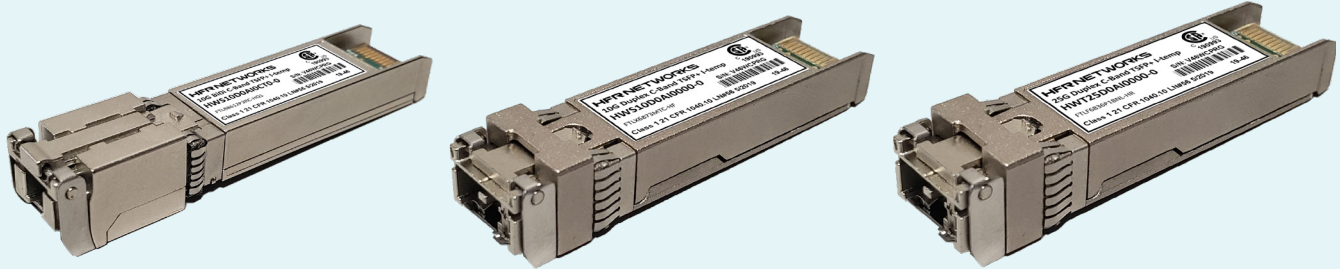


flexiHaul Smart Tunable Optics

flexiHaul Smart Tunable Optics: Intelligent, Plug-and Play, Wavelength Self-Tuning Transceivers



10 Gb/s DWDM BiDi Self-tuning

10 Gb/s DWDM Duplex Self-tuning

25 Gb/s DWDM Duplex Self-tuning

Fixed, Proprietary, and Wavelength Tunable Transceiver Challenges

Service providers are adding more Dense Wavelength Division Multiplexing (DWDM) capacity to networks to meet the growing demand for additional bandwidth. However, if fixed wavelength pluggable transceivers are utilized there are numerous issues, such as inventory management, logistics costs, and planning challenges. Fixed wavelength solutions require field technicians to stock many product variants and undergo a time-consuming, labor intensive installation process. This challenge is even more complex when certain vendors, such as RAN suppliers require “proprietary” optics that operate only with their solutions. Wavelength tunable transceivers offer a more efficient solution compared to fixed wavelength transceivers, since service providers no longer have to anticipate in advance which wavelengths will be needed for a specific deployment. Even with this advantage, wavelength tunable transceivers require an on-site technician to track fibers, and program each module with the correct wavelength – a time consuming process.

Self-tunable Transceivers: Maximum Ease of Operations, Flexibility and Lower Costs

HFR Networks has innovated by adding Smart Tunable Optics into their flexiHaul solutions, including 25G T-SFP28 duplex and 10G bidirectional products. Smart Tunable Optics are intelligent, plug-and-play, wavelength self-tuning transceivers that eliminate the need for time-consuming tasks, such as wavelength planning, manual fiber tracking, and wavelength programming. Each Smart Tunable transceiver on a DWDM optical link can automatically self-tune to the correct wavelength within ~5 minutes determined only by its physical connection to the passive mux/demux infrastructure without intervention by the host system or a field technician.

Smart Tunable transceivers use integrated firmware to determine the proper wavelengths to connect each host port to its remote end of the link. This reduces provisioning time from hours to minutes and results in significant OPEX savings for service providers in DWDM metro and access applications, such as mobile fronthaul, remote PHY, and data

center interconnections (DCI). Smart Tunable Optics allow service providers to standardize RAN or access transport across a diverse ecosystem of suppliers which reduce costs while ensuring consistent performance across the network.

HFR Networks' Smart Tunable solutions offer service providers significant operational benefits with the ability to work over a wide range of fiber channels using flexible self-tunable optics versus sourcing many different channels of fixed optics. With built-in diagnostics to ensure carrier grade operations, Smart Tunable Optics offer a variety of other key features, including electrical loopback and effortless plug-and-play installation. These solutions help service providers quickly and economically add capacity and new services to their networks, while also providing full visibility to important portions of the access or xHaul networks for efficient ongoing operations.

Key Features

- Integrates 25G T-SFP28 duplex and 10G bidirectional optics.
- Quickly adds capacity to 4G networks in parallel with new 5G service deployments across a diverse ecosystem of RAN vendors.
- Significantly simplifies the network deployment of Dense Wavelength Division Multiplexing (DWDM) transceivers.
- Offers compelling benefits over both fixed and traditional tunable optics.
- Substantially reduces inventory with only a single SKU/part# needed to support the C-band.
- Enables standardization across vendors to simplify operations and inventory versus proprietary vendor-specific optics.
- Saves hours of set-up and installation time during deployment.
- Eliminates complexity by removing the need for manual programming and fiber tracking.
- Provides built-in diagnostics for effortless plug-and-play installation and carrier grade operations.

Model	10 Gb/s DWDM Multi-rate Self-tuning Bidirectional SFP+ Transceiver	10Gb/s DWDM Multi-rate Self-tuning Duplex SFP+ Transceiver	25 Gb/s DWDM Multi-rate Self-tuning SFP28 Transceiver
Description	HFR Networks' HWS10D0AI0CT0-0 and HWS10D0AI0RT0-0 transceivers are enhanced small form factor, pluggable, self-tuning, SFP+ transceivers designed for use in 10-Gigabit multi-rate links up to 20 km of G.652 single mode fiber. They are compliant with SFF-8431I, SFF-84322, SFF-86908, and support CPRI, eCPRI and 10GbE over 20 km of fiber. This transceiver features electrical loopback. The optical transceiver is compliant per the EU's Directive 2011/65/EU.	HFR Networks' HWS10D0AI0000-0 transceivers are enhanced small form factor, pluggable, self-tuning, SFP+ transceivers designed for use in 10-Gigabit multi-rate links up to 80 km of G.652 single mode fiber. They are compliant with SFF-8431I, SFF-84322, SFF-86908, and G.698.1 DS100S1-2Dz(C), and support CPRI, eCPRI and 10GbE over 80 km of fiber. The optical transceiver is RoHS compliant (per Directive 2002/95/EC) and lead free per Directive 2011/65/EU4.	HFR Networks' HWT25D0AI0000-0 transceivers are enhanced small form factor, pluggable, self-tuning, SFP28 transceivers designed for use in 25 Gb/s links up to 15 km of G.652 single mode fiber. They are compliant with SFF-8431I, SFF-84322, SFF-86908, and support CPRI, eCPRI and 10GbE/25GbE over 15 km of fiber. This transceiver features electrical loopback. The optical transceiver is RoHS compliant (per Directive 2002/95/EC) and lead free per Directive 2011/65/EU4.
Form Factor	SFP+	SFP+	SFP28
Speed	Supports 1.2 to 11.3 Gb/s	Supports up to 11.3 Gb/s	Supports 25.78 Gb/s Ethernet and 24.33 Gb/s CPRI-10; also Supports Lower Data Rates with CDR Bypass
Link Budget	19 dB @ 10.7 Gb/s	22 dB @ 10.7 Gb/s	17 dB @ 24.33 or 25.78 Gb/s
BiDi / Duplex	Bi-Directional	Duplex	Duplex
Channels	40 CH, ITU-T C -Band 100 GHz Grid	40 CH, ITU-T C -Band 100 GHz Grid	40 CH, ITU-T C -Band 100 GHz Grid
Operating Temperature	HWS10D0AC0CT0-1: -5 ~ 75 °C HWS10D0AI0RT0-0: -20 ~ 85 °C with -40 °C Cold Start HWS10D0AI0CT0-0: -20 ~ 85 °C with -40 °C Cold Start	HWS10D0AI0000-0: -40 ~ 85 °C	HWT25D0AI0000-0: -20 ~ 85 °C with -40 °C Cold Start
Smart Features	Self-Tuning Remote Loopback Remote DDM Remote WL Locking	Self-Tuning Remote DDM	Self-Tuning Remote Loopback Remote DDM Remote WL Locking