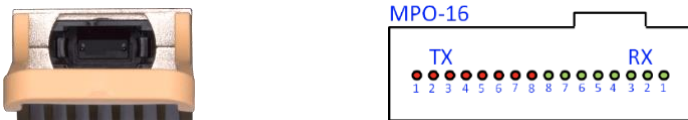
The 400G-DR4 and 400G-XDR4 optics modules use a single row, angled (APC) MPO12 connector for use with single mode fiber. Although a MPO12 cable can have up to 12 SMF fibers, only 8 out of the 12 fibers are used (4 for Tx and 4 for Rx).

An image, and a schematic drawing of an MPO12 connector are shown below:



The 400G-SR8 optics module uses a single row, angled (APC) MPO16 connector for use with multi-mode fiber. All 16 fibers are used (8 Tx and 8 Rx).

An image, and a schematic drawing of an MPO16 connector are shown below:



The 400G-2FR4 optics module uses 2 x CS connectors, for use with single mode fiber. An image, and a schematic drawing of 2 x CS connectors is shown below:



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