

LTE SMALL CELL SOLUTIONS

WHY QUCELL?

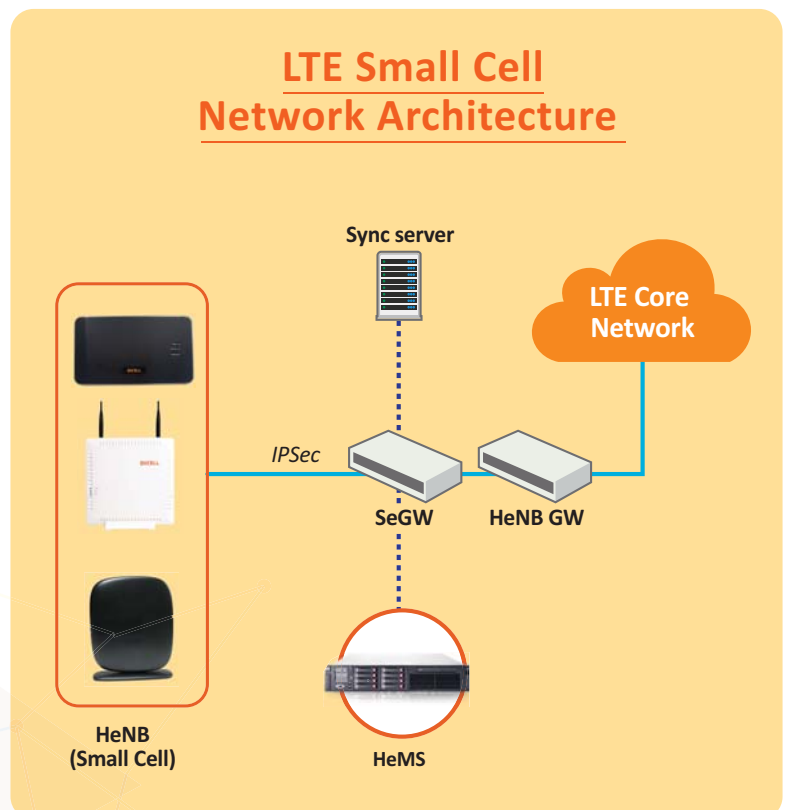
Qucell offers comprehensive solutions of LTE Small Cells for the home, enterprise and outdoor. We are living in an ever-changing and fast-paced world, where desktops and laptops are being replaced by smartphones. The current infrastructure is not keeping up with how people are using their mobile devices. Qucell is addressing this explosion in indoor data usage by offering innovative solutions in LTE small cell technology.

MAIN FEATURES

- 1 3GPP Compliant Release 9/10 LTE HeNB
- 2 Scalable bandwidth with 5 / 10 / 15 / 20 MHz
- 3 Air security, IPSec, Secure Boot
- 4 Supports VoLTE, PSVT, CSFB
- 5 Intra/inter-frequency handover, X2 & S1 based handover
- 6 Gigabit Ethernet Backhaul
- 7 IEEE1588v2 PTP/NTP Synchronization, NL Synchronization, GPS Synchronization
- 8 TR-069 standard interface, TR-181/TR-196 standard data model for Management System
- 9 SON including Qualcomm's Ultra-SON

KEY ADVANTAGE

Qucell's comprehensive suite of Small Cell Solution is a game-changer, with plug-and-play capabilities and dramatically reducing initial capital investment. Qucell's LTE Small Cell is environment-friendly, offering better performance and coverage where you really need it.



SUITE OF SOLUTIONS LTE SMALL CELLS

RESIDENTIAL



- Creates LTE signal in home
- High indoor data throughput with Plug & Play
- Robust LTE connectivity with competitive price

Category	Item Specification
Maximum TX Power	50 mW/path with 2x2 MIMO
Bandwidth	5, 10,15,20 MHz
Capacity or Max users	8/16 active users
Input Power	DC 12V (with AC adapter)
Size	210 mm x 130 mm x 30 mm
Weight	< 600g

ENTERPRISE



- Serves LTE connectivity for businesses
- High Quality of Service & Great User Experience
- Scalable capacity

Category	Item Specification
Maximum TX Power	100 mW/path with 2x2 MIMO
Bandwidth	5,10,15,20 MHz
Capacity or Max users	16/32/64/128* active users
Input Power	DC 12V (with AC adapter)
Size	211 mm x 132 mm x 33 mm
Weight	< 800g

OUTDOOR



- Expands LTE coverage to rural areas
- Easily mountable on building walls or lampposts
- Low CAPEX/OPEX

Category	Item Specification
Maximum TX Power	10W/path, 20W/path(2W&5W *); 2x2 MIMO
Bandwidth	5, 10,15,20 MHz
Capacity or Max users	16/32/64/128* active users
Input Power	AC 110/220V
Size	210 mm x 440 mm x 195 mm
Weight	< 18kg

* Under development

** Subject to be changed without prior notice

QUCELL

HeNB MANAGEMENT SYSTEM (HeMS)

Qucell's HeNB Management System (HeMS) allows for seamless, smarter connectivity. Fast installation and easy self-configuration is what distinguishes our solutions from others. A well-managed, tailor-made LTE network is your key to delivering the best price-per-performance wireless service.

KEY SPECIFICATION

- 1 Fully automated management system
- 2 Scalable capacity to meet customer's needs
- 3 Helps to roll-out networks fast and "first-time-right"
- 4 TS 32.593 discovery and registration procedures
- 5 TR-069 standard interface
- 6 TR-181/TR-196 standard data model
- 7 User friendly GUI + engineering commands
- 8 Remote access supported

MAJOR ADVANTAGES

- 1 Ease connection through web. Intuitive usage for monitoring, management and fault detection of HeNBs
- 2 Extensive real time data logging for storage and investigation of statistics data
- 3 Simplicity in adding, removing and modifying configuration parameters
- 4 Comprehensive Audit functionality with KPIs tracking
- 5 Preserved confidentiality of authentication between HeNBs and HeMS

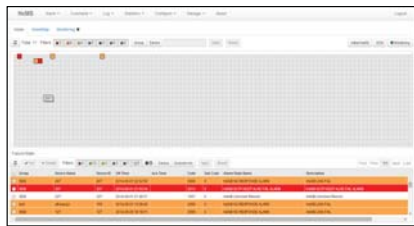

HeMS SERVER FUNCTIONS

Category	Functions
Configuration Management	HeNB configuration through RPC (Remote Procedure Call) methods
	Read and write LTE stack related parameters (e.g. SIB, RRC)
	Auto-configuration and provisioning (e.g. SON related commands : ANR)
	Software/firmware image management and diagnostics
Fault Management	Communication / Environmental
	Equipment / Synchronization
	Processing / Security
	Quality of service

KPI SERVER FUNCTIONS

Category	Functions
Performance Management	RRC Connection (setup/re-establish.)
	E-RAB (setup/release)
	Handover (in/out)
	Throughput (DL/UL/drop/loss/...)
	Paging (attempts/discards)
	PRB (DL/UL)

WEB BASED GUI

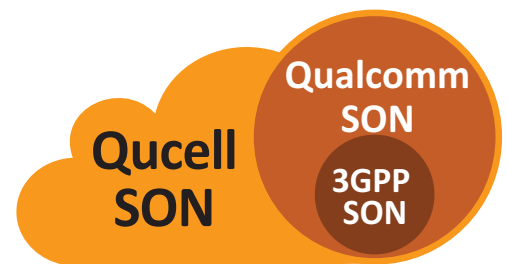



LTE SMALL CELLS SELF-ORGANIZING NETWORKS

MAJOR FEATURES OF DISTRIBUTED SON

Autonomous eNB operation with real-time decision making

- eNB utilizes rich data set obtained from the radio layers
- Reduced signaling load eases complexity and processing need at centralized entity



Category	Item Specification
Self Configuration Automatic cell parameters configuration	Automatic PCI selection and conflict resolution Automatic Neighbor Relation (ANR)
Mobility Management Optimize HO performance and reduce signaling load	Frequent Handover Mitigation (FHM) Forward Handove (FHO) Mobility Robustness Optimization (MRO)
Resource and Tx Power Management Optimize capacity and minimize pilot pollution	Tx Power management (TPM) Resource partitioning and coordination (ICIC) Mobility Load Balancing (MLB)
Backhaul Aware Operation Handle backhaul constraints	Backhaul aware load management (BALM)

SON FIXING SMALL CELLS ROLL-OUT ISSUES

- Dense & Unplanned Deployments that are hard to install and be managed in massive volume
- Co-existence with Heterogeneous Networks improving overall user experience and network load balance
- Co-channel Interferences preventing disruptions of existing networks

Reliable Coverage

SINR improvement by reducing pilot pollution
Improve cell edge performance

Robust Mobility

Reduce coverage fragmentation (Fewer HO boundaries)
Reaction to mobility failure

Self Optimization

Runtime adaptation by monitoring performance and changes in environment w/o manual optimization