QUANRAY ELECTRONICS

SHANGHAI QUANRAY ELECTRONICS CO. LTD

Connecting Everything Secure

CONTENTS

Company Positioning

Company Vision

Technical Panorama

Key Strengths

R&D Capabilities

Product Portfolio

Value Creation

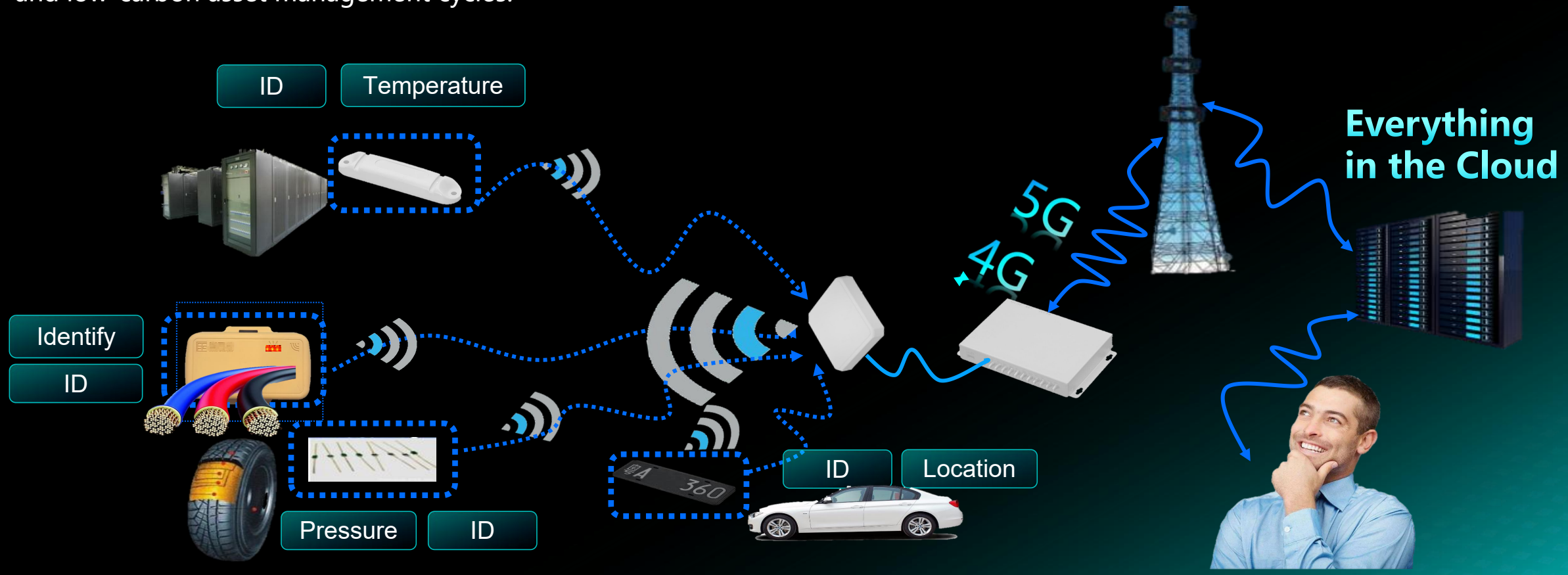
Collaborative Ecosystem

坤锐电子版权所有copyright © 2025

Quanray: Green Passive IoT Solutions Provider

QUANRAY ELECTRONICS

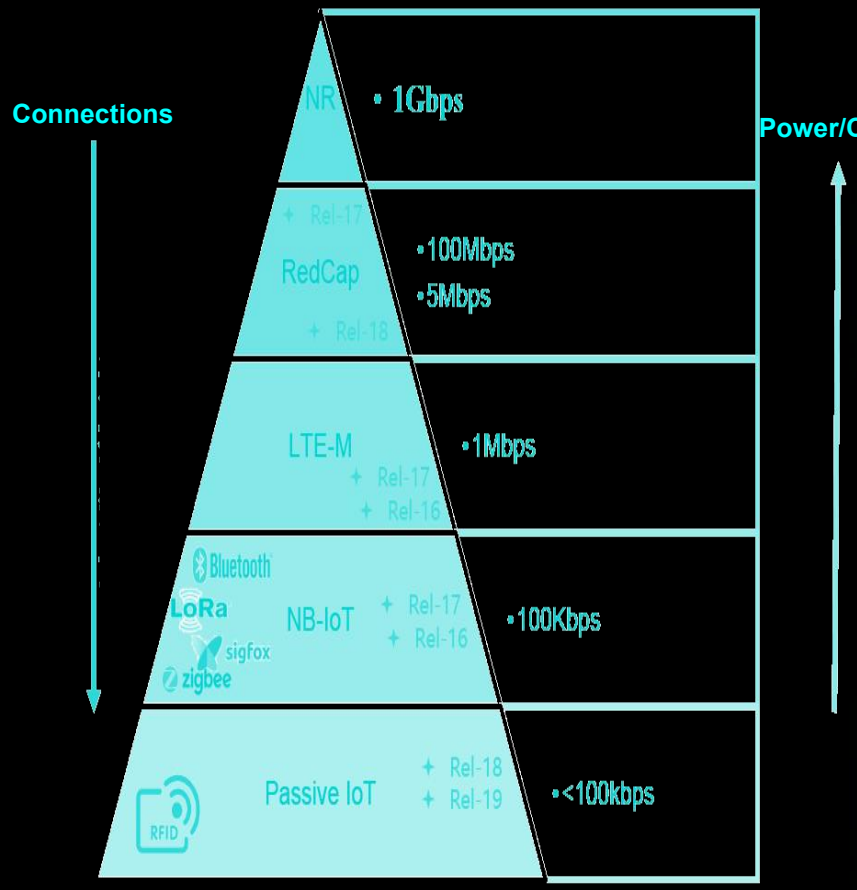
Shanghai Quanray Electronics Co., Ltd. —— An innovative enterprise focused on passive IoT technology. Driven by the vision of "Green Connectivity, AI Empowerment," we leverage **battery-free** sensing RFID chips and tags to build zero-carbon, **low-cost** IoT data infrastructure. By transmitting item identity, status, and trajectory information to the cloud via 4G/5G networks, we provide **sustainable and massive data streams** for AI systems, enabling enterprises to achieve intelligent and low-carbon asset management cycles.



坤锐电子版权所有copyright © 2025

Building a Perceptible IoT Network

QUANRAY ELECTRONICS



Passive IoT: The Definitive Answer for Trillion-Level Connections

Applications for enterprise private networks

Warehouse Management

Industrial Automation

Smart Port Solutions

Intelligent Power Grid

Scenarios for consumer public networks

Supply Chain Management

Smart City

Retail & Fashion Industry

Smart Home

坤锐电子版权所有copyright © 2025

Three IoT Technologies for All-Scenario Data Acquisition

QUANRAY ELECTRONICS

We are committed to addressing the key challenges in IoT data acquisition—**difficulty, high cost, and excessive energy consumption**—through three primary data collection methods. We provide a pervasive and uninterrupted data foundation for the interconnected digital world.

Near-field passive IoT

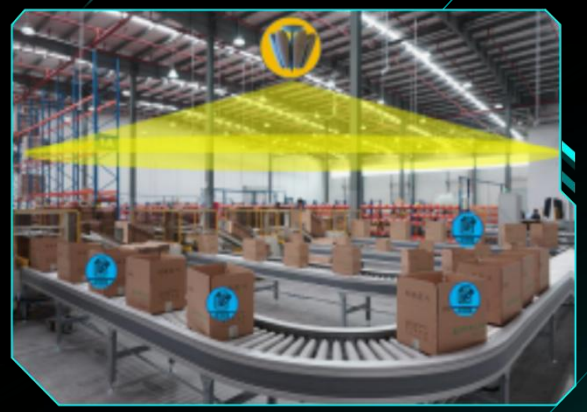
- **Traditional RFID**
- **RFID + sensing**

Mature technology enables close-range data collection, allowing for rapid asset identification and real-time monitoring of environmental temperature and humidity. It is widely used in logistics inventory and food cold chain traceability.

Local-area passive IoT

- **Passive Bluetooth AoA positioning**

High-precision positioning at the centimeter level without batteries, suitable for mall navigation and factory asset tracking. It has low deployment costs and high positioning efficiency.



Wide-area passive IoT

- **Ambient IOT**

Utilizing environmental energy to achieve long-distance data transmission, covering remote areas, creating a fully connected wide-area network, and establishing a new business model of Internet of Everything based on cloud platforms.

坤锐电子版权所有copyright © 2025

Near-field passive IoT-RFID+

QUANRAY ELECTRONICS

RFID

Operating frequency：LF/HF/UHF/DF

Operating distance：<20M

Transfer ID and memory data

RFID+ “X”

Protocol：ISO 18000-6C

RFID+ sensor information, such as temperature, temperature, angle, status, air pressure, acceleration, etc.

RFID+ distance, tag sensitivity ≤-30 DBM, reading distance up to 50 meters +.

RFID+Integration Innovations

High-Performance RFID Tag Chips:

Our own RFID tag chips deliver high performance and ultra-low power consumption. Supporting multiple frequency bands, they are widely applied across industrial, warehousing, and logistics applications.

Ultra-Low-Power Consumption Sensor Integration:

We integrate various sensors—including temperature, humidity, and vibration—with RFID tag chips to create multi-functional passive sensing tags. These enable high-precision monitoring of physical parameters without external power.

坤锐电子版权所有copyright © 2025

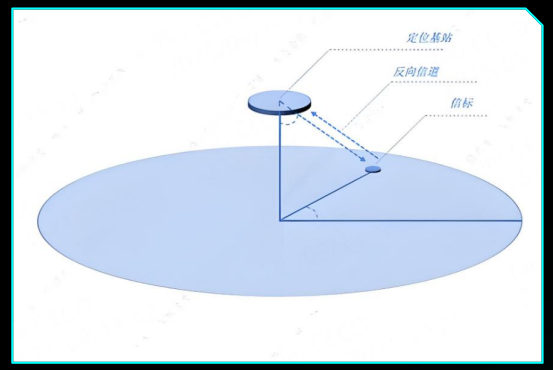
Local-Area Passive IoT: Battery-free Bluetooth AoA High-Precision Positioning

QUANRAY ELECTRONICS

Technical Principle

Bluetooth AoA (Angle of Arrival) positioning uses antenna arrays to determine signal direction, combined with time difference of arrival to achieve precise positioning. Compatible with existing Bluetooth devices and smartphones for indoor high-precision positioning.

The technology employs multi-antenna receivers to measure signal angles, combined with time difference of arrival to calculate device position.



Pain Points of Current Positioning Technologies

Rapid Power Drain & Poor Battery Life

Frequent signal transmission from tags leads to quick battery depletion and compromised endurance.

Complex Environmental Interference

Signal reflection and challenging application environments significantly impact positioning accuracy.

Highlights of Quanray Solutions

Battery-Free Bluetooth Beacon
It adopts the independently developed technology of Quanray and is powered by environmental energy collection, without the need for battery power.

High-Precision Positioning
Resistant to metal interference and provides sub-meter accuracy, ensuring reliable location data.

Easy Deployment
Streamlined installation process minimizes initial setup costs for enterprises.

Low Maintenance Costs
Ultra-low power consumption and battery-free design enable long-term operation with minimal upkeep.

坤锐电子版权所有copyright © 2025

Wide-area passive IoT——Ambient IOT

QUANRAY ELECTRONICS

Perception Layer	Network Layer	Platform Layer	Application Layer
Class A, B and C Labels	5G Base Stations	Cloud Server	Business Platform

Quanray Passive IoT Solution-Ambient IoT

- Simplified Perception Layer: Enables direct communication between passive tags and base stations, eliminating the need for specialized reader devices.
- Unified Network Layer: Leverages existing 5G base station infrastructure.
- Reduced Deployment Costs: Offers significant cost advantages compared to traditional active technologies.

5G-A Empowers Ambient IoT

Passive Connectivity

5G-A provides dual channels for both power and communication, enabling maintenance-free, low-cost, large-scale device connectivity.

Mass Commercialization

Drives hundreds of billions of device interconnections, accelerates the implementation of digital twins and intelligent decision-making, and empowers multiple industries.

坤锐电子版权所有copyright © 2025

Four Core Advantages for Greener and More Cost-Effective IoT Data Acquisition

QUANRAY ELECTRONICS

Environmental Sustainability

- Battery-free operation powered by ambient energy
- Near-zero carbon footprint supporting global decarbonization goals

Ultra-Low Cost

- 50%+ reduction in tag costs versus conventional solutions
- Significant operational savings at scale

Massive Connectivity

- Architecture supporting trillion-level device connections
- Meeting large-scale demands from smart cities to industrial IoT

Comprehensive Coverage

- Integrated short/local/wide-area technology stack
- Boundary-free data collection across all scenarios

坤锐电子版权所有copyright © 2025

Dedicated R&D, Forging Core Technological Barriers

- **Over 65% of our staff are R&D personnel, led by top industry experts**
- Filed 200+ patent applications, with 105 already granted
- Nearly 2 patents/utility models per engineer on average

Patent Type	Status	Number
Invention	Applicate	136
	Authorized	57
Utility model	Applicate	60
	Authorized	46
PCT	Applicate	5
International patent	Authorized	2
Integrated circuit layout	Registered	18

The company has **successfully executed key national R&D programs**, with its technological route and capabilities receiving national endorsement.

Core Technologies & Innovation Capabilities

QUANRAY ELECTRONICS

With mastery of RFID core technology, Kunrui has developed key expertise in energy harvesting, low-power wireless transceivers, and sensor data acquisition. It is one of the few domestic passive IoT manufacturers with independent chip design capabilities.

RF Circuit Design

High-efficiency RF rectifiers for electronic identification chips

Adaptive matching circuits for electronic identification chips

Enhanced reverse link signal strength for tag chips

Ultra-Low Power Circuit Technology

Low-power codec circuits

Low-power mutual authentication and encryption algorithms

Ultra-low-power non-volatile memory technology

Antenna Design

High-reliability RFID tag design

RFID tag design for complex electromagnetic environments

Passive IoT Technologies

Multi-channel energy harvesting/management technology

Battery-free Bluetooth technology

AmbIoT-I/IIA technology

坤锐电子版权所有copyright © 2025

20-Year Journey of Continuous Innovation

QUANRAY ELECTRONICS

2005
Founded
May 2005

2008
First Production
HF chip QR2217
UHF chip QR2235
EPC Certification

2013
Qstar-5X
UHF high-performance chip Qstar-5X officially put into the market

2014
Qstar-5R
64K large-capacity chip won the bid for Airbus RFID tag procurement

2016
Car Electronic Tag
The first batch of car electronic tags put into service

2017
Qstar-6S
UHF/HF dual frequency encryption chip enters the market

2018
Unmanned Retail
Quanray launches intelligent unmanned retail hardware solutions

2019
Qstar-6T
Sensor with IO interface

Qstar-6X
Dual frequency encryption chip
Anti-clone solution launched

2020
Qstar-7X
High sensitivity UHF tag chip

2021-2022
Qstar-7U
Ultra-High Sensitivity UHF Chip
Low-Cost, Ideal for Apparel Labels
High-Reliability Memory Technology

2023
QMars-6X
Highly optimized HF RFID chip
Perfect for library labels

AmbIoT-ES Field Test Success
Haier Washing Machine Factory
Hangzhou Asian Games

2024
AmbIoT-Module
RFID
BLE
5G-A

2025
AmbIoT-Chipset
Multi-Channel Energy Harvesting
AIoT I/IIA
BLE

坤锐电子版权所有copyright © 2025

Flexible Business Models

QUANRAY ELECTRONICS

RF Solutions

Full-Process Design

Industrial IoT

Transportation & Logistics

Retail Anti-Counterfeiting

Standard Products

Electronic Tag Chips

Tag Inlays

Readers/Writers

Product Customization

Custom ASIC with

Unique Functions

Custom Tags & Reader Antennas

Application-Tailored Readers

IP Licensing

NFC Controllers

Low-Power Memory

Low-Power Digital Units

超高频芯片 UHF Chip

高频芯片 HF Chip

双频芯片 DF Chip

低频芯片 LF Chip

标签 RFID Tag

读写器 Reader

集成 Integration

天线 Antenna

NFC移动支付 NFC Mobile Payment

客户定制 Customization

坤锐电子版权所有copyright © 2025

Comprehensive Product Line

QUANRAY ELECTRONICS

Manufacture

Logistics

Retail

Anti-counterfeiting

RFID chip and tag

- UHF
- HF
- LF
- UHF/HF
- UHF with Dual interface

RFID reader

- LF
- HF
- UHF

Passive IoT

- RFID+Sensor
- Battery-Free Bluetooth
- Passive cellular network

坤锐电子版权所有copyright © 2025

Rich and Complete Solutions

QUANRAY ELECTRONICS

Industrial IoT

Industrial Manufacturing

-Industrial sensing

-Asset Management

-Intelligent Manufacturing

Anti-counterfeiting Traceability

Alcohol Anti-counterfeiting

-Agricultural products, tobacco

-Alcoholic beverages and drinks

-Cosmetics

Smart Transprotation

Transportation and logistics

-Automotive Electronic Identification

-E-bike Identification

-Aviation Luggage Tracking

Logistics & Retail

Warehouse Logistics

-Smart Warehousing

-Smart Retail

-Apparel & Footwear

Security

Sensing

Group Reading

High Sensitivity

Reliability

Low Cost

Smartphone Readable

坤锐电子版权所有copyright © 2025

Near-field Asset Tracking & Tracing Solution

QUANRAY ELECTRONICS

Cable Rapid Localization Management

Pain Point: Difficulty in quickly locating target cables during fault diagnosis in dark underground environments, leading to low efficiency and high error rates.

Solution: LED tie-on tags based on Qstar-6T chips are bound to each cable, enabling remote-triggered flashing for visual identification.

Outcome: Enables rapid visual fault localization, improves inspection efficiency, and ensures data security with encrypted tags for critical infrastructure.

Transmission Tower Real-time Monitoring & Inspection

Pain Point: Wide distribution and complex environments make manual inspection challenging, with difficulties in real-time detection of structural tilting and other risks.

Solution: Deployment of DXS-TA sensing tags based on Qstar-8D chips, integrating tilt monitoring and RFID, with solar-assisted power and support for handheld or drone-based remote reading.

Outcome: Achieves real-time tower posture monitoring and contact-free inspection, enhances early warning capabilities, reduces safety risks, and supports efficient maintenance.

坤锐电子版权所有copyright © 2025

Local-Area Asset Tracking & Tracing Solution

QUANRAY ELECTRONICS

Battery-Free Bluetooth Asset Tracking (Ningbo Case)

Pain Point: Widespread mobile carriers and assets lead to inefficient manual inventory, low location visibility, and difficult resource scheduling.

Solution: Kunrui's battery-free Bluetooth tags attached to assets, combined with base stations, enable wide-range automatic inventory and zonal-level positioning.

Outcome: Achieves multiple daily automated inventories and real-time location tracking, allowing management to monitor asset status dynamically, optimize resource allocation, and significantly enhance production efficiency.

Battery-Free Bluetooth Asset Inventory (Large Manufacturing Pilot)

Pain Points: Traditional manual inventory requires long cycles and high costs, with delayed asset information affecting turnover efficiency and equipment utilization.

Solution: Deployment of Kunrui's battery-free Bluetooth system in the pilot area, where tags automatically report information within a 50-100 meter coverage range, enabling 24/7 automated inventory and area monitoring.

Outcomes: Manual inventory replaced, significantly reducing labor costs; real-time asset data visibility achieved; internal logistics efficiency substantially improved, laying the foundation for comprehensive rollout.

坤锐电子版权所有copyright © 2025

Wide-Area Asset & Environment Solutions

QUANRAY ELECTRONICS

Hangzhou Asian Games Project

Challenge: Dispersed logistics vehicles with battery risks, lacking cost-effective remote monitoring

Solution: Partnered with China Mobile and Huawei to deploy 5G-A passive IoT tags enabling 100-meter coverage for real-time temperature monitoring and positioning

Result: Ensured secure logistics operations while validating 5G-A's value for large-scale smart logistics

BaoGang steel Material Management

Challenge: High GPS costs and limited RFID accuracy for steel coil tracking

Solution: Deployed 5G-A passive IoT network with self-powered PIoT tags for real-time data transmission to backend systems.

Outcomes: Achieved low-cost, high-precision material management while enhancing operational efficiency and service quality.

坤锐电子版权所有copyright © 2025

Users and Partners

QUANRAY ELECTRONICS

AVERY DENNISON
Checkpoint Retail Technology Solutions
BRADY
SML
ARIZON
STid
AXEM Technology
CONFIDEX
FUJITSU
BEONTAG
SY RFID Manufacturing Service Provider
厦门信达 XINDECO
Srfid
XGSun 新歌山科技

中国南方电网 CHINA SOUTHERN POWER GRID
PIA
国家电网公司 STATE GRID CORPORATION OF CHINA
五粮液
BOEING 波音
GOSUNCN 高新兴
COMAC 中国商飞
欧治 Ouyeel
AIRBUS
远望谷
Ford
HDSC
TMRI
Haier
CITY BOX 魔盒
復旦大學 FUDAN UNIVERSITY

中国移动 China Mobile
China unicom中国联通
oppo
中国电信 CHINA TELECOM
CHINA TOWER 中国铁塔
ZTE中兴
orange
LG
Deutsche Telekom

坤锐电子版权所有copyright © 2025

Contact us

Shanghai Quanray Electronics Co., Ltd.

Add: Building 10-02, 1387 Zhang Dong Road, Pudong Shanghai
Tel: 021-68795432
E-mail: marketing@quanray.com

坤锐电子版权所有copyright © 2025