White Paper

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

With workloads shifting to the cloud and enterprise networks needing to support HD and 4K video, advanced collaboration applications, and real-time IoT data streaming, traffic growth in both campus and data centre networks has surged.

Many campus networks and systems still rely on 10G Ethernet technology. Upgrading to 25G Ethernet boosts network throughput by 2.5 times, providing a fast and efficient solution to meet increasing bandwidth demands. However, when it comes to optics and fiber infrastructure, transitioning from 10G to 25G presents two key challenges:

1. While many 25G switching platforms support both 10G and 25G operation, optics have traditionally been single-rate devices. This poses a challenge for phased network migrations—such as upgrading the spine or edge to 25G first, followed by leaf nodes and servers. Single-rate optics require both ends of a link to be upgraded simultaneously, necessitating careful coordination.

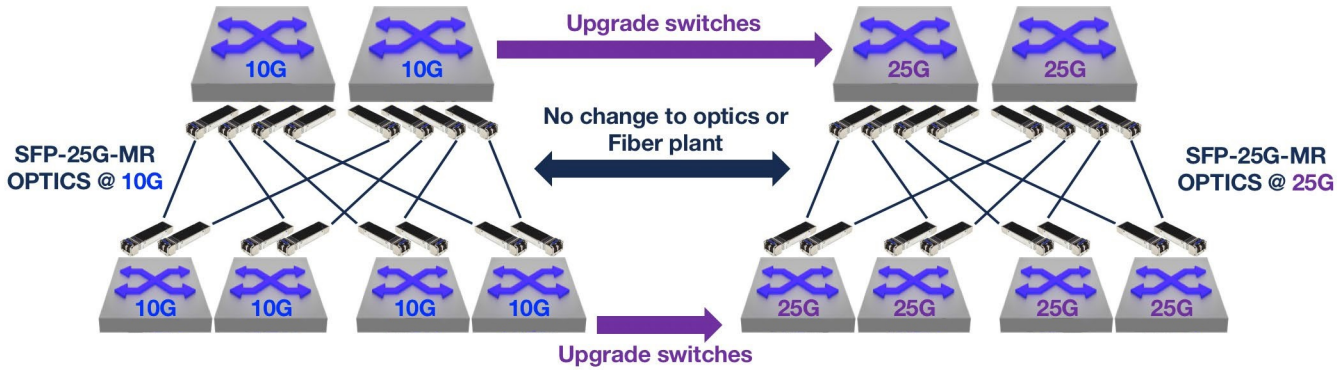
2. In Multimode Fibre (MMF) networks, IEEE standard 25GBASE-SR optics have a reach of 100m over OM4 MMF, significantly shorter than the 400m reach of 10GBASE-SR optics. This reduced reach means that upgrading from 10G to 25G may also require replacing the fibre infrastructure, which can be expensive, disruptive, and time-consuming.

To overcome these challenges, GBICS has introduced multi-rate 25G and 10G optics for both Multimode Fibre (MMF) and Single-Mode Fibre (SMF) networks. These optics allow network operators to seamlessly mix and match optics with hardware, simplifying the migration process and enabling a more flexible and efficient transition for deployed systems.

Advantages of GBICS 25G-MR products include:

- **Simplified Network Upgrades:** The dual-rate (25G/10G) capability allows for a gradual transition from 10G to 25G, making network upgrades seamless and flexible.
- **Backward Compatibility:** The transceiver can be configured for either 10G or 25G based on the switch port's capability.
- **Extended Reach:** The 25G-MR-XSR optic supports 300m over OM4 at 25G and 400m over OM4 at 10G matching the reach of 10G-SR optics allowing for upgrades without replacing the fibre plant.
- **Cost-Effective and Future-Proof:** Deploying 25G-MR optics with 10G platforms enables an easy upgrade to 25G in the future without purchasing new optics, reducing capital expenses and extending network longevity.
- **Simplified Inventory Management:** A single optic supports both 10G and 25G connectivity, reducing the need to stock multiple transceiver types.

The diagram to the right illustrates how networks can be upgraded from 10G to 25G with no change to the optics or fibre plant by utilising the dual-rate capabilities of GBICS MR optics.



The tables below summarize the key specifications of GBICS 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-CSR	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

GBICS 10/25GBASE-CSR SFP28 400m Transceiver

GBICS 10/25GBASE-LR SFP28 10km Transceiver

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

- The SFP-25G-MR-LR can be used for 4x 25G breakout over parallel SMF with the QSFP-100G-PSM4.
- The SFP-25G-MR-SR can be used for 4x 25G breakout over parallel MMF with the QSFP-100G-SR4.
- When connecting 25G-MR optics to legacy fixed rate 10G and 40G optics, attenuation may be required for short links.

GBICS 25G/10G MR and extended reach transceivers are another example of GBICS 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.

For more information on these and other optics see GBICS Transceivers pages on GBICS.com.

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