



Fixed Broadband LTE in Unlicensed Spectrum

Telrad Networks is now offering its radical LTE innovation for the unlicensed 5 GHz spectrum. The unlicensed product suite extends the benefits of LTE technology to ISPs and telecom operators who either **don't have access to licensed spectrum or are interested in expanding coverage and capacity by supplementing their licensed spectrum with unlicensed spectrum.**

5 GHz unlicensed spectrum, which has up to 500 MHz of bandwidth available in many regions of the world, is a great option for operators to deploy reliable, cost-effective, high bandwidth broadband LTE networks.

Designed for high performance & low cost-of-ownership

With Telrad products, operators can leverage high data rates and high spectral efficiency, which will improve overall network performance to ensure a high-quality online experience for all users.

Always taking the operator needs into consideration, Telrad has designed their unlicensed LTE products to offer **cost-optimized configurations, lower total cost of ownership, NLOS capabilities and higher throughput.**

The Telrad unlicensed product suite includes the BreezeU-100 base station, the BreezeCOMPACT 1000 base station, the CPE12000U outdoor high-power CPE, BreezeVIEW network management, and BreezeWAY - the most flexible and scalable EPC on the market.



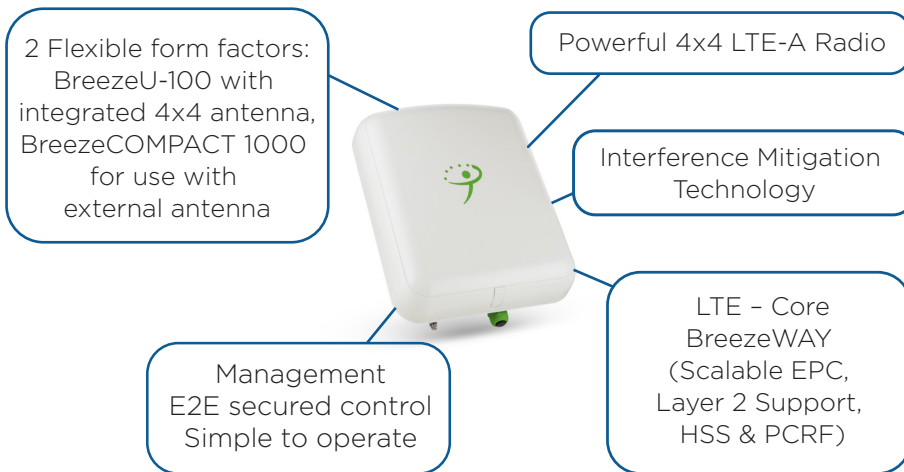
Big value in a small package

Unlicensed 5 GHz LTE

Telrad's revolutionary unlicensed LTE base stations enable any size customer to deploy a complete, fully standards-based LTE network.

The BreezeU-100 and BreezeCOMPACT 1000 are all-outdoor, simple-to-deploy solutions, requiring minimal tower space and easily maintained by an advanced LTE core and network management system.

Innovative Unlicensed LTE includes:



LTE Features

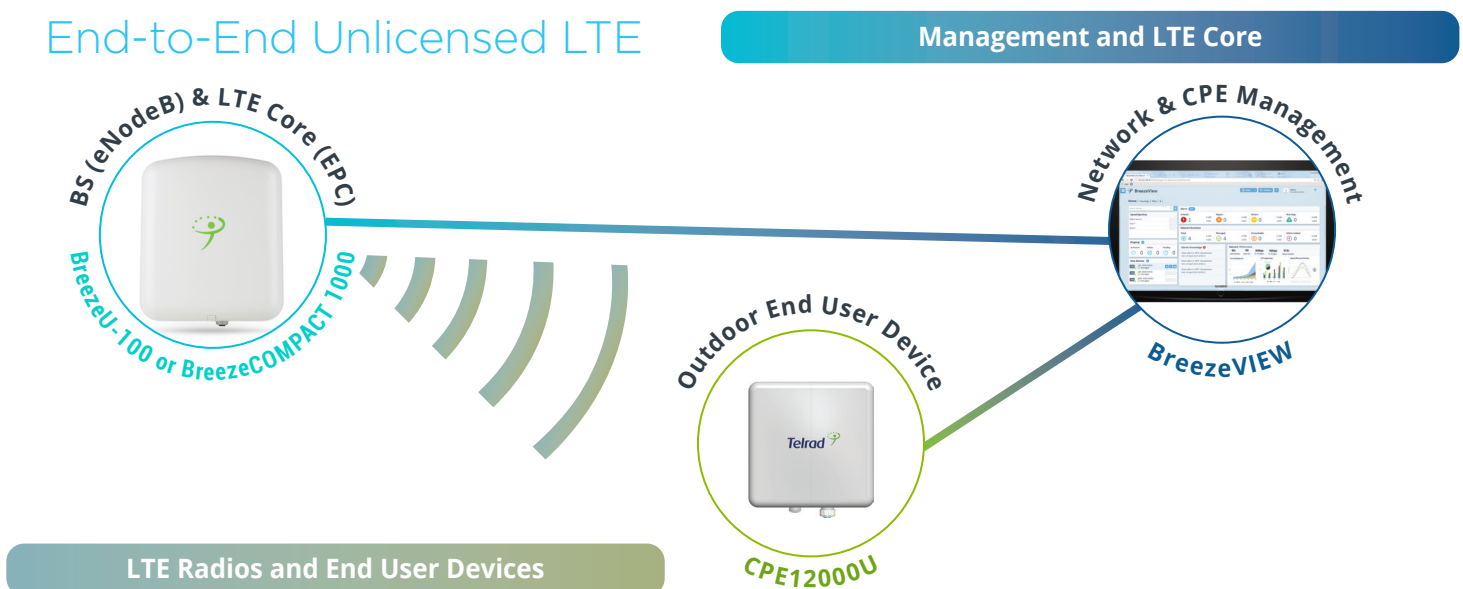
- LTE Advanced
- 4x4 Radio
- Dual Sector (BreezeCOMPACT)
- Carrier Aggregation or MU-MIMO
- Mobility
- AAA Support
- Time synchronization
- End user services
 - Guaranteed bit rate
 - Layer 2 support
- Secured management interface
- Spectrum analyzer
- Dynamic Frequency Selection (DFS)

The unlicensed network solution is fully featured and operates with the Telrad CPE12000U an LTE standard end user device. The CPE12000U is an outdoor device with an integrated directional antenna for high capacity and coverage.

The Telrad LTE Core network, the BreezeWAY EPC, is standards-based with additional unique features designed specifically for fixed wireless service providers, such as PCRF (QoS), layer 2, and AAA/billing support. The product is managed with BreezeVIEW NMS, a secured system that supports the entire network for configuration, maintenance and performance monitoring of all the base station (eNodeB) and User Equipment (UE).

The BreezeU-100 and BreezeCOMPACT 1000 fully coexists with Telrad's BreezeWAY EPC and BreezeVIEW NMS solutions. They can be used as standalone 5 GHz deployments or as a capacity extension to existing BreezeCOMPACT networks.

End-to-End Unlicensed LTE



BreezeU-100 & BreezeCOMPACT Specs



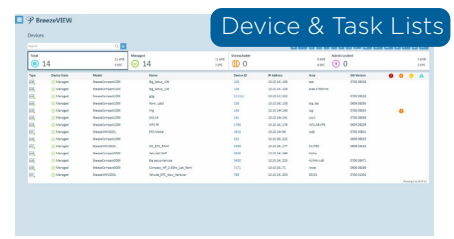
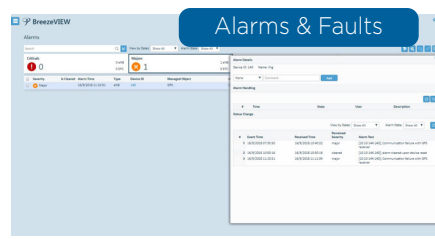
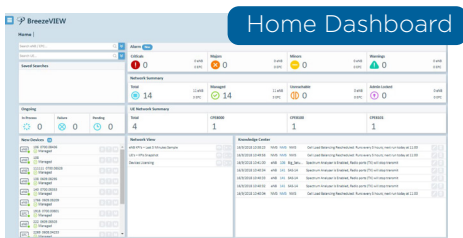
| BreezeU-100 BreezeCOMPACT 1000 | | LTE Features | |
|----------------------------------|---|------------------------------------|--|
| Frequency | 5.150-5.950 or 4.900-5.350 GHz | Standard Compliance | 3GPP LTE-Advanced Release 10** |
| Radio Configuration | 4TX x 4RX | EPC Interworking | BreezeWAY-2020, BreezeWAY-1010, or 3rd Party EPC |
| Channel Bandwidth | 5, 10, 15, 20 MHz | Carrier Aggregation | Intraband contiguous & non-contiguous, Interband |
| Max Tx Power /Port | 20 dBm | Mobility Support | Fixed, Nomadic and Mobile |
| Weight | 12 kg / 26 lbs 8 kg / 18 lbs | Architecture | Full EPC - MME, SGW, PGW |
| Dimensions (HxWxL) | 423 x 159 x 357 mm 310 x 165 x 240 mm 16.6 x 6.2 x 14.0 in 12.2 x 6.5 x 9.5 in | Added Value Package | iPCRF (QoS) Layer 2 |
| Power Consumption | 60W up to 100W | Authorization & Billing | AAA or iHSS |
| Power Input | 48 VDC | Management | BreezeVIEW for base station and CPE management |
| Primary Interfaces | 1G - Copper (RJ-45) / Optical SFP | | |
| Antenna Gain | Integrate 17dBi external antenna* | | |
| LEDs | Power, Alarm, GPS | | |
| | * BreezeCOMPACT 1000 only | | ** Upgradeable to Release 12 |

BreezeVIEW - Network Management

The BreezeVIEW Management System is a comprehensive apparatus for building, managing and supporting the entire LTE device life-cycle - from initial installation to full service provisioning and ongoing maintenance and support activities.

BreezeVIEW is scalable for any network size, and can be deployed gradually in accordance with network needs.

The BreezeVIEW solution enables provisioning, monitoring and maintaining of the BreezeCOMPACT Family, BreezeWAY EPC & Telrad CPE portfolio.



CPE12000U - Cost-Efficient, High Performance 5 GHz CPE

The CPE12000U Series consists of flexible CPE units, designed to deliver extended coverage and high data throughput for virtually any deployment scenario. The CPE12000U units are designed to operate on license-free bands, enabling a more cost-effective operation. The units support a wide range of connectivity needs, and can be optimized for a triple-play service offering on LTE platforms.

LTE Specifications



LTE Interface

| | |
|----------------------------|--|
| Standard Compliance | 3GPP Release 12 |
| LTE UE Category | Cat 12 |
| Duplex Mode | TDD |
| Frequency Bands | 5.150-5.950 GHz |
| Channel bandwidth | 5 MHz, 10 MHz, 15 MHz, 20 MHz |
| Uplink Modulation | QPSK, 16QAM, 64QAM |
| Downlink Modulation | QPSK, 16QAM, 64QAM, 256QAM |
| L1 | DL MIMO 4x4 |
| L2 & L3 | Multiple APN PLMN and Cell Selection |
| Authentication | USIM SIM function (1.8V and 3.3V SIM and USIM card) |
| QoS | Non-GBR, GBR |

Product Excellence

CPE12000U Features

- Unlicensed band operation
- Cost-effective, rugged CPEs
- One Data port
- Carrier Aggregation
- High gain 20dBi embedded Antenna
- Optional connectorized version
- Easy installation saves time and money
- Device Management – Web and TR69
- IPv4, IPv6 DS-Lite Support
- IP67 environmental rating - fully ruggedized - suitable for harshest outdoor scenarios

CPE Specifications

CPE12000U Outdoor

| | |
|-------------------------------|--|
| Dimensions (HxWxD) | 330x330x72mm 12.9 x 12.9 x 2.8 in |
| Weight | < 3.5 Kg 7.7 lb |
| User Interface | 1 RJ45 10/100M ETH LED - System, LAN, SIM, RF(4) SIM Support - SIM card slot |
| Maximum Transmit Power | 21 dBm |
| Antenna | 2TX/4RX, 20 dBi |
| Power Source | 100~240 VAC |
| Environmental | IP67 |
| Operating Temperature | -40° to 55° C -40° to 131° F |

For more, please visit telrad.com or email sales@telrad.com.

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