WHY QUCELL® ?
A wide range of Small Cell products and solutions (4G/5G/CBRS)

QUCELL® is a global leader in 4G/5G/CBRS Small Cell Solutions with a portfolio of field-proven and market-ready 4G/5G/CBRS Small Cell, Home eNB Management System (HeMS) and SON since 2012. QUCELL® has a number of commercial deployments with major wireless carriers. QUCELL® provides a competitive Plug & Play base installation platform with a full-featured HeMS system.
QUCELL® solutions provide dramatic improvement in CAPEX/OPEX with better coverage, performance and flexibility than traditional RAN solutions. We strive to lead the market with our advanced features including 5G, and inspire the world with our innovative products and solutions.

Proven comprehensive Small Cell solutions per various use cases

Proven Small Cell solutions for commercialization

- ☑ Have been commercializing Residential/Enterprise/Outdoor Small Cells for worldwide customers
  - **Customer**
    Major operators in Korea, Japan, UK, Malaysia, India
  - **Technology**
    FDD / TDD
  - **Type**
    Residential/SOHO, Enterprise, Outdoor

Strong R&D to offer frictionless engagement in commercial Deployments

- ☑ Have proven technical skills to use commercial SOC and abundant experiences
  - Qualcomm, Broadcom, Intel, Cavium
- ☑ Developed own Protocol Stack
  - Layer 2/3, LTE feature
  - Development of 5G Layer 2/3 is on progress
- ☑ Ability to design and develop HW
  - The defective rate of commercial HW is 600ppm or less
- ☑ Working with operators related to IOT and providing highly customizable products
  - Interoperability with Samsung, Ericsson, Nokia EPC ..
  - CA,sXGP-LBT,CBRS-SAS ..

Test/Measurement solutions tailored for operators and comprehensive quality control

- ☑ Specializing in various Test/Measurement products
  - Thorough verification using various Test/Measurement products for each scenario
- ☑ Customize testing environment using own Test/Measurement products for each scenario
- ☑ Thorough quality control with QA organization and Issue management process
- ☑ Satisfied major operator's quality standards all over the world (Korea, Japan, India)

Offering a variety of Small Cells for major operators around the world

Status of QUCELL® Small Cell Products

Residential / SOHO	Enterprise	Outdoor
Commercialized	Commercialized	Commercialized
Korea Japan India	Korea Japan Malaysia UK	Korea US

- **Korea** : KT commercial service starting with **Enterprise > Outdoor > Indoor** in progress (2012~)
- **Global** : Worldwide commercial service including Products and Technical support in progress (2016~)

QUCELL® Product line-up

QUCELL® 4G Small Cell Solutions

QUCELL® 4G Home	QUCELL® 4G Enterprise	QUCELL® 4G Outdoor

QUCELL® CBRS Small Cell & CPE Solutions

QUCELL® CBRS Outdoor Small Cell	QUCELL® CBRS Outdoor CPE
* Category A	* Category 7

QUCELL® 5G Small Cell Solutions

QUCELL® 5G mmWave All-in-One type (CU+DU+RU)	QUCELL® 5G Sub6 All-in-One Type (CU+DU+RU)

QUCELL® HeMS

Performance Management 1
Fault Management 2
Configuration Management 3
Web Interface

QUCELL® SON (QuSON)

Enable Plug & Play
- PCI Conflict & Confusion Resolution
- Automatic Neighbor Relation (ANR)

Self Optimization
- Frequent Handover Mitigation (FHM)
- Mobility Robustness Optimization (MRO)

Reliable Coverage & Robust Mobility
- Tx Power Management(TPM)
- Resource Partitioning and Coordination (including 3GPP ICIC) Mobility Load Balancing (MLB)

QuSON   Ultra-SON

QUCELL® 4G Small Cell Solutions

QUCELL® 4G Home

Item	Product Specification
Type	FDD / TDD
Maximum Active Users	8 / 16
Maximum TX Power	50 / 100 mW / Path
MIMO / Antennas	2 x 2 MIMO
Interfaces	RJ-45 1 port (WAN-backhaul)
Input Power	DC12V (External AC-DC Adaptor)

QUCELL® 4G Enterprise

Item	Product Specification
Type	FDD / TDD
Maximum Active Users	16 / 32
Maximum TX Power	100 mW / Path
MIMO / Antennas	2 x 2 MIMO
Interfaces	RJ-45 1 port (WAN-backhaul)
Input Power	DC12V (External AC-DC Adaptor)

QUCELL® 4G Outdoor

Item	Product Specification
Type	FDD / TDD
Maximum Active Users	32 / 64
Maximum TX Power	10W / path
MIMO / Antennas	2 x 2 MIMO, External Ports
Interfaces	Optic/RJ-45 (WAN-backhaul)
Input Power	AC100~220V
Advanced features	256 QAM

- Plug and Play Installation support
- FDD 5/10/15/20 MHz, TDD 5/10/20 MHz bandwidth
- FDD Synchronization: NTP, PTP, NL sync using FDD macro signal
- TDD Synchronization: GPS, PTP, NL Sync using TDD/FDD macro signal
- VoLTE, PSVT (DRX, QCI, ROHC)

QUCELL® 4G Small Cell Use Cases

▮ USE CASE : QUCELL® 4G Home Small Cell

Easy Self Installation - Simply Plug & Play to Enable LTE Communication at Home

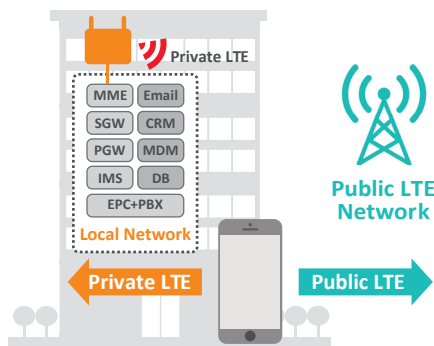**Delivery**   **Plug in**   **Ready**   Max. 5min

- Provides Full Bar LTE signal inside of homes and LTE shadow areas, including basements and parking lots
- High performance indoor data throughput to meet exploring data demands
- Automated, self-configuring Small Cell installation at home through SON and HeMS

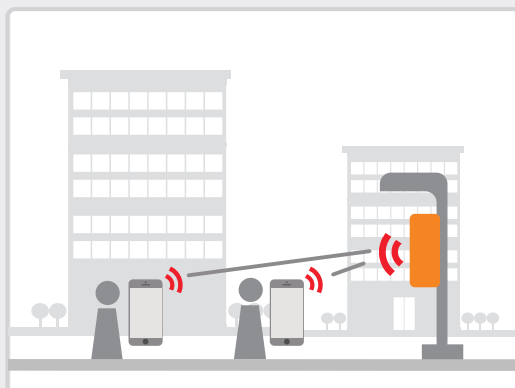## ▮ USE CASE : QUCELL® 4G Enterprise Small Cell

Enhancing Manageability, Controllability and Reliability

Private LTE

MME	Email
SGW	CRM
PGW	MDM
IMS	DB
EPC+PBX	

Local Network

Public LTE Network

◀ **Private LTE**   **Public LTE** ▶

- Private LTE networks are capable of handling the bandwidth, latency and security requirements for local and independent networks
- Venue types: Private multi-dwelling buildings with weak signals, dense populated residential building, factory and office buildings
- Private LTE ensures high quality phone calls, enhanced security, seamless streaming and an enriched user experience

▮ USE CASE : QUCELL® 4G Outdoor Small Cell
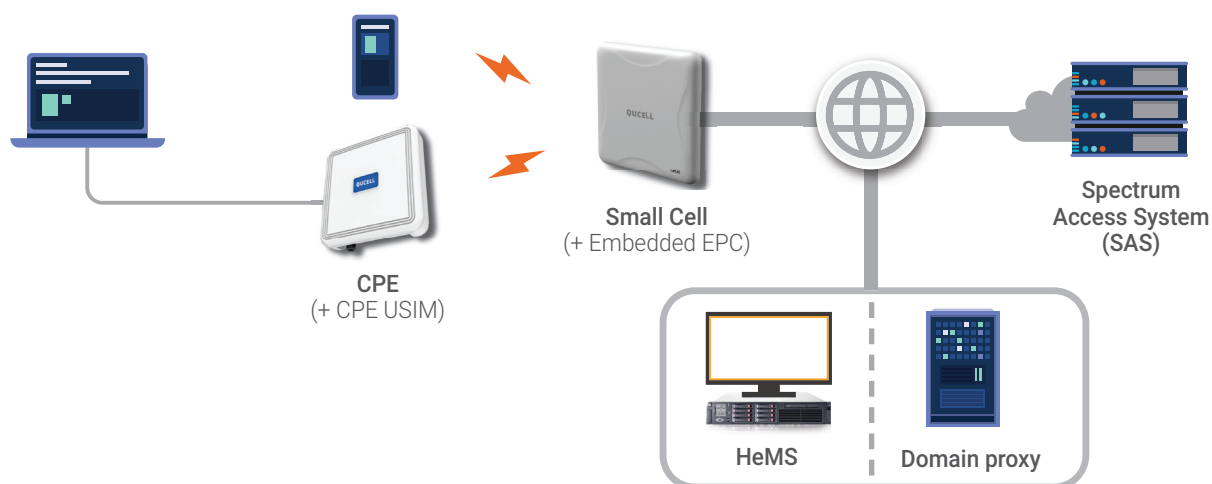
Extending service coverage to shadow areas

- Provides LTE coverage to rural areas and enhances its quality of service for enormous mobile traffic explosion
- Offers a great platform for providing seamless connectivity
- Deployment options in many different existing infrastructures, including lamp posts

QUCELL® CBRS Total Solutions
Small Cell, CPE, EPC, Domain proxy, HeMS, SAS

CBRS(Citizens Broadband Radio System) uses TDD-LTE to provide data service in shared spectrum of 3.5GHz(3550MHz to 3700MHz). The process of assigning spectrum is automated, with SAS (Spectrum Allocation Servers) co-ordinating the scheme.

QUCELL® has the wide portfolio of products to meet the customer's demands of CBRS deployments.

CPE
(+ CPE USIM)

Small Cell
(+ Embedded EPC)

Spectrum
Access System
(SAS)

HeMS

Domain proxy

▌ QUCELL® CBRS Small Cell

1	**Support full LTE eNB features** S1/X2 handover and IP security(IPSec) with internet backhaul
2	**Simple plug-and-play installation and management** Using its powerful SON features and HeMS
3	**High performance data service** 2 carrier aggregation and 2x2 MIMO
4	**Lower CAPEX/OPEX** Using shared spectrum
5	**Various Deployment Scenarios** Mounted on walls or poles

QUCELL® CBRS Total Solutions

▮ QUCELL® CBRS Small Cell Solutions

Item	Product Specification
CBSD Category	Category A
Carrier Aggregation	2CA (Max. 40MHz CA bandwidth)
RF Antenna	< 14dBi, 2x2 MIMO
Interface	RJ-45 1 port (WAN-backhaul), up to 1Gbps, PoE+
Use Case	FWA Outdoor, Industrial Use (Outdoor, Indoor)

▮ QUCELL® CBRS CPE Solutions

Item	Product Specification
LTE	3GPP Release 10/11, Category 7
LAN	IEEE 802.3/802.3u/802.3ab (Giga Ethernet) & PoE(IEEE 802.3af) x 1 port
RF Antenna	Internal Patch Antenna (2 ports), Directional , 15dBi gain
Use Case	FWA Outdoor, Industrial Use (Outdoor, Indoor)

QUCELL® 5G Small Cell Solutions

QUCELL® can meet different requirements with various products. QUCELL® 5G solutions support mmWave and Sub6, NSA and SA. QUCELL® 5G solutions offer private, high capacity and secure 5G networks for various scenarios – smart factories, office buildings, hospitals, universities, stadiums, shopping malls and so on.

Item	QUCELL® 5G mmWave All-in-One Type (CU+DU+RU)	QUCELL® 5G Sub6 All-in-One Type (CU+DU+RU)
Type	* Under Development	* Under Development
Frequency	5G mmWave NR (n257)	5G Sub 6 NR (n77)
Transmit Power	50dBm (Max EIRP)	24dBm/path
Bandwidth	Max. 400 MHz	Max. 100MHz
RF Antenna	Internal-128 Tx / 128 Rx (64dual-pole)	Internal-2 Tx / 2 Rx
Synchronization	IEEE1588v2 / GPS	IEEE1588v2 / GPS
Interface	Backhaul - 10Gbps SFP+ (for optical) x 1 port - 5G NBase-T ethernet x 1 port Management - 1Gbps Ethernet x 1 port	Backhaul - 10Gbps SFP+ (for optical) x 1 port - 5G NBase-T ethernet x 1 port Management - 1Gbps Ethernet x 1 port
Power Input	AC-DC adapter	AC-DC adapter
Size	285 X 285 X 60 (W x H x D, mm)	245 X 245 X 62 (W x H x D, mm)
IP Grade	IP30	IP30
Mount Type	Wall Mount	Ceiling Mount (optional. Wall Mount)