5G Brings evolutionary and disruptive changes in the IoT

05/2022

THE EVOLUTION TO 5G
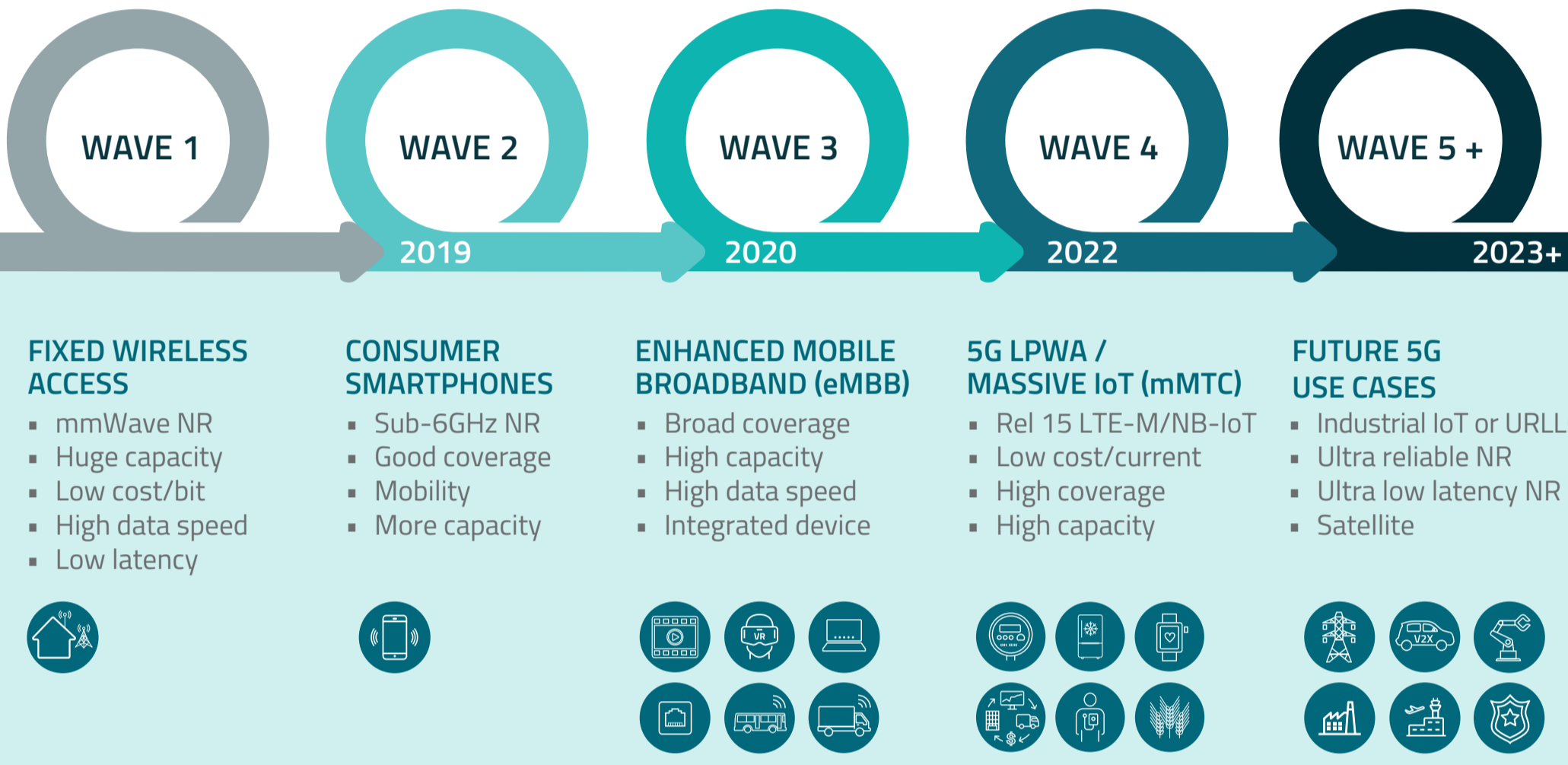
1990   2000   2010   2020

SPEED

5G NR mmWave
Up to 200+ Gbps

5G NR SUB-6
Up to 70+ Gbps

LTE-A PRO
600 Mbps-2.5 Gbps

LTE-A
50-300 Mbps

LTE
5-20 Mbps

5G LPWA
145Kbps-1Mbps

UMTS, CDMA, HSPA
1-5 Mbps

GSM, GPRS, EDGE, CDMA
56 Kbps

LPWA
(LTE-M,NB-IOT)
50-300Kbps

LATENCY 700-400ms

LATENCY 200-75ms

LATENCY 60-15ms

5G NR LATENCY 10-0.2ms

2G   **3G**   **4G**   **5G**

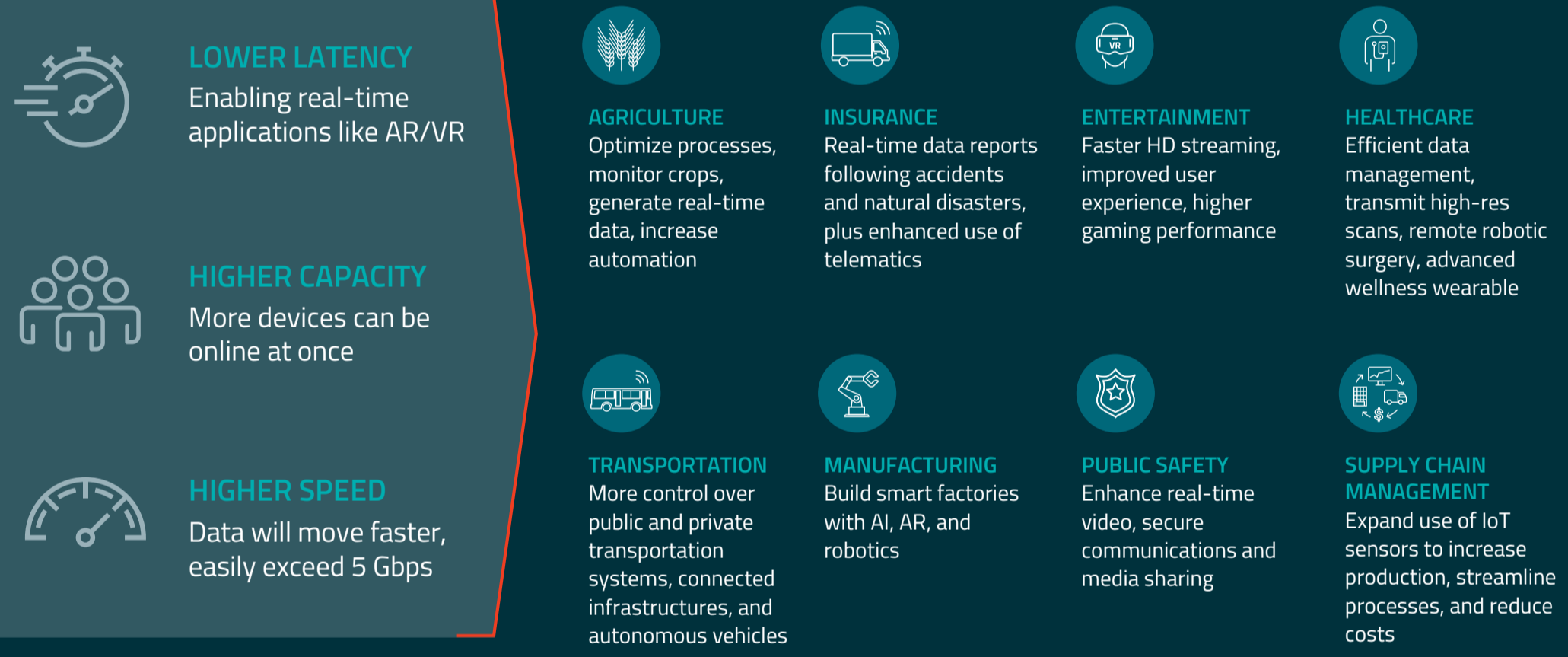## Did you know...

4G 5G 4G Coexistence with 5G
will extend the LTE lifecycle even further

5G 5G NR & 5G LPWA
continues the 4G track to support
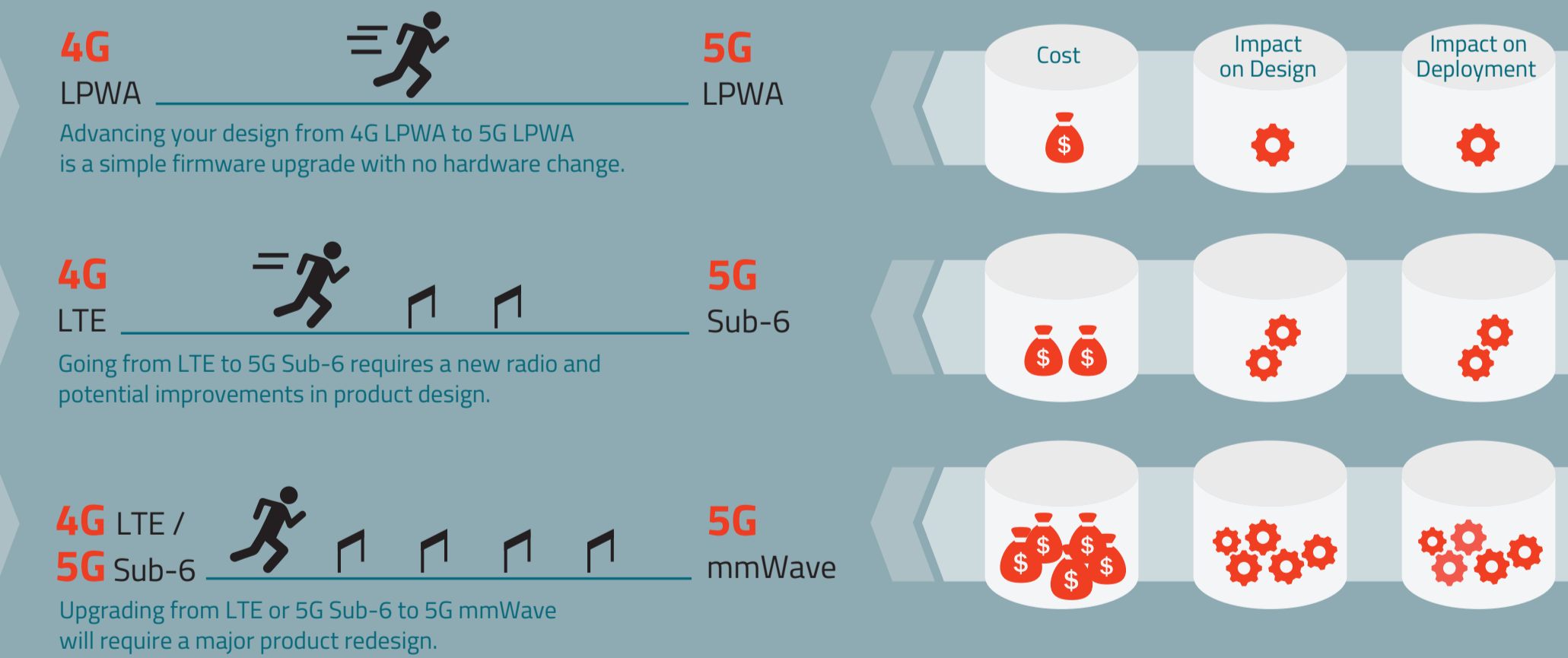high and lowbandwidth use cases
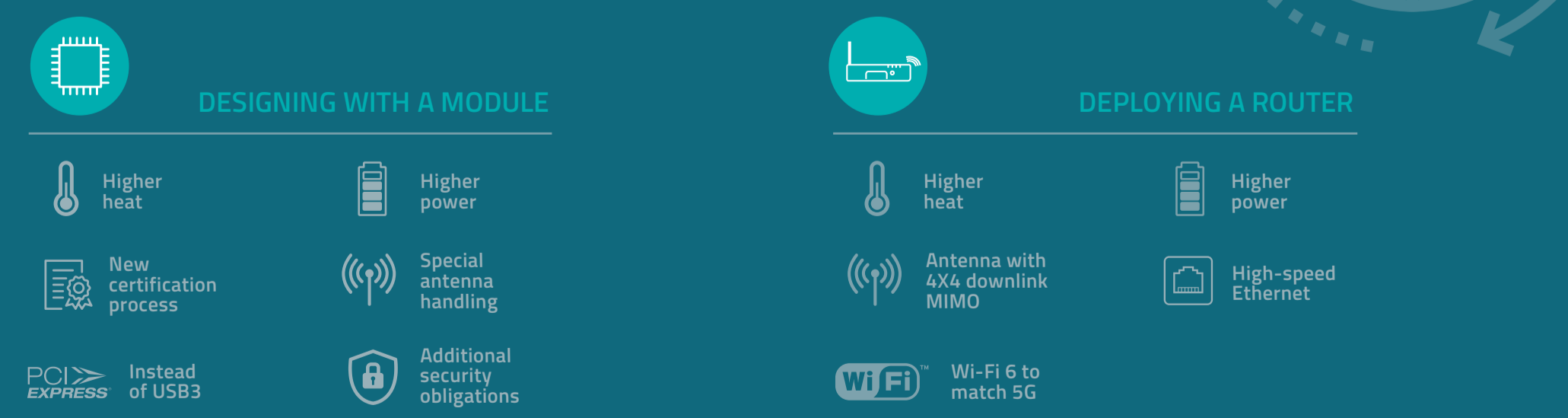
5G is coming in waves and bringing in new use cases...

WAVE 1   WAVE 2   WAVE 3   WAVE 4   WAVE 5 +

2019   2020   2022   2023+

FIXED WIRELESS ACCESS
- mmWave NR
- Huge capacity
- Low cost/bit
- High data speed
- Low latency

CONSUMER SMARTPHONES
- Sub-6GHz NR
- Good coverage
- Mobility
- More capacity

ENHANCED MOBILE BROADBAND (eMBB)
- Broad coverage
- High capacity
- High data speed
- Integrated device

5G LPWA / MASSIVE IoT (mMTC)
- Rel 15 LTE-M/NB-IoT
- Low cost/current
- High coverage
- High capacity

FUTURE 5G USE CASES
- Industrial IoT or URLLC
- Ultra reliable NR
- Ultra low latency NR
- Satellite

5G is creating new business opportunities

LOWER LATENCY
Enabling real-time applications like AR/VR

HIGHER CAPACITY
More devices can be online at once

HIGHER SPEED
Data will move faster, easily exceed 5 Gbps

AGRICULTURE
Optimize processes, monitor crops, generate real-time data, increase automation

INSURANCE
Real-time data reports following accidents and natural disasters, plus enhanced use of telematics

ENTERTAINMENT
Faster HD streaming, improved user experience, higher gaming performance

HEALTHCARE
Efficient data management, transmit high-res scans, remote robotic surgery, advanced wellness wearable

TRANSPORTATION
More control over public and private transportation systems, connected infrastructures, and autonomous vehicles

MANUFACTURING
Build smart factories with AI, AR, and robotics

PUBLIC SAFETY
Enhance real-time video, secure communications and media sharing

SUPPLY CHAIN MANAGEMENT
Expand use of IoT sensors to increase production, streamline processes, and reduce costs

Plan your path to 5G carefully

	Cost	Impact on Design	Impact on Deployment

4G LPWA → **5G** LPWA
Advancing your design from 4G LPWA to 5G LPWA is a simple firmware upgrade with no hardware change.

4G LTE → **5G** Sub-6
Going from LTE to 5G Sub-6 requires a new radio and potential improvements in product design.

4G LTE / **5G** Sub-6 → **5G** mmWave
Upgrading from LTE or 5G Sub-6 to 5G mmWave will require a major product redesign.

Things to consider when designing or deploying

DESIGNING WITH A MODULE

- Higher heat
- Higher power
- New certification process
- Special antenna handling
- PCI EXPRESS Instead of USB3
- Additional security obligations

DEPLOYING A ROUTER

- Higher heat
- Higher power
- Antenna with 4X4 downlink MIMO
- High-speed Ethernet
- Wi-Fi 6 to match 5G

Security and 5G

As the number of connected devices increases, so will the number of IoT security threats, and working with a trusted partner will become more important than ever. With 20+ years of IoT security experience, Sierra Wireless helps organizations realize a more secure future.

SIERRA WIRELESS