FLEX4G-5000 ETSI

Flex4G-5000
shown with 12" (30cm) Antenna

80GHz Wireless Backhaul System Delivering 4.7 Gbps Capacity

As mobile data consumption increases exponentially, operators are looking for a backhaul solution that provides the lowest Total Cost of Ownership with the flexibility to easily scale to meet tomorrow's bandwidth demands. BridgeWave's Flex4G-5000 with support for backhaul capacity of up to 4.7 Gbps per radio. Flex4G-5000 ETSI operates in modulations to 256QAM to provide the highest system gain for a ultra high capacity millimeterwave radio. Flex4G-5000 ETSI has been designed to alleviate the strain of backhaul connections by combining advanced radio and modem capabilities with carrier-grade 10G Ethernet, CPRI, and SONET/SDH features at the lowest total cost of ownership.

BridgeWave's highly integrated RF and spectrally efficient signal processing techniques provide for the longest link distances, while maintaining multi-gigabit speeds in narrow channel bandwidths. Further enabling future-proof transport, Flex4G-5000 allows operators to flexibly provision links across multiple network topologies including mixing Ethernet, CPRI, and SONET/SDH traffic.

Carrier Ethernet services are provided through the use of an integrated low-latency switch supporting jumbo frames and advanced Ethernet functionality including Quality of Service (QoS), VLAN support, Provider Bridge (Q-in-Q), and Ethernet OAM management. Flex4G-5000 provides comprehensive timing support required for 4G/LTE deployments including Synchronous Ethernet and IEEE1588v2 with hardware-based timestamping for one-step or two-step clocks.

With low power consumption and PoE power along with direct DC power, Flex4G-5000 provides all of the above in an environmentally friendly, compact and lightweight, zero-footprint all-outdoor solution.

Flex4G-5000 leverages BridgeWave's expertise in providing high reliability gigabit millimeter wave wireless solutions. BridgeWave has delivered tens of thousands of gigabit millimeter wave radios worldwide.

Performance
- 4.7 Gbps data rate per 1+0 radio and up to 9.4 Gbps per 2+0 radio
- Adaptive Code Modulation from BPSK through 256QAM
- 250 MHz, 500 MHz, and 750MHz bandwidth support
- Highest bit/Hz spectral efficiency at the longest link distances
- Outstanding RF performance benefiting from highly integrated architecture
- LDPC FEC providing threshold improvement over other FEC technologies
- RF channel tuning across the entire 70/80 GHz band in 250 MHz steps
- Automatic Transmit Power Control
- Zero-footprint ODU with low power consumption and Power-over-Ethernet

Carrier-Grade:
- Carrier Ethernet services enabled via built-in low-latency switch
- Quality of Service (802.1p) traffic prioritization, VLAN (802.1q), Provider Bridge (Q-in-Q 802.1ad)
- Synchronous Ethernet per G.8261 and G.8262 and G.8264
- PTP per 1588v2 – Transparent and Boundary Clock support
- Ethernet OAM support per 802.3ah, 802.1ag and Y.1731
- 1+0 and 2+0 configuration support
- SONET/SDH & CPRI interfaces

Security:
- Highly secure narrow beamwidth antennas
- FIPS-197 compliant AES Encryption provides the ultimate in data protection at full line rate gigabit speeds with minimal latency

Proven Reliability:
- Based on proven design – tens of thousands of systems deployed worldwide
- Rigorous HALT/HASS testing
- Carrier-grade 99.999% availability

Flex4G-5000 ETSI SPECIFICATIONS

Frequency	Range: 71 – 76 GHz / 81 – 86 GHz T/R Spacing: 10 GHz, FDD operation Channelization: Software selectable channels in 250 MHz increments per ITU-R F.2006 Recommendation Stability: ±10 ppm
Configurations	1+0 Non-Protected; 2+0 Dual Path Transmission
Data Rate	Up to 4.7 Gbps in 1+0 configuration or 9.4 Gbps in 2+0
F.E.C	Low Density Parity Check (LDPC)

Modulation	BPSK	QPSK	16QAM	32QAM	64QAM	128QAM	256QAM
RF Channel Bandwidth	250 / 500 / 750 MHz	250 / 500 / 750 MHz	250 / 500 / 750 MHz	250 / 500 / 750 MHz	250 / 500 / 750 MHz	250 / 500 / 750 MHz	250 / 500 / 750 MHz
User Data Rate (Mbps)	187 / 376 / 589	374 / 752 / 1178	749 / 1504 / 2357	937 / 1880 / 2964	1125 / 2257 / 3535	1312 / 2633 / 4125	1500 / 3009 / 4714

Tx Power Output (dBm)	Up to 17dBm
Link Budget (10E^{-6} BER)	Up to 182dB (1ft/30cm antenna) and 196dB (2ft/60cm antenna)

Interfaces	Ethernet: 1 x 10G/2.5G/1G SFP+, 2 x 2.5G/1G SFP+, and 2 x RJ-45 for 1G
	SDH/SONET/CPRI: 1 x SFP
	    SDH/SONET: 1 x STM-4/OC-12 (622.08 Mbps) or 1 x STM-16/OC-48 (2488.32 Mbps)
	    CPRI: 1 x Option 1 to 5 (614.4 Mbps to 4915.2 Mbps)

Networking	Quality of Service per IEEE 802.1p, DSCP and port based Scheduling: 8 queues allowing user configurable Strict Priority or Shaped Deficit Weighted Round Robin (SDWRR) MEF compliant traffic policing (two rate, three color scheme) VLAN per IEEE 802.1q, up to 4096 VLANs Provider Bridge Q-in-Q per IEEE 802.1ad Synchronous Ethernet (SyncE) per ITU-T G.8261, G.8262 and DNU section of G.8264 Precision Time Protocol (PTP) per IEEE 1588v2 – Transparent and Boundary Clock support Congestion Management: WRED and Tail Dropping Ethernet Protection: Ring per G.8032, Linear per G.8031, MPLS-TP protection (G.8131 & G.8132) Maximum Ethernet frame length: Jumbo packets up to 10,000 bytes MAC Layer: Supports MAC Learning, MAC Switching, MAC Ageing Multiple Spanning Tree Protocol (MSTP), Rapid Spanning Tree Protocol: (RSTP) Link State Propagation: Rapid Link Shutdown (RSP) supports remote port LSP
Latency	Dependent on configuration, as low as 12 µSec
Security	Inherently secure ultra-narrow beamwidth antennas for low probability of detection and interception Option: FIPS-197 compliant 256-bit AES Encryption (export controlled)
Management	Web-based (HTTP/HTTPS) embedded management agent; Console Interface (CLI/SSH), IPv6 protocol stack SNMP Support: MIB-II and BridgeWave enterprise MIB, SNMP V1, V2, V3 SysLog (RFC 3164, RFC 3195) event support, RADIUS RFC2865 client support Ethernet OAM per 802.3ah (Link OAM), 802.1ag (Configuration Fault Management), Y.1731 (Performance Monitoring) Loopbacks: Ethernet (per port, per direction), Local Modem Test
Power	48 VDC nominal input, ± (42.5 to 57) VDC input to POE or +/- (37.5 to 60) VDC direct DC input; 53W typical power consumption Max POE Cat5E/6 cable length is 328 ft (100 m) Max DC cable length with 12 AWG cable is 650 ft (198 m) and with 14 AWG cable is 400 ft (122 m)
Size & Weight	13.1" w x 11.6" h x 4" d (33.4 cm x 29.5 cm x 10.2 cm); 9.6 lbs (4.4 kg)
Environmental	Operating Temperature: -33ºC to +55ºC (-27ºF to +131ºF) per EN 300 019-1-4 Class 4.1 Humidity: 100% all-weather operation Operating Altitude: Up to 4,500m (14,764 ft) Water Ingress: NEMA 4X (IP66) RoHS & WEEE Compliant
Regulatory	RF Certifications: U.S. FCC Part 101, EN 302 217-3; RF Exposure : meets FCC 1.310 General Population & EN 62311 RF MPE limits Safety: CE Mark; 60950-1; Corrosion : EN 60950-22 EMC/EMI: EN 301 489-1 and -4; FCC Part 15 Class B Surge & Immunity: IEC61000-4-5, GR-1089, K.21, K.44
Antennas	12" (30cm) Parabolic, 44dBi gain, 0.8º beamwidth or 24" (60cm) Parabolic, 51dBi gain, 0.4º beamwidth