



Parallel Wireless CWS-200 In-vehicle Hardware Family Data Sheet

Overview

Converged Wireless Systems (CWS) is a multi-RAT eNodeB that supports LTE, LTE advanced, and Wi-Fi. The nodes have flexible backhaul integrated and can communicate with each other over wireless mesh using various frequencies (e.g., LTE, licensed and unlicensed spectrum, LOS, NLOS).

Wi-Fi access points have demonstrated that reliable high-capacity networks can be assembled from cost effective components. CWS hardware is similarly designed from cost effective components. CWS nodes can be placed in vehicles or attached to buildings, light poles, or other structures. They transmit a powerful signal that extends a broadband network over a large outside area. This signal can also provide deep in-building coverage.

Features and Capabilities

The nodes feature:

- 4G/LTE, and Wi-Fi Access
- Integrated flexible backhaul: LOS and nLOS; Fiber/Ethernet/LTE, multi-radio wireless mesh
- 3GPP compliant
- IPsec
- SON-based interference mitigation
- Dynamic RF power adjustments
- Fleet-grade hardware

Figure 1. CWS-200



CWS-200 IN-VEHICLE SERIES

Multi-RAT base station with integrated flexible backhaul

Key Features

- 3GPP Compliant
- SON-based interference mitigation
- Self-configuring, self-optimizing, and self-managed via LTE Access Controller

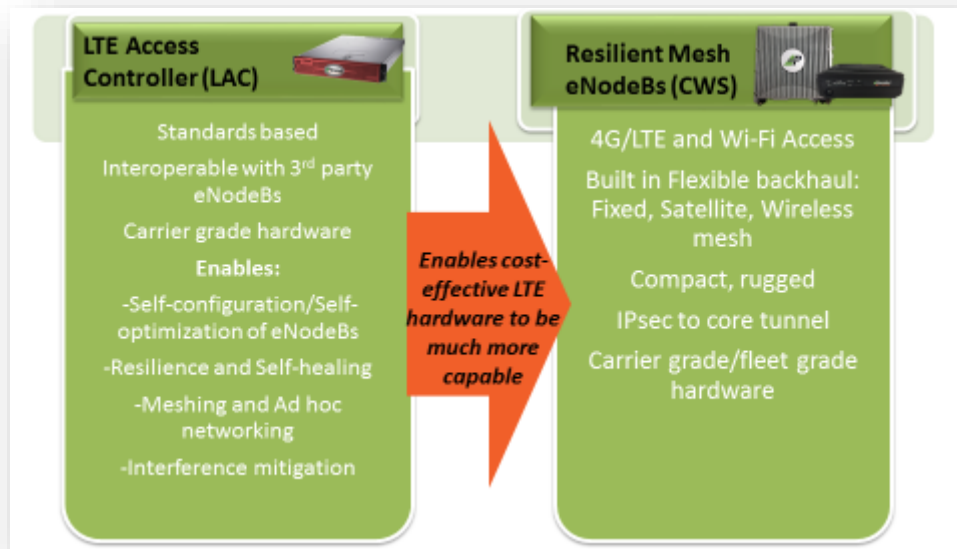
Key Benefits

Cost-effective, resilient coverage anywhere:

- To enhance coverage or create instant coverage via Bring Your Own Coverage (BYOC) capability

The nodes are self-configured and self-managed via LTE Access Controller from Parallel Wireless and can be deployed and maintained without any specialized staff.

Figure 2. **LTE Access Controller Enabling CWS Capabilities**



Benefits include:

- Low cost resilient coverage
- Bring Your Own Coverage (BYOC) enabler
- Seamless handoffs
- Future proof for additional bands or bands reconfigurations and neutral-host enabler
- Flexibility of matching LTE access frequencies and backhaul in varying network and deployment conditions

Deployment Options

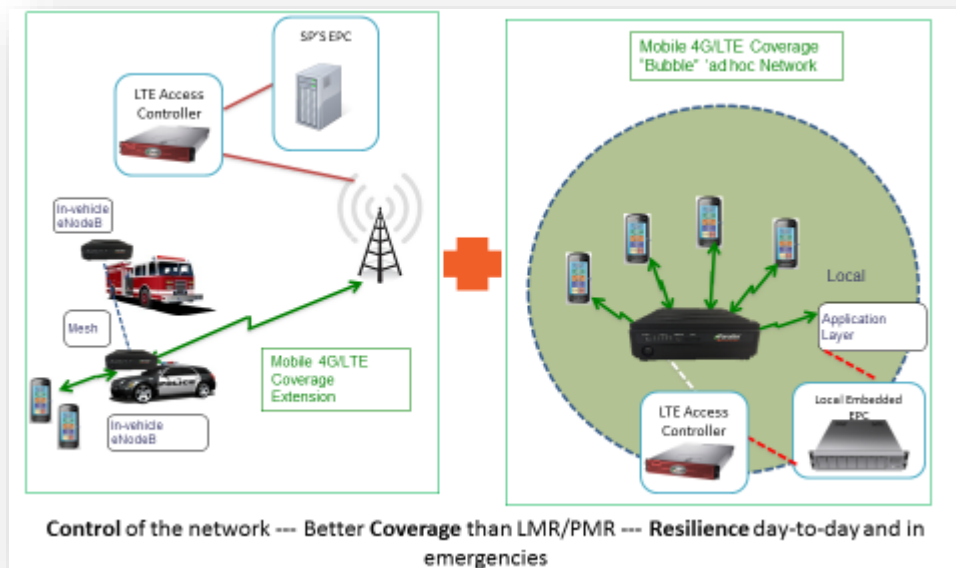
CWS hardware reduces overall network costs. Its flexibility helps to build or extend networks with one product family, no matter what the requirements may be. **CWS-200** – a specialized in-vehicle node, a portable, ruggedized eNodeB that can instantly extend network coverage or create coverage via a portable/ad hoc network capability. Its small form factor and light weight makes it easy to fit in any vehicle. *Recommended:* for performance critical Public Safety, Military, and local government environments to enhance coverage or create instant coverage via Bring Your Own Coverage (BYOC) capability

CWS-200 as an Enabler of Bring Your Own Coverage (BYOC)

Bring Your Own Coverage (BYOC) addresses coverage shortfalls from geographical or building limitations to network outages and emergency circumstances as it enables two coverage solutions:

- Extending a nearby macro's coverage area: **Enhanced Mobile Coverage**
- Creating an instant "coverage bubble"/ad hoc network via a **Closed Network** (isolated, free standing ad hoc network) capability

Figure 3. **BYOC: Enhanced Mobile Coverage and Ad Hoc Network**



Enhanced Mobile Coverage

- Enhanced Mobile Coverage is the ability to have a CWS-200 hardware close to the user at all times to provide consistent wireless coverage indoors or outdoors where geographical limitations (based on terrain, building construction, etc.) or crowd density might otherwise prevent an optimal wireless experience. The additional capacity improves call reliability, boosts data traffic capacity, and enables more consistent network access.
- Additional vehicles can wirelessly mesh into this network, extending the coverage area further as an enhancement to the coverage of the macro network. A hand-off from the in-vehicle eNodeB is seamless and secure to the enhanced or macro coverage.

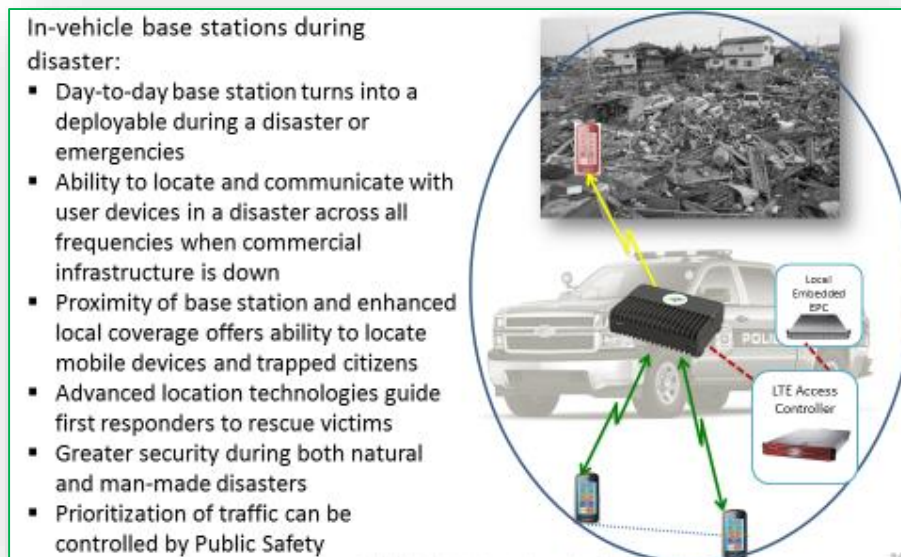
Closed Network Coverage

Closed Network Coverage is the ability to provide a complete ad hoc network without access to backend/connected network. Public Safety personnel can connect to this ad hoc network to communicate with each other even when they are completely disconnected from the network. A direct connection is provided via the CWS-200 in-vehicle eNodeB. Additional nodes in other vehicles can create a mesh, thereby extending the network further.

How is CWS-200 in-vehicle node different?

- LTE Access Controller enables cost effective eNodeB hardware
- CWS-200 can instantly incorporate into the fixed network to create instant coverage. When an emergency service vehicle pulls up to the building, it extends coverage inside with BYOC — as a result solving the indoor coverage problem with lower-power UE uplink
- A low-cost CWS-200 can be placed in any public safety and/or public transport vehicle
- Everyday base station turns into a deployable during a disaster or emergencies:
 - Small enough to fit into any vehicle
 - Auto configuration capability allows the network to be operational in minutes
 - The nearness of the base station could help penetrate debris from a disaster to rescue a trapped citizen. The base station employs an external antenna that can project a stronger signal. The software can detect not only new attached devices, but also attempts to attach. Once software detects new devices or attach attempts, an enhanced GPS capabilities can lead to a disaster victim, so they can be rescued in the first critical hours after the disaster
 - Advanced location technologies could help guide the first responder to rescue the victim

Figure 4. **Trapped Victim Rescue**



CWS-200 Family Specifications at a Glance

Architecture	High-capacity platform for instant resilient coverage anywhere
Flexibility	Virtualized design: functions based on software are not coupled to hardware: • Auto-config • Self-healing • Multi-radio backhaul mesh
Air Interface	3GPP Release 9 compliant
Software Features	• QoS based mesh routing • IPsec • SON resource control • Low latency links (< 2ms round trip)
Timing Support	Built-in GPS
Antenna type	External connector for variety of antennas
Frequency Bands	All major LTE frequency bands supported
RF and backhaul	• Up to 20 MHz 2X2 MIMO LTE radios, 1W • Wi-Fi Access: 2X2 MIMO, WPA 2 Enterprise encryption, dual band 802.11a,b,g,n • Built in SDN mesh backhaul: multi-radio mesh, up to 2X2 MIMO, 40 MHz wide, WPA 2 Enterprise grade encryption
User Capacity	64 active/128 connected users (Software Limited)
Throughput	• Downlink/Uplink @ 20MHz ◦ 2x2 MIMO : 150Mbps/75 Mbps
Security	• Network connection security: IPsec • Device security and authentication: Certificate • Air interface integrity and ciphering: 128-EIA1(SNOW 3G) , 128-EIA2 (AES), EIA0 (Null), 128-EEA1 (SNOW 3G), and 128-EEA2 (AES), EEA0 (Null)
Resilience	Full hardware and software redundancy, as well as high- availability software techniques
Dimensions and Weight	• Height 6.99 cm (2.75 ins), Width 21.59 cm (8.5 ins), Depth 21.51 cm (8.5 ins) • Weight 3.18 kg (7 lbs)
Temperature	Vehicle enclosure (-20 °C to +50 °C)
Input Power	100 - 240 VAC; 50-60 Hz

Power Consumption	60W
Peak Power Output	2x0.5W (2x27dBm). Adjustable. Maximal power varies depending on data rate, frequency band and country setting

Note: Current and future features are listed

CWS hardware family is designed to comply with the following standards:

Regulatory and Compliance	
Ingress Protection Class	Outdoor IP55 IEC529, Mil-Std-810f ("Dust protected", "Water jets")
Safety & Environmental	EN 60 950-1 / UL 60950 / CSA C22.2 RoHS Directive 2002/95/EC Directive 1999/519/EC, EN 50383, 50384
Radio & EMC Compliance	FCC Part 27 FCC Part 90 2004/108/EC R & TTE directive 1999/5/EC EN 55022 Class B EN 55022 Class B ETSI EN 301 489-1 V1.9.2 ETSI EN 301 489-4 V1.4.1 ETSI EN 301 489-23 V1.5.1 ETSI EN 201 468 V1.3.1 ETSI TS 125 113 V10.2.0 ETSI EN 301 908-1 V5.2.1 ETSI EN 301 908-3 V5.2.1 ETSI EN 301 502 V9.2.1
CE Marking	93/68/EEC 2006/95/EEC

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For more information on CWS-200 hardware family, please e-mail marketing@parallelwireless.com.