# Seamless Upgrade from 10G to 25G using Multi-Rate 25G / 10G Optics

With workloads migrating to the cloud, and the need for enterprise networks to support HD and 4K video, new applications for collaboration, and streaming data from IoT devices, traffic growth in both campus and datacenter networks has accelerated.

Many campus networks and systems are built on 10G Ethernet technology. Upgrading from 10G to 25G Ethernet increases network throughput by 2.5x and is the quickest and simplest way to keep pace with increased bandwidth demands. When it comes to optics and the fiber plant however, upgrading from 10G to 25G presents two challenges:

1. While many 25G switching platforms can be operated at either 10G or 25G, optics have usually been single rate devices. This creates a challenge for any phased network migration - for example, first upgrading the spine or edge to 25G, then upgrading the leaf nodes and servers as required. Single-rate optics require both ends of the link to be upgraded simultaneously, which requires coordination.

2. For Multimode Fiber (MMF) networks, the reach of IEEE standard 25GBASE-SR optics is 100m over OM4 MMF, considerably shorter than the 400m reach of equivalent 10GBASE-SR optics. The shorter reach of 25G-SR optics means that upgrading from 10G to 25G may also require replacing the fiber plant which is costly, disruptive, and time-consuming.

To address these challenges, Arista has introduced multi-rate 25G and 10G optics for both MMF and single-mode fiber (SMF) networks, enabling network operators to mix and match optics with hardware, and simplify the migration of deployed systems.
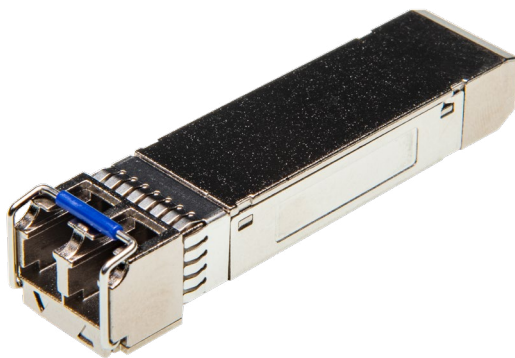
SFP-25G-MR-LR: *10G/25G Dual rate SFP, up to 10km over duplex SMF*

SFP-25G-MR-XSR: *10G/25G Dual rate SFP, up to 200m/300m over OM3/OM4 MMF*

Advantages of Arista's 25G-MR optics include:

- **Simplify network upgrades:** The dual rate (25G/10G) feature enables easy upgrade of 10G networks to 25G as needed, over time.

- **Backward compatible:** 25G-MR optics can be used in *any* Arista 10G SFP+ or SFP25 switch/router port running EOS release 4.23.2 or later. The transceiver can be configured for 10G or 25G, depending on the capability of the switch port.

- **Extended reach:** The 25G-MR-XSR optic has an extended reach of 300m over OM4 at 25G, and a reach of 400m over OM4 at 10G, closely matching the reach of 10G-SR optics (400m over OM4), enabling network upgrades without changing the fiber plant.

- **Future proof the physical layer while saving capex:** Installing 25G-MR optics when deploying 10G platforms allows easy upgrade to 25G without requiring the purchase of new optics, saving capex and future proofing the network.

- **Simplify Sparing:** Stock a single part for both 10G and 25G connectivity.

The diagram below illustrates how networks can be upgraded from 10G to 25G with no change to the optics or fiber plant by utilizing the dual-rate capabilities of Arista's MR optics.
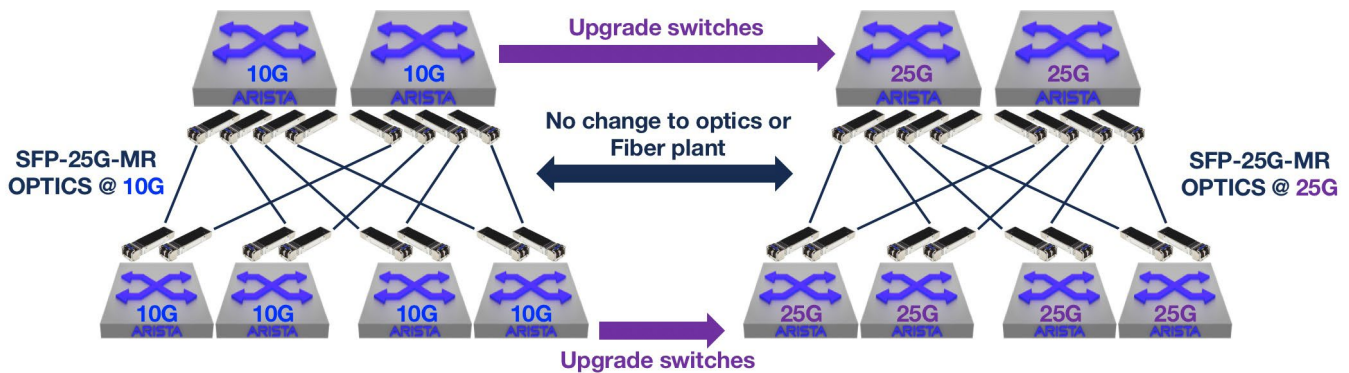

Figure 1: Save by re-using Arista's Multi-Rate optics in both 10G and 25G networks

The tables below summarize the key specifications of Arista's multi-mode and single-mode 10G/25G multi-rate optics compared to equivalent single-rate devices.

Table 1: Single-rate vs Multi-Rate optics for MMF: Reach, data rate, and compatibility					
Transceiver	Reach (OM4)	Data Rate(s)	Compatible with 10G SFP+ ports	Compatible with SFP25 port @ 10G	Compatible with SFP25 port @ 25G
SFP-10G-SR	400m	10G	YES	YES	NO
SFP-25G-SR	100m	25G	NO	NO	YES
SFP-25G-MR-XSR	400m@10G 300m@25G	25G, 10G	YES	YES	YES

Table 2: Single-rate vs Multi-Rate optics for SMF: Reach, data rate, and compatibility

Transceiver	Reach (OM4)	Data Rate(s)	Compatible with 10G SFP+ ports	Compatible with SFP25 port @ 10G	Compatible with SFP25 port @ 25G
SFP-10G-LR	10km	10G	YES	YES	NO
SFP-25G-LR	10km	25G	NO	NO	YES
SFP-25G-MR-LR	10km	25G, 10G	YES	YES	YES

The 25G/10G multi-rate optics also support 40G and 100G optical breakouts:

- The SFP-25G-MR-LR can be used for 4x 25G breakout over parallel SMF with the QSFP-100G-PSM4, and 4x 10G breakout with the QSFP-40G-PLR4/PLRL4.

- The SFP-25G-MR-XSR can be used for 4x 25G breakout over parallel MMF with the QSFP-100G-SR4, and 4x 10G breakout with the QSFP-40G-SR4/XSR4.

- When connecting 25G-MR optics to legacy fixed rate 10G and 40G optics, attenuation may be required for short links - refer to the Optics Modules and Cables Data Sheet, and the Arista Transceiver and Cable Guide for detailed optical specifications.

Arista's 25G/10G MR and extended reach transceivers are another example of Arista's leadership in addressing real customer problems, dramatically simplifying migration paths to higher speed networks. Multi-rate transceivers enable 10G networks to seamlessly upgrade to 25G using the same cable infrastructure, and leverage a single optic for both 10G and 25G. Arista's 25G/10G MR transceivers, combined with high-density Arista 10G and 25G switches, offer best in class performance for networks of any size. For more information on these and other optics see Arista Transceivers pages on Arista.com.

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