

NB-IOT & CATM CONNECTIVITY IN VIETNAM VIETTEL (JANUARY 2019)

Kenny Lau | Sales Director(South-east Asia)

Philip Cu | Sales Manager (Vietnam HCMC)

Henry Ngo | FAE Manager (Vietnam Hanoi)

Content

IoT Development Trend

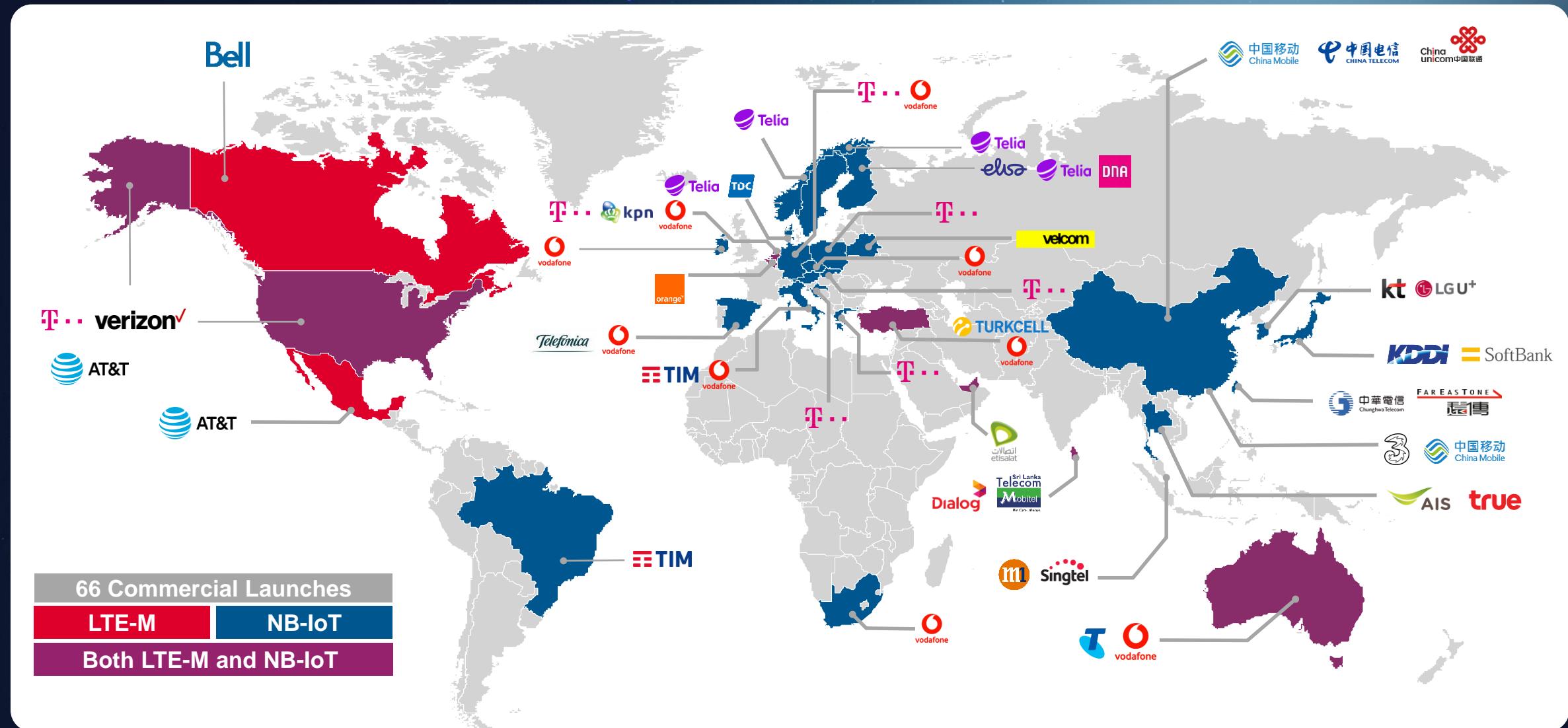
LPWA Product Introduction

Quectel Advantages

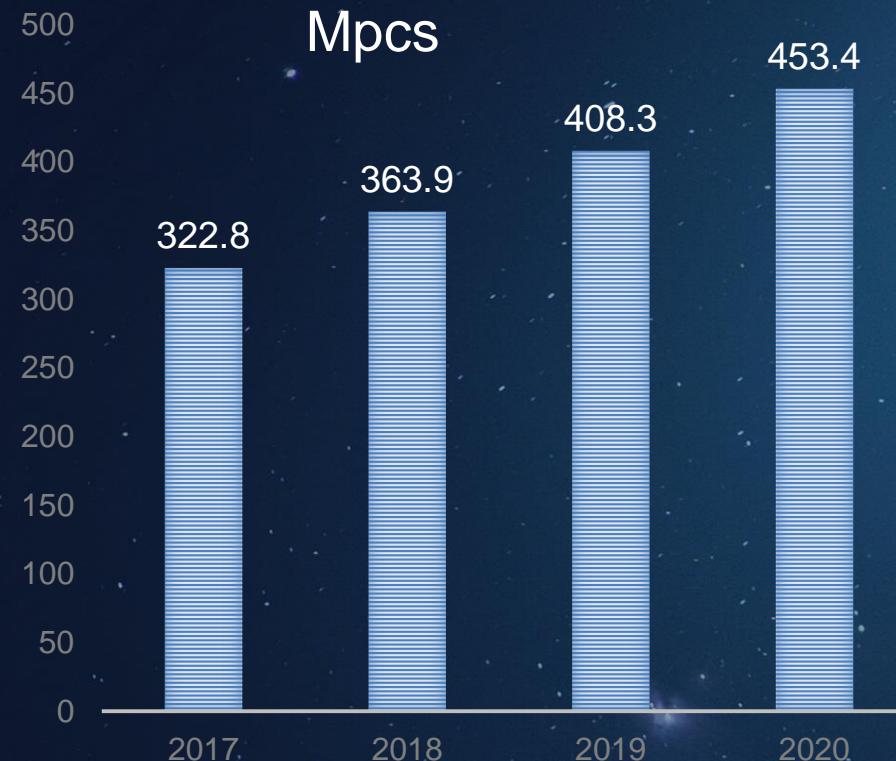
Supporting Partner - Avnet

Build a Smarter World

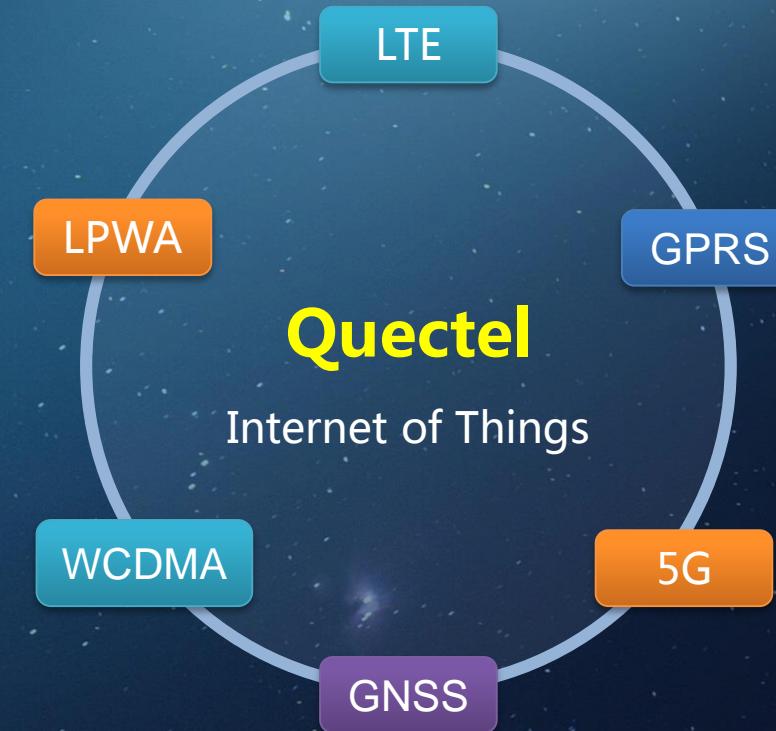
Mobile IoT Global Coverage



Global Connected IoT Devices

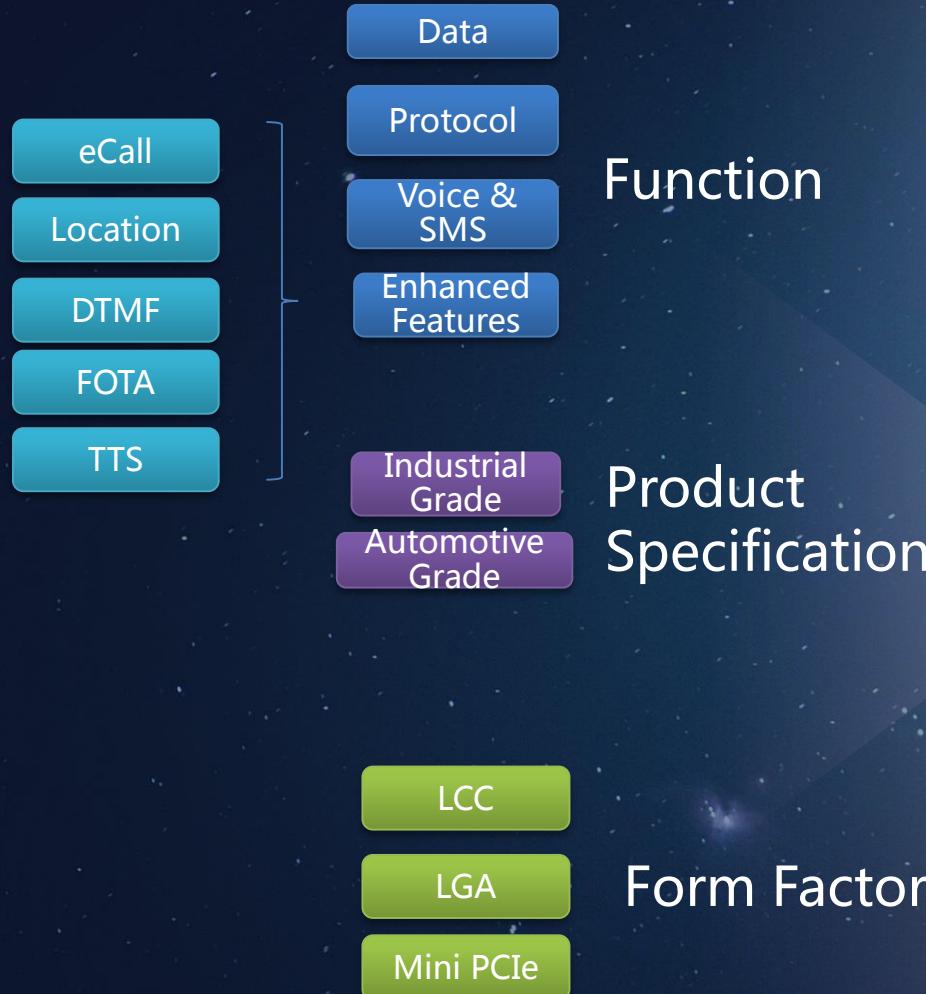
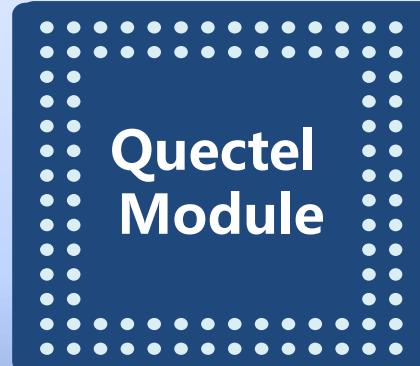


Data source: Techno Systems Research



Introduction of IoT Module

Quectel Module,
at the Core of IoT



WLAN

- Bluetooth
- Zigbee
- Wi-Fi

WWAN

- GSM/GPRS
- UMTS
- LTE
- 5G
- NB-IoT
- Cat M

LPWAN

- Sigfox
- LoRa
- Weighless
- SATCOM
- Fiber Optic

Others

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IoT Development Trend

LPWA Product Introduction

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R&D History of Quectel LPWA Modules

Huawei, Vodafone and Qualcomm proposed NB-CIoT standards.

In 2015, Quectel and Huawei signed an agreement on NB-IoT development.

BC95 was the world's first NB-IoT module receiving GCF certification

BC95 earned CCC, SRRC certifications

BC95 achieved mass production



● 2015.05

● 2016.06

● 2017

● 2017.Q4

NB-IoT 3GPP standards were frozen.

2016.07 Quectel released the world's first NB-IoT module compliant with 3GPP R13 standards.

In 2017, Quectel became the first module vendor supporting over 500 NB-IoT cases in China, which cover utilities, industry & agriculture, personal , etc.



NB-IoT Outlook

R14 standards

R15 is on the way



Positioning

- OTDOA/UTDOA, positioning accuracy of 50m
- E-cid, positioning accuracy of several hundred meters



Multicast

- Send commands to multiple devices simultaneously, easy to manage



Mobility

- Enhanced and continuous mobility, smooth cell handover

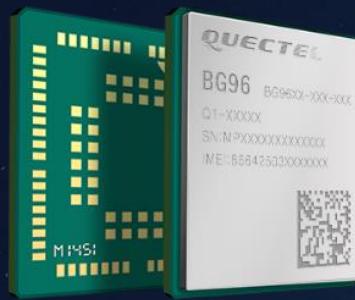


Output Power

- Optimized output power, lower energy consumption

Global Leading LPWA Solutions

China's leading NB-IoT technologies are accelerating global IoT growth.



Quectel BG96

Chip : MDM9206
 Band : CATM1/CAT NB1/EGPRS:
 LTE FDD:
 B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/
 B20/B26/B28
 LTE TDD: B39 (only support CatM1)
 EGPRS: 850/900/1800/1900
 Dimensions : **22.5 × 26.5 × 2.3mm**
 Working temperature : -40 °C ~ +85 °C
 Voltage : 3.3V~4.3V , typ. 3.8V



Quectel BC95-G

Chip : Boudica V150
 Band : **CAT NB2**
 LTE FDD : B1/B3/B5/B8/B20/B28
 Dimensions : **19.9 × 23.6 × 2.2mm**
 Working temperature :
 -40 °C ~ +85 °C
 Voltage : 3.1V~4.2V , typ. 3.6V
 Output power: 23dbm
 PSM : 3.0uA
 IDLE : 4.7mA
 Max : 230mA@23dbm



Quectel BC68

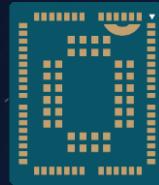
Chip: Boudica V150
 Band: **CAT NB2**
 B1/B3/B5/B8/B20/B28
 Dimensions: **15.8 × 17.7 × 2.0mm**
 Working temperature:
 -40 °C ~ +85 °C
 Voltage: 3.1V~4.2V, typ. 3.6V
 Output power: depends on working model
 PSM: 3.0uA
 IDLE: 2mA
 Max: 230mA@23dB



Quectel BC66

Chip: Mediatek MT2625
Band: NB1
 B1/B3/B5/B8/B20/B28/B2*/B4*/B12*/B13*/B17*/B18*/B19*/B25*/B26*/B66*
 Dimensions: **15.8 × 17.7 × 2.0mm**
 Working temperature:
 -40 °C ~ +85 °C
 Voltage: **2.1V~3.63V**, typ. 3.3V
 Output power: depends on working model
 PSM: 3.8uA
 IDLE: 2mA
 Max: 230mA@23dB

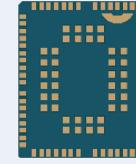
LPWA Modules Roadmap



Cat M1/ Cat NB1/ EGPRS/ GNSS
Quectel BG96

Cat M1/ GNSS

Quectel BG96-M



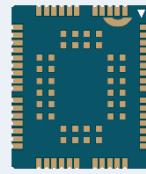
Cat M1/ Cat NB2/ EGPRS/ GNSS
Quectel BG95

Cat M1/ GNSS

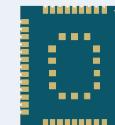
Quectel BG95-M

Cat NB2/ GNSS

Quectel BG95-N



NB2 IoT
Quectel BC95-G



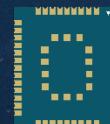
NB2 IoT
Quectel BC68

3GPP R14 supported in Q3 2018



Cat M1/ Cat NB2/ EGPRS/ GNSS
Quectel BG99 (Smaller Size)

Based on Qualcomm 9205 chipset



NB IoT
Quectel BC66

2016

2017

2018

2019

Quectel Pushes Commercialization of LPWA

- Globally certified
- FOTA function
- Support various protocols
- Support multiple cloud platforms

Comprehensive functions

- Gain certification by all three carriers in China
- Cooperate with global top carriers like AT&T, Verizon , Vodafone, etc.

Close co-op with carriers

- Cooperate with 100+ IoT design houses
- Support IoT applications in a wide range of segments

Know IoT applications better

Multiple chipset platforms

- Qualcomm
- HiSilicon
- MTK

NB-IoT Applications



Public Utilities

- Water/Gas Metering
- Parking
- Fire Hydrant
- Smoke Alarm
- Street Lighting
- Trash Bin

Industry & Agriculture

- Gas Detector
- Soil PH/Optical Sensor
- Machine Alarm
- Irrigation Controller



Personal Life

- Asset Tracking
- Wearable Devices
- Person/Pet Tracking



Smart Home

- Smart Lock
- Home Appliance Monitoring & Control

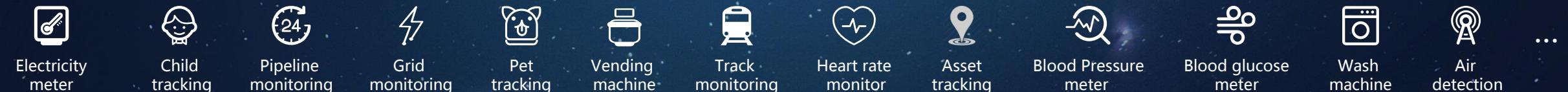


50 NB-IoT Use Cases in 40 Industries Are Taking Off ...

14 cases replicable



35+ cases in incubation



Expansion of Cellular IoT Connections from China to the World

Millions of IoT Applications



Shared white goods
200 Colleges in China



Smart electric scooters
3 million in Zhengzhou

Smart meters
1 million by 2018



Smoke detectors
1 million in Hangzhou



South Korea LG U+
120 thousand sites on air



Smart Gas
Detector
Tracking
Lock



Thailand NB-IoT Alliance

Thailand AIS&True
Incubate use cases through the
Alliance



P
Smart parking

T-Mobile: 11k smart parking
spaces in Hamburg

T Deutsche
Telekom



New use cases with eMTC



POS
Smart phone

Smart City

Smart Trash Bin



Smart Well Lid



Smart Parking

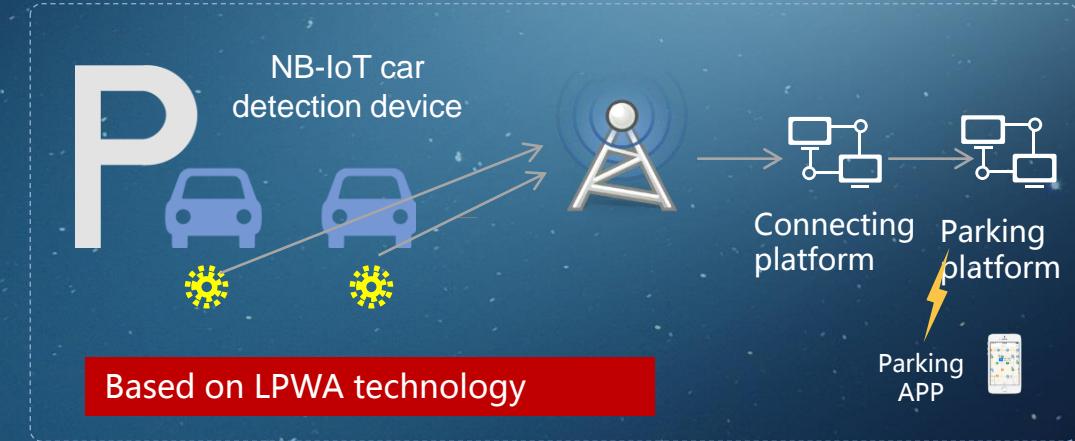
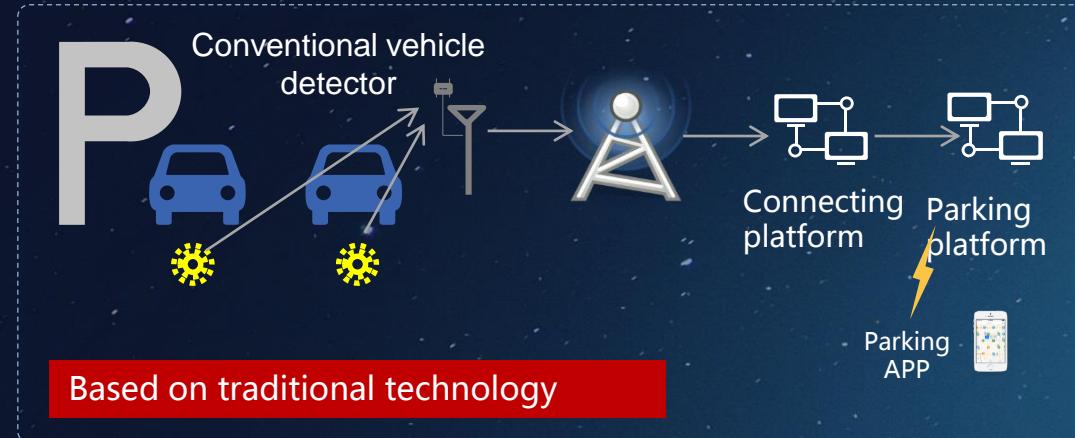


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Smart Fire Hydrant

IoT Trend Smart Parking Based on IoT



LPWA, the core technology for IoT

China's three major carriers will complete network construction by year end. The pioneering smart parking project will leave a mark in IoT history.

Reduced costs due to simplified gateways

Vehicle detectors can access NB-IoT network without gateway, which is expected to save 30% cost as there is no need to install and maintain gateways.

Plug and play, easy to install/maintain

Device detector supports plug and play, easy installation, no requirement on technical support, and easy upgrading for increased parking space. No need to worry about network compatibility.

High network reliability

NB-IoT network is operated by carriers, and has equivalent reliability and stability to 2G/3G/4G networks.

Smart Home

- NB-IoT Smart Lock
- Smoking Alarm
- Home Appliance
- Secure, Convenient
- Support multiple cloud platforms



Water Heater



Air Purifier



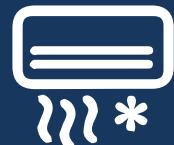
Smoke
Detector



Smart Lock



Refrigerator



AC

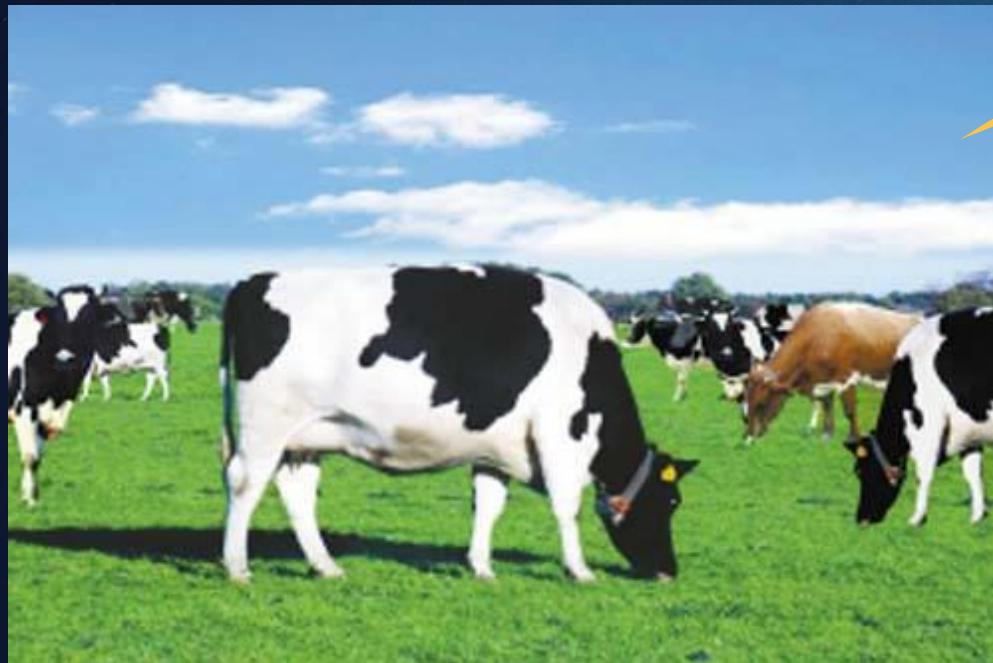


Washing Machine

Smart Agriculture: Monitor Cow Estrus, Increase Milk Production

China has a stock of around 16 million cows, accounting for 11% of the world.

China imports 30% of globally traded raw milk, meaning great potential for domestic milk.



Accurate detection of estrus will decide milk production directly

If dairy farmer fails to detect an estrus cycle (21 days), he will suffer loss of appx. 2,268 yuan, assuming that each cow produces 30kg milk each day ($30\text{kg} * 2.6\text{yuan/kg} * 21\text{days} = 2,268\text{ yuan}$).

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IoT Development Trend

LPWA Product Introduction

Quectel Advantages

Supporting Partner - Avnet

Build a Smarter World

Quectel Leading IoT Innovations from NB-IoT to 5G

Quectel Wireless Solutions is the leading global supplier of **LTE**, **LTE-A**, **LPWA**, **UMTS/HSPA(+)**, **GSM/GPRS** and **GNSS** modules.

Leveraging Quectel's strong R&D capabilities, comprehensive expertise, broad product portfolio and unparalleled customer support, Quectel has established itself as a reliable and trustworthy provider of wireless modules since its establishment in 2010.

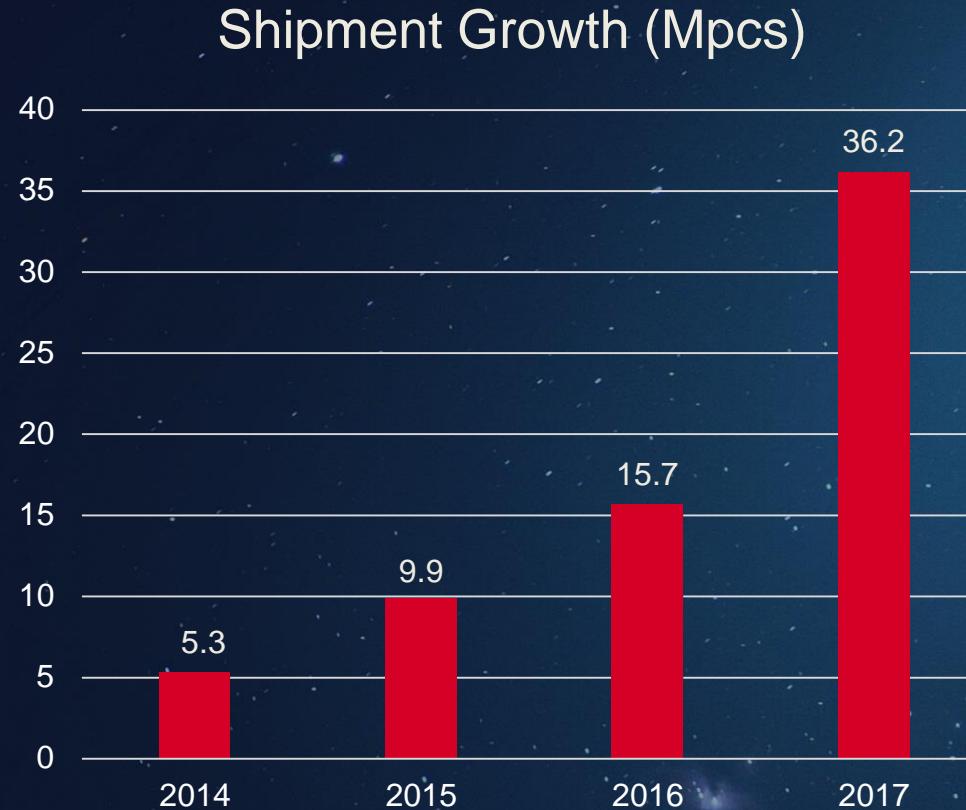


About Quectel

- Founded in October, 2010
- **HQ in Shanghai and Hefei R&D Center, China.**
- 40+ Sales Offices, 70+ Distributors Worldwide
- Monthly production capacity over **6 Mpcs**
- More than **3000+** customers worldwide



Quectel Key Figures



Global Presence



Technology Partners and Certifications



Software Advantages



USB Serial Drivers

- Windows XP/Vista/7/8/8.1/10
- Windows CE 5.0/6.0/7.0*
- Linux 2.6/3.x/4.1
- Android 4.x/5.x/6.x/7.x



NDIS & RIL Drivers

- RIL Driver:
Android 4.x/5.x/6.0
- NDIS Driver:
Windows 7/8/8.1/10,
Linux 2.6/3.x/4.1



Quality Assurance

- Reliable network protocols
- Steady flash protection mechanism
- Superior audio algorithms
- High sensitivity



Special Features

- QuecOpen™*
- PSM*



Enhanced AT Commands

- Standard V.25ter AT commands
- 3GPP TS 27.007 (GSM 07.07)
- 3GPP TS 27.005 (GSM 07.05 SMS)
- TCP/IP stack AT commands
- STK (SIM Application Toolkit)



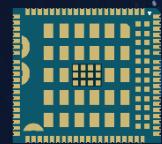
Flexible Applications

- eCall
- (U)SIM card detection
- DTMF

Constant Innovation in LTE Modules

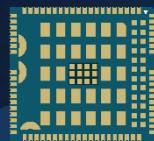
High Data Rate

LTE Cat 1



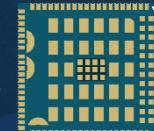
Quectel EC21

LTE Cat 3



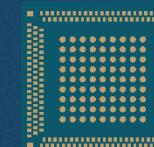
Quectel EC20

LTE Cat 4



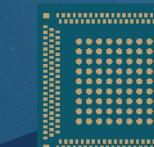
Quectel EC25/EC20
Quectel AG35
Quectel SC20
Quectel EM05

LTE Cat 6



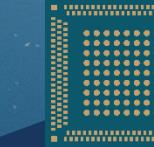
Quectel SC60
Quectel EP06
Quectel EG06
Quectel EM06
Quectel AGx5

LTE Cat 12



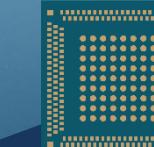
Quectel EP12
Quectel EG12
Quectel EM12

LTE Cat 16



Quectel EP16
Quectel EG16
Quectel EM16

LTE Cat 18



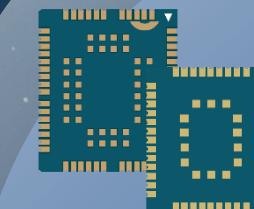
Quectel EP18
Quectel EG18
Quectel EM18

5G



LPWA

BG96 Cat M1/NB1/GSM
BC95G Cat NB2
BC68 Cat NB2
BC66 Cat NB1

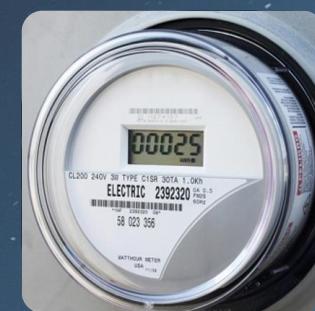


Target Applications



Telematics & Transport

- Automotive OEM
- Vehicle Tracking
- Container Tracking
- Ship Tracking
- Fleet Management
- OBD
- DVR
- Insurance Box



Energy

- Electricity Meter
- Gas Meter
- Water Meter
- Heat Meter
- Smart Grid
- Wind Turbines
- Solar Panel
- Charging Pile



Payment

- Wireless POS
- Cash Register
- ATM
- Vending Machine
- Top-up Machine



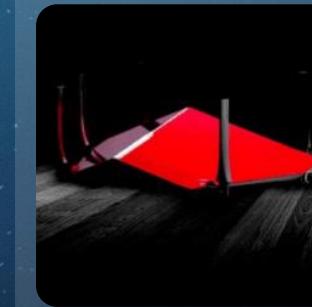
Security

- Alarm
- Camera
- Video Surveillance
- Intrusion Detection
- Smoke Detector
- Asset Protection



Smart City

- Street Lighting
- Sharing Economy
- Traffic Light
- Elevator
- Digital Signage
- Advertisement Display
- LED Lighting
- Garbage Bin Monitoring
- Parking



Gateway

- DTU
- Consumer Router
- Industrial Router
- VOIP
- Server
- Wi-Fi Hotspot



Industry

- Industrial PDA
- Rugged Tablet PC
- Pipeline Management
- UAV
- Robot
- Flow Meter
- Refrigerator
- Industrial Control
- Industrial Monitoring



Life & Healthcare

- Personal Tracker
- Home Appliances
- Pet Tracker
- Wearable Devices
- Elderly Monitoring
- Remote Medical Equipment
- Glucometer
- Blood Pressure Monitor
- Gambling Machine



Agriculture & Environment

- Trail Camera
- Food Traceability
- Farm Machinery
- Irrigation
- Meteorological Station
- Wildlife Tracking
- Environment Monitoring
- Pollution Monitoring

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Build a Smarter World

Thank you!

7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District,
Shanghai 200233, China
Tel: +86-21-5108 6236 Email: info@quectel.com
Website: www.quectel.com

-  <https://www.linkedin.com/company/quectel-wireless-solutions>
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Quectel Wechat