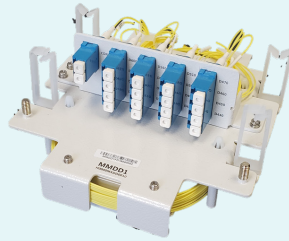# HFR NETWORKS

flexiHaul Passive Optical Products

A Broad Portfolio of Solutions to Meet Specific xHaul Requirements

- Outdoor, Strand & Manhole
- Course & Dense Wave Multiplexers
- Thin Film Filters
- Band Pass Filter for Cascading
- Variable DWDM WL Drop

Delivering Complete Solutions

HFR Networks has extensive experience with large scale deployments, as well as relationships across a rich vendor ecosystem. We are often tasked with sourcing additional components to deliver the ideal end-to-end design for our customers. With our global deployment experience, HFR Networks is skilled at integrating other best of breed components into our open solutions to provide high performance with a rapid time to market, while always achieving superior economics to ensure the customer's business case is met. We have a broad portfolio of components to draw upon and can quickly deliver modifications needed to meet a customer's specific requirements.

HFR Networks' flexiHaul Passive Optical Products offer a wide variety of course wave and dense wave multiplexers. With add drop wavelength counts and full mux demux solutions ranging from 2 to 80 wavelengths, we can deliver the passive optical solution optimized to solve an operator's specific business challenge.

For example, HFR Networks' solution for 5G network deployments includes a 32 wavelength, 100GHz thin film filter (TFF) that passes two bidirectional 50GHz wavelengths per port with very low signal loss. Building a linear chain design of four by eight wavelength drop modules, we deliver access to multiple towers with one fiber drop to enable enough wavelengths for up to four sites, simulaneously supporting both legacy 4G and future 5G requirements. These filters are specifically designed with HFR Networks' Smart Tunable Optics for a complete fronthaul semi-passive network from the baseband units (BBUs) to the network of remote radio heads (RRHs).

Passive Optical Products*

Part Number	Description
H7200CHS00000-0	7200 Passive Chassis
H7200IK000000-0	8500 Mux Installation Kit for 7200
H7200MF000000-0	8300 Mux Adaptor Frame for 7200
H7200MF010000-0	8100 Mux Adaptor Frame for 7200
H7200MF020000-0	Common Mux Adaptor Frame for 7200
H7200MF02000B-0	7200 Dual Mux Adaptor Frame (PMF80B)

*This list does not include all of HFR Networks' Passive Optical products. Please contact us for a complete product listing to meet your specific requirements.

About HFR Networks

HFR Networks, Inc. is leading the industry with our flexiHaul portfolio of intelligent xHaul RAN Transport and Edge Access solutions. We solve today's most critical RAN transport demands, especially when fiber is constrained for fronthaul or backhaul applications. Our solutions have optimized economics for this segment of the network, while also delivering high performance, simplified operations, interoperability across wireless technologies, and a diverse ecosystem of 3rd party RAN suppliers. HFR Networks' technological leadership helps customers to lower costs for 3G/4G operations, while also accelerating new 5G and Ethernet services. We enable advanced mobile networks by utilizing nanosecond timing to connect radios using CPRI and eCPRI, within both traditional and cloud-based mobile architectures.

flexiHaul Solutions for Intelligent RAN Transport

flexiHaul Packet M-Series TSN Switch

Flexible Fronthaul and Backhaul Solution for 4G and Beyond

HFR Networks' M-Series Solutions: CPRI, eCPRI and Ethernet Multiplexing for xHaul

The M6424 platform, HFR Networks' flexiHaul packet solution, is a cost-effective, scalable, high capacity TSN switch that delivers superior economics and enables the ability to combine RAN transport with other traffic types such as Ethernet business services on a common infrastructure. Purpose built for time sensitive networks, the M6424's state-of-the-art, high performance design enables advanced mobile networking architectures and applications with nanosecond timing requirements.

The M6424 connects radios with nanosecond timing using Common Public Radio Interface (CPRI) and eCPRI to bridge traditional mobile networks and Ethernet services, supporting modern centralized or cloud-based architectures. Encapsulating CPRI traffic, the M6424 utilizes IEEE 1914.3 compliant Radio over Ethernet mappers with integrated synchronization to provide higher performance, simplified operations and significant cost savings.

flexiHaul C-RAN 8000 Solutions

HSN8000 Series: Pay-As-You-Grow Architecture for Optimal Performance, Rapid Service Deployment, and Cost Effective Operations

HSN8500
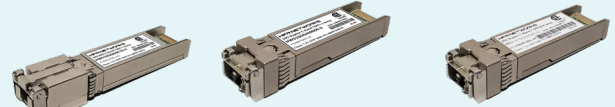HSN8300
HSN8100
HSN8130
HSN8120

Flexible xHaul Solution for 4G and 5G

HFR Networks' flexiHaul C-RAN 8000 xHaul solutions offer a complete portfolio of CPRI and Ethernet over WDM solutions for cost effective and high performance transportation of mobile traffic and Carrier Ethernet offerings. These field proven WDM solutions support CPRI transport with low latency, minimal jitter, and unparalleled flexibility across active or passive WDM and DWDM configurations. HFR Networks' solutions have been proven in large scale customer deployments at leading global tier one mobile operators. These C-RAN solutions enable service providers to rapidly expand mobile services, especially when fiber is constrained and it is imperative to quickly to add capacity to create new revenue streams.

flexiHaul Smart Tunable Optics

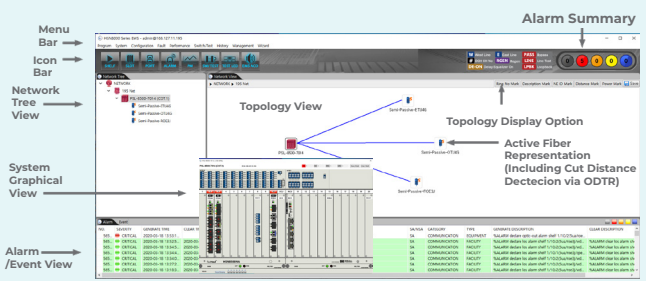**flexiHaul Smart Tunable Optics: Intelligent, Plug-and Play, Wavelength Self-Tuning Transceivers**

10 Gb/s DWDM Duplex Self-Tuning

10 Gb/s DWDM BiDi Self-Tuning

25 Gb/s DWDM Duplex Self-Tuning

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.

flexiHaul Element Management System

EMS For flexiHaul C-RAN & M-Series TSN Switch Solutions

flexiHaul Element Management System: HSN8800NA

Carrier-Class EMS Enables Simplified Operations

HFR Networks' flexiHaul Element Management System (EMS) offers full visibility and operational control into remotely deployed RAN transport and Ethernet access equipment. Easy to install and operate, HFR Networks' EMS greatly simplifies network operations. Pre-integrated with HFR Networks' solutions, this highly scalable, carrier-class software solution runs on commercial off-the-shelf hardware or in a cloud instance. This ensures operators can quickly install new services while also maintaining higher performance in order to exceed their customers' service level agreements (SLAs). Highly intuitive, the flexiHaul EMS helps optimize operations across a range of xHaul and Ethernet access service use cases, including mobile fronthaul/backhaul applications and converged Carrier Ethernet offerings.

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