**BridgeWave**
COMMUNICATIONS

# FLEX4G™-UHA

## Ultra High Availability Wireless Backhaul Solutions for 4G/LTE Networks

As mobile data consumption increases exponentially, operators are looking for backhaul solutions that provide the lowest Total Cost of Ownership (TCO) with the flexibility to easily scale to meet tomorrow's bandwidth demands.

BridgeWave's innovative Flex4G-UHA has been designed to alleviate the strain on backhaul connections by combining advanced radio and modem capabilities with carrier-grade Ethernet features. Implementing BPSK modulation achieves improved link budget compared to high-QAM systems. Furthermore, incorporating BridgeWave's patented AdaptRate™ technology achieves an additional 10dB link budget gain during periods of inclement weather.

BridgeWave's Silicon Germanium (SiGe) integration reduces complexity and increases reliability. Carrier Ethernet services are provided through the use of an integrated low-latency switch supporting jumbo frames while including Quality of Service (QoS), VLAN support, Provider Bridge (Q-in-Q) along with Ethernet OAM management. Flex4G-UHA provides comprehensive timing support required for 4G/LTE deployments, including Synchronous Ethernet and IEEE 1588.v2 with hardware-based time stamping for one-step or two-step clocks. With low power consumption and PoE capability, Flex4G-UHA provides all of the above in an environmentally friendly, compact and lightweight, zero-footprint all-outdoor solution.

BridgeWave is the market leader in providing highly reliable gigabit wireless solutions. Flex4G-UHA 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.

**FLEX4G-UHA**
Shown with 30 cm Antenna

## WIRELESS VIRTUAL FIBER SOLUTIONS FOR:

### MOBILE BACKHAUL
Future-proof multi-gigabit backhaul for next generation 4G/LTE networks.

### SERVICE PROVIDER
High Capacity business services, fiber extensions, cellular/Wi-Fi/WiMAX backhaul, redundant fiber overlays, mesh.

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

### ENTERPRISE
Leased line replacement, LAN extensions, server centralization, remote data storage and backup.

### GOVERNMENT/MUNICIPALITIES
Inter-building connections, Video surveillance systems, traffic control and monitoring, Wi-Fi/4.9 GHz backhaul.

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

## PERFORMANCE:
- Outstanding RF performance benefiting from highly integrated SiGe architecture
- Longest link distances
- 1 Gbps full-duplex user data rate
- AdaptRate™
- Automatic Transmit Power Control
- Zero-footprint ODU with low power consumption supports 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, G.8262 and G.8264
- PTP per IEEE 1588.v2 – Transparent clock support
- Ethernet OAM support per 802.3ah, 802.1ag and Y.1731
- 1+0 Non-protected, 1+1 HSB fully redundant, or 2+0 link configurations

## SECURITY:
- Highly secure narrow beamwidth antennas
- FIPS-certified 256-bit AES Encryption provides the ultimate in data protection at full line rate gigabit speeds with minimal latency

AES

## PROVEN RELIABILITY:
- Based upon proven design – thousands of systems deployed worldwide
- Integrated SiGe decreases component count for exceptional reliability and MTBF
- Rigorous HALT/HASS testing
- Carrier-grade 99.999% availability

*Backhaul Evolved*®

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# FLEX4G™-UHA SPECIFICATIONS

| | |
|---|---|
| **FREQUENCY** | Range: 71 – 76 GHz / 81 – 86 GHz<br>T/R Spacing: 10 GHz, full-duplex operation<br>RF Interface: 74.125 / 84.125 GHz, (71.875 / 81.875 GHz for FL4G-UHA-G model), BPSK modulated signal<br>Stability: ±10 ppm |
| **CONFIGURATIONS** | 1+0 Non-Protected; 2+0 utilizing Orthogonal Mode Transducer (OMT)<br>1+1 Hot Standby - dual antenna or single antenna with unequal loss coupler |
| **DATA RATE** | Up to 1 Gbps full-duplex user data rate, 250 Mbps initial data rate with software capacity upgrades to 500 Mbps or 1000 Mbps full-duplex<br>Ethernet: Two pluggable SFP slots plus one RJ45 1000Base-T supports line rate speeds up to Gigabit Ethernet |
| **F.E.C** | Reed-Solomon |

**SYSTEM PERFORMANCE**

| | Normal | AdaptRate™ |
|---|---|---|
| Operating Mode | | |
| User Data Rate | 1000 Mbps | 100 Mbps |
| Link Budget for $10^{-6}$ B.E.R. w/ 12" (30cm) Antennas | 168 dB | 178 dB |
| Link Budget for $10^{-6}$ B.E.R. w/ 24" (60cm) Antennas | 182 dB | 192 dB |

| | |
|---|---|
| **INTERFACES** | Ethernet: Physical layer: SFP, 1000Base-X, single mode (-LX) or multi-mode (-SX) fiber, 1000Base-T with RJ45 connector – CAT5e or CAT6 cable |
| **NETWORKING** | Quality of Service per IEEE 802.1p, DSCP and port based<br>Scheduling: 8 queues allowing user configurable Strict Priority or Shaped Deficit Weighted Round Robin (SDWRR)<br>MEF compliant traffic policing (two rate, three color scheme)<br>VLAN per IEEE 802.1q, up to 4096 VLANs<br>Provider Bridge Q-in-Q per IEEE 802.1ad<br>Synchronous Ethernet (SyncE) per ITU-T G.8261, G.8262 and DNU section of G.8264<br>Precision Time Protocol (PTP) per IEEE1588.v2 (-2008) – Distributed transfer of clock to avoid variable asymmetric link delays<br>Congestion Management: WRED and Tail Dropping<br>Ethernet Protection: Ring per G.8032, Linear per G.8031<br>Maximum Ethernet frame length: Jumbo packets up to 10,000 bytes<br>MAC Layer: Supports MAC Learning, MAC Switching, MAC Ageing<br>Link State Propagation: Rapid Link Shutdown (RSP) supports remote port LSP |
| **LATENCY** | Dependent on configuration, as low as 30 μSec |
| **SECURITY** | Inherently secure ultra-narrow beamwidth antennas for low probability of detection and interception<br>Option: FIPS-197 certified 256-bit AES Encryption (export controlled) |
| **MANAGEMENT** | Web-based (HTTP/HTTPS) embedded management agent; Console Interface (CLI/SSH); IPv6<br>SNMP Support: MIB-II and BridgeWave enterprise MIB, SNMP V1, V2C, V3<br>SysLog (RFC 3164, RFC 3195) event support; RADUIS RFC2865 client support<br>Ethernet OAM per 802.3ah (Link OAM), 802.1ag (Configuration Fault Management), Y.1731 (Performance Monitoring)<br>Loopbacks: Ethernet (per port, per direction), Local Modem Test |
| **POWER** | -48VDC Nominal DC Input, ± (37.5 to 60) VDC direct DC input or ± (37.5 to 57) VDC input to POE; 36 Watts max power consumption<br>Power over Ethernet up to 328 ft (100 m) CAT5e/CAT6 cable separation |
| **SIZE & WEIGHT** | 13.0" w x 8.6" h x 2.5" d (33.0 cm x 21.9 cm x 6.4 cm); 6.5 lbs (3 kg) (excluding antenna and mount) |
| **ENVIRONMENTAL** | Operating Temperature: -33ºC to +55ºC (-27ºF to +131ºF) per EN 300 019-2-4<br>Humidity: 100% all-weather operation<br>Operating Altitude: Up to 5,000 m (16,405 ft)<br>Water Ingress: IP66<br>RoHS & WEEE Compliant |
| **REGULATORY** | RF Certifications: U.S. FCC Part 101 Subpart C; EN 302 217-3<br>Safety: CE Mark; 60950-1; EN 60950-22; meets FCC 1.307 General Population & EN 62311 RF MPE limits<br>EMC/EMI: EN 301 489-4; FCC Part 15 Class B<br>Surge & Immunity: EN 301-489-1 |
| **ANTENNAS** | 12" (30 cm) Parabolic  or  24" (60 cm) Parabolic – see antenna data sheet for specifications |

**Backhaul Evolved®**