

# **BC66&BC66-NA-QuecOpen**

## **Solution Presentation**

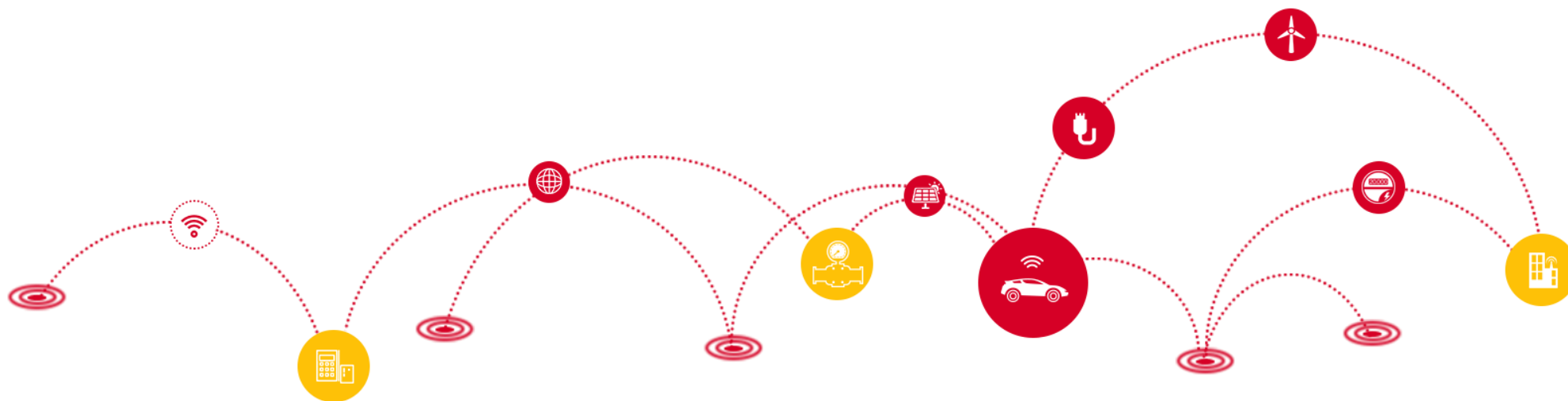
January, 2020

# QuecOpen<sup>®</sup> Overview

Resources & Advantages

Software Architecture

Development Requirements



# QuecOpen<sup>®</sup> Overview

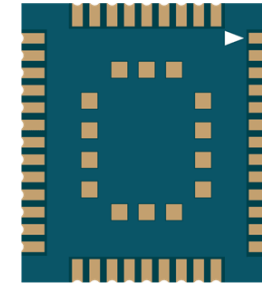


**QuecOpen<sup>®</sup>** is an embedded development solution for IoT applications. Based on it, embedded applications can be designed conveniently. QuecOpen<sup>®</sup> SDK is available to be downloaded directly into Quectel modules to run and enables creation of innovative applications.

In QuecOpen<sup>®</sup> solution, Quectel NB-IoT module acts as a main processor. So, NB-IoT module with QuecOpen<sup>®</sup> solution facilitates product designs and accelerates the application development.

BC66-QuecOpen and BC66-NA-QuecOpen are functional multi-band NB-IoT modules in LCC castellation packaging. Both of them support UDP, TCP, LwM2M and MQTT protocols, and are compatible with Quectel M66 GSM/GPRS module in footprint design. These make them a best choice for applications that have strict requirements on extended functions, cost-effectiveness and low power consumption (PSM and eDRX).

BC66-QuecOpen and BC66-NA-QuecOpen modules can be widely used in IoT fields, such as smart metering, bike sharing, smart wearables, smart parking, security and asset tracking, home appliances, agricultural and environmental monitoring, etc.



17.7 mm × 15.8 mm × 2.0 mm

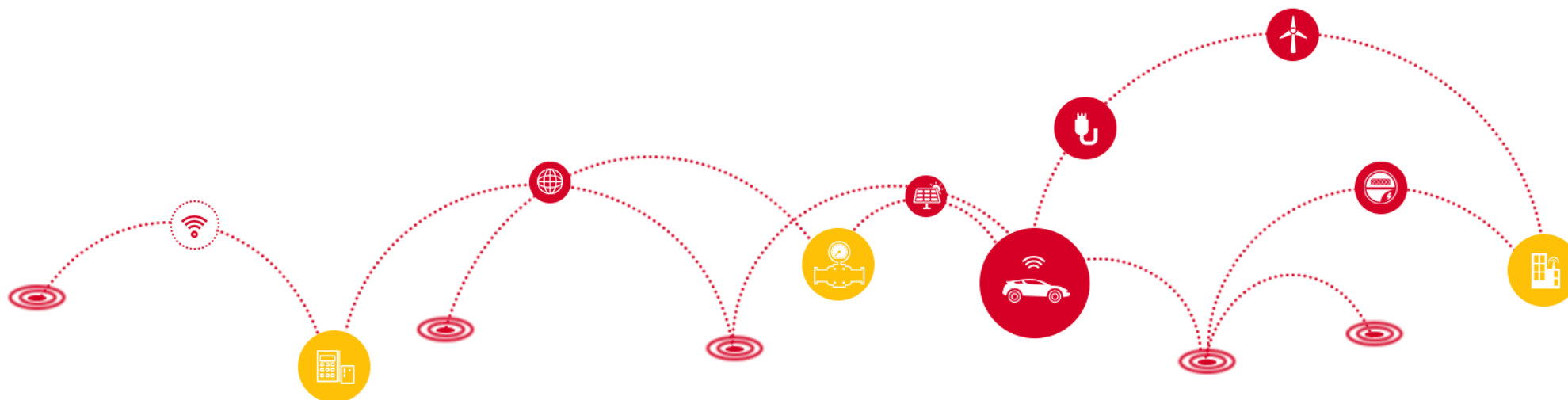


# QuecOpen® Overview

## Resources & Advantages

# Software Architecture

# Development Requirements



## System Resources

### ■ CPU

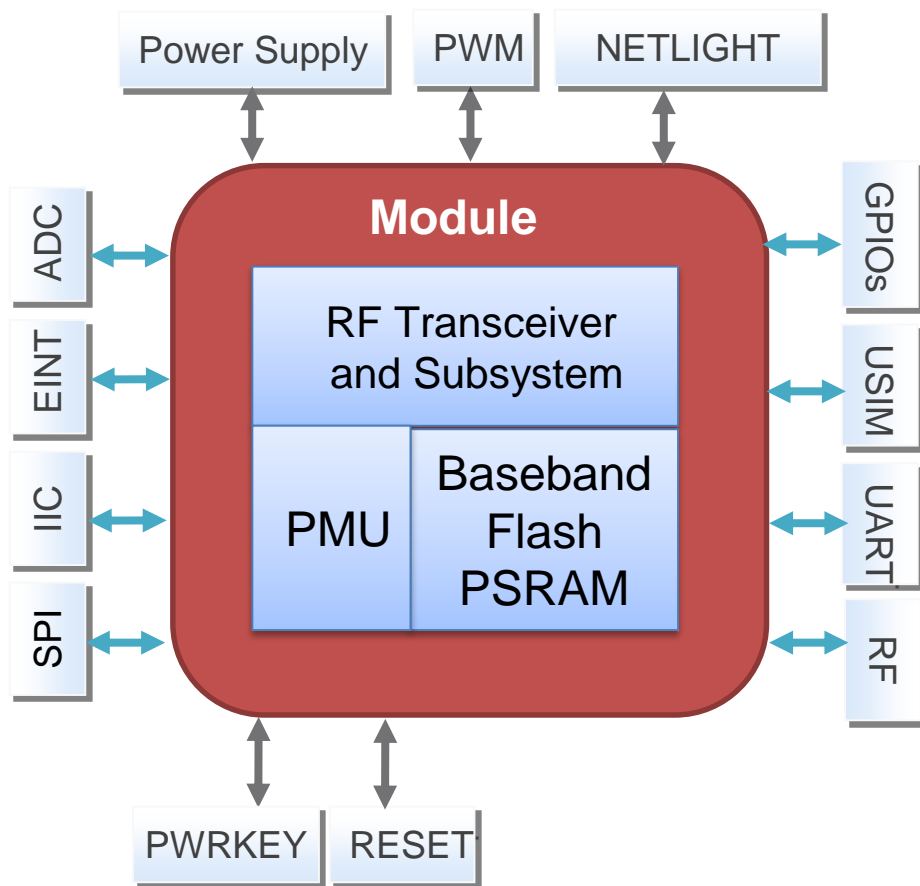
- BC66-QuecOpen: 32-bit ARM<sup>®</sup> Cortex<sup>®</sup>-M4 RISC 78 MHz with FPU and MPU
- BC66-NA-QuecOpen: 32-bit ARM<sup>®</sup> Cortex<sup>®</sup>-M4 RISC 156 MHz with FPU and MPU

### ■ Memory (4 MB Flash + 4 MB RAM)

- Code Region: *200 KB* space for APP image bin
- RAM: *100 KB* static memory and *300 KB* dynamic memory

# Open Resources – Hardware Resources

## Hardware Architecture



## Hardware Resources

- Power supply
- USIM interface
- GPIO interfaces
- EINT interfaces
- IIC interface
- SPI interface
- UART interface
- NETLIGHT interface
- PWM
- ADC

# BC66-QuecOpen Resources – Programmable Multiplexing Pins

Pin No.	Pin Name	Default Mode	Mode 0	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
3	SPI_MISO	0	GPIO		SPI_MISO					EINT
4	SPI_MOSI	0	GPIO		SPI_MOSI					EINT
5	SPI_SCLK	0	GPIO		SPI_SCK					EINT
6	SPI_CS	0	GPIO		SPI_CS					EINT
16	NETLIGHT	0	GPIO					PWM		EINT
20	RI	0	GPIO				I2C0_SCL			EINT
21	DCD	0	GPIO				I2C0_SDA			EINT
22	CTS_AUX	3	GPIO			UART1_RTS				EINT
23	RST_AUX	3	GPIO			UART1_CTS		PWM		EINT
26	GPIO1	0	GPIO							EINT
28	RXD_AUX	3	GPIO			UART1_RXD				EINT
29	TXD_AUX	3	GPIO			UART1_TXD				EINT
30	GPIO2	0	GPIO							EINT
31	GPIO3	0	GPIO					PWM		EINT
32	GPIO4	0	GPIO							EINT
33	GPIO5	0	GPIO							EINT
38	RXD_DBG	3	GPIO			UART2_RXD				EINT
39	TXD_DBG	5	GPIO					UART2_TXD		EINT
8	GPIO0	0	GPIO							EINT
47	USB_MODE	0	GPIO							EINT
52	GPIO6	0	GPIO							EINT
53	GPIO7	0	GPIO					ADC		EINT
54	GPIO8	0	GPIO					ADC		EINT

# BC66-NA-QuecOpen Resources – Programmable Multiplexing Pins



Pin No.	Pin Name	Default Mode	Mode 0	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
3	SPI_MISO	0	GPIO		SPI_MISO					EINT
4	SPI_MOSI	0	GPIO		SPI_MOSI					EINT
5	SPI_SCLK	0	GPIO		SPI_SCK					EINT
6	SPI_CS	0	GPIO		SPI_CS					EINT
16	NETLIGHT	0	GPIO					PWM		EINT
20	RI	0	GPIO				I2C0_SCL			EINT
21	DCD	0	GPIO				I2C0_SDA			EINT
22	CTS_AUX	3	GPIO			UART1_RTS				EINT
23	RST_AUX	3	GPIO			UART1_CTS		PWM		EINT
26	GPIO1	0	GPIO							EINT
28	RXD_AUX	3	GPIO			UART1_RXD				EINT
29	TXD_AUX	3	GPIO			UART1_TXD				EINT
30	GPIO2	0	GPIO							EINT
31	GPIO3	0	GPIO					PWM		EINT
32	GPIO4	0	GPIO							EINT
33	GPIO5	0	GPIO							EINT
38	RXD_DBG	3	GPIO			UART2_RXD				EINT
39	TXD_DBG	5	GPIO					UART2_TXD		EINT
8	GPIO0	0	GPIO							EINT
47	USB_MODE	0	GPIO							EINT
53	GPIO6	0	GPIO					ADC		EINT
54	GPIO7	0	GPIO					ADC		EINT



# Advantages – Low Cost & Fast Time-to-market



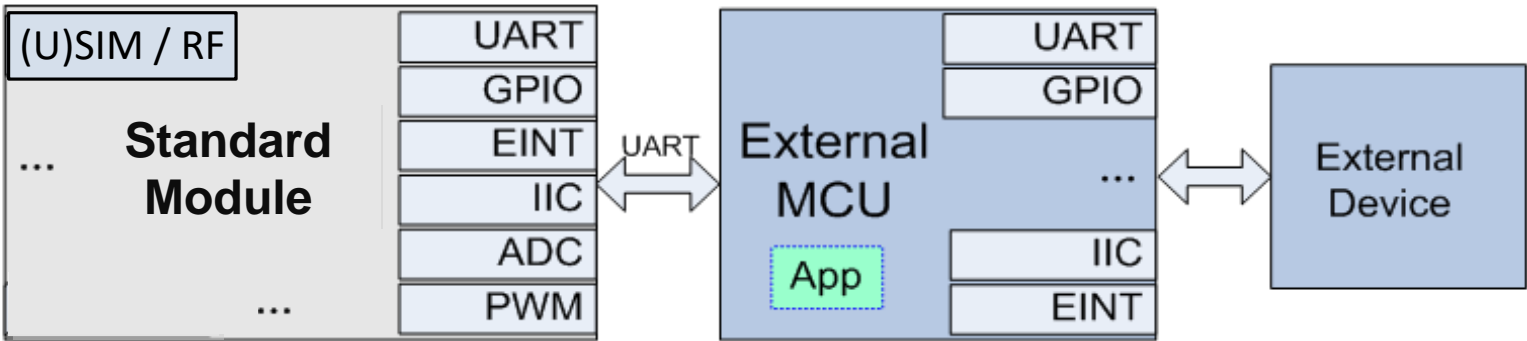
- Reduce product development time
- Simplify circuit design and reduce product cost
- Reduce power consumption
- Decrease the size of terminal products
- Support firmware and APP bin upgrade via DFOTA
- Improve cost-performance ratio of products, and enhance product competitiveness

**Low Cost & Fast Time-to-market**

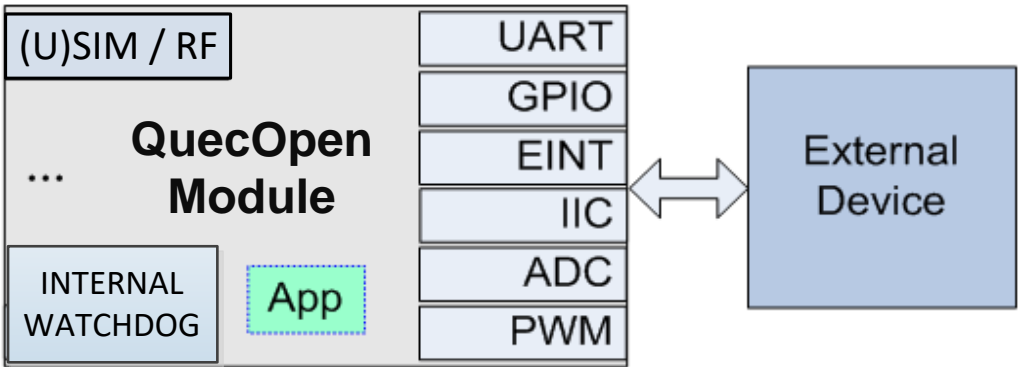
# Advantages – Easier Hardware Design

Compared with traditional solutions, QuecOpen<sup>®</sup> solution make the hardware design easier for developers. The following are details of traditional and QuecOpen<sup>®</sup> solutions.

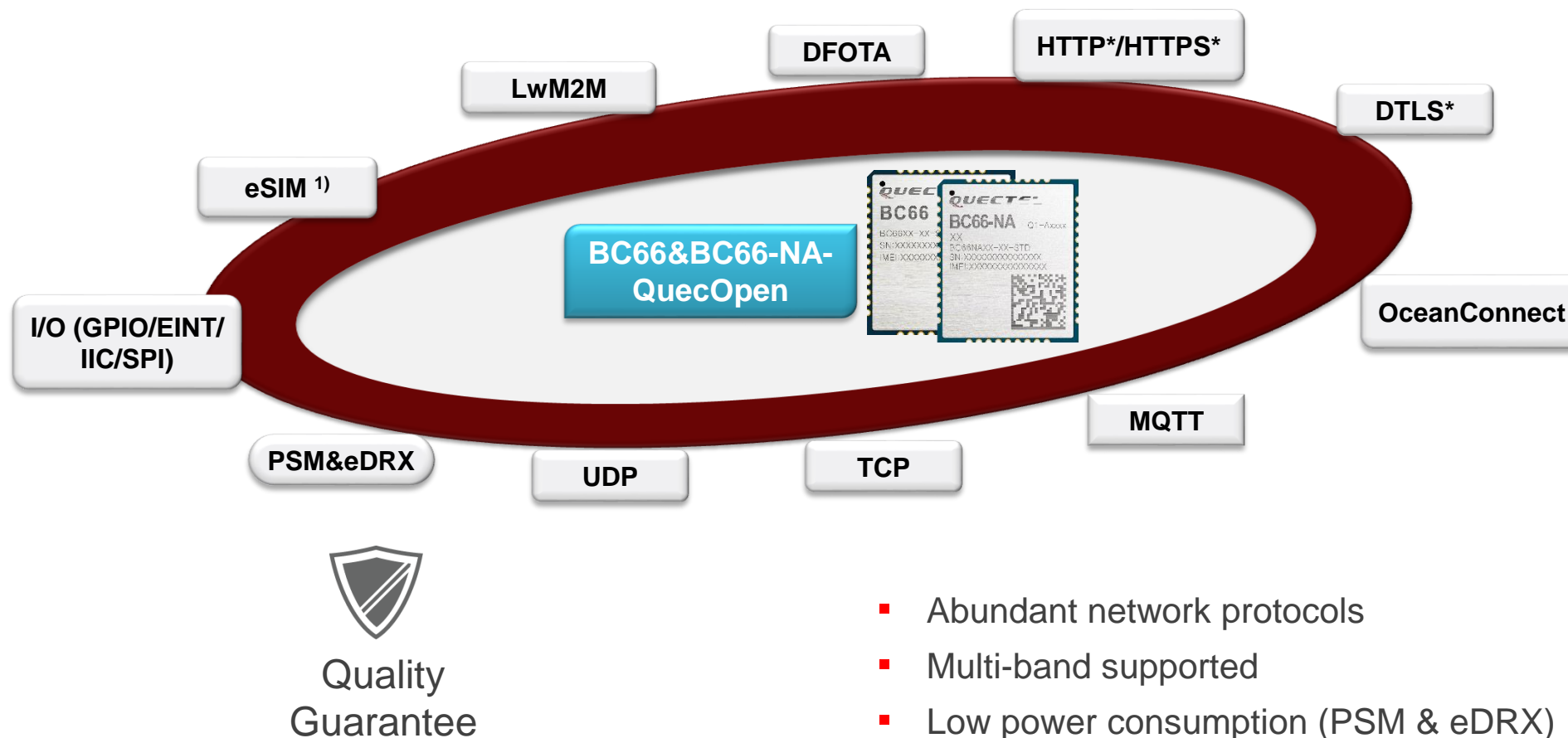
## ■ Traditional Solution



## ■ QuecOpen<sup>®</sup> Solution



# Advantages – Enhanced Technologies



- Abundant network protocols
- Multi-band supported
- Low power consumption (PSM & eDRX)
- Rich I/O interfaces

*\* means under development.*

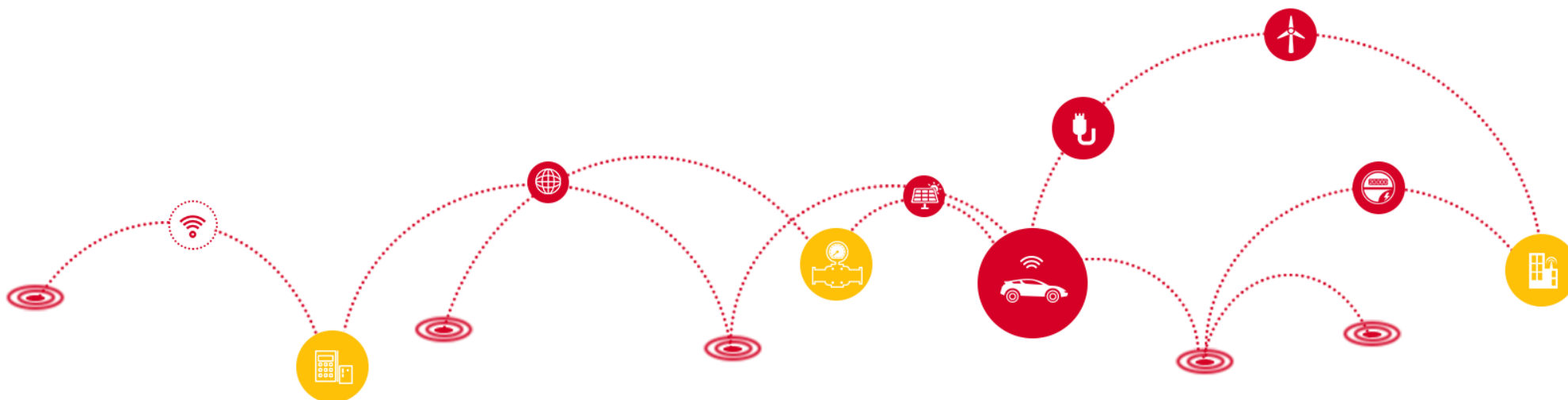
*1) eSIM is reserved and not included in the modules by default. If the eSIM feature is required, please contact Quectel Technical Support.*

# QuecOpen® Overview

## Resources & Advantages

## **Software Architecture**

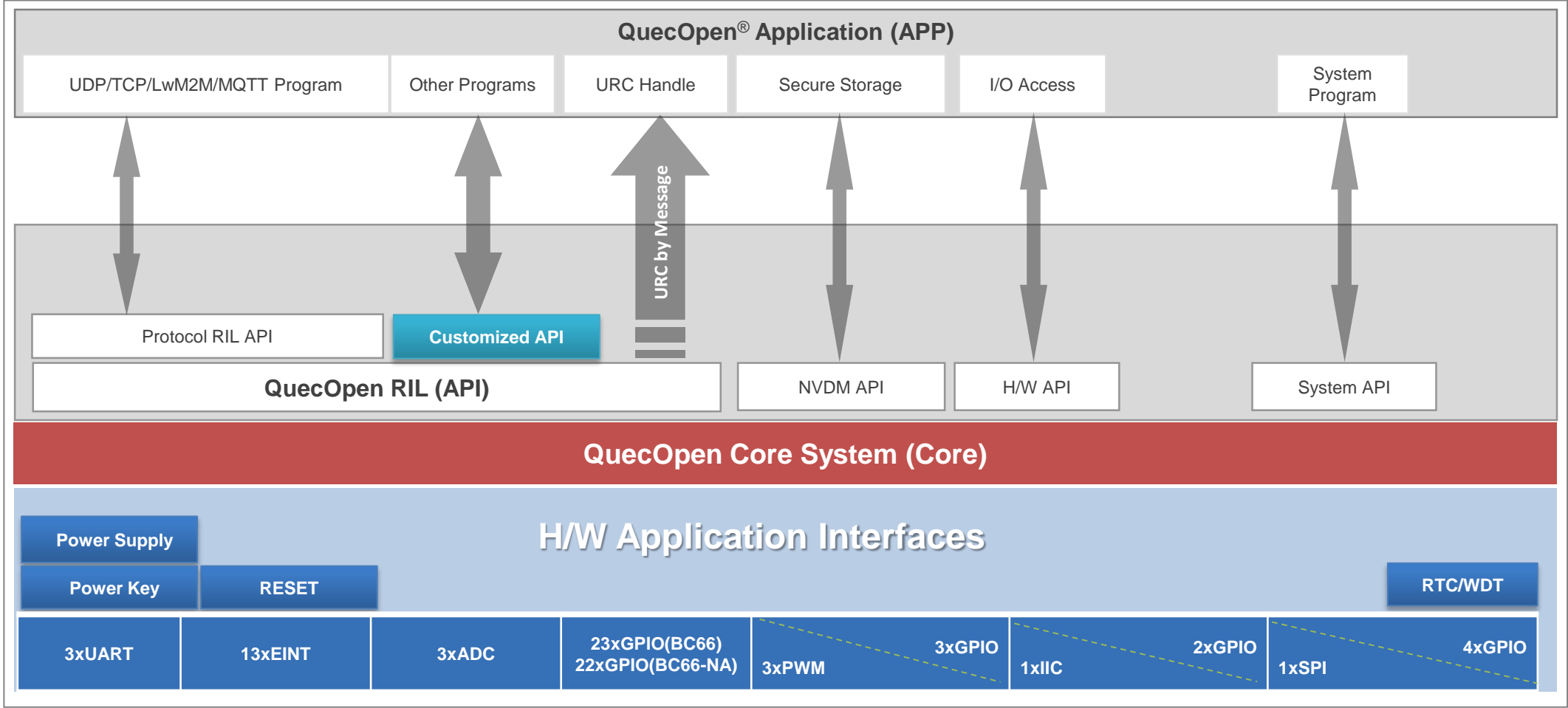
## Development Requirements



# Software Architecture (1)

System software of QuecOpen<sup>®</sup> solution consists of 3 layers: Core system, User API and Application.

The following block diagram shows the software architecture of QuecOpen<sup>®</sup>.



# Software Architecture (2)

## ■ Core System

Core System is a combination of hardware and system software of NB-IoT module. It has a built-in ARM Cortex-M4 processor, and has been built over FreeRTOS operating system which has the characteristics of micro-kernel, real-time, multi-tasking, etc.

## ■ QuecOpen RIL

QuecOpen RIL, an open source layer, is embedded into User API layer. With QuecOpen<sup>®</sup> RIL, developers can simply call API to send AT commands and get the response immediately when API returns.

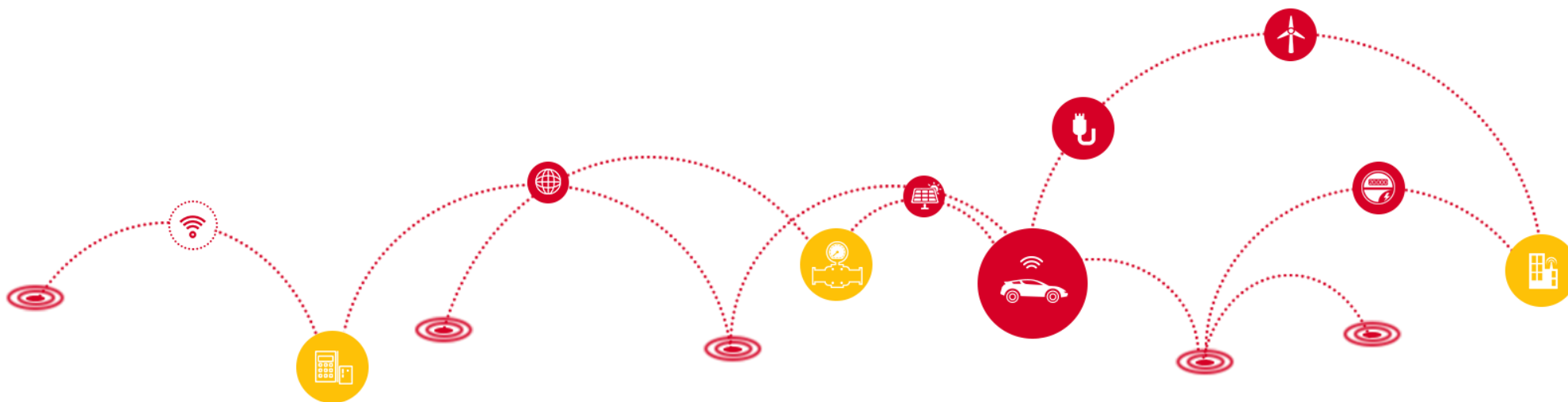
New API functions can be easily developed to implement the AT commands on the basis of requirements.

# QuecOpen<sup>®</sup> Overview

## Resources & Advantages

## Software Architecture

## **Development Requirements**



# What's New?

## ■ GCC Compiler Support

- Support free-of-charge GCC compiler (*gcc-arm-none-eabi V4.8*).
- Support compilation in Linux environment and Windows environment.

## ■ IDE Support

- Command-line + Source Insight



# Development Requirements (1)

## ■ Host System Requirements

The following host operating systems and architectures are supported:

- Microsoft Windows XP (SP1 or later)
- Windows Vista
- Windows 7 systems with IA32, AMD64, and Intel 64 processors.

## ■ Compiler Requirements

- GCC Compiler (*gcc-arm-none-eabi V4.8*)

# Development Requirements (2)

## ■ Programming Language Requirement

- Proficient in C programming language.

## ■ SDK and Other Requirements

- Quectel BC66/BC66-NA NB-IoT module with QuecOpen solution.
- Quectel BC66/BC66-NA TE-B.
- QuecOpen SDK.
- Firmware download tool (included in SDK).

# Thank you!

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