



# FlexPort80™

80 GHz High-Capacity Wireless Carrier Backhaul

## 80 GHz WIRELESS LINKS FOR FUTURE-PROOF HIGH BANDWIDTH APPLICATIONS

The FlexPort™ family of high capacity millimeter wave radios offers carriers, service providers, government and enterprise users the ultimate flexibility in an access and aggregation/backhaul solution for today's legacy SDH/SONET-based networks, while seamlessly providing a future-proof transition to enable tomorrow's Ethernet-based applications. The FlexPort80 is the first carrier-class solution to enable simultaneous transmission of native SDH/SONET and Ethernet protocols, efficient network planning and spectrum utilization, and Carrier Ethernet capabilities designed specifically to enable cost-effective, scalable backhaul migration for 4G network deployments.

Carrier Ethernet services are provided via FlexPort thru the use of full-rate gigabit transmission coupled with carrier-grade features such as Quality of Service (Qos), VLAN support, as well as integrating Ethernet OAM network management into a compact, all-outdoor package.

BridgeWave is the market leader in providing highly reliable gigabit wireless solutions. The FlexPort family of products leverages our expertise in designing and bringing to market carrier-class millimeter wave solutions that have been accepted and used in thousands of installations worldwide.



**FlexPort80**



**FlexPort80X**

### WIRELESS VIRTUAL FIBER SOLUTIONS FOR:



**Mobile Backhaul**

Future-proof full-rate gigabit backhaul for next generation 4G/LTE/WiMAX backhaul.



**Service Provider**

High-capacity business services, fiber extensions, cellular/Wi-Fi/WiMAX backhaul, redundant fiber overlays, mesh.



**Enterprise**

Server centralization, remote data storage and backup, leased line replacement.



**Healthcare**

Secure, HIPAA-compliant connectivity, medical office, lab network access, real-time imaging & records, application connectivity.



**Education**

High-performance campus connectivity, Wi-Fi and security camera backbone.



**Government/Municipalities**

Video surveillance systems, traffic control and monitoring, Wi-Fi/4.9GHz backhaul.

### FEATURES

**Performance:**

- Multi-protocol support in native mode: Up to 4 SDH/SONET + 5 Ethernet Interfaces
- Up to 1500 Mbps throughput delivering the equivalent of full gigabit Ethernet plus 200 Mbps
- Efficient spectrum utilization using QPSK modulation
- Effective network planning via RF channel tuning across the entire 70/80 GHz band

**Carrier-Grade:**

- Carrier Ethernet services enabled through built-in Gigabit Ethernet Layer 2 switch
- Robust Quality of Service (802.1p) traffic prioritization
- Carrier-grade network management with Ethernet OAM support

**Proven Reliability:**

- Based on proven design – thousands of GigE terminals installed
- Rigorous HALT/HASS testing
- Up to 99.999% carrier-grade availability

**Security:**

- Highly secure narrow beamwidth antennas
- FIPS-certified AES Encryption option provides the ultimate in data protection at full line rate gigabit speeds





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## OPTIMIZE NEXT GENERATION NETWORK CONNECTIVITY WITH FLEXPOR

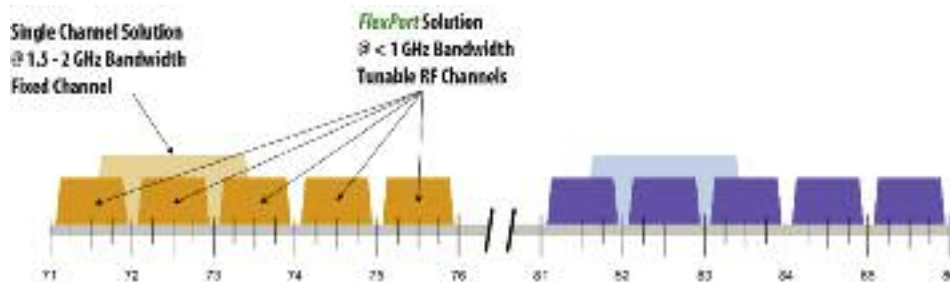
### SDH/SONET + Ethernet Connectivity

With the advances in mobile networks from 2G to 3G to 4G, network operators are faced with the challenge of providing more backhaul capacity while migrating technologies from circuit-based SDH/SONET networks to packet-based IP networks. BridgeWave's FlexPort provides simultaneous native SDH/SONET and native Ethernet connectivity in a single, all-outdoor solution with transmission rates up to 1500 Mbps. With FlexPort, network operators have the ability to supply multiple STM-1/OC-3 (155.52 Mbps) connections and/or a single STM-4/OC-12 (622.08 Mbps) to base stations, and as network requirements change, enable gigabit Ethernet interfaces remotely from the Network Operations Center. The capability of providing multiple simultaneous SDH/SONET and Ethernet streams at gigabit speeds is unmatched by any other millimeter wave radio on the market.



### Upgradeable Capacity

FlexPort provides future-proof "pay-as-you grow" capabilities in a single, compact solution. Start off with one STM-1/OC-3 or sub-gigabit Ethernet connection and expand as your network needs grow. FlexPort supports up to four STM-1/OC-3 (155 Mbps) and/or one STM-4 (OC-12) TDM interface while simultaneously providing gigabit Ethernet capacity through its built-in gigabit Ethernet switch.



### Frequency Agile RF Tuning

FlexPort is the only millimeter wave radio that can be tuned across the entire 80 GHz spectrum. Unlike other 80 GHz radios on the market that operate at a single channel, FlexPort conforms to ECC 05/07 recommendations and provides the ultimate in frequency agility. As next generation networks require greater cell density along with higher capacities, the ability to reuse frequencies and tune to adjacent channels is paramount to successful network implementation. Network planning is simplified with FlexPort's RF tuning capability.

### Ethernet OAM

As next generation networks migrate to Ethernet based systems, the ability to fully manage these Ethernet services will play a critical role in allowing operators to offer service level agreements (SLAs) and generate new revenues. FlexPort incorporates Ethernet Operation, Administration, and Maintenance (OAM) functionality in the form of Link OAM and Service OAM. This provides network operators automated end-to-end management and monitoring of their network with the ability to validate connections, detect faults and alarms, perform loopbacks, and monitor link performance. Further, FlexPort's advanced Ethernet OAM capabilities enable service providers to measure QoS parameters and make decisions proactively, before the network is affected. FlexPort's Ethernet OAM facilitates efficient fault isolation and circuit restoral, reducing expensive truck rolls and lowering maintenance costs.



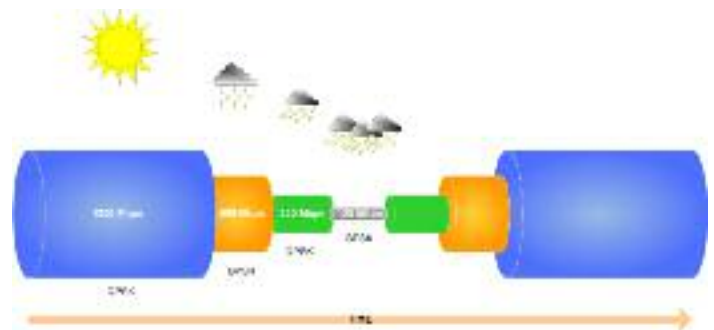
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## Spectrum Efficiency

FlexPort utilizes Quadrature Phase Shift Keying (QPSK) modulation, enabling more efficient use of the 80 GHz spectrum. With FlexPort, full-rate gigabit Ethernet transmissions (or combination of Ethernet + SDH/SONET up to 1200 Mbps) are made utilizing 1 GHz of spectrum. This translates into lower licensing costs, better frequency reuse, and greater conservation of the 80 GHz resource.

## Adaptive Rate Modulation

FlexPort's Adaptive Rate Modulation (ARM) feature provides gradual adaptive data rate and modulation changes to the transmission that alters the modulation type and/or changes the signal bandwidth, allowing the link to maintain high availability connections during rain fades. As anomalies in the path reduce signal levels, FlexPort shifts modulation from QPSK to BPSK, and capacity decreases in incremental steps. The internal engine provides the necessary prioritization of Ethernet and SONET/SDH traffic to maintain quality of service at the new data rate. Once the anomaly subsides, FlexPort automatically restores transmission capacity.



## Automatic Transmit Power Control

FlexPort utilizes Automatic Transmit Power Control (ATPC), enabling links to maintain carrier-grade high availability during periods of inclement weather.

## Flexible Deployment Configurations

FlexPort provides the ability to configure the link in non-protected (1+0), monitored hot standby (MHSB 1+1) and dual-transmission (2+0) configurations. 1+1 and 2+0 configurations can be made available with dual antennas, or utilizing an equal split (3dB/3dB) or unequal loss coupler (0.5dB/10dB) for the ultimate flexibility in link planning.

## Carrier-Class Ethernet Performance

FlexPort unleashes the power of advanced Quality of Service using a carrier grade integrated Ethernet switch. FlexPort evolves into a Service Aware platform which allows different end-user-services data flows to be treated according to their QoS requirements. Classification is managed in a highly flexible portfolio of Ethernet criteria, and an advanced 8 queue scheduling mechanism supporting Strict Priority and Shaped Deficit Weighted Round Robin which allows the network manager to plan ahead for high priority services and jitter sensitive applications.

FlexPort supports today's legacy networks, while allowing seamless migration to tomorrow's Carrier Ethernet networks providing advanced layer-2 functionality.

- Quality of Service per IEEE 802.1p
- VLAN per IEEE 802.1q
- Jumbo frame up to 10,000 byte packets

## Carrier-Class Network Management

FlexPort supports advanced network management and remote diagnostics features required for next generation networks. The network management functionality of FlexPort is designed to help reduce OPEX costs by providing comprehensive, proactive status and maintenance information of the system.

- HTTP/HTTPS Web Browser Interface, SNMP V1, V2 Support with BridgeWave Enterprise MIB, MIB-II
- SysLog supports local storage of events
- Complete Ethernet MIB statistics
- Remote Monitoring (RMON)
- RADIUS authentication



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	<b>FlexPort80</b>
Frequency	Range: 71 – 76 GHz / 81 – 86 GHz T/R Spacing: 10 GHz Channelization: Software selectable channels in 250 MHz increments per ECC/REC/(05)/07 Recommendation Stability: ±25ppm
Configurations	1+0 Non-Protected; 2+0 Non-Protected Dual Path Transmission 1+1 Monitored Hot Standby (dual antenna, equal loss splitter 3 dB/3 dB, or unequal loss coupler 0.5 dB/10 dB)
Data Rate	SDH/SONET only, Ethernet only, or a combination of SDH/SONET plus Ethernet over a single RF channel up to an equivalent of 1200 Mbps SDH/SONET: Four separate STM-1/OC-3, 155.52 Mbps, independent per-port clock synchronization; One STM-4/OC-12, 622.08 Mbps Ethernet: Four pluggable slots plus one RJ45 10/100/1000 Base-T supports line rate speeds up to Gigabit Ethernet
Modulation	QPSK or BPSK with Reed-Solomon Forward Error Correction RS (204,188)
Link Budget for 1x10 <sup>-6</sup> B.E.R. (with 2', 60 cm antennas)	240 Mbps: 191 dB 600 Mbps: 187 dB 1200 Mbps: 184 dB
Interfaces	SDH/SONET: STM-1/OC-3 (155.52 Mbps) and STM-4/OC-12 (622.08 Mbps): SFP, single mode fiber Ethernet: Physical layer: SFP, 1000Base-X, single mode or multi-mode fiber, 10/100/1000 Base-T with RJ45 connector - CAT6 cable
Latency	Dependent on configuration, as low as 65µSec
Security	Inherently secure ultra-narrow beamwidth antennas for low probability of detection and interception Link ID Codes: user settable up to 256 internal Link ID codes Option: FIPS certified 256-bit AES Encryption (export controlled)
Management	Web based (HTTP/HTTPS) embedded management agent, HTTPS secure management option SNMP support: MIB-II and BridgeWave enterprise MIB SysLog (RFC 3164, RFC 3195) event support, RADIUS client support Ethernet OAM per 802.3ah (Link OAM), 802.1ag (Configuration Fault Management), Y.1731 (Performance Monitoring)
Power	-48 VDC input, -37.5v to -70v range, 60 watts power consumption. Supports redundant "A" and "B" power feeds
Size & Weight	11.5" w * 11.5" h * 5" d (29.2 cm x 29.2 cm x 12.7 cm); 14 lbs (6.3 kg)
Environmental	Operating temperature: -33°C to +55°C (-27°F to +131°F) per EN 300 019 Class 4.1 Operating Altitude: 4,500 m (14,764 ft) Water Ingress: IP66
Antenna	External 30 cm (12") directional cassegrain, 44 dBi gain, 0.9° beamwidth, EN 302 217-4-2, class 3, FCC Category A External 60 cm (24") directional cassegrain, 51 dBi gain, 0.4° beamwidth, EN 302 217-4-2, class 2, FCC Category A Mount: Fine adjust pole mount, 8.9 - 11.4 cm (3.5" - 4.5") diameter - SCH40 or higher
Regulatory	Safety: UL Listed, CE Mark, EN60950, meets FCC 1.310 general population RF MPE limits RF Certifications: U.S. FCC Part 15.255, EN 302 217 (2008-11) Environmental: EN 300 019

