



Quectel LPWA Module

Product Overview

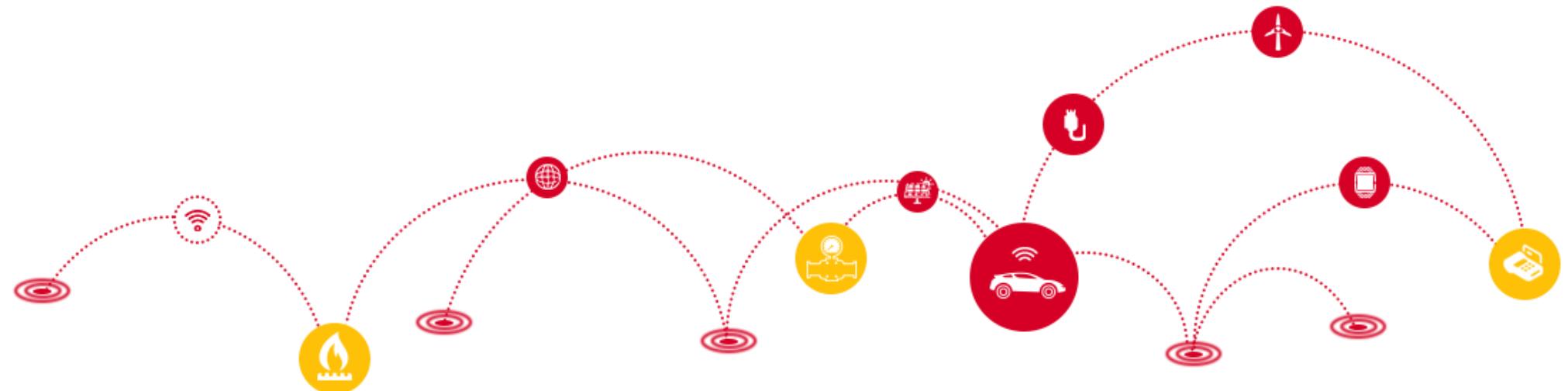
February, 2020

LPWA Technology

LPWA Modules Summary

Product Overview

Applications

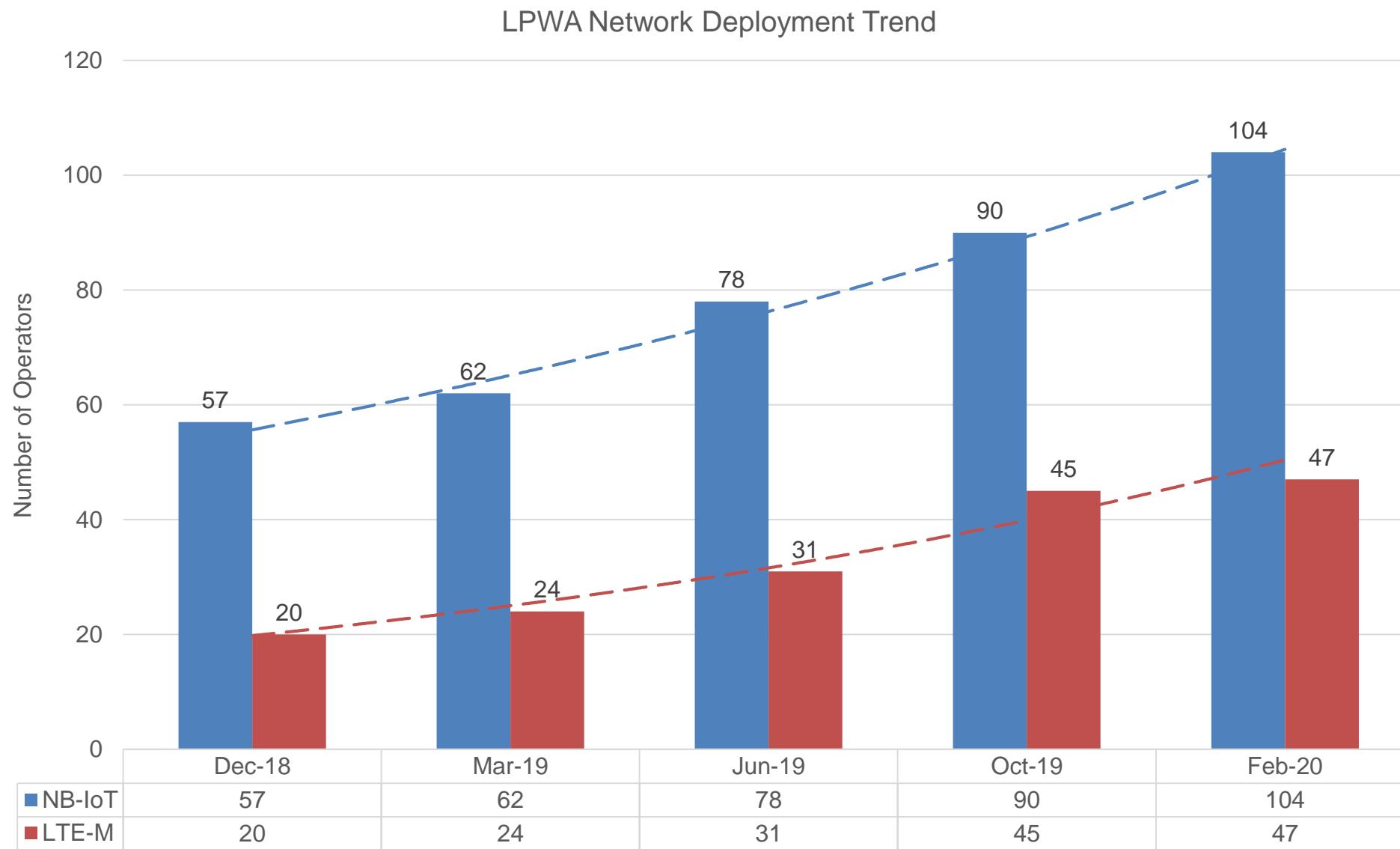


LPWA Network Deployment

(Based on GSMA Data up to Feb. 15, 2020)



LPWA Network Deployment Trend



NB-IoT Deployment (1)

(Based on GSMA Data up to Feb. 15, 2020)



NB-IoT = 104

Operator	Country/Region	Bands	Operator	Country/Region	Bands	Operator	Country/Region	Bands
3	Hong Kong, China	8	Elisa	Estonia	20	Rogers	Canada	4, 5, 12
A1	Austria	20	Etisalat	UAE	20	SFR	France	20
A1	Croatia	20	Entel	Chile	28	Singtel	Singapore	8
A1	Belarus	/	FarEasTone	Taiwan, China	28	SmarTone	Hong Kong, China	8
AIS	Thailand	8	Grameenphone	Bangladesh	3, 8 (TBC)	SoftBank	Japan	1, 3, 8
APTG	Taiwan, China	8	KCELL	Kazakstan	/	StarHub	Singapore	3, 8
Altice	Portugal	20	KT	South Korea	3	STC	Saudi Arabia	28
Antel	Uruguay	3, 28	Kyvistar	Ukraine	3	Swisscom	Switzerland	20
AT&T	USA	2, 4, 12	LGU+	South Korea	5	Taiwan Mobile	Taiwan, China	3, 28
AT&T	Mexico	5	LMT	Latvia	/	TDC	Denmark	20
BASE (Telenet)	Belgium	3, 20	M1	Singapore	8	Telcel	Mexico	5
China Mobile	China	8	Maxis	Malaysia (6 Cities)	3	Telecom Italia/TIM	Brazil	3, 28
China Mobile	Hong Kong, China	3	MegaFon	Russia	20, 8, 3	Telecom Italia/TIM	Italy	20
China Telecom	China	5	Mobily	Saudi Arabia	20	Telefónica/Movistar	Argentina	4, 28
China Unicom	China	3, 8	Mobitel	Sri Lanka	3, 8	Telefónica	Spain	20
Chunghwa	Taiwan, China	8	MTS	Russia	3	Telefónica	Brazil	3, 28
Claro	Brazil	3, 28	NOS	Portugal	3, 20	Telefónica	Germany	8, 20
Claro	Colombia	5	NTT Docomo	Japan	1, 19	Telefonica	Colombia	2
Dialog Axiata	Sri Lanka	3, 8	Orange	Belgium	3, 20	Telenor	Denmark	20
DNA	Finland	20, 3	Orange	Spain	20	Telenor	Norway	8, 20
DU	UAE	20	Proximus	Belgium	20	Telia	Finland	20
Elisa	Finland	20, 3	Reliance Jio	India	3, 5	Telia	Norway	20

NB-IoT Deployment (2)

(Based on GSMA Data up to Feb. 15, 2020)



NB-IoT = 104

Operator	Country/Region	Bands	Operator	Country/Region	Bands	Operator	Country/Region	Bands
Telia	Sweden	20	Viettel	Vietnam	3	XL Axiata	Indonesia	8
Telia	Denmark	20, 8	Vodafone	Australia	8	Zain	Saudi Arabia	3
Telia	Estonia	20	Vodafone	Czech	8, 20			
Telkomsel	Indonesia	8	Vodafone	Germany	20			
Telstra	Australia	28	Vodafone	Greece	20			
True	Thailand	8	Vodafone	Hungary	20			
T-Mobile	Austria	8	Vodafone	Ireland	20			
T-Mobile(DT)	Croatia	8, 20	Vodafone	Italy	20			
T-Mobile	Germany	8, 20	Vodafone	Malta	/			
T-Mobile (Cosmote)	Greece	20	Vodafone	New Zealand	28			
T-Mobile	Hungary	20	Vodafone	Portugal	8, 20			
T-Mobile (DT)	Poland	20	Vodafone	Spain	8, 20			
T-Mobile (Slovakia Telecom)	Slovakia	20	Vodafone/Vodacom	South Africa	8			
T-Mobile(DT)	Netherlands	8, 20	Vodafone	Netherlands	20			
T-Mobile	USA	2, 4, 12, 66, 71, 85	Vodafone	Turkey	8, 20			
Turkcell	Turkey	20	Vodafone	United Kingdom	20			
Velcom	Belarus	8	Vodafone	Ukraine	3			
Verizon	USA	13	Vodafone	Romania	20			

LTE-M Deployment

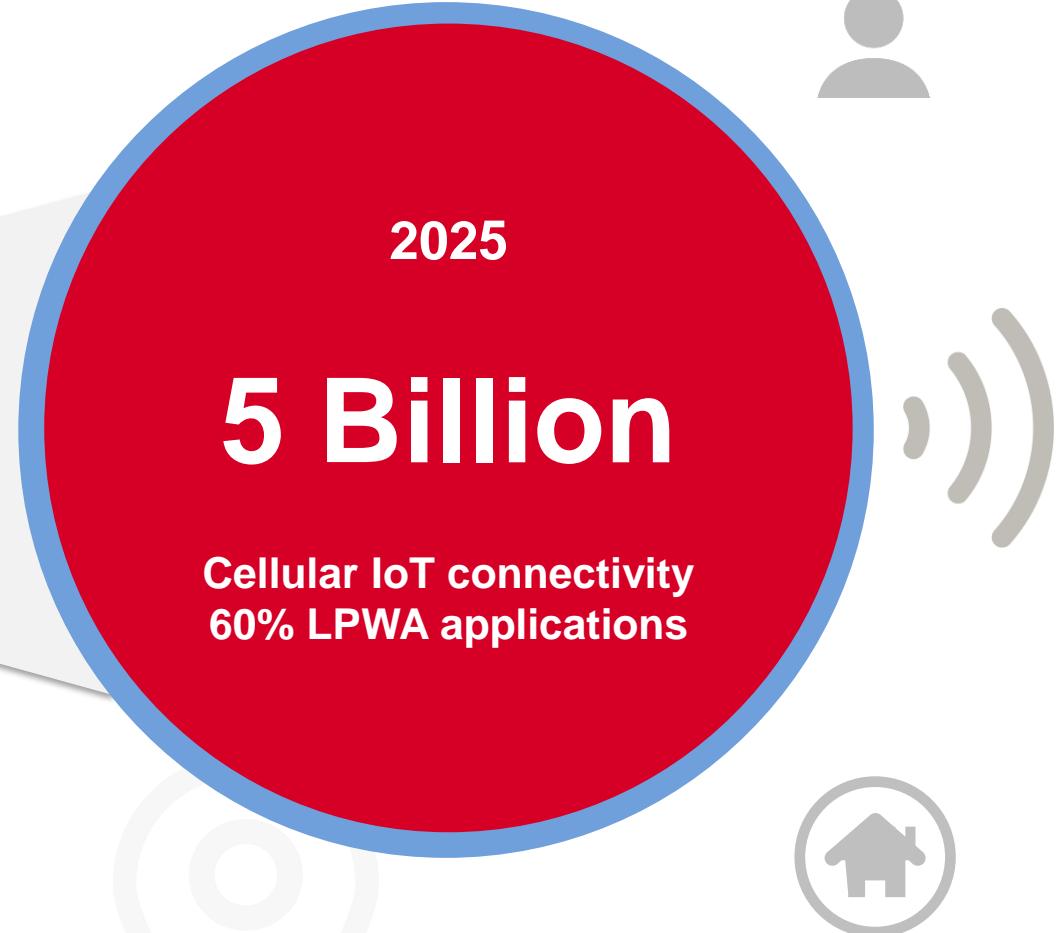
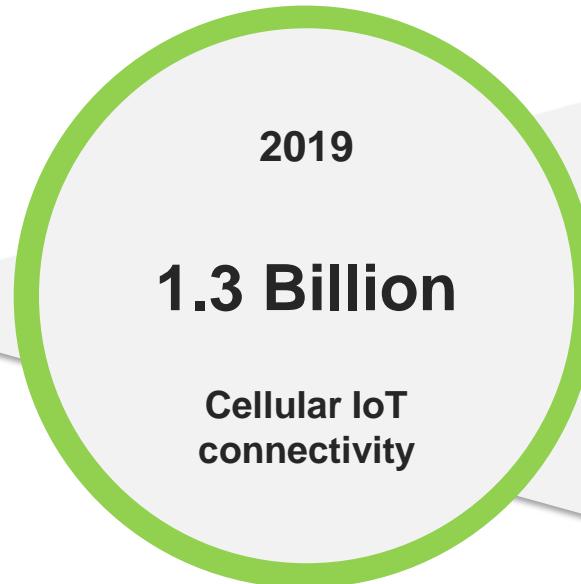
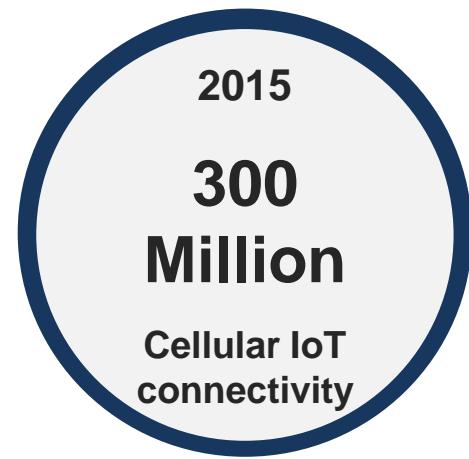
(Based on GSMA Data up to Feb. 15, 2020)



LTE-M = 47

Operator	Country/Region	Bands	Operator	Country/Region	Bands	Operator	Country/Region	Bands
AIS	Thailand	3, 8	NTT DOCOMO	Japan	1, 19	Telenor	Norway	20
América Móvil	Mexico	4	Orange	Belgium	20	Telenor	Sweden	20
APTG	Taiwan, China	8, 28	Orange	France	20	Telstra	Australia	28
AT&T	Mexico	4, 5	Orange	Romania	3	Telus	Canada	2, 4, 5, 12
AT&T	USA	2, 4, 12	Orange	Spain	3, 20	Turkcell	Turkey	3, 20
Bell	Canada	12	Rogers	Canada	4, 5, 12	USCC	US	2, 4, 5, 12
Chunghwa	Taiwan, China	3	SingTel	Singapore	3, 8	Verizon	USA	4, 13
Claro	Brazil	3, 28	SKT	South Korea	3, 5	Vodafone	New Zealand	3, 28
Claro	Colombia	2	SoftBank	Japan	1, 3, 8	Vodafone	Netherlands	20
Claro	Chile	28	Spark	New Zealand	3, 28			
Claro	Argentina	28	Sprint	USA	25, 26			
Dialog Axiata	Sri Lanka	8	Swisscom	Switzerland	20			
DNA	Finland	20, 3	Telcel	Mexico	4			
Elisa	Estonia	/	Telefónica/Movistar	Argentina	4, 28			
Etisalat	UAE	5	Telefónica/VIVO	Brazil	3, 28			
KDDI	Japan	18, 26	Telefónica	Germany	20			
KT	South Korea	3	Telefonica	Colombia	2, 4			
KPN	Netherlands	20	Telefonia	Spain	20			
LGU+	South Korea	5	Telenor	Denmark	20			

IoT Connectivity Forecast



LPWA Advantages



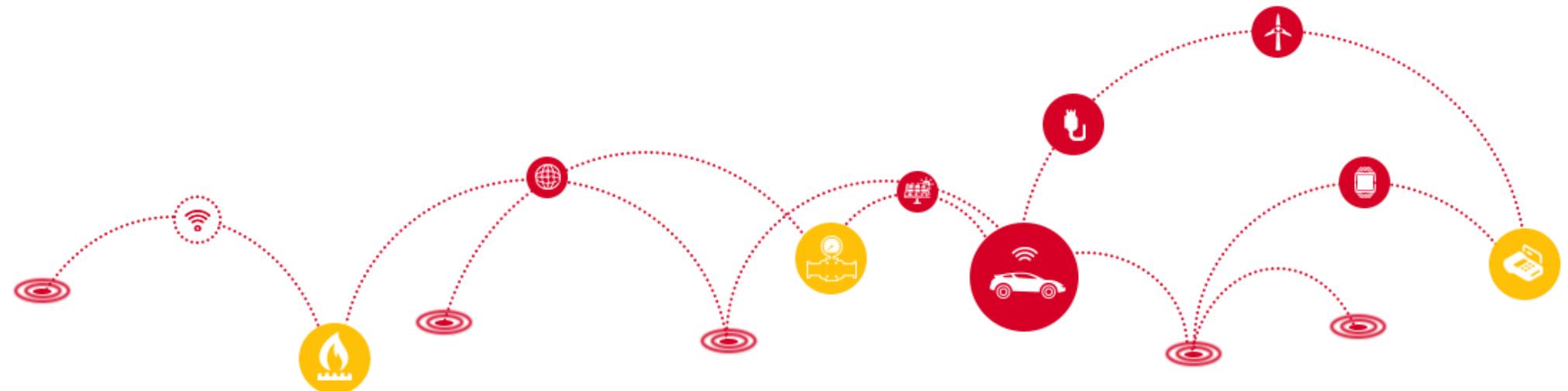
Note: VoLTE is supported on LTE Cat M1 only.

LPWA Technology

LPWA Modules Summary

Product Overview

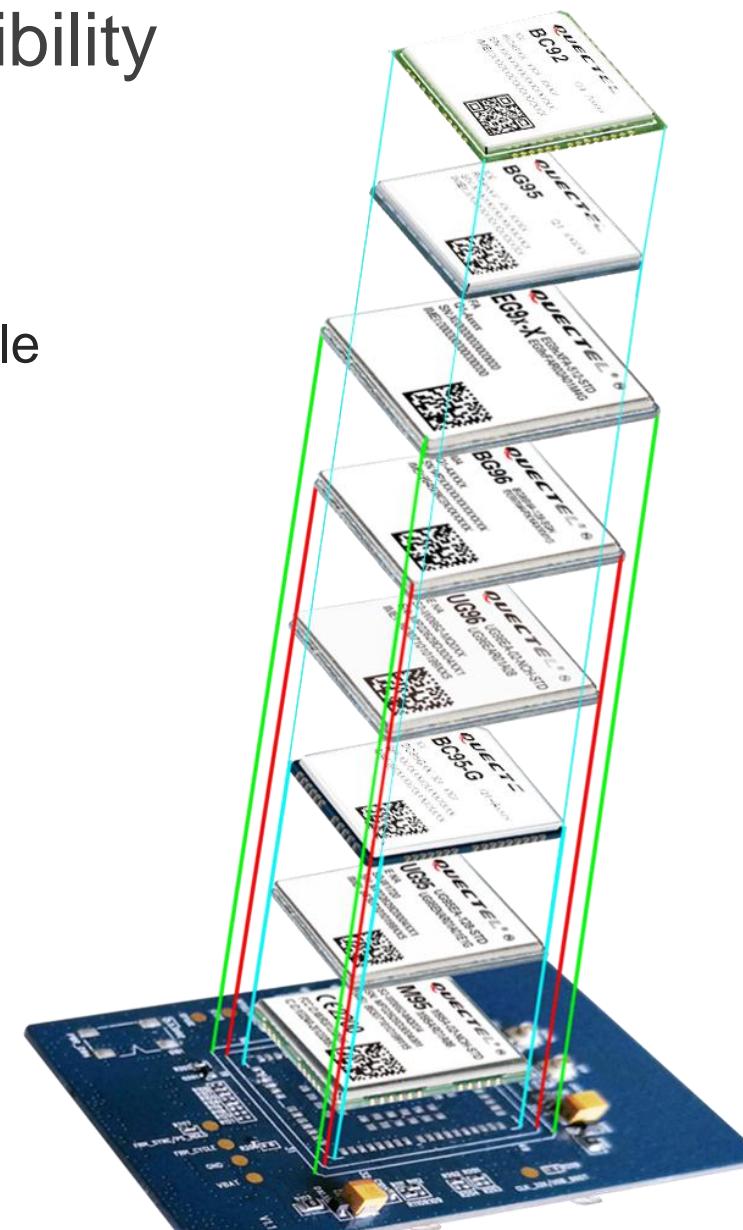
Applications



BG95/BG96/BC95-G/BC92 Compatibility

BG95, BG96, BC95-G and BC92 are compatible with the following Quectel 2G/3G/4G modules:

- GSM/GPRS module M95
- UMTS/HSPA modules UG96/UG95
- LTE Cat 4/Cat 1 module EG95/EG91



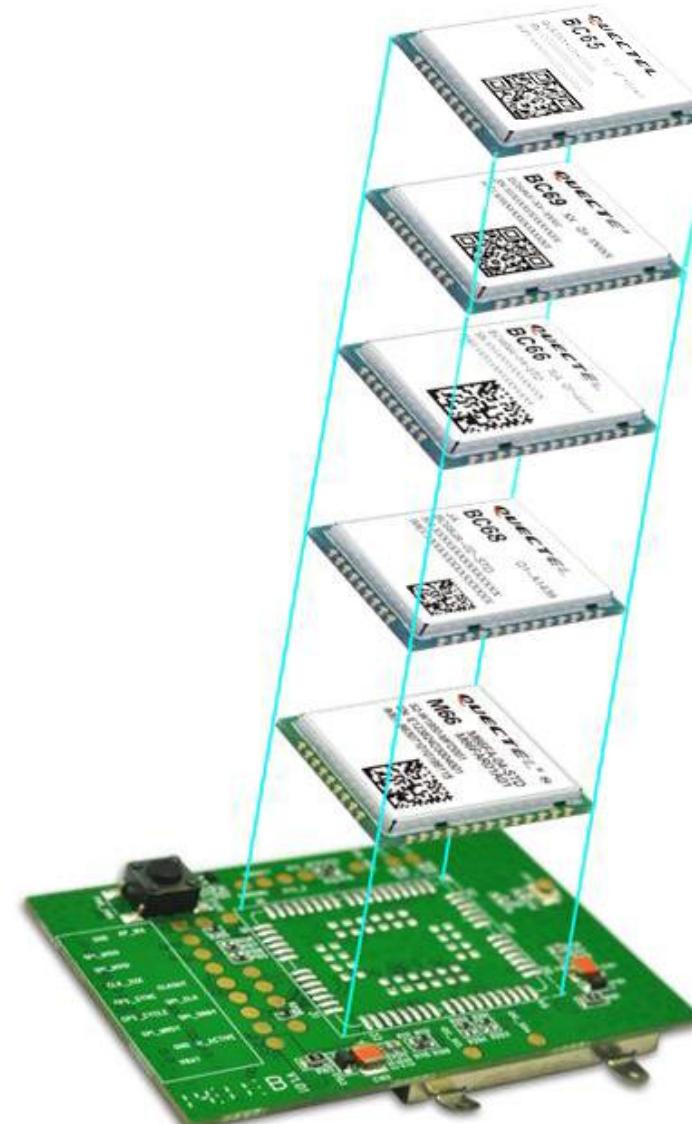
The compatibility diagram shown here is for illustration purpose only, and only selected modules are included. The actual label design of the modules may be different.

BC69/BC66(-NA)/BC68/BC65 Compatibility



BC69/BC66/BC66-NA/BC68/BC65 are compatible with the following Quectel 2G module:

- Quectel GSM/GPRS M66 module

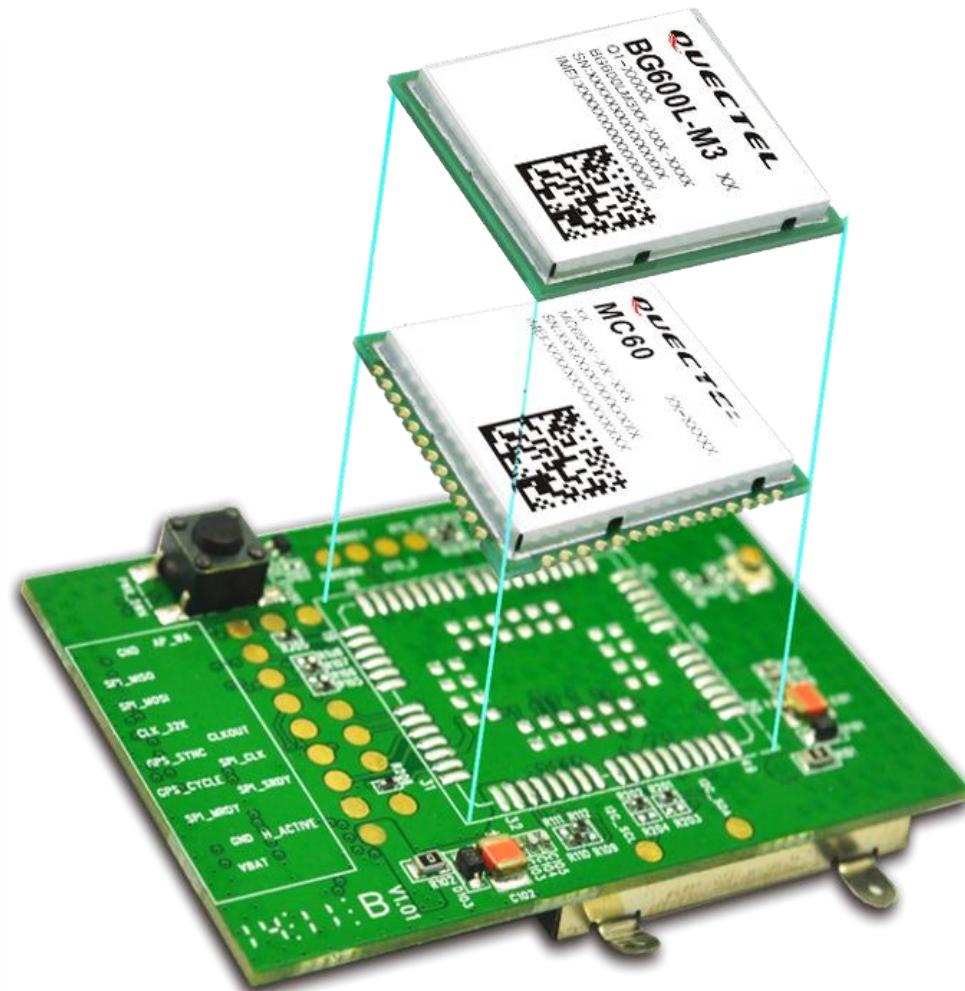


The compatibility diagram shown here is for illustration purpose only, and only selected modules are included. The actual label design of the modules may be different.

BG600L-M3 Compatibility

BG600L-M3 is compatible with

- Quectel GSM/GPRS/GNSS module MC60



The compatibility diagram shown above is for illustration purpose only.
The actual label design of the modules may be different.

Quectel LPWA Modules Summary (MP 1)



Module	BG96	BG95-M3	BG77
Timeline	MP in Jan. 2018	MP in Jan. 2020	MP in Feb, 2020
Chipset	Qualcomm MDM9206	Qualcomm MDM9205	Qualcomm MDM9205
Mode	Cat M1/ Cat NB1/ EGPRS/ GNSS	Cat M1/ Cat NB2/ EGPRS/ GNSS	Cat M1/ Cat NB2/ GNSS
LTE Band	1/2/3/4/5/8/12(17)/13/18/19/20/25 ^① 26*/28/39 <i>(B39 for Cat M1 only)</i>	1/2/3/4/5/8/12/13/14 ^② /18/19/20/ 25/26/27 ^② /28/31/66/71 ^③ /85	1/2/3/4/5/8/12/13/14 ^② /18/19/20/ 25/26/27 ^② / 28/66/71 ^③ /85*
Compatibility	EG91/ UG95/ UG96/ BG95	BG96/ EG91/ UG95/ UG96/ M95	----
Highlight	<ul style="list-style-type: none"> Robust quality 30+ global certifications 	<ul style="list-style-type: none"> Low power consumption 1119 kbps UL (Cat M1) 3.3–4.3 V power supply VoLTE for Cat M1/ CS voice for GSM eSIM 	<ul style="list-style-type: none"> Super compact size (14.9 × 12.9 × 1.7) mm 2.6–4.8 V power supply
Certification	Carrier: Vodafone/ Deutsche Telekom/ Telefónica/ Verizon/ AT&T/ T-Mobile/ Sprint/ U.S. Cellular/ Rogers/ Telus/ SKT/ LGU+/ NTT DOCOMO/ SoftBank/ KDDI/ Telstra Regulatory: GCF/ CE/ FCC/ PTCRB/ IC/ Anatel/ IFETEL/ CCC/ KC/ NCC/ JATE/ TELEC/ RCM/ NBTC/ IMDA	All major global carriers	All major global carriers
Promotion Recommendations	<ul style="list-style-type: none"> Quality sensitive customers Asset tracking 	<ul style="list-style-type: none"> Quality sensitive customers Asset tracking 	<ul style="list-style-type: none"> Smart wearables Size-sensitive applications

^{“*”} means under development.

^① LTE B25 supported on BG96 with R1.2 hardware version.

^② Cat M1 bands only ^③ Cat NB2 Bands Only

Quectel LPWA Modules Summary (MP 2)



Module	BC66	BC92
Timeline	MP in Dec. 2018	MP in Feb. 2020
Chipset	MTK MT2625	UNISOC RDA8909B
Mode	Cat NB1	Cat NB2/ GSM
LTE Band	1/2/3/4/5/8/12/13/17/18/19/20/25/28/66/26*	3/5/8/20/28
Compatibility	M66/ BC68	BC95-G/ /BG95/ M95
Highlight	<ul style="list-style-type: none"> • Cost efficiency • Small size • 2.1–3.63 V power supply • eSIM 	<ul style="list-style-type: none"> • GSM voice call* • Built-in ADC temperature detection* • Low power design • DFOTA
Certification	<p>Carrier: Vodafone/ Deutsche Telekom/ AT&T/ T-Mobile/ SoftBank/ Telefonica*/ Verizon*/ Sprint*/ LGU+*/ NTT DOCOMO*/ Telstra*</p> <p>Regulatory: GCF/ CE/ FCC/ PTCRB/ IC/ KC/ NCC/ JATE/ TELEC/ RCM/ NBTC/ IMDA</p> <p>Others: ATEX*</p>	<p>Carrier: Vodafone*/ MTN*/ Vodacom</p> <p>Regulatory: GCF*/ CE/ RCM/ ICASA*</p>
Promotion Recommendations	<ul style="list-style-type: none"> • Smart metering/ smoke detector/ tracker • Cost-sensitive customers 	<ul style="list-style-type: none"> • Smart wristband/ smart watch/ student card/ bike sharing/ tracker/ parking/ truck

“*” means under development/planning or ongoing

Quectel LPWA Modules Summary (MP 3)



Module	BC95-G	BC68
Timeline	MP in Jun. 2018	MP in Jun. 2018
Chipset	Hisilicon Hi2115	Hisilicon Hi2115
Mode	Cat NB2	Cat NB2
LTE Band	1/3/5/8/20/28	1/3/5/8/20/28
Compatibility	M95	M66/ BC66
Highlight	<ul style="list-style-type: none"> • Good robustness • Proprietary DFOTA 	<ul style="list-style-type: none"> • Good robustness • Proprietary DFOTA
Certification	<p>Carrier: Vodafone/ Deutsche Telekom/ Telefónica/ KT/ LGU+/ SoftBank/ Telstra Regulatory: GCF/ CE/ KC/ NCC/ JATE/ TELEC/ RCM/ NBTC/ IMDA Others: ATEX*</p>	<p>Carrier: Vodafone/ Deutsche Telekom/ Telefónica/ SoftBank/ Telstra Regulatory: GCF/ CE/ NCC/ JATE/ TELEC/ RCM/ IMDA Others: ATEX</p>
Promotion Recommendations	<ul style="list-style-type: none"> • Smart metering/ smoke detector • Customers with high requirements on product maturity 	<ul style="list-style-type: none"> • Smart metering/ smoke detector • Customers with high requirements on product maturity

“**” means under development.

① LTE B25 supported on BG96 with R1.2 hardware version.

Rev.: V2.8 | Status: Released

Quectel LPWA Modules Summary (Under Development 1)



Module	BG95 Series (excl. BG95-M3)	BG600L-M3
Timeline	BG95-M1: • ES: Jul. 2019 • CS: Feb. 2020	• ES: Feb. 2020 • CS: Apr. 2020
Chipset	Qualcomm MDM9205	Qualcomm MDM9205
Mode	Cat M1/ Cat NB2/ EGPRS/ GNSS/ Wi-Fi	Cat M1/ Cat NB2/ EGPRS/ GNSS
LTE Band	1/2/3/4/5/8/12/13/14 ^① /18/19/20/ 25/26/27 ^① /28/31/66/71 ^② /72/73/85	1/2/3/4/5/8/12/13/14 ^① /17/18/B19/20/ 25/26/27 ^① / 28/66/71 ^② /85
Compatibility	BG96/ EG91/ UG95/ UG96/ M95	MC60
Highlight	<ul style="list-style-type: none"> • Low power consumption • 1119 kbps UL (Cat M1) • 2.6–4.8 V or 3.3–4.3 V power supply • VoLTE for Cat M1/ CS voice for GSM • eSIM • Wi-Fi positioning 	<ul style="list-style-type: none"> • Compact size • VoLTE for Cat M1/ CS voice for GSM • 1119 kbps UL (Cat M1) • 3.3–4.3 V power supply
Certification Plan (depend on customer demands)	All major global carriers	All major global carriers
Promotion Recommendations	<ul style="list-style-type: none"> • Quality sensitive customers • Asset tracking 	<ul style="list-style-type: none"> • Quality sensitive customers • Asset tracking

“” means under development*

① Cat M1 bands only

② Cat NB2 Bands Only

Quectel LPWA Modules Summary (Under Development 2)



Module	BC66-NA	BC950N-N1	BC65
Timeline	<ul style="list-style-type: none"> ES: Jun. 2019 CS: Oct. 2019 	<ul style="list-style-type: none"> ES: Dec. 2019 CS: May 2020 	<ul style="list-style-type: none"> ES: Mar. 2020 CS: May 2020
Chipset	MTK MT2625	MTK MT2625	UNISOC RDA8908A
Mode	Cat NB2	Cat NB1 (450MHz supported) / BLE 5.0 (optional)	Cat NB2
LTE Band	1/2/3/4/5/8/12/13/17/18/19/20/25/28/66/26*/ 71/85	1/2/3/4/5/8/12/13/17/18/19/20/25/26/ 28/66/31	1*/3/5/8/20/28
Compatibility	M66/ BC68/ BC66	BC95-G	BC66/ BC68/ M66
Highlight	<ul style="list-style-type: none"> Cost efficiency Small size 2.1–3.63 V power supply eSIM 	<ul style="list-style-type: none"> Support 450MHz (Band 31) BLE 5.0 (optional) Low power consumption Cost efficiency 	<ul style="list-style-type: none"> Built-in ADC temperature detection* QuecOpen® * Low power design DFOTA
Certification Plan (depend on customer demands)	Carrier: Vodafone/ T-Mobile/ Deutsche Telekom*/ Verizon*/ AT&T*/ Telstra* Regulatory: GCF/ CE/ FCC/ PTCRB/ IC/ JATE/ TELEC/ RCM/ KC*/ NCC*/ NBTC*/ IMDA* Others: ATEX*	Regulatory*: GCF/ CE/ RCM	Regulatory*: CE/ RCM
Promotion Recommendations	<ul style="list-style-type: none"> Smart metering/ smoke detector/ tracker Cost-sensitive customers 	<ul style="list-style-type: none"> Electric/ water/ gas meter Smart home/ agriculture/ city Detector/ tracker Cost-sensitive customers 	Smart wristband/ smart watch/ student card/ bike sharing/ tracker/ parking/ truck

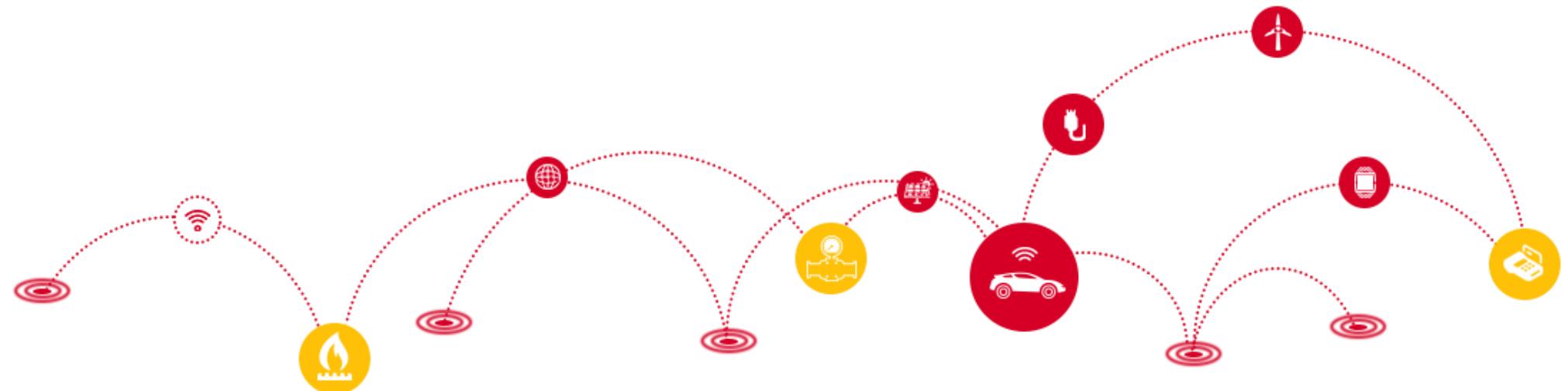
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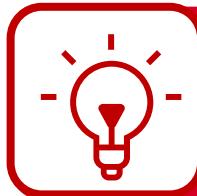
LPWA Technology

LPWA Modules Summary

Product Overview

Applications





Qualcomm Solution

LPWA Modules (Qualcomm) Roadmap



MDM9205

BG95 Series are Pin-to-Pin Compatible with BG96



BG95-M1

- Cat M1
- Global Version



BG95-M2

- Cat M1/ NB2
- Global Version



BG95-M3

- Cat M1/ NB2/ EGPRS
- Global Version



BG77

- Cat M1/ NB2
- Super Compact Size
- Global Version



BG95-M4

- Cat M1/ NB2
- B31/B72/B73 (450MHz)
- Global Version



BG95-M5

- Cat M1/ NB2/ EGPRS
- Power Class 3
- Global Version



BG95-MF

- Cat M1/ NB2
- Wi-Fi Positioning
- Global Version



BG95-N1

- Cat NB2
- Global Version



BG600L-M3

- Cat M1/ NB2/ EGPRS
- LGA Package
- Compatible With MC60
- Global Version



BC69

- Cat M1/ NB2
- LCC Package
- Compatible With M66
- Global Version

MDM9206



BG96

- Cat M1/NB1/EGPRS
- MDM9206-0
- 375K DL/ 375K UL
- Global Version

MM/YYYY Estimated Engineering Sample Dates

2017

2018

2019

2020

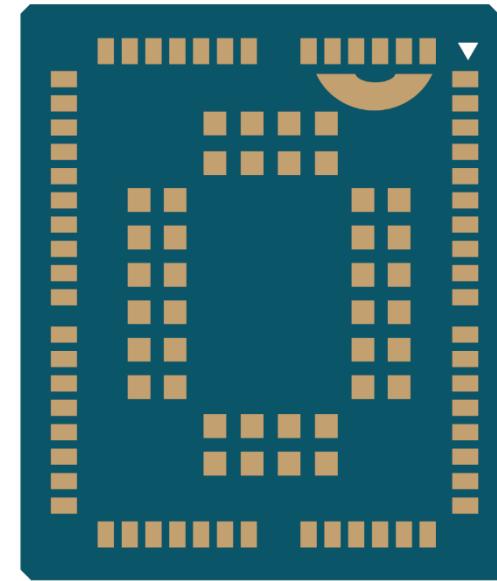
BG96/BG95/BG77/BG600L-M3/BC69 Summary



Model	Variants	Bands	Package	Dimensions (mm)	eSIM	Compatibility	Target Carrier Certifications
BG96	BG96 (Cat M1/NB1/EGPRS)	Global	LGA	26.5 × 22.5 × 2.3	On-board	BG95/ BC95-G/ BC92/ EG9x/ UG9x/ M95	All major global carriers
BG95	BG95-M1 (Cat M1 Only)	Global	LGA	23.6 × 19.9 × 2.2	Embedded /On-board	BG96/ BC95-G/ BC92/ EG9x/ UG9x/ M95	All major global carriers/ depend on customers' requirements
	BG95-M2 (Cat M1/Cat NB2) BG95-M3 (Cat M1/Cat NB2/EGPRS) BG95-N1 (Cat NB2 Only) BG95-M4 (Cat M1/Cat NB2, 450MHz Supported)						
	BG95-M5 (Cat M1/Cat NB2/EGPRS, Power Class 3) BG95-MF (Cat M1/Cat NB2, Wi-Fi Positioning)				On-board		
BG77	BG77 (Cat M1/Cat NB2)	Global	LGA	14.9 × 12.9 × 1.7	On-board	/	All major global carriers/ depend on customers' requirements
BG600L-M3	BG600L-M3 (Cat M1/Cat NB2/EGPRS)	Global	LGA	18.7 × 16.0 × 2.1	On-board	MC60	All major global carriers/ depend on customers' requirements
BC69	BC69 (Cat M1/Cat NB2)	Global	LCC	17.7 × 15.8 × 2.0	On-board	BC66/ BC66-NA/ BC68/ M66	Major carriers in Europe

BG96 Mechanical Dimensions

Multi-Mode LPWA Module (MDM9206)



Length: 26.5 mm (± 0.15 mm)
Width: 22.5 mm (± 0.15 mm)
Height: 2.3 mm (± 0.2 mm)
Weight: Approx. 3.1 g

BG96 Highlights

Highlight	Description
Multi Modes	Cat M1/ Cat NB1/ EGPRS
Global Bands	<ul style="list-style-type: none">Cat M1/NB1: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25^①/B26*/B28/B39 (B39 for Cat M1 only)EGPRS: 850/900/1800/1900 MHz
Low Power Consumption	Approx. 10µA in PSM mode
Mobility	Movable application (TX3.0)
Extended Power Supply Range	3.3–4.3 V, 3.8 V typ.
GNSS (Optional)	GPS, GLONASS, BeiDou/Compass, Galileo, QZSS
VoLTE	PCM digital audio interface
QuecOpen®	ARM A7 Processor, with 3MB Flash and 3MB RAM available for users
QuecLocator®*	Location based on base station cell information
Compatibility	Soldering footprint completely compatible with Quectel UG95/UG96/BC95

** means under development.

① LTE B25 supported on BG96 with R1.2 hardware version.

Rev.: V2.8 | Status: Released

Cat M1/Cat NB1/EGPRS



26.5 mm × 22.5 mm × 2.3 mm

Package: 102-pin LGA

Supply Voltage: 3.3–4.3 V, 3.8 V Typ.

Data Rate:

- LTE Cat M1: Max. 375 kbps (DL), Max. 375 kbps (UL) (Half Duplex)
- LTE Cat NB1: Max. 32 kbps (DL), Max. 70 kbps (UL)
- EGPRS: Max. 296 kbps (DL), Max. 236.8 kbps(UL)
- GPRS: Max. 107 kbps (DL), Max. 85.6 kbps (UL)

Protocols: PPP/TCP/UDP/SSL/TLS/FTP(S)/HTTP(S)/MQTT

Functions: Data/VoLTE/GNSS/DFOTA/NITZ/PING

Interfaces: (U)SIM/UART/USB/I2C/PCM/ADC/GPIO/Antenna

Power Consumption (Typical): 10 µA @PSM

BG96 Specifications 2

■ LPWA Cat M1/Cat NB1/EGPRS Module



QUECTEL[®]
Build a Smarter World

26.5 mm × 22.5 mm × 2.3 mm
Cat M1: 375 kbps DL/375 kbps UL
Cat NB1: 32 kbps DL/70 kbps UL

Items	Description
Cat M1	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25 ^① /B26*/B28 LTE TDD: B39
Cat NB1	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25 ^① /B26*/B28
EGPRS	850/900/1800/1900 MHz
GNSS	Optional
Region	Global
Certification	Carrier: Vodafone/ Deutsche Telekom/ Telefónica/ Verizon/ AT&T/ T-Mobile/ Sprint/ U.S. Cellular/ Rogers/ Telus/ SKT/ LGU+/ NTT DOCOMO/ SoftBank/ KDDI/ Telstra Regulatory: GCF/ CE/ FCC/ PTCRB/ IC/ Anatel/ IFETEL/ CCC/ KC/ NCC/ JATE/ TELEC/ RCM/ NBTC/ IMDA

“*” means under development.

^① LTE B25 supported on BG96 with R1.2 hardware version.

BG96 Power Consumption



Description	Conditions	Typ.	Max.	Unit
Power Saving Mode	PSM @ Real Network	10	-	µA
Sleep State^①	DRX = 1.28 s @ Paging Duration = 35 mA/25 ms	1.5	78	mA
	e-I-DRX = 40.96 s @ PTW = 2.3 mA/10 s	1.2	81	mA
Idle State^②	DRX = 1.28 s @ Paging Duration = 45 mA/16 ms	15	77	mA
	e-I-DRX = 40.96 s @ PTW = 16 mA/10 s	15	83	mA
Active State	23 dBm @ Instrument	205	496	mA
	10 dBm @ Instrument	140	278	mA
	0 dBm @ Instrument	128	225	mA
	Data Transfer @ Real Network	95	-	mA
	Voice @ Real Network	108	-	mA

^① Sleep state with UART connected and USB disconnected. The module can enter into sleep state through executing **AT+QSCLK=1** command via UART interface and then controlling the module's DTR pin. For details, please refer to [Quectel_BG96_Hardware_Design](#).

^② Idle state with UART connected and USB disconnected.

BG96 Main Interfaces

Interface	Description
(U)SIM	1.8 V/3.0 V
UART	3 (UART1, UART2, UART3)
USB	1
I2C	1
ADC	2
GPIO	2 (I2C and UART3 can be re-configured as extra 4 GPIOs if they are not used)
PCM	1
Antenna Interface	2 (for Main Antenna and GNSS Antenna, respectively)
GNSS (Optional)	GPS, GLONASS, BeiDou/Compass, Galileo, QZSS

BG96 Main Functions

Function	Description
Protocols	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ MQTT
USB Serial Driver	Windows 7/8/8.1/10, Linux 2.6/3.x/4.1–4.15, Android 4.x/5.x/6.x/7.x/8.x/9.x
GNSS Driver	Android 4.x/5.x/6.x/7.x/8.x/9.x
RIL Driver	Android 4.x/5.x/6.x/7.x/8.x/9.x
NDIS Driver	Windows 7/8/8.1/10
GobiNet Driver	Linux 2.6–5.4
QMI_WWAN Driver	Linux 3.4–5.4
SMS	Point-to-point MO and MT; SMS Cell Broadcast; Text and PDU Mode
Voice	VoLTE (for Cat M1 only. Support Realtek ALC 5616 codec by default firmware)
DFOTA	Delta Firmware Upgrade Over-The-Air
LwM2M	Enabled

“” means under development*

BG96 (TX2.0, R02Axx) Development Schedule



2018		2019				2020	
Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
MP (I)		MP (II)	MP (III)	MP (IV)	MP (V)		MP (VI)
Version: BG96MAR02A07M1G <ul style="list-style-type: none"> TCP/IP PPP UDP PSM SMS PING GNSS FILE (UFS) RF TX/RX FTM LwM2M SSL/TLS FTP(S) HTTP(S) BIP DoNAS NIDD MQTT DFOTA CMUX GNSS Geo Fence 	Version: BG96MAR02A08 M1G <ul style="list-style-type: none"> QuecLocator® SKT/ Telefónica certification issue fix Platform optimization and issue fix 	Version: BG96MAR02A09 M1G <ul style="list-style-type: none"> Disable Cat M1 Add T-Mobile LwM2M new request Platform optimization and issue fix 	Version: BG96MAR02A10 M1G <ul style="list-style-type: none"> TCP keep alive Security file folder Verizon network issue fix Platform optimization and issue fix 	Version: BG96MAR02A11 M1G <ul style="list-style-type: none"> SKT issue fix Platform optimization and issue fix 	Version: BG96MAR02A12 M1G <ul style="list-style-type: none"> QuecThing® GNSS power issue fix Platform optimization and issue fix 		
Completed: AT&T/ Verizon/ U.S. Cellular/ Rogers/ Telus/ KDDI/ Vodafone/ PTCRB	Completed: SKT/ Telefónica	Completed: T-Mobile	Completed: Verizon MR	Completed: SKT MR	No MR plan		

The timeline will be adjusted according to the actual development status.

BG96 (TX2.0) Certifications



Project Stage

BG96 (TX2.0)

MP

Carrier Certifications

Vodafone/ Deutsche Telekom/ Telefónica/ Verizon/ AT&T/ T-Mobile/ U.S. Cellular/
Rogers/ Telus/ SKT/ KDDI/ Telstra



Regulatory Certifications

GCF/ CE/ FCC/ PTCRB/ IC/ Anatel/ IFETEL/ CCC/ KC/ NCC/ JATE/ TELEC/ RCM/ NBTC/ IMDA



BG96 (TX3.0, R04Axx) Development Schedule (North America)



2018	2019			2020		
Q4	Q1	Q2	Q3	Q4	Q1	Q2
MP (I)		MP (II)			MP (III)	MP (IV)
Version: BG96MAR04A02M1G <ul style="list-style-type: none"> • TCP/IP • PPP • UDP • PSM • SMS • PING • GNSS • FILE (UFS) • RF TX/RX FTM • LwM2M • SSL/TLS • FTP(S) • HTTP(S) • BIP • DoNAS • NIDD • MQTT • DFOTA • CMUX • GNSS Geo Fence 	Version: BG96MAR04A03M1G <ul style="list-style-type: none"> • VoLTE • Security file folder • Verizon certification issue fix • Platform optimization and issue fix 	Version: BG96MAR04A04M1G <ul style="list-style-type: none"> • Jamming detection • Add AT&T LwM2M new objects request • Verizon/ AT&T certification issue fix • Platform optimization and issue fix 	Version: BG96MAR04A05M1G <ul style="list-style-type: none"> • QuecThing® • Verizon NB-IoT network issue fix • Platform optimization and issue fix 			
Completed: T-Mobile/ Sprint/ PTCRB	Completed: Verizon		Completed: Verizon MR, AT&T, Sprint	Plan for: Verizon MR (NB-IoT)		

The timeline will be adjusted according to the actual development status.

Rev.: V2.8 | Status: Released

BG96 (TX3.0, R03Axx) Development Schedule (Other Regions)



2018		2019				2020	
Q4	Q1	Q2	Q3	Q4	Q1	Q2	
MP (I)		MP (II)		MP (III)		MP (IV)	MP (V)
Version: BG96MAR03A03M1G <ul style="list-style-type: none"> • TCP/IP • PPP • UDP • PSM • SMS • PING • GNSS • FILE (UFS) • RF TX/RX FTM • LwM2M • SSL/TLS • FTP(S) • HTTP(S) • BIP • DoNAS • NIDD • MQTT • DFOTA • CMUX • GNSS Geo Fence 	Version: BG96MAR03A04M1G <ul style="list-style-type: none"> • VoLTE • Security file folder • Platform optimization and issue fix 	Version: BG96MAR03A06M1G <ul style="list-style-type: none"> • QuecThing® • Add LGU+ certification requests • Add MBN auto activation function • Add DTLS function • Platform optimization and issue fix 	Version: BG96MAR03A07M1G <ul style="list-style-type: none"> • Jamming detection • LGU+ new network issue fix • Platform optimization and issue fix 	Version: BG96MAR03A08M1G <ul style="list-style-type: none"> • Add MBN auto activation function for SoftBank • Fixed HTTP GET issue • Platform optimization and issue fix 			
Completed: SoftBank	Completed: KDDI/ NTT DOCOMO/ SoftBank MR	Completed: LGU+	Plan for: LGU+ MR	Plan for: SoftBank MR			

The timeline will be adjusted according to the actual development status.

Rev.: V2.8 | Status: Released

Project Stage

BG96 (TX3.0, R04Axx)

MP

Carrier Certifications

Verizon/ AT&T/ T-Mobile/ Sprint



Regulatory Certifications

GCF/ CE/ FCC/ PTCRB/ IC/ RCM



BG96 (TX3.0, R03Axx) Certifications (Other Regions)



Project Stage

BG96 (TX3.0, R03Axx)

MP

Carrier Certification Schedule

LGU+/ NTT DOCOMO/ SoftBank/ KDDI/ Telstra



LGU+

NTT docomo



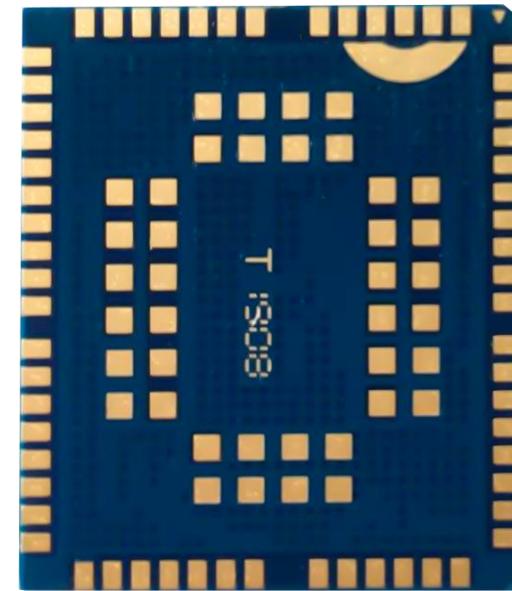
SoftBank

KDDI



BG95 Mechanical Dimensions

Multi-Mode LPWA Module (MDM9205)



Length: 23.6 mm (± 0.15 mm)
Width: 19.9 mm (± 0.15 mm)
Height: 2.2 mm (± 0.2 mm)
Weight: Approx. 2.15 g

BG95 Series



Model	Mode	Bands	Target Carrier Certifications	Status
BG95-M1	Cat M1 Only	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14/B18/B19/B20/B25/B26/B27/B28/B66/B85	All major global carriers	CS
BG95-M2	Cat M1/ Cat NB2	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14 ^① /B18/B19/B20/B25/B26/B27 ^① /B28/B66/B71 ^② /B85	All major global carriers	CS
BG95-M3	Cat M1/ Cat NB2/ EGPRS	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14 ^① /B18/B19/B20/B25/B26/B27 ^① /B28/B66/B71 ^② /B85 EGPRS: 850/900/1800/1900 MHz	All major global carriers	MP
BG95-N1	Cat NB2 Only	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B28/B66/B71/B85	All major global carriers	ES
BG95-M4	Cat M1/ Cat NB2 (450MHz Supported)	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14 ^① /B18/B19/B20/B25/B26/B27 ^① /B28/ B31/B66/B72/B73/B85	Major carriers in Europe and Latin America	ES
BG95-M5	Cat M1/ Cat NB2/ EGPRS (Power Class 3)	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14 ^① /B18/B19/B20/B25/B26/B27 ^① /B28/B66/B71/B85 EGPRS: 850/900/1800/1900 MHz	All major global carriers	ES
BG95-MF	Cat M1/ Cat NB2 (Wi-Fi Positioning)	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14 ^① /B18/B19/B20/B25/B26/B27 ^① /B28/B66/B71 ^② /B85 Wi-Fi (Positioning Only): 2.4 GHz	Based on market demand	<i>Planning</i>

^① Cat M1 bands only

^② Cat NB2 bands only

BG95 Highlights

Highlight	Description
Multi Modes	Cat M1/ Cat NB2/ EGPRS
Rich Product Variants	Support Power Class 3/ Power Class 5 (21 dBm)/ 450 MHz/ Wi-Fi Positioning/ Mini PCIe
Global Bands	<ul style="list-style-type: none">LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14^①/B18/B19/B20/B25/B26/B27^①/B28/B31/B66/B71^②/B72/B73/B85EGPRS: 850/900/1800/1900 MHz
Low Power Consumption	BG95-M3: Approx. 3.9 µA in PSM mode (USB and UART disconnected)
Mobility	Movable application with handover support (Cat M1 only)
PSM Wake-up	Support T3412 expiration and real-time hardware pin wake-up
Extended Power Supply Range ^③	2.6–4.8 V, 3.3 V Typ. (BG95-M1/-M2/-N1) 3.3–4.3 V, 3.8 V Typ. (BG95-M3/-M5) 3.8 V Typ. (BG95-M4)
GNSS (Optional)	GPS, GLONASS, BeiDou, Galileo, QZSS
Voice*	<ul style="list-style-type: none">VoLTE for Cat M1CS voice for GSM
QuecOpen®	Integrated ARM Cortex A7 processor supporting ThreadX
Security*	Comprehensive set of hardware-based security features
Compatibility	Soldering footprint compatible with Quectel BG96/M95
Special Features	SoftSIM/ nuSIM; AWS/ Azure

* means under development

LTE-FDD B31/B72/B73 for BG95-M4 supports Power Class 2.

① Cat M1 bands only ② Cat NB2 Bands Only

③ please refer to the hardware design manual for more specific requirements on power supply voltage

Cat M1/Cat NB2/EGPRS



Package: 102-pin LGA

Supply Voltage^①: 2.6–4.8 V, 3.3 V Typ. (BG95-M1/-M2/-N1)
3.3–4.3 V, 3.8 V Typ. (BG95-M3/-M5)
3.8 V Typ. (BG95-M4)

Data Rate:

- LTE Cat M1: Max. 588 kbps (DL), Max. 1119 kbps (UL) (Half Duplex)
- LTE Cat NB2: Max. 127 kbps (DL), Max. 158.5 kbps (UL)
- EGPRS: Max. 296 kbps (DL), Max. 236.8 kbps(UL)
- GPRS: Max. 107 kbps (DL), Max. 85.6 kbps (UL)

Protocols: PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ MQTT/ LwM2M/ CoAP

Functions: Data/ VoLTE*/ GNSS/ DFOTA/ NITZ/ PING/ Jamming Detection*/ Triangle Location

Interfaces: (U)SIM/ eSIM^②/ UART/ USB/ I2C*/ PCM*/ ADC/ GPIO/ GRFC/ Antenna

Power Consumption (Typical): 3.9 µA @ PSM (USB and UART disconnected), BG95-M3

* means under development

① please refer to the hardware design manual for more specific requirements on power supply voltage.

② eSIM is reserved and not included by default.

BG95 Specifications 2

■ LTE Cat M1/Cat NB2/EGPRS Module



QUECTEL[®]
Build a Smarter World

23.6 mm × 19.9 mm × 2.2 mm

**Cat M1: 588 kbps DL/1119 kbps UL
Cat NB2: 127 kbps DL/158.5 kbps UL**

Items	BG95-M1	BG95-M2	BG95-M3	BG95-N1	BG95-M4	BG95-M5	BG95-MF (Planning)	
Cat M1	LTE FDD	B1/B2/B3/B4/B5/B8/ B12/B13/B14/B18/ B19/B20/B25/B26/B 27/B28/B66/B85	B1/B2/B3/B4/B5/B8/ B12/B13/B14/B18/ B19/B20/B25/B26/B 27/B28/B66/B85	B1/B2/B3/B4/B5/B8/ B12/B13/B14/B18/ B19/B20/B25/B26/ B27/B28/B66/B85	/	B1/B2/B3/B4/B5/B8/ B12/B13/B14/B18/ B19/B20/B25/B26/ B27/B28/B31/B66/B72/ B73/B85	B1/B2/B3/B4/B5/B8/ B12/B13/B14/B18/ B19/B20/B25/B26/ B27/B28/B66/B85	B1/B2/B3/B4/B5/B8/ B12/B13/B14/B18/ B19/B20/B25/B26/ B27/B28/B66/B85
Cat NB2	LTE FDD	/	B1/B2/B3/B4/B5/B8/ B12/B13/B18/B19/ B20/B25/B26/B28/B 66/B71/B85	B1/B2/B3/B4/B5/B8/ B12/B13/B18/B19/ B20/B25/B26/B28/ B66/B71/B85	B1/B2/B3/B4/B5/B8/ B12/B13/B18/B19/ B20/B25/B26/B28/ B66/B71/B85	B1/B2/B3/B4/B5/B8/ B12/B13/B18/B19/ B20/B25/B26/B28/ B31/B66/B72/B73/B85	B1/B2/B3/B4/B5/B8/ B12/B13/B18/B19/ B20/B25/B26/B28/ B66/B71/B85	
EGPRS	/	/	850/900/1800/1900MHz	/	/	850/900/1800/1900 MHz	/	
Wi-Fi (For Positioning Only)	/	/	/	/	/	/	2.4 GHz	
GNSS	Optional	Optional	Optional	Optional	Optional	Optional	Optional	
Certification	All major global carriers/ depend on customers' requirements	All major global carriers/ depend on customers' requirements	All major global carriers/ depend on customers' requirements	All major global carriers/ depend on customers' requirements	Major carriers in Europe and Latin America	All major global carriers/ depend on customers' requirements	TBD	

“*” means under development

BG95 Power Consumption (BG95-M3)

Description	Conditions	Typ.	Unit
Leakage	Power off mode	14.5 ^{NOTE}	µA
Power Saving Mode	PSM @ Real Network (USB and UART disconnected)	3.9	µA
Sleep State (Under Cat M1 network)	DRX = 1.28 s	1.65	mA
	e-I-DRX = 81.92 s @ PTW = 20.48 s, DRX = 2.56 s	0.85	mA
Sleep State (Under Cat NB1 network)	DRX = 1.28 s	1.56	mA
	e-I-DRX = 81.92 s @ PTW = 20.48 s, DRX = 2.56 s	0.81	mA
Active State GNSS OFF (Under Cat M1 network)	21 dBm @ Instrument	202	mA
	Data Transfer @ Real Network (TCP 200B)	48	mA
Active State GNSS OFF (Under Cat NB1 network)	21 dBm @ Instrument	167	mA
	Data Transfer @ Real Network (TCP 200B)	40	mA
Active State GNSS (LTE off)	Acquisition	71	mA
	Tracking	56	mA

NOTE: More internal power supplies are powered off and also the internal clock frequency is reduced in PSM, therefore the power consumption in PSM is much lower than that in power-off mode.

BG95 Main Interfaces



Interface	Description
(U)SIM	1 (Support 1.8 V Only)
UART	3 (Main UART, Debug UART, GNSS UART)
USB 2.0	1
PCM*	1
I2C*	1
ADC	1
PWRKEY	1
GPIO	9
GRFC	2
Antenna Interface	2 (for Main Antenna and GNSS Antenna, respectively)

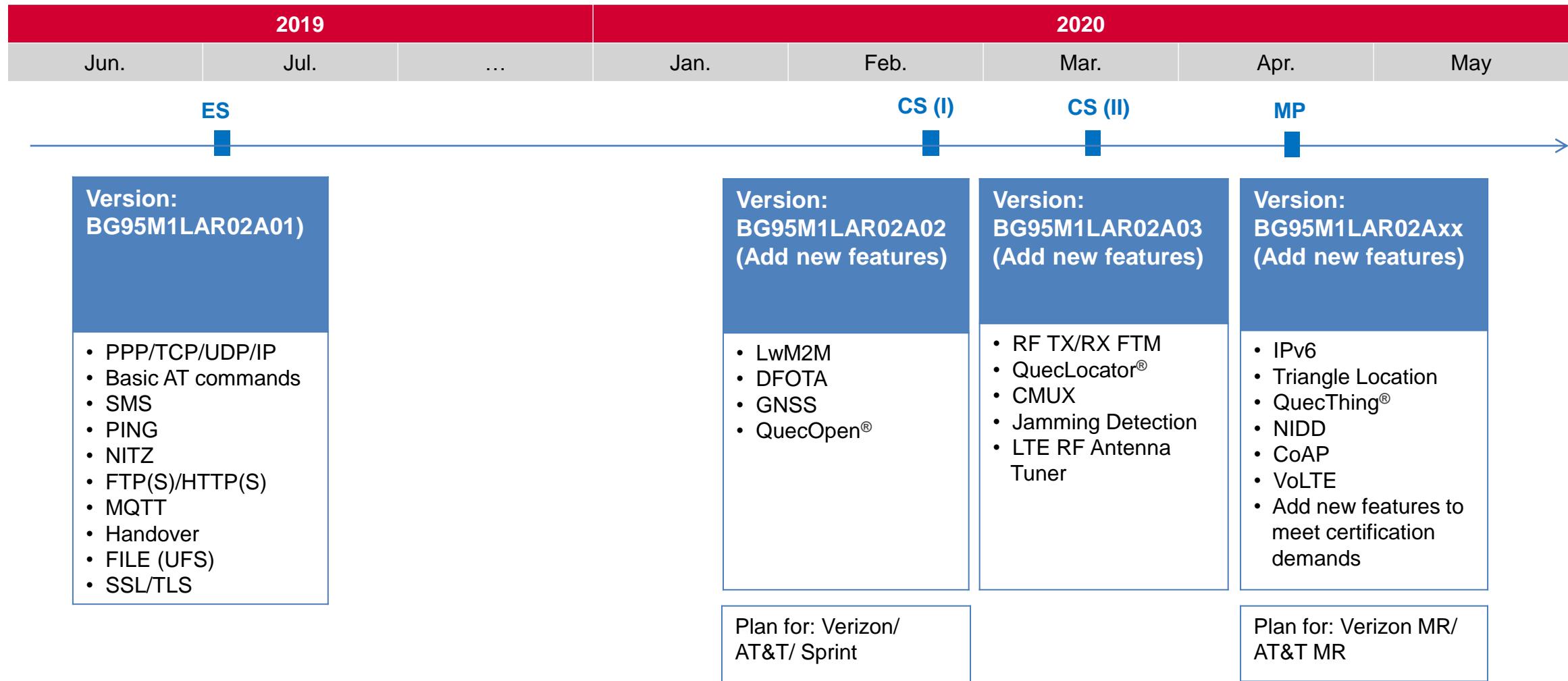
“*” means under development

BG95 Main Functions

Function	Description
Protocols	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ MQTT/ LwM2M/ CoAP
USB Serial Driver*	Windows 7/8/8.1/10, Linux 2.6–5.4, Android 4.x/5.x/6.x/7.x/8.x/9.x
GNSS/ RIL Driver*	Android 4.x/5.x/6.x/7.x/8.x/9.x
SMS	Point-to-point MO and MT; SMS Cell Broadcast; Text and PDU Mode
Voice*	<ul style="list-style-type: none">• VoLTE for Cat M1• CS voice for GSM
DFOTA	Delta Firmware Upgrade Over-The-Air
LwM2M	Supported
GNSS (Optional)	GPS, GLONASS, BeiDou, Galileo, QZSS

“*” means under development

BG95-M1 Development Schedule



The timeline may be adjusted according to the actual development status.

BG95-M3 is the main variant to be developed, and BG95-M1 will leverage the development functions of BG95-M3.

Rev : V2.8 | Status: Released

BG95-M1 Timeline (1)

2019							2020									
Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Verizon



Start (Planned)

Complete (Planned)

AT&T



—

Sprint

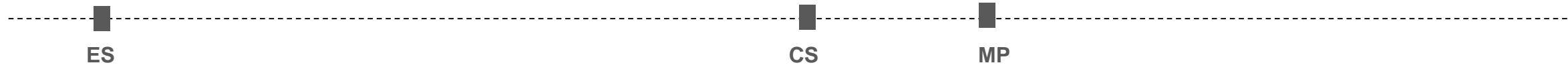


The timeline may be adjusted according to the maturity of Qualcomm baseline. BG95-M1 will leverage some test results of BG95-M3.

BG95-M1 Timeline (2)

2019							2020									
Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Regulatory Certification Schedule

GCF/PTCRB



CE/RCM



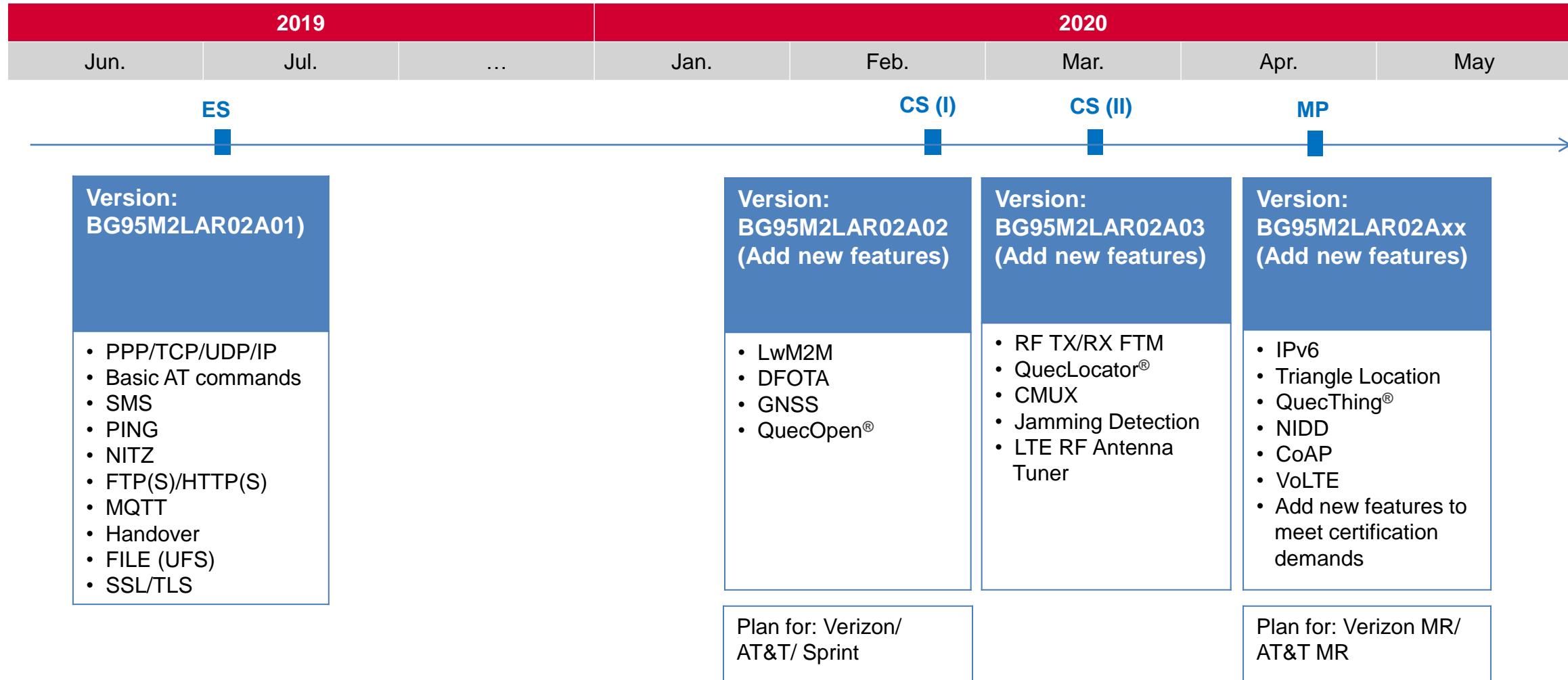
FCC/IC



The timeline may be adjusted according to the maturity of Qualcomm baseline.
BG95-M1 will leverage some test results of BG95-M3.

Rev.: V2.8 | Status: Released

BG95-M2 Development Schedule

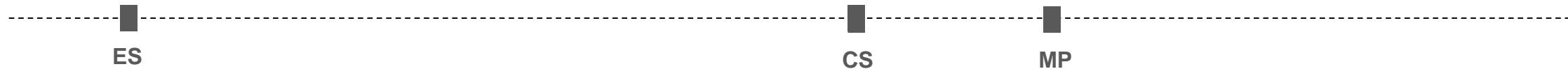


The timeline may be adjusted according to the actual development status.
BG95-M3 is the main variant to be developed, and BG95-M2 will leverage the development functions of BG95-M3.

BG95-M2 Timeline (1)

2019							2020									
Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Verizon



AT&T



Sprint



NTT DOCOMO



KDDI



**T-Mobile/ SKT/
SoftBank/ Telstra**

TBD

TBD

BG95-M2 Timeline (2)

2019							2020									
Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.

Regulatory Certification Schedule

GCF/PTCRB

Start Complete (Planned)

CE/RCM

Start Complete

FCC/IC

Start Complete

NCC

Start Complete

JATE/TELEC

Start Complete

NBTC

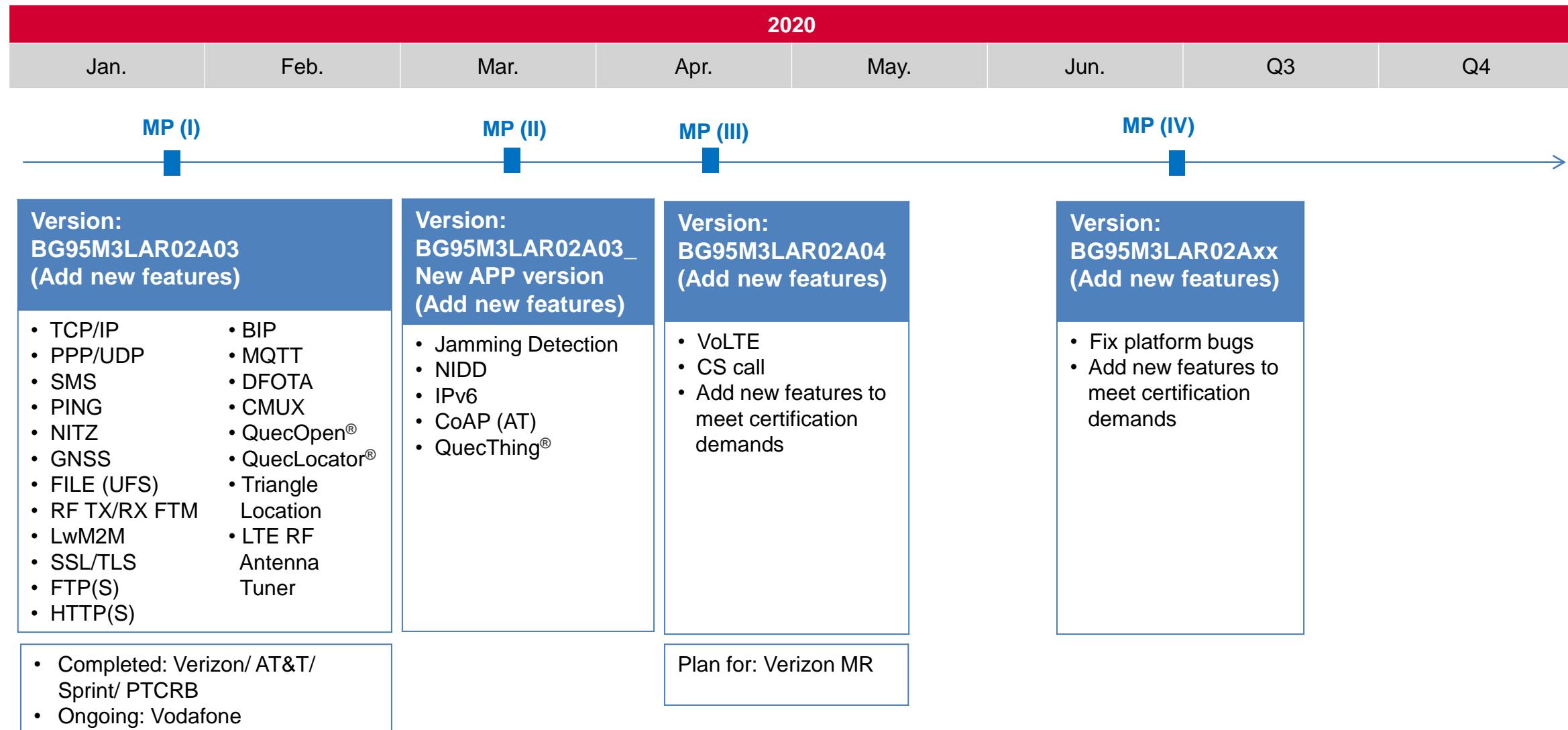
Start Complete

KC

TBD TBD

The timeline may be adjusted according to the maturity of Qualcomm baseline.
BG95-M2 will leverage some test results of BG95-M3.

BG95-M3 Development Schedule



The timeline may be adjusted according to the actual development status.

BG95-M3 Timeline (1)

2019							2020									
Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.

Project Stage

BG95-M3 MP

Carrier Certification Schedule

Verizon/ AT&T/ Sprint

Completed

Vodafone



Deutsche Telekom



T-Mobile



NTT DOCOMO



SoftBank



KDDI



**Telefónica/ China Telecom/ China Telecom/
China Unicom/ SKT/ Telstra**

TBD

TBD

back

BG95-M3 Timeline (2)

2019							2020											
Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	

Regulatory/Other Certification Schedule

GCF/ CE/ FCC/ PTCRB/ IC/ RCM/ PEN

Completed

Anatel



CCC



JATE/TELEC



ATEX



SRRC/NAL/KC/NCC/NBTC/IMDA



The timeline may be adjusted according to the maturity of Qualcomm baseline.

BG95-M4 Development Schedule



2020

Feb. Mar. Apr. May Jun. Jul. Aug. Sep.

ES

CS

MP (I)

MP (II)

Version: BG95M4LAR02A01 (Add new features)	
• TCP/IP	• SSL/TLS
• PPP/UDP	• FTP(S)
• SMS	• HTTP(S)
• PING	• BIP
• NITZ	• MQTT
• GNSS	• DFOTA
• FILE (UFS)	• CMUX
• RF TX/RX	• QuecLocator®
FTM	
• LwM2M	

Version: BG95M4LAR02A02 (Add new features)
• QuecOpen® • Jamming Detection • NIDD • IPv6 • CoAP • LTE RF Antenna Tuner

Version: BG95M4LAR02A03 (Add new features)
• VoLTE • Triangle Location • QuecThing® • Add new features to meet certification demands

Version: BG95M4LAR02Axx (Add new features)
• Fix platform bugs • Add new features to meet certification demands

Plan for: Vodafone

The timeline may be adjusted according to the actual development status.
BG95-M3 is the main variant to be developed, and BG95-M4 will leverage the development functions of BG95-M3.

2020											
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.
CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.
MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Vodafone



Regulatory Certification Schedule

GCF



CE/FCC



Anatel

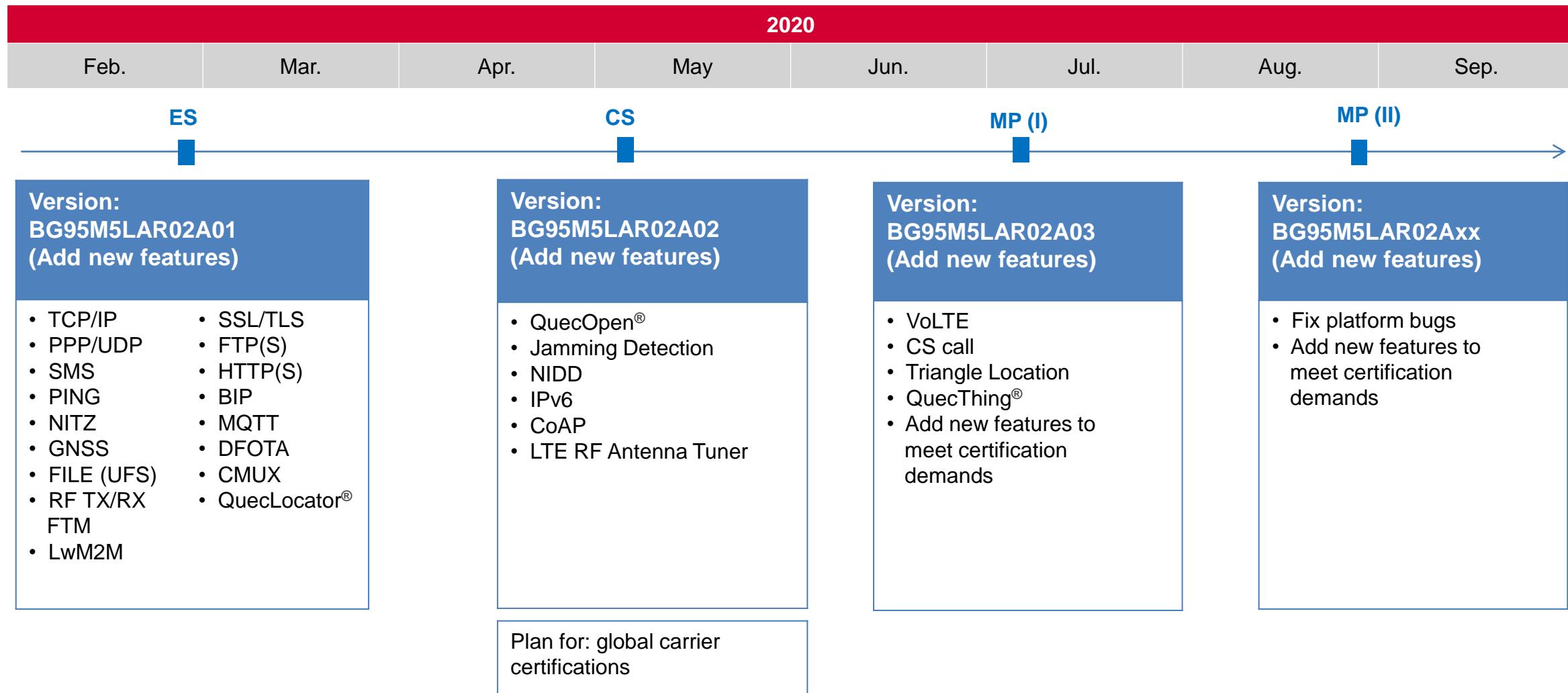


IFETEL



The timeline may be adjusted according to the maturity of Qualcomm baseline.
BG95-M4 will leverage some test results of BG95-M3. Rev.: V2.8 | Status: Released

BG95-M5 Development Schedule

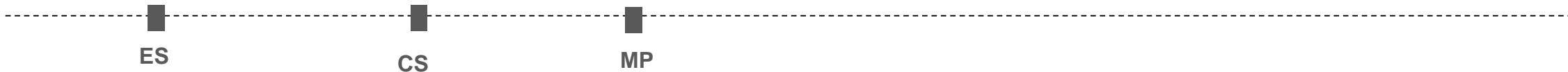


*The timeline may be adjusted according to the actual development status.
BG95-M3 is the main variant to be developed, and BG95-M5 will leverage the development functions of BG95-M3.*

BG95-M5 Timeline (1)

2020												2021		
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Verizon

Start (Planned)

Complete (Planned)

AT&T

Start (Planned)

Complete (Planned)

Sprint

Start (Planned)

Complete (Planned)

SKT

Start (Planned)

Complete (Planned)

LGU+

Start (Planned)

Complete (Planned)

SoftBank

Start (Planned)

Complete (Planned)

Telstra

Start (Planned)

Complete (Planned)

The timeline may be adjusted according to the maturity of Qualcomm baseline.
BG95-M5 will leverage some test results of BG95-M3. Rev.: V2.8 | Status: Released

BG95-M5 Timeline (2)

2020												2021		
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.

Carrier Certification Schedule

Vodafone/ Deutsche Telekom/ T-Mobile/
China Mobile/ China Telecom/ China Unicom/ NTT DOCOMO/ KDDI

TBD

Regulatory/Other Certification Schedule

GCF/PTCRB



CE/FCC/IC/RCM



KC



JATE/TELEC

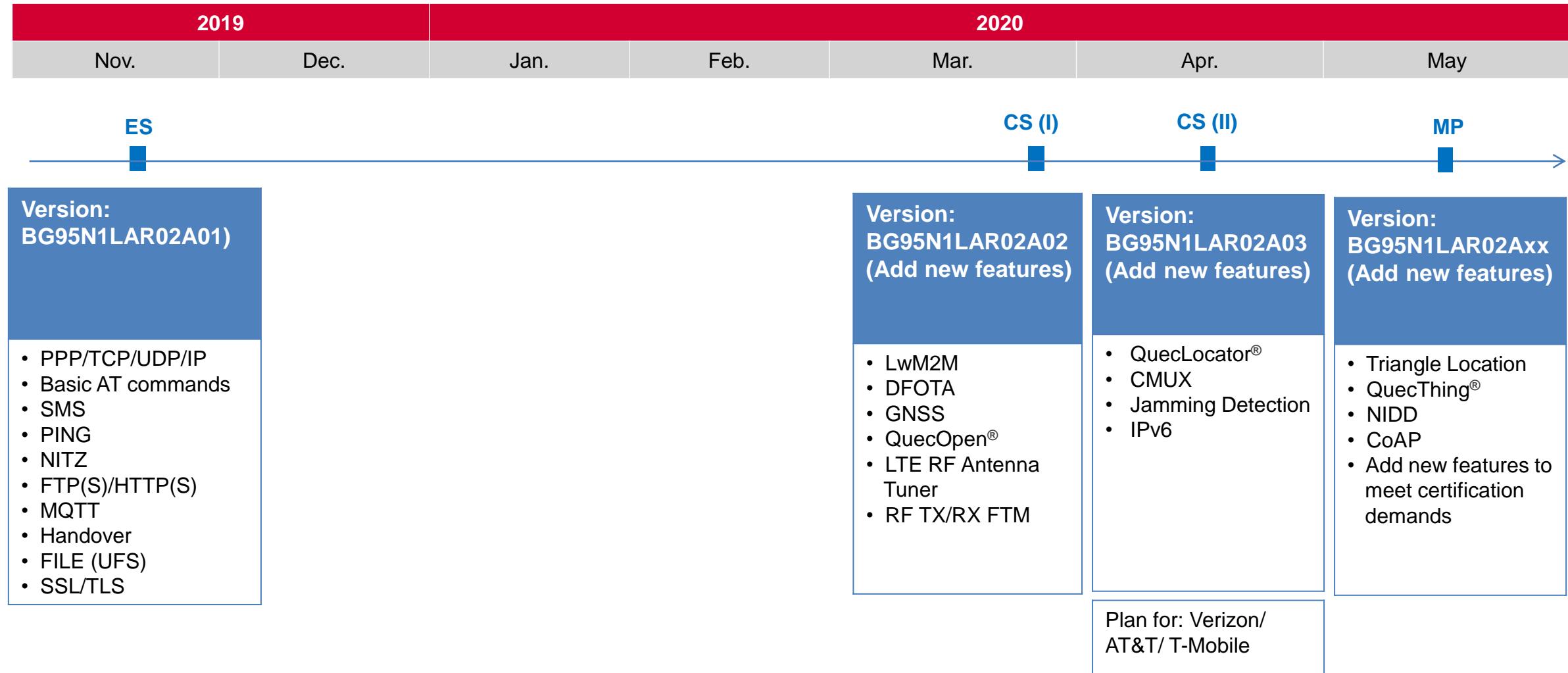


Anatel/ SRRC/ NAL/ CCC/ NCC/ NBTC/ IMDA/ ATEX

TBD

The timeline may be adjusted according to the maturity of Qualcomm baseline.
BG95-M5 will leverage some test results of BG95-M3. Rev.: V2.8 | Status: Released

BG95-N1 Development Schedule



The timeline may be adjusted according to the actual development status.

BG95-M3 is the main variant to be developed, and BG95-N1 will leverage the development functions of BG95-M3.

BG95-N1 Timeline

2019							2020									
Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Verizon/ AT&T/ T-Mobile



Regulatory Certification Schedule

GCF/PTCRB



CE/RCM



FCC/IC

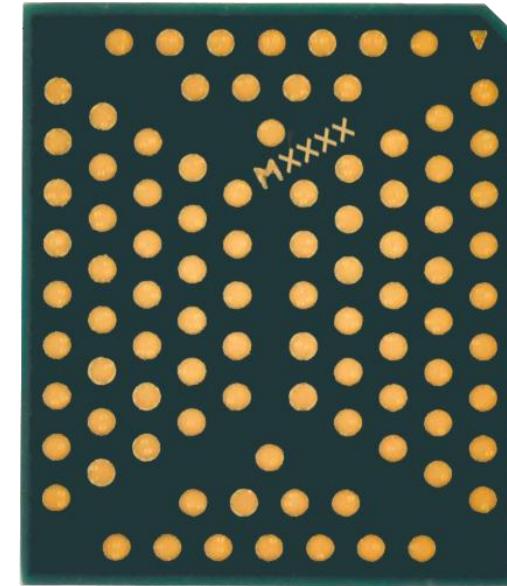


The timeline may be adjusted according to the maturity of Qualcomm baseline.
BG95-N1 will leverage some test results of BG95-M3.

BG77 Mechanical Dimensions

Ultra Compact LTE Cat M1/ Cat NB2 Module (MDM9205)

QUECTEL[®]
Build a Smarter World



Length: 14.9 mm (± 0.15 mm)
Width: 12.9 mm (± 0.15 mm)
Height: 1.7 mm (± 0.2 mm)
Weight: Approx. 0.73 g

BG77 Highlights

Highlight	Description
Super Compact Size	14.9 mm × 12.9 mm × 1.7 mm
Dual-Mode	LTE Cat M1/ Cat NB2
Power Class	Support Power Class 5 (21 dBm)
Global Bands	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14 ⁽¹⁾ /B18/B19/B20/B25/B26/B27 ⁽¹⁾ /B28/B66/B71 ⁽²⁾ /B85*
Low Power Consumption	Approx. 3.2 µA in PSM mode
Mobility	Movable application with handover support (Cat M1 only)
PSM Wake-up	Support T3412 expiration and real-time hardware pin wake-up
Extended Power Supply Range ⁽³⁾	2.6–4.8 V, 3.3 V typ.
GNSS (Optional)	GPS, GLONASS, BeiDou, Galileo, QZSS
Voice*	VoLTE (For Cat M1 Only)
QuecOpen®	Integrated ARM Cortex A7 processor supporting ThreadX
Security*	Comprehensive set of hardware-based security features
Special Features	SoftSIM

* means under development

⁽¹⁾ Cat M1 bands only

⁽²⁾ Cat NB2 bands only

⁽³⁾ please refer to the hardware design manual for more specific requirements on power supply voltage

Rev.: V2.8 | Status: Released

Cat M1/Cat NB2



14.9 mm × 12.9 mm × 1.7 mm

Super Compact Size: 14.9 mm × 12.9 mm × 1.7 mm

Package: 94-pin LGA

Supply Voltage ^①: 2.6–4.8 V, 3.3 V Typ.

Data Rate:

- LTE Cat M1: Max. 588 kbps (DL), Max. 1119 kbps (UL) (Half Duplex)
- LTE Cat NB2: Max. 127 kbps (DL), Max. 158.5 kbps (UL)

Protocols: PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ MQTT/ LwM2M/ CoAP

Functions: Data/ VoLTE*/ GNSS/ DFOTA/ NITZ/ PING/ Jamming Detection*/ Triangle Location

Interfaces: (U)SIM/ UART/ USB/ I2C*/ PCM*/ ADC/ GPIO/ GRFC/ Antenna

Power Consumption (Typical): 3.2 µA @ PSM (USB and UART disconnected)

* means under development

① please refer to the hardware design manual for more specific requirements on power supply voltage.

BG77 Specifications 2

■ LTE Cat M1/Cat NB2 Module



QUECTEL[®]
Build a Smarter World

14.9 mm × 12.9 mm × 1.7 mm
Cat M1: 588 kbps DL/1119 kbps UL
Cat NB2: 127 kbps DL/158.5 kbps UL

Items	BG77
Cat M1	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14/B18/B19/B20/B25/B26/B27/B28/B66/B85*
Cat NB2	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B28/B66/B71/B85*
EGPRS	/
GNSS	Optional
Certification	All major global carriers

“” means under development*

BG77 Power Consumption

Description	Conditions	Typ.	Unit
Leakage	Power off mode	13 ^{NOTE}	µA
Power Saving Mode	PSM @ Real Network (USB and UART disconnected)	3.2	µA
Sleep State (Under Cat M1 network)	DRX = 1.28 s	1.63	mA
	e-I-DRX = 81.92 s @ PTW = 20.48 s, DRX = 2.56 s	0.76	mA
Sleep State (Under Cat NB1 network)	DRX = 1.28 s	1.5	mA
	e-I-DRX = 81.92 s @ PTW = 20.48 s, DRX = 2.56 s	0.79	mA
Active State GNSS OFF (Under Cat M1 network)	21 dBm @ Instrument	227	mA
	Data Transfer @ Real Network (TCP 200B)	55	mA
Active State GNSS OFF (Under Cat NB1 network)	21 dBm @ Instrument	185	mA
	Data Transfer @ Real Network (TCP 200B)	45	mA
Active State GNSS (LTE off)	Acquisition	72	mA
	Tracking	62	mA

NOTE: More internal power supplies are powered off and also the internal clock frequency is reduced in PSM, therefore the power consumption in PSM is much lower than that in power-off mode.

BG77 Main Interfaces



Interface	Description
(U)SIM	1 (Support 1.8 V Only)
UART	3 (Main UART, Debug UART, GNSS UART)
USB	1
PCM*	1
I2C*	1
RESET_N	1
ADC	2
GPIO	7
GRFC	2
Antenna Interface	2 (for Main Antenna and GNSS Antenna, respectively)

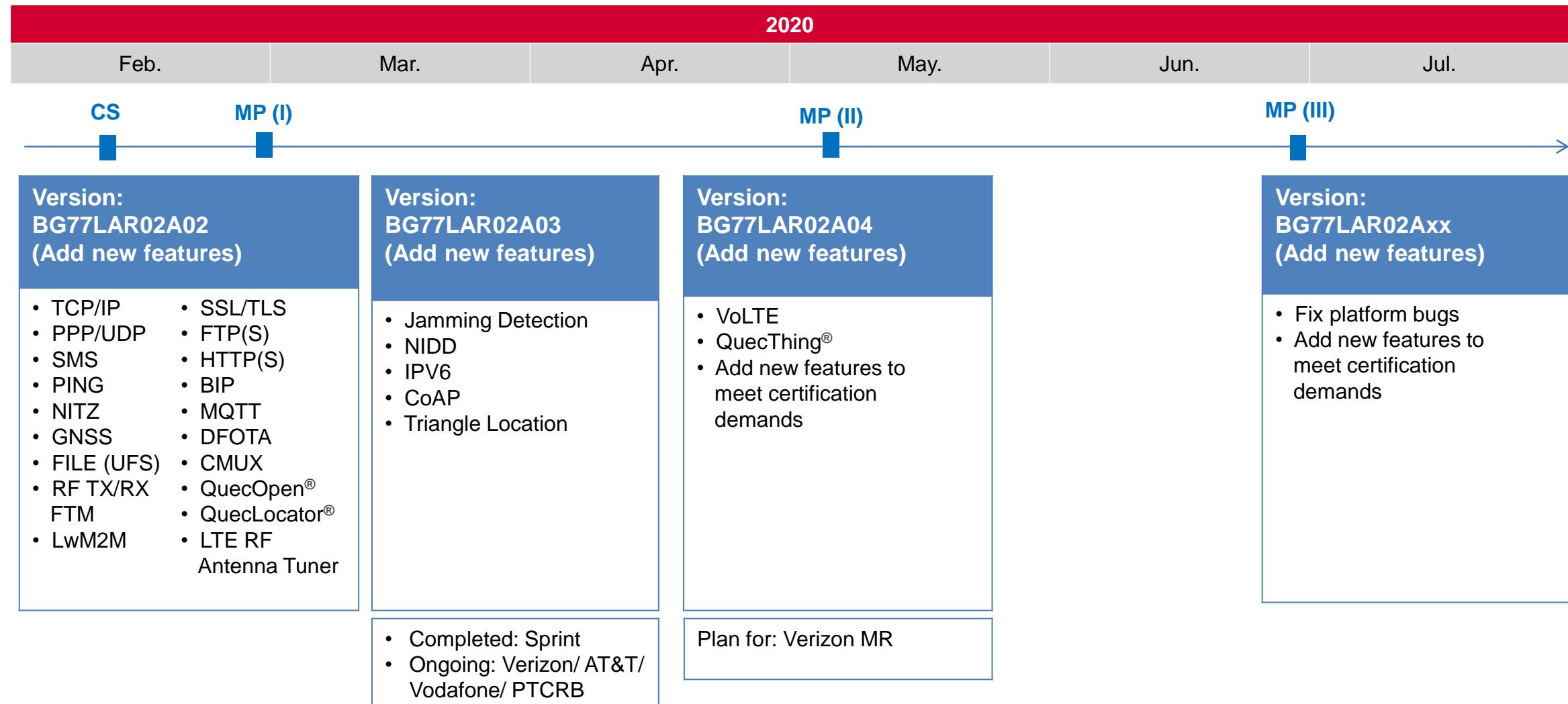
“*” means under development

BG77 Main Functions

Function	Description
Protocols	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ MQTT/ LwM2M/ CoAP
USB Serial Driver*	Windows 7/8/8.1/10, Linux 2.6–5.4, Android 4.x/5.x/6.x/7.x/8.x/9.x
GNSS/ RIL Driver*	Android 4.x/5.x/6.x/7.x/8.x/9.x
SMS	Point-to-point MO and MT; SMS Cell Broadcast; Text and PDU Mode
Voice*	VoLTE (For Cat M1 Only)
DFOTA	Delta Firmware Upgrade Over-The-Air
LwM2M	Supported
GNSS (Optional)	GPS, GLONASS, BeiDou, Galileo, QZSS

“*” means under development

BG77 Development Schedule



The timeline may be adjusted according to the actual development status.

BG77 Timeline (1)

2019						2020											
Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	

Project Schedule

■
ES

■ ■
CS MP

ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Sprint

Completed

Vodafone

Start Complete (Planned)

Verizon

Start

AT&T

Start

NTT DOCOMO

Start

SoftBank

Start

KDDI

Start

BG77 Timeline (2)

2019						2020											
Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	

Carrier Certification Schedule

T-Mobile/ Telus/ China Mobile/China Telecom/China Unicom/ SKT/ Telstra TBD

Regulatory Certification Schedule

CE/ JATE/ TELEC

Completed

GCF/PTCRB

Start

Complete (Planned)

FCC/IC/RCM



NCC



NBTC



SRRC/ NAL/ CCC/ KC



TBD

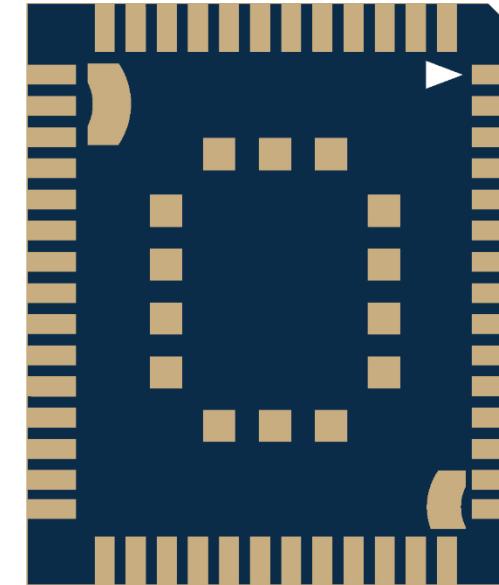
TBD

The timeline may be adjusted according to the maturity of Qualcomm baseline.
BG77 will leverage some test results of BG95-M3.

BG600L-M3 Mechanical Dimensions

Multi-Band LTE Cat M1/ Cat NB2 / EGPRS Module (MDM9205)

QUECTEL[®]
Build a Smarter World



Length: 18.7 mm (± 0.15 mm)
Width: 16.0 mm (± 0.15 mm)
Height: 2.1 mm (± 0.2 mm)

BG600L-M3 Highlights



Highlight	Description
Multi Modes	Cat M1/ Cat NB2/ EGPRS
Global Bands	<ul style="list-style-type: none">LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14^①/B18/B19/B20/B25/B26/B27^①/B28/B66/B71^②/B85EGPRS: 850/900/1800/1900MHz
Power Class	Support Power Class 5 (21 dBm)
Low Power Consumption	TBD in PSM mode
Mobility	Movable application with handover support (Cat M1 only)
PSM Wake-up	Support T3412 expiration and real-time hardware pin wake-up
Extended Power Supply Range	3.3–4.3 V, 3.8 V typ.
GNSS* (Optional)	GPS, GLONASS, BeiDou, Galileo, QZSS
Voice*	VoLTE (For Cat M1 Only), CS voice for GSM
QuecOpen®*	Integrated ARM Cortex A7 processor supporting ThreadX
Security*	Comprehensive set of hardware-based security features
Compatibility	Compatible with Quectel MC60

* means under development

^① Cat M1 bands only

^② Cat NB2 bands only

Rev.: V2.8 | Status: Released

Cat M1/Cat NB2/EGPRS



18.7 mm × 16.0 mm × 2.1 mm

Small Size: 18.7 mm × 16.0 mm × 2.1 mm

Package: 68-pin LGA

Supply Voltage: 3.3–4.3 V, 3.8 V Typ.

Data Rate:

- LTE Cat M1: Max. 588 kbps (DL), Max. 1119 kbps (UL) (Half Duplex)
- LTE Cat NB2: Max. 127 kbps (DL), Max. 158.5 kbps (UL)

Protocols*: PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ MQTT/ CoAP

Functions*: Data/ VoLTE/ GNSS/ DFOTA/ NITZ/ PING/ Jamming Detection/ Triangle Location

Interfaces: (U)SIM/ UART/ USB/ I2C*/ PCM*/ ADC/ GPIO*/ GRFC*/ Antenna

Power Consumption (Typical): TBD @ PSM

* means under development

BG600L-M3 Specifications 2

■ LTE Cat M1/Cat NB2/EGPRS Module



18.7 mm × 16.0 mm × 2.1 mm
Cat M1: 588 kbps DL/1119 kbps UL
Cat NB2: 127 kbps DL/158.5 kbps UL

Items	BG600L-M3
Cat M1	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B14/B18/B19/B20/B25/B26/B27/B28/B66/B85
Cat NB2	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B28/B66/B71/B85
EGPRS	850/900/1800/1900 MHz
GNSS*	Optional
Certification	All major global carriers/ depend on customers' requirements

* means under development

BG600L-M3 Power Consumption



Description	Conditions	Typ.	Unit
Power Saving Mode	PSM @ Real Network (USB and UART disconnected)	TBD	µA
Sleep State (Under Cat M1 network)	DRX = 1.28 s	TBD	mA
	e-I-DRX = 81.92 s @ PTW = 20.48 s, DRX = 2.56 s	TBD	mA
Sleep State (Under Cat NB1 network)	DRX = 1.28 s	TBD	mA
	e-I-DRX = 81.92 s @ PTW = 20.48 s, DRX = 2.56 s	TBD	mA
Active State	21 dBm @ Instrument	TBD	mA
	Data Transfer @ Real Network	TBD	mA

BG600L-M3 Main Interfaces



Interface	Description
USB	1
USIM	1
UART	3 (Main UART, Debug UART, GNSS UART)
ADC	1
PWRKEY	1
NET_STATUS	1
Antenna Interface	2
GRFC*	2
I2C*	1
PCM*	1
GPIO*	6

* means under development

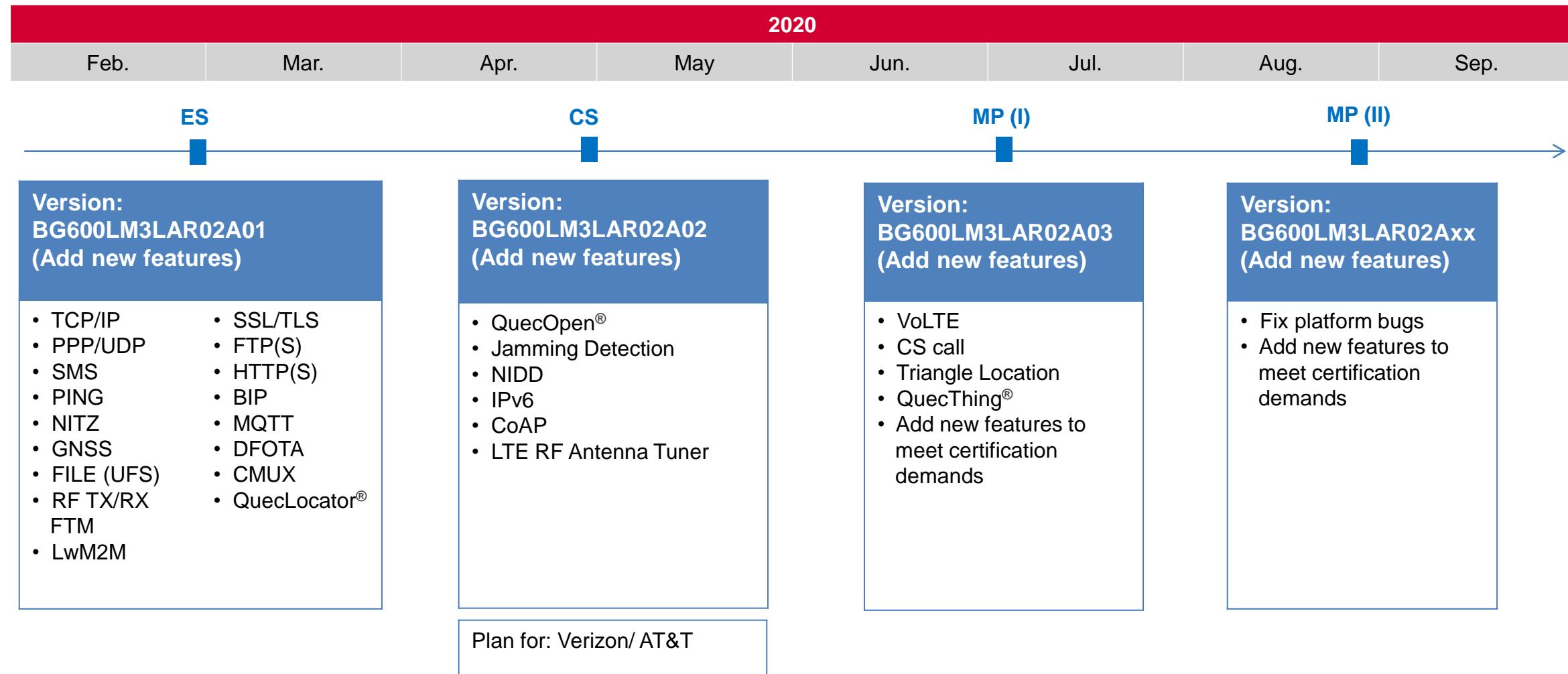
BG600L-M3 Main Functions



Function	Description
Protocols*	PPP/ TCP/ UDP/ SSL/ TLS/ FTP(S)/ HTTP(S)/ MQTT/ CoAP
USB Serial Driver*	Windows 7/8/8.1/10, Linux 2.6–5.4, Android 4.x/5.x/6.x/7.x/8.x/9.x
GNSS/ RIL Driver*	Android 4.x/5.x/6.x/7.x/8.x/9.x
ECM Driver*	Linux 2.6–5.4
SMS*	Point-to-point MO and MT; SMS Cell Broadcast; Text and PDU Mode
Voice*	<ul style="list-style-type: none">• VoLTE for Cat M1• CS voice for GSM
DFOTA*	Delta Firmware Upgrade Over-The-Air
LwM2M*	Supported

* means under development

BG600L-M3 Development Schedule

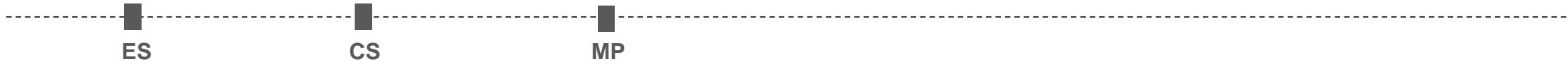


The timeline may be adjusted according to the actual development status.

BG600L-M3 Timeline (1)

2020												2021				
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.		

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Vodafone



Deutsche Telekom



Telefónica



Verizon



AT&T



Sprint



T-Mobile



The timeline may be adjusted according to the maturity of Qualcomm baseline.

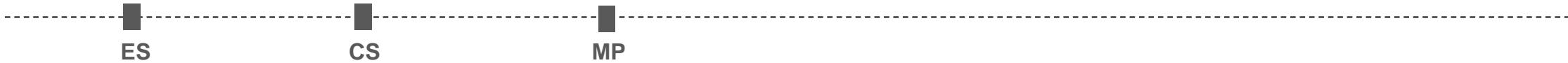
BG600L-M3 will leverage some test results of BG95-M3.

Rev.: V2.8 | Status: Released

BG600L-M3 Timeline (2)

2020												2021			
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Regulatory Certification Schedule

GCF/PTCRB



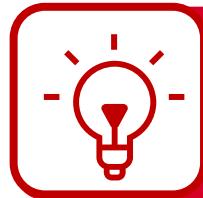
CE/FCC/IC/RCM



CCC



The timeline may be adjusted according to the maturity of Qualcomm baseline. BG600L-M3 will leverage some test results of BG95-M3.



MTK Solution

NB-IoT Modules (MTK) Roadmap



MT2625



BC66
▪ Cat NB1
▪ 25.5 K DL/ 62.5 K UL
▪ Global Version



BC66-NA
▪ Cat NB2
▪ 103 K DL/ 151 K UL
▪ **B71/B85 Supported**
▪ Global Version



BC950N-N1
▪ Cat NB1
▪ 25.5 K DL/ 62.5 K UL
▪ **450 MHz Supported**

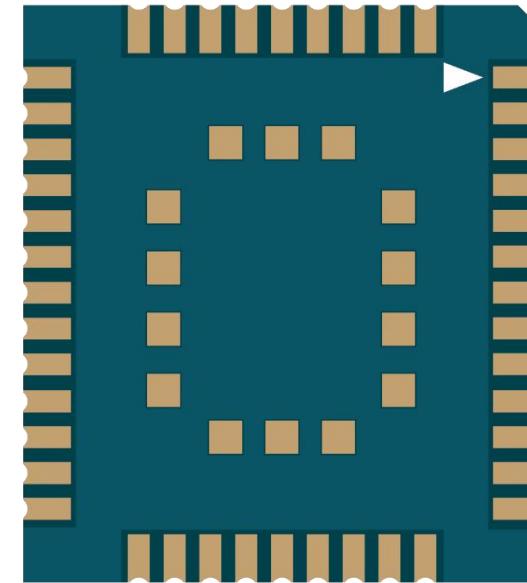
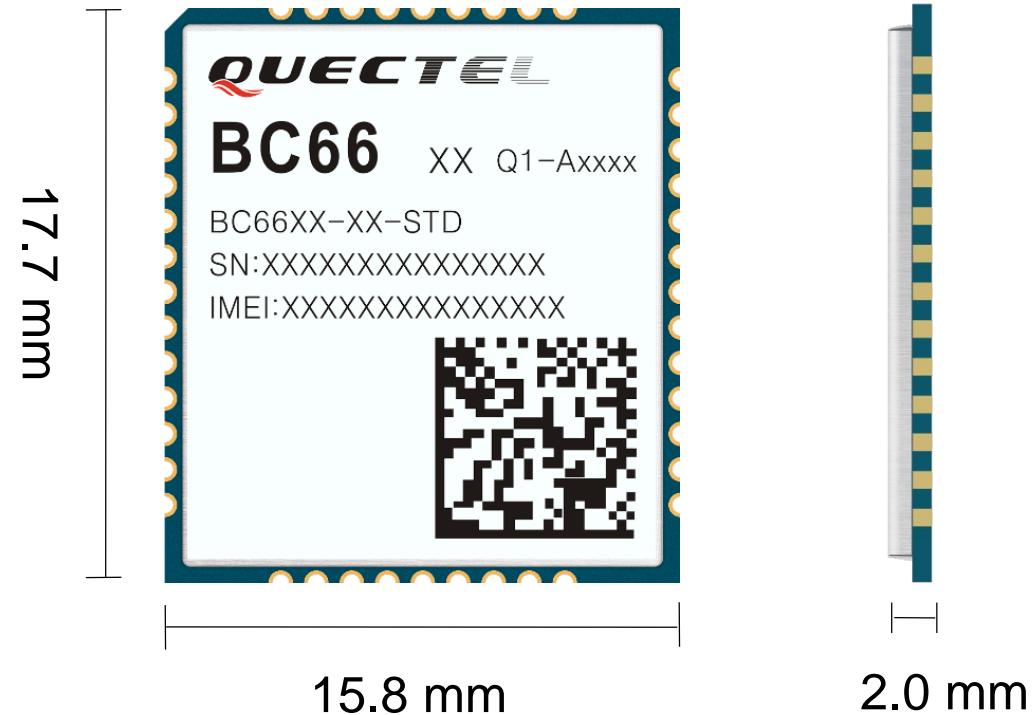
2018

2019

BC66 Mechanical Dimensions

Multi-Band Cat NB1 Module (MTK MT2625)

QUECTEL[®]
Build a Smarter World



Length: 17.7 mm (± 0.15 mm)
Width: 15.8 mm (± 0.15 mm)
Height: 2.0 mm (± 0.2 mm)
Weight: Approx. 1.2 g

BC66 Highlights



LTE Cat NB1
25.5 kbps DL / 62.5 kbps UL

QUECTEL®
Build a Smarter World

Highlight	Description
Global Bands	B1/B2/B3/B4/B5/B8/B12/B13/B17/B18/B19/B20/B25/B26*/B28/B66
Rich Hardware Interfaces	USB/ UART/ SPI ^① / I2S ^① / I2C ^① / USIM/ ADC/ NETLIGHT/ PSM_EINT/ PWRKEY/ RESET
Abundant Protocols	UDP/ TCP/ LwM2M/ MQTT/ SNTP/ DTLS/ TLS/ PPP*/ CoAP*/ HTTP*/ HTTPS*
Special Features	QuecOpen®, DFOTA, eSIM ^②
Low Power Consumption	3.5 µA (PSM), 0.24 mA (eDRX), 0.35 mA (DRX), 110 mA (Active, 23dBm) <small>Average Value</small>
QuecLocator®*	Location based on base station cell information
Power Supply Feature	Low power supply voltage (2.1–3.63 V, 3.3 V typ.)
Wake-up Feature	Specialized PSM_EINT for module wake-up via external interrupt
Compatibility	Compatible with Quectel GSM module M66 and Quectel NB-IoT module BC68/ BC66-NA/ BC65

* means under development.

① means supported only on QuecOpen® version.

② eSIM is reserved and not included by default.

BC66 Main Interfaces

Interface	Description
USB	1
USIM	1
UART	3 (Main/Debug/Auxiliary UART)
PSM_EINT	1 (wake up device via external interrupt)
ADC	1 (10 bits)
RESET	1
PWRKEY	1
NETLIGHT	1
Antenna Pad	1
SPI	1 (for QuecOpen® version only)
I2C	1 (for QuecOpen® version only)
I2S	1 (for QuecOpen® version only)
GPIO	Configurable (for QuecOpen® version only)

BC66 Main Functions



Function	Description
Protocols	UDP/ TCP/ LwM2M/ MQTT/ SNTP/ DTLS/ TLS/ PPP*/ CoAP*/ HTTP*/ HTTPS*
SMS*	Text and PDU mode
DFOTA	Delta firmware upgrade over-the-air
eSIM	Supported ^①
QuecOpen®	<ul style="list-style-type: none">ROM: 200 KB for APP image binRAM: 400 KB (100 KB static memory and 300 KB dynamic memory)

* means under development.

① eSIM is reserved and not included by default. If needed, a different OC will be provided.

BC66 Development Schedule

2018		2019			2020	
Q4	Q1	Q2	Q3	Q4	Q1	Q2
MP (I)		MP (II)		MP (III)	MP (IV)	MP (V)
Version: BC66NBR01A06 <ul style="list-style-type: none"> • TCP/IP • UDP • LwM2M • MQTT • DFOTA • QuecOpen® 		Version: BC66NBR01A07 <ul style="list-style-type: none"> • Platform optimization and issue fix • Add T-Mobile LwM2M new request 		Version: BC66NBR01A10 <ul style="list-style-type: none"> • SSL/TLS • MQTTS • SMS* • LwM2M optimization • Platform optimization and issue fix 	Version: BC66NBR02A02_SBK <ul style="list-style-type: none"> • SSL/TLS • Softbank customization requirements • Platform optimization and issue fix 	Version: BC66NBR03A0x <ul style="list-style-type: none"> • SMS • HTTP(S) • CoAP • Platform optimization and issue fix
Completed: Vodafone/ Deutsche Telekom/ PTCRB		Completed: T-Mobile		Completed: T-Mobile MR	Completed: SoftBank	Plan for: AT&T MR/ T-Mobile MR/ Telstra MR

The timeline will be adjusted according to the actual development status.

BC66 Timeline (1)

2019												2020											
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.			

Project Stage

BC66 → MP

Carrier Certification Schedule

Vodafone/ Deutsche Telekom/ AT&T/ T-Mobile/ SoftBank

Completed

Telefónica

Start

Complete (Planned)

Verizon



Sprint



NTT DOCOMO



Telstra



LGU+



TBD

TBD



BC66 Timeline (2)

2019												2020											
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.			

Project Stage

BC66 MP

Regulatory/Other Certification Schedule

GCF/ CE/ FCC/ PTCRB/ IC/ KC/ NCC/ JATE/ TELEC/ RCM/ NBTC/ IMDA

Completed

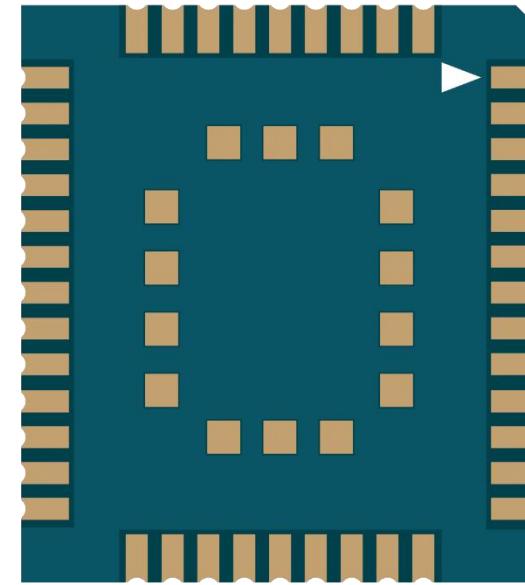
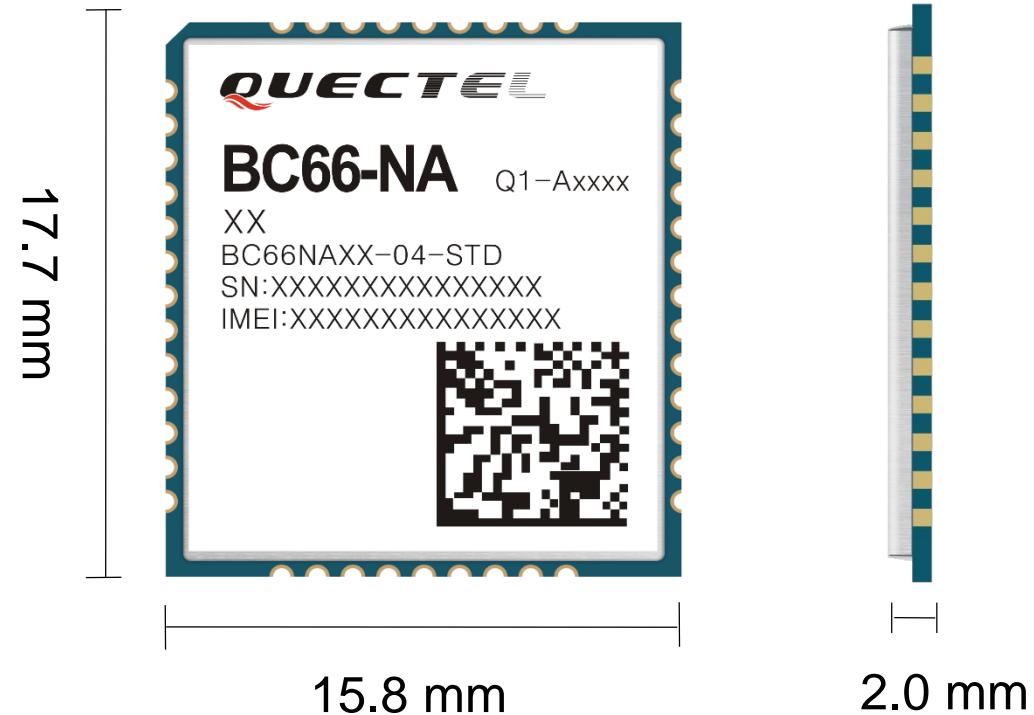
ATEX



BC66-NA Mechanical Dimensions

Multi-Band Cat NB2 Module (MTK MT2625)

QUECTEL[®]
Build a Smarter World



Length: 17.7 mm (± 0.15 mm)
Width: 15.8 mm (± 0.15 mm)
Height: 2.0 mm (± 0.2 mm)
Weight: Approx. 1.2 g

BC66-NA Highlights



LTE Cat NB2
103 kbps DL/151 kbps UL

Highlight	Description
Global Bands	B1/B2/B3/B4/B5/B8/B12/B13/B17/B18/B19/B20/B25/B26*/B28/B66/B71/B85
Rich Hardware Interfaces	USB/ UART/ SPI ^① / I2S ^① / I2C ^① / USIM/ ADC/ NETLIGHT/ PSM_EINT/ PWRKEY/ RESET
Abundant Protocols	UDP/ TCP/ LwM2M/ MQTT/ SNTP/ DTLS/ TLS/ PPP*/ CoAP*/ HTTP*/ HTTPS*
Special Features	QuecOpen®, DFOTA, ECID OTDOA, eSIM ^②
Low Power Consumption	3.5 µA (PSM), 0.13 mA (eDRX), 0.25 mA (DRX), 95 mA (Active, 23dBm) <small>Average Value</small>
QuecLocator®*	Location based on base station cell information
Power Supply Feature	Low power supply voltage (2.1–3.63 V, 3.3 V typ.)
Wake-up Feature	Specialized PSM_EINT for module wake-up via external interrupt
Compatibility	Compatible with Quectel GSM module M66 and Quectel NB-IoT module BC68/ BC66/ BC65

* means under development.

① means supported only on QuecOpen® version.

② eSIM is reserved and not included by default.

BC66-NA Main Interfaces

Interface	Description
USB	1
USIM	1
UART	3 (Main/Debug/Auxiliary UART)
PSM_EINT	1 (wake up device via external interrupt)
ADC	1 (10 bits)
RESET	1
PWRKEY	1
NETLIGHT	1
Antenna Pad	1
SPI	1 (for QuecOpen® version only)
I2C	1 (for QuecOpen® version only)
I2S	1 (for QuecOpen® version only)
GPIO	Configurable (for QuecOpen® version only)

BC66-NA Main Functions

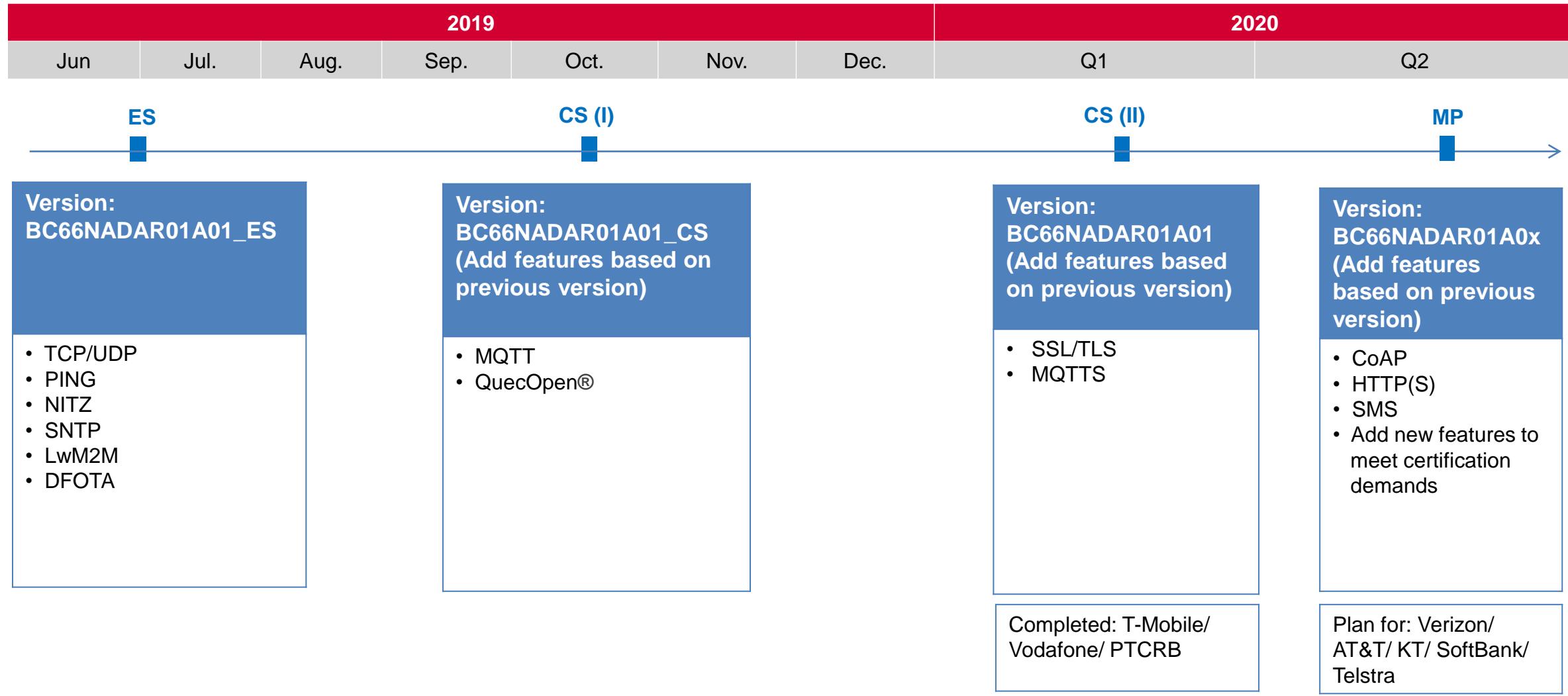


Function	Description
Protocols	UDP/ TCP/ LwM2M/ MQTT/ SNTP/ DTLS/ TLS/ PPP*/ CoAP*/ HTTP*/ HTTPS*
SMS*	Text and PDU mode
OTDOA*	Observed Time Difference of Arrival
DFOTA	Delta firmware upgrade over-the-air
eSIM	Supported ^①
QuecOpen®	<ul style="list-style-type: none">ROM: 200KB for APP image binRAM: 400KB (100KB static memory and 300KB dynamic memory)

* means under development.

① eSIM is reserved and not included by default. If needed, a different OC will be provided.

BC66-NA Development Schedule



The timeline may be adjusted according to the actual development status.

BC66-NA Timeline (1)

2019												2020								
Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.			

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Vodafone/ T-Mobile

Completed

Deutsche Telekom

Start

Complete (Planned)

Verizon

AT&T

Telstra

NTT DOCOMO/ SoftBank

TBD

TBD

BC66-NA Timeline (2)

2019												2020								
Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.			

Regulatory/Other Certification Schedule

GCF/ CE/ FCC/ PTCRB/ IC/ JATE/ TELEC/ RCM

Completed

KC

Start (Planned)

Complete (Planned)

NCC

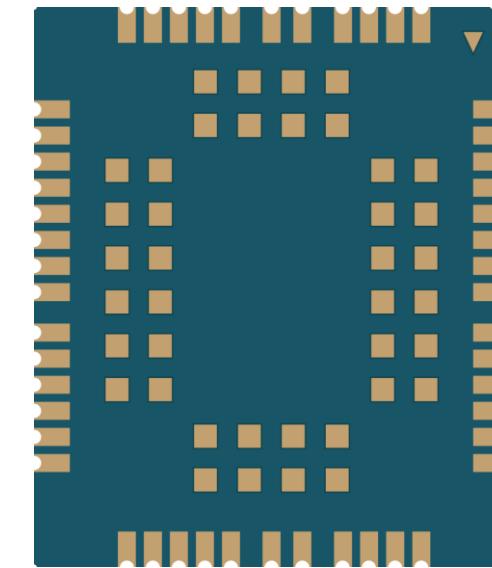
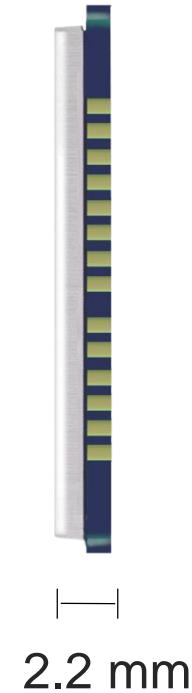
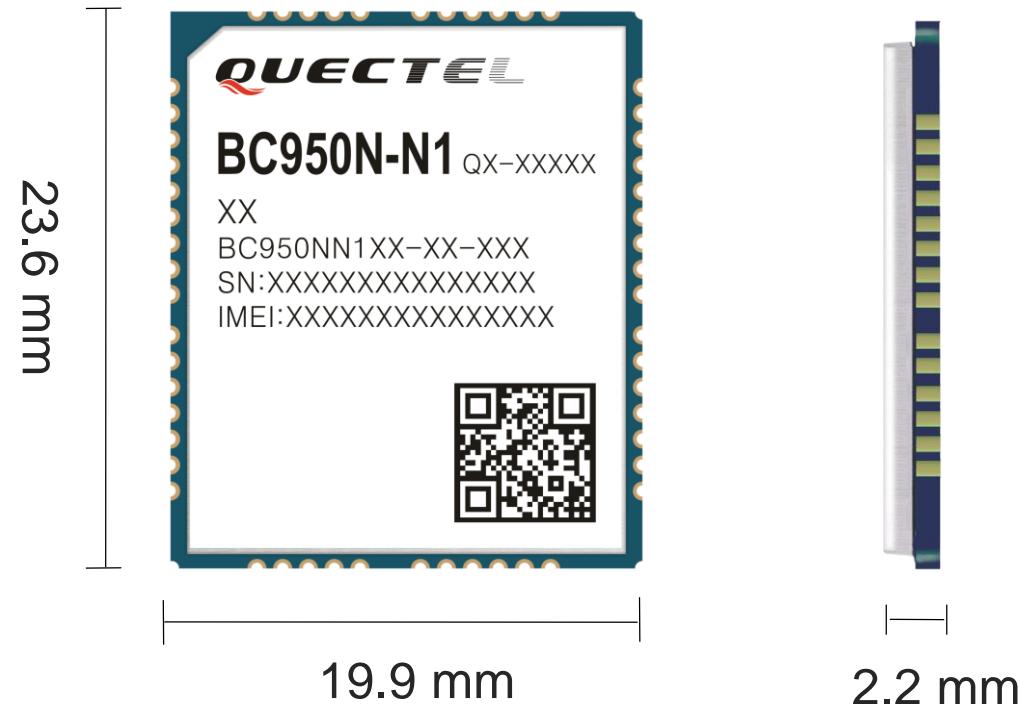
NBTC/IMDA

ATEX

BC950N-N1 Mechanical Dimensions

Multi-band LTE Cat NB1 Module (MTK MT2625)

QUECTEL[®]
Build a Smarter World



Length: 23.6 mm (± 0.15 mm)
Width: 19.9 mm (± 0.15 mm)
Height: 2.2 mm (± 0.2 mm)
Weight: 1.8 \pm 0.2 g

BC950N-N1 Highlights



QUECTEL®
Build a Smarter World

Highlight	Description
LTE Cat NB1 with Band 31	B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B17/ B18/ B19/ B20/ B25/ B26/ B28/ B66/ B31 (450 MHz supported)
Hardware Platform	<ul style="list-style-type: none">78MHz ARM® Cortex®-M4Embedded 32 Mbits Flash + Embedded 32 Mbits PSRAM
BT Function*	BLE 5.0 (Optional)
Rich Hardware Interfaces	UART/ USIM/ PSM_EINT/ PWRKEY/ RESET/ ADC/ NETLIGHT/ USB
Abundant Internet Protocols	UDP/ TCP/ SNTP/ LwM2M/ MQTT/ MQTT(s)*/ TLS*/ CoAP(s)*/ HTTP(s)*/ PPP*
Enhanced Features	QuecOpen®, DFOTA
Compatibility	Compatible with Quectel NB-IoT module BC95-G

“*” means under development.

BC950N-N1 Main Interfaces

Interfaces	Description
USIM	1
UART	4
USB	1
PSM_EINT	1 (wake up device via external interrupt)
ADC	1 (10 bits)
RESET	1
PWRKEY	1
NETLIGHT	1
Antennas	2 (main antenna and BT* antenna)
I2C	1 (for QuecOpen [®] version only)
SPI	1 (for QuecOpen [®] version only)
GPIO	Configurable (for QuecOpen [®] version only)

^{“*” means under development.}

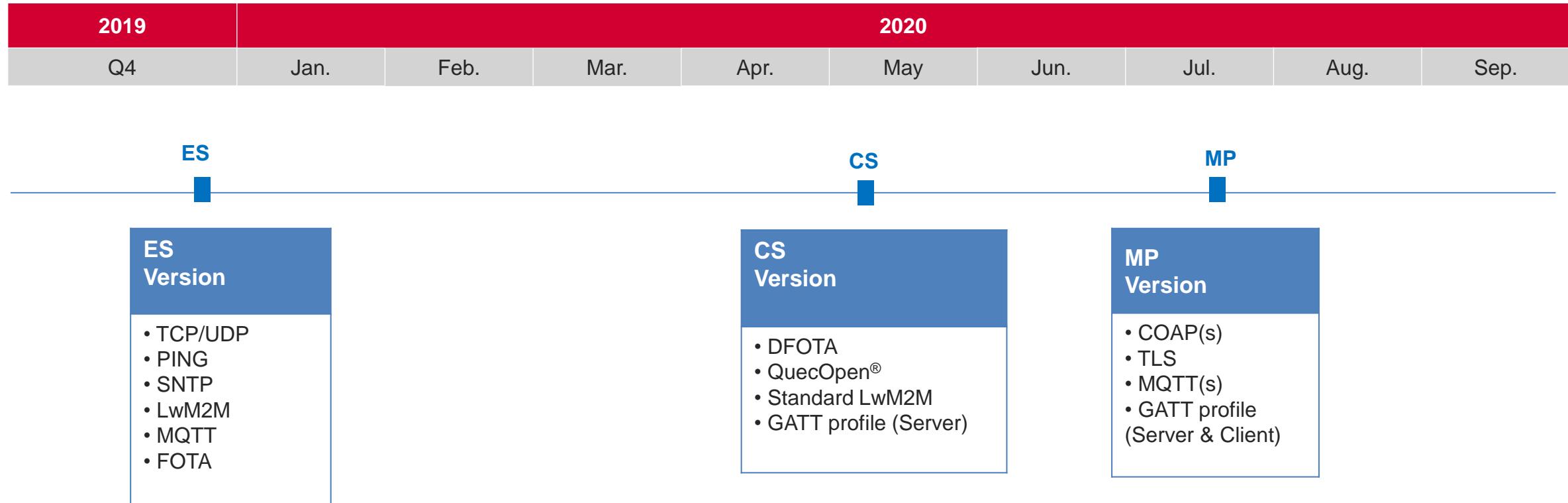
BC950N-N1 Main Functions



Function	Description
Protocols	UDP/TCP/SNTP/LwM2M/MQTT/MQTT(s)*/TLS*/ CoAP(s)*/ HTTP(s)*/PPP*
SMS*	Text and PDU modes
DFOTA	Delta Firmware Upgrade Over-The-Air

“*” means under development.

BC950N-N1 Development Schedule

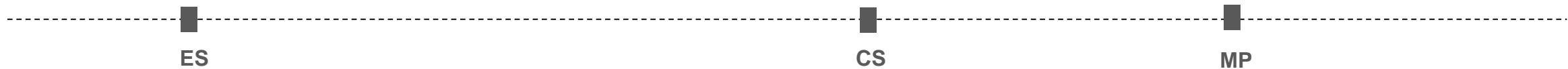


The timeline will be adjusted according to the actual development status.

BC950N-N1 Timeline

2019	2020									
Q4	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Regulatory Certification Schedule

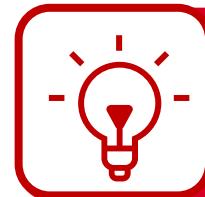
GCF

Start (Planned)

Complete (Planned)

CE/RCM

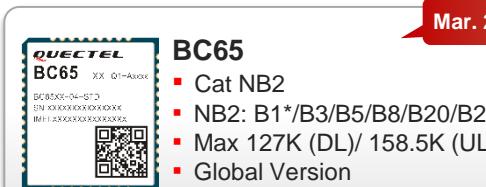




UNISOC Solution

RDA8908A

Mar. 2020



RDA8909B

MM/YYYY

Estimated Engineering Sample Date

* means under development.



BC92

- Cat NB2/ GSM
- NB2: B3/B5/B8/B20/B28
- GSM: 850/900/1800/1900MHz
- Global Version

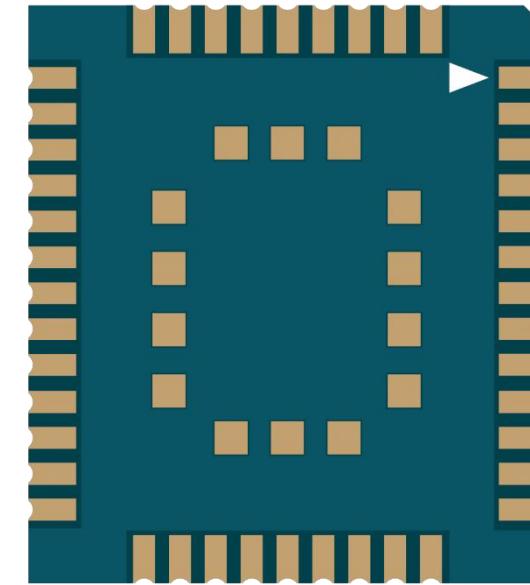
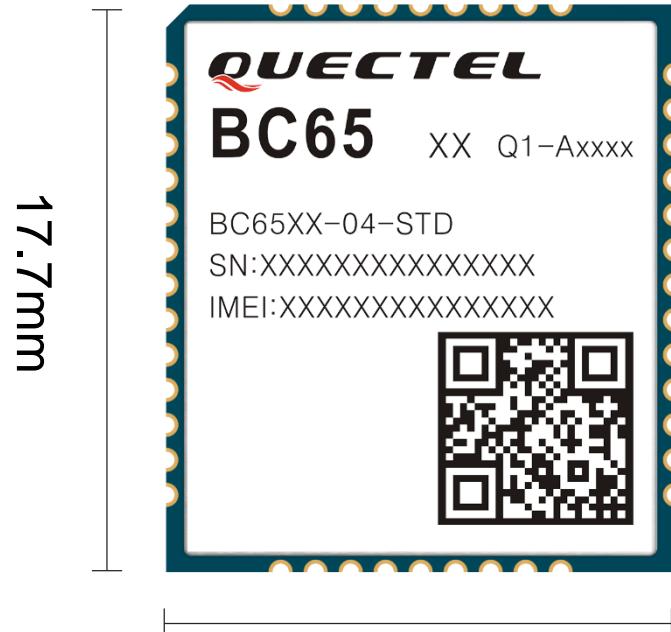
2019

2020

BC65 Mechanical Dimensions

Multi-Band LTE Cat NB2 Module (RDA8908A)

QUECTEL[®]
Build a Smarter World



Length: 17.7mm ($\pm 0.15\text{mm}$)
Width: 15.8mm ($\pm 0.15\text{mm}$)
Height: 2.2mm ($\pm 0.2\text{mm}$)
Weight: Approx. 1.2g

BC65 Highlights



LTE Cat NB1:
Max 25.5kbps (DL)/ 62.5kbps (UL)
LTE Cat NB2:
Max.127kbps (DL)/158.5kbps (UL)

QUECTEL®
Build a Smarter World

Highlight	Description
Global Bands	B1*/B3/B5/B8/B20/B28
Data Rate	<ul style="list-style-type: none">LTE Cat NB1: Max. 25.5kbps (DL)/ 62.5kbps (UL)LTE Cat NB2: Max.127kbps (DL)/158.5kbps (UL)
Rich Hardware Interfaces	UART/USIM/PSM_EINT/ADC*/RESET/PWRKEY/RI*/NETLIGHT/Antenna/SPI ^{①*} /PWM ^{①*} /I2C ^{①*} /DCD ^{①*} /GPIO ^{①*}
Abundant Protocols	UDP/TCP/LwM2M*/SNTP/FTP*/MQTT/CoAP*/PPP/TLS*/DTLS*/HTTP*
eSIM Supported	eSIM ^② reserved to support customization
Power Supply Feature	Supply Voltage: 3.2V~4.2V, 3.8V Typ.
Wake-up Feature	Specialized PSM_EINT for module wake-up via external interrupt
Special Features	<ul style="list-style-type: none">Built-in ADC temperature detection*QuecOpen®*Low power designDFOTA
Compatibility	Compatible with Quectel GSM module M66 and Quectel NB-IoT module BC66/BC68

* means under development.

① means supported only on QuecOpen® version.

② eSIM is reserved but not included by default.

BC65 Main Interfaces

Interface	Description
USIM	1
UART	3 (Main/Debug/Auxiliary UART)
PSM_EINT	1 (wake up device via external interrupt)
ADC*	1 (10 bits)
RESET	1
PWRKEY	1
RI*	1
NETLIGHT	1
Antenna	1
SPI*	1 (for QuecOpen® version only)
PWM*	1 (for QuecOpen® version only)
DCD*	1 (for QuecOpen® version only)
I2C*	1 (for QuecOpen® version only)
GPIO*	Configurable (for QuecOpen® version only)

* means under development.

BC65 Main Functions

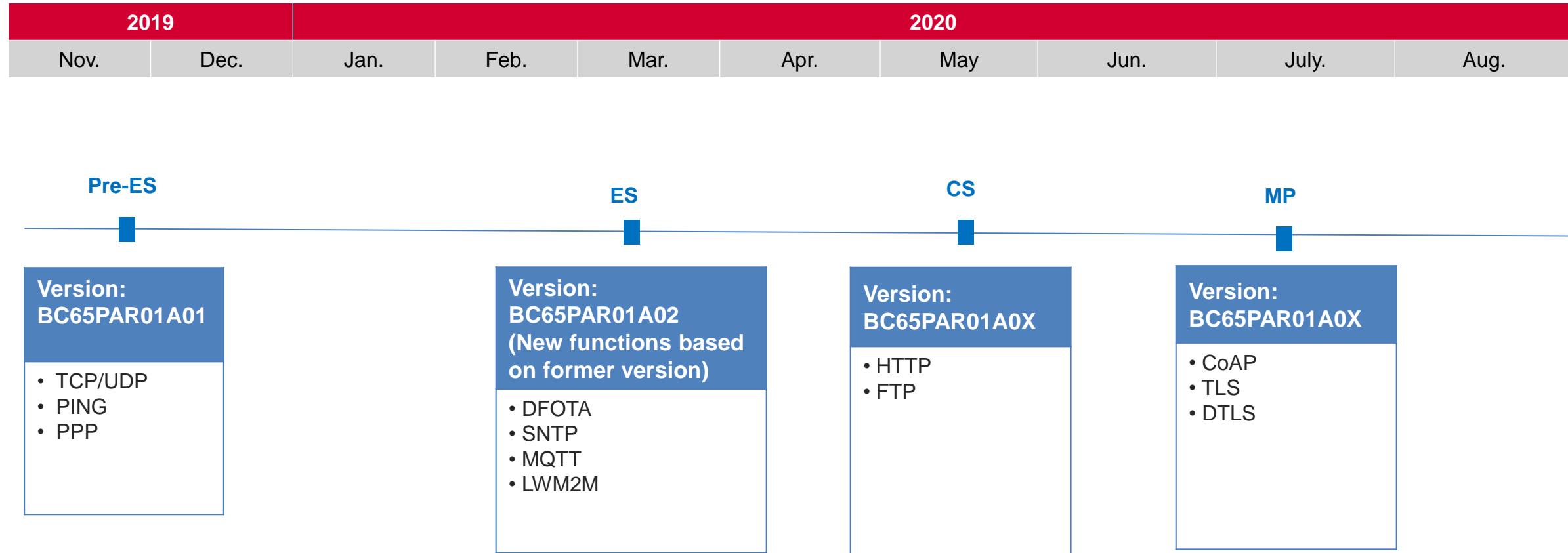


Function	Description
Protocols	UDP/TCP/LwM2M*/SNTP/FTP*/MQTT/CoAP*/PPP/TLS*/DTLS*/HTTP*
SMS*	Text and PDU mode
DFOTA	Delta Firmware Upgrade Over-The-Air
eSIM	Supported ^①
Power Supply	Range: 3.4V~4.2V Typical: 3.8V

* means under development.

① eSIM is reserved but not included by default. If needed, a different OC will be provided.

BC65 Development Schedule



BC65 Timeline

2019		2020									
Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July.	Aug.		

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Regulatory Certification Schedule

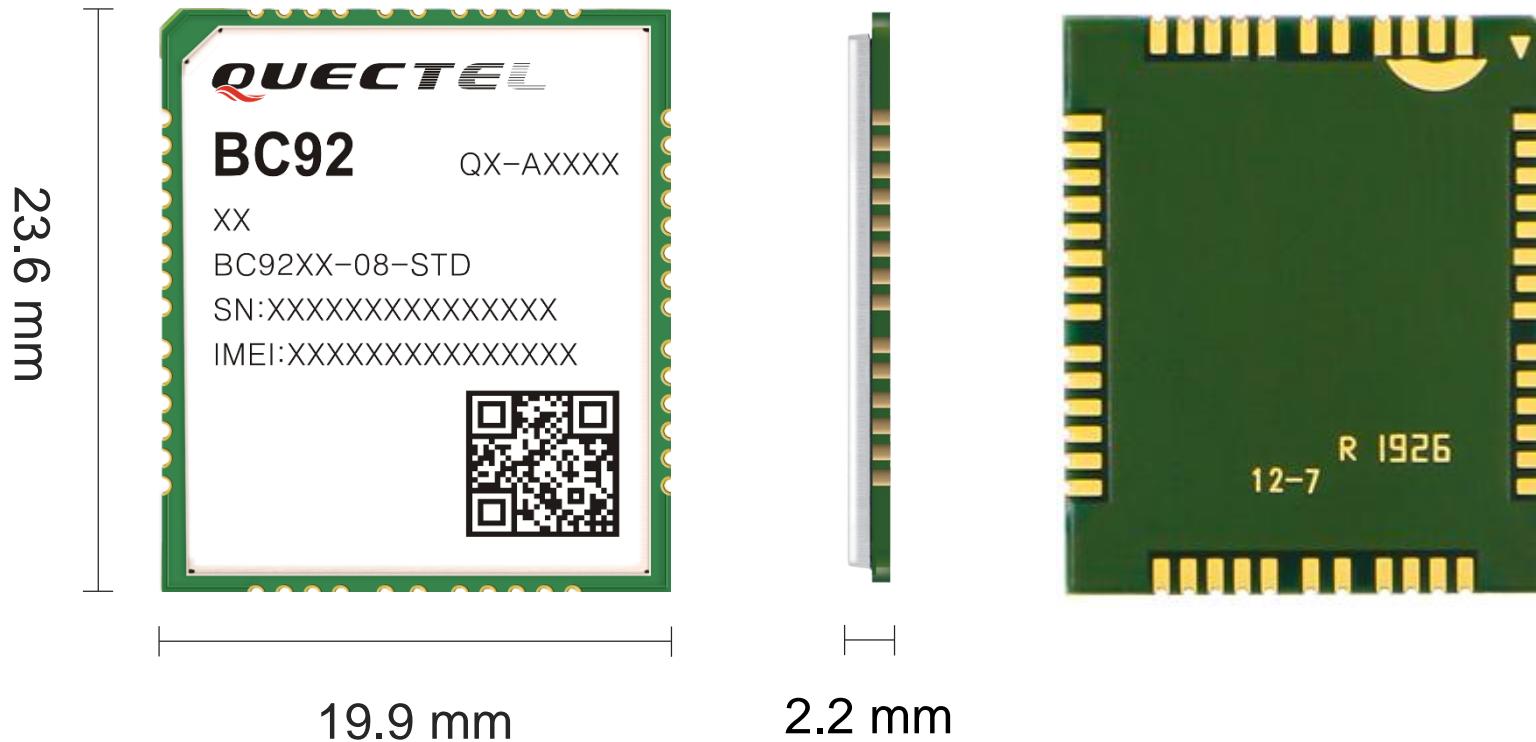
CE/RCM



BC92 Mechanical Dimensions

Multi-Band LTE Cat NB2 / GSM Module (RDA8909B)

QUECTEL[®]
Build a Smarter World



Length: 23.6mm ($\pm 0.15\text{mm}$)
Width: 19.9mm ($\pm 0.15\text{mm}$)
Height: 2.2mm ($\pm 0.2\text{mm}$)

BC92 Highlights



LTE Cat NB2/GSM

LTE Cat NB1: Max. 25.5kbps (DL)/ 62.5kbps (UL)

LTE Cat NB2: Max. 127kbps (DL)/ 158.5kbps (UL)

GSM: Max. 85.6kbps (DL)/ 85.6kbps (UL)



Highlight	Description
Global Bands / Dual Mode	<ul style="list-style-type: none">LTE Cat NB2: B3/ B5/ B8/ B20/ B28GSM: 850/ 900/ 1800/ 1900MHz
Data Rate	<ul style="list-style-type: none">LTE Cat NB1: Max. 25.5kbps (DL)/ 62.5kbps (UL)LTE Cat NB2: Max. 127kbps (DL)/ 158.5kbps (UL)GSM: Max. 85.6kbps (DL)/ 85.6kbps (UL)
Rich Hardware Interfaces	UART/ USIM/ ADC*/ NETLIGHT/ PSM_EINT/ PWRKEY/ RI/ RESET/ Audio*/ Antenna
Abundant Protocols	UDP/ TCP/ LwM2M/ SNTP/ PPP/ MQTT/ CoAP*/ HTTP*/ HTTPS*/ FTP*
Power Supply Feature	Supply Voltage: 3.4V~4.2V, 3.8V Typ.
Wake-up Feature	Specialized PSM_EINT for module wake-up via external interrupt
QuecLocator®	Location based on base station cell information
Special Features	<ul style="list-style-type: none">GSM voice call*Built-in ADC temperature detection*Low power designDFOTA
Compatibility	Compatible with Quectel GSM module M95 and Quectel NB-IoT module BC95-G and Quectel LPWA BG95 module

* means under development.

BC92 Main Interfaces

Interface	Description
USIM	2 (USIM1 supports NB-IoT/GSM, USIM2* only supports GSM)
UART	2 (Main, Debug)
PSM_EINT	1 (External Wake-up pin)
ADC*	1 (10 bits)
RESET	1
PWRKEY	1
RI	1
NETLIGHT	1
Antenna	1
Audio*	3 (1 MIC differential input, 1 SPK differential output and 1 LOUDSPK differential output)

* means under development.

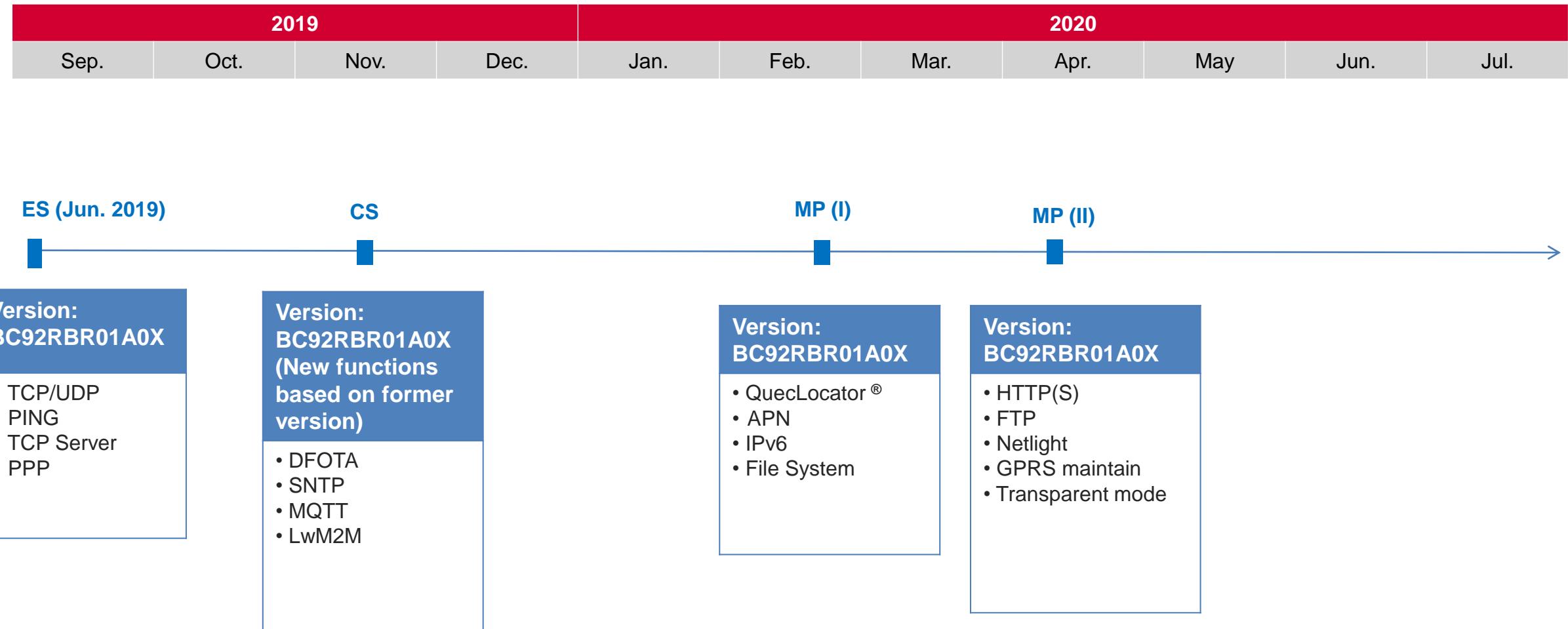
BC92 Main Functions



Function	Description
Protocols	UDP/ TCP/ LwM2M/ SNTP/ PPP/ MQTT/ CoAP*/ HTTP*/ HTTPS*/ FTP*
SMS*	Text and PDU mode
DFOTA	Delta Firmware Upgrade Over-The-Air
Power Supply	Range: 3.4V~4.2V Typical: 3.8V
Voice Call*	GSM voice call

* means under development.

BC92 Development Schedule



BC92 Timeline (1)

2019				2020						
Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Carrier Certification Schedule

Vodacom Completed

Vodafone

Start

Complete (Planned)

MTN

BC92 Timeline (2)

2019				2020						
Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.

Project Schedule



ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.

CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.

MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Regulatory Certification Schedule

CE/RCM Completed

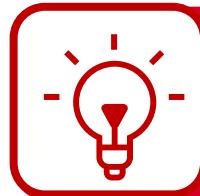
GCF

Start

Complete (Planned)

ICASA





Hisilicon Solution

NB-IoT Modules (Hisilicon) Roadmap



Boudica V200



BC950V-xx ①

- 3GPP R14/R15
- BLE 5.0
- Compatible with BC95-G

Q3. 2020



BC680V-xx ①

- 3GPP R14/R15
- BLE 5.0
- Compatible with BC68

Q3. 2020

Boudica V150



BC95-G

- Cat NB2 (NB-IoT)
- 125K DL/ 150K UL
- Global Version



BC68

- Cat NB2 (NB-IoT)
- 125K DL/ 150K UL
- Global Version

① Project name and hardware/software specifications to be determined

2017

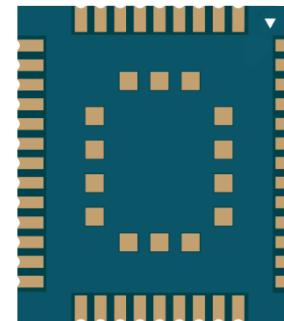
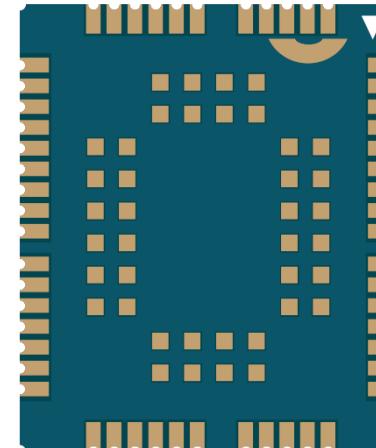
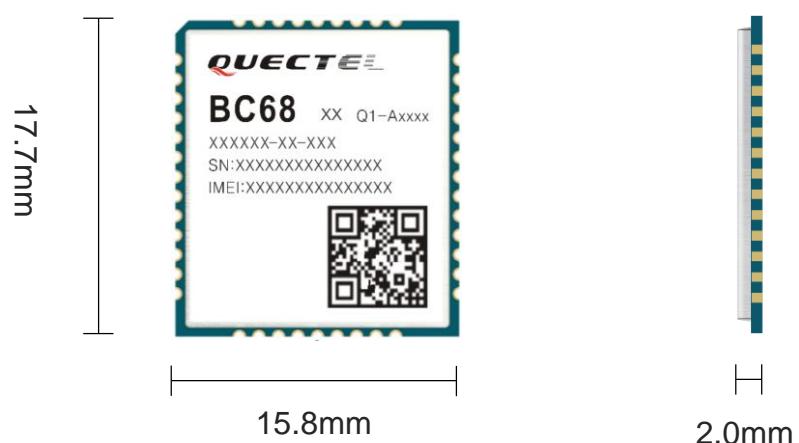
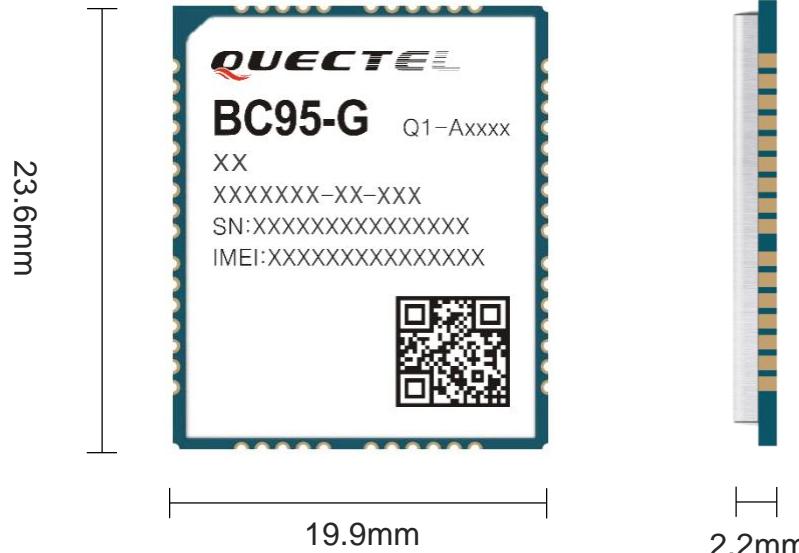
2018

2019

2020

BC95-G/BC68 Mechanical Dimensions

Multi-Band LTE Cat NB2 Module (Hisilicon Boudica V150)



23.6mm × 19.9mm × 2.2mm

Length: 23.6mm ($\pm 0.15\text{mm}$)
Width: 19.9mm ($\pm 0.15\text{mm}$)
Height: 2.2mm ($\pm 0.2\text{mm}$)
Weight: Approx. 1.8g ($\pm 0.2\text{g}$)

17.7mm × 15.8mm × 2.0mm

Length: 17.7mm ($\pm 0.15\text{mm}$)
Width: 15.8mm ($\pm 0.15\text{mm}$)
Height: 2.0mm ($\pm 0.2\text{mm}$)
Weight: Approx. 1.1g ($\pm 0.2\text{g}$)

LTE Cat NB2 (NB-IoT)

BC95-G/BC68 Specifications



23.6mm x 19.9mm x 2.2mm
LTE Cat NB2



17.7mm x 15.8mm x 2.0mm
LTE Cat NB2

Module	BC95-G	BC68
LTE	B1/B3/B8/B5/B20/B28 @LTE-FDD	B1/B3/B8/B5/B20/B28 @LTE-FDD
Supply Voltage	3.1–4.2V, 3.6V Typ.	3.1–4.2V, 3.6V Typ.
Dimension	23.6mm x 19.9mm x 2.2mm	17.7mm x 15.8mm x 2.0mm
Region	Global	Global
Certification	Carrier: Vodafone/ Deutsche Telekom/ Telefónica/ KT/ LGU+/ SoftBank/ Telstra Regulatory: GCF/ CE/ KC/ NCC/ JATE/ TELEC/ RCM/ NBTC /IMDA Others: ATEX*	Carrier: Vodafone/ Deutsche Telekom/ Telefónica/ SoftBank/ Telstra Regulatory: GCF/ CE/ NCC/ JATE/ TELEC/ RCM/ IMDA Others: ATEX

** means under development.

BC95-G/BC68 Features



Item	BC95-G/ BC68	
Chipset	Boudica 150 (Hi2115)	
Band	Multi band (698MHz-960MHz, 1695MHz-2180MHz) B1/B3/B8/B5/B20/B28	
LCC Package	<ul style="list-style-type: none">BC95-G: 23.6mm x 19.9mm x 2.2mmBC68: 17.7mm x 15.8mm x 2.0mm	
Data Rate	Single Tone	DL: 25.2kbps; UL: 15.625kbps
	Multi Tone	DL: 25.2kbps; UL: 54kbps
	Extended TBS/2 HARQ	DL: 125kbps; UL: 150kbps
Protocols	IPv4/IPv6/UDP/CoAP/LwM2M/Non-IP/DTLS/TCP/MQTT	
Power Consumption (Typical)	<ul style="list-style-type: none">3µA @PSM0.5mA @Idle Mode, DRX=2.56s, ECL0250mA @Tx, 23dBm (B1/B3)220mA @Tx, 23dBm (B8/B5/B20)280mA @Tx, 23dBm (B28)130mA @Tx, 12dBm (B1/B3/B8/B5/B20/B28)70mA @Tx, 0dBm (B1/B3/B8/B5/B20/B28)60mA @Rx	

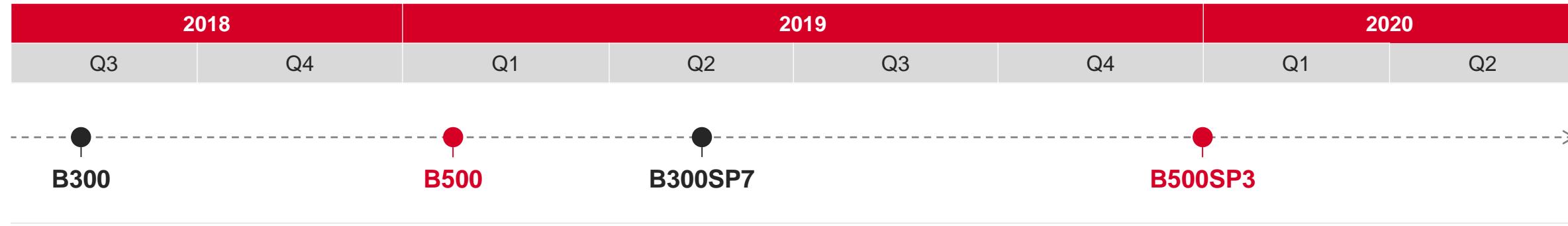
BC95-G/BC68 Enhanced Features



Feature	Description
NB-IoT Network	Cat NB1 / Cat NB2
Global Bands	B1 / B3 / B5 / B8 / B20 / B28
Low Power Consumption	PSM and eDRX features realize ultra-low power consumption and extended battery life; 3µA @PSM; 0.5mA @Idle Mode, DRX=2.56s, ECL0; Max 220mA @Tx, 23dBm; 60mA @Rx
Abundant Protocols	IPv4 / IPv6 / UDP / CoAP / LwM2M / Non-IP / DTLS / TCP / MQTT
Special Features	DFOTA (proprietary algorithm), QuecOpen®, eSIM
Security	TEE Security, Digital Signature*
Compatibility	Compatible with various other Quectel modules in packaging
Extensive Experience	Over 10 million shipments, five-hundred-customer foundation; Customers can deploy commercial products more quickly and stably. Millions of terminals have been functioning well with Quectel NB-IoT modules, and such applications includes smart meters, trackers and smart NB-IoT white goods, etc.

“” means under development.*

BC95-G/BC68 Baseline Features



B300 (3GPP Rel-13) Software Functions:

- **R01A0x:**
TCP/ UDP/ SMS/ Non-IP/ NITZ/ PING/ DNS/ DFOTA/ LwM2M/ DTLS/ Basic CoAP/ MQTT
- **QuecOpen®**

B500 (3GPP Rel-14) New Features:

- Cat-NB2
- New Power Class
- OTDOA
- Multi PRB (Non-anchor)
- Extended TBS / 2 HARQ
- Mobility Enhancement

Software Functions:

- **R02A0x:**
TCP/ UDP/ SMS/ Non-IP/ NITZ/ PING/ DNS/ DFOTA/ LwM2M/ DTLS/ Basic CoAP/ MQTT

BC95-G Certificate Timeline



2019									2020				
Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	

Project Stage
BC95-G MP

Carrier Certification Schedule

Vodafone/ Deutsche Telekom/ Telefónica/ KT/ LGU+/ SoftBank/ Telstra Completed



Regulatory Certification Schedule

GCF/ CE/ KC/ NCC/ JATE/ TELEC/ RCM/ NBTC/ IMDA Completed

ATEX



2019

Project Stage

BC68 MP

Carrier Certification Schedule

Vodafone/ Deutsche Telekom/ Telefónica/ SoftBank/ Telstra Completed



= SoftBank



Regulatory Certification

GCF/ CE/ NCC/ JATE/ TELEC/ RCM/ IMDA/ ATEX Completed



INFOCOMM
MEDIA
DEVELOPMENT
AUTHORITY

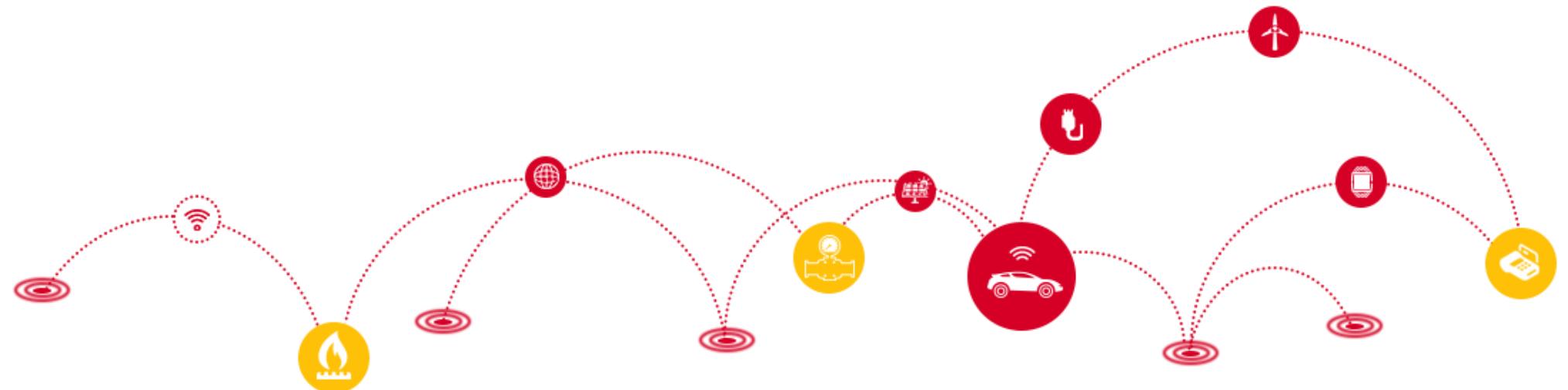


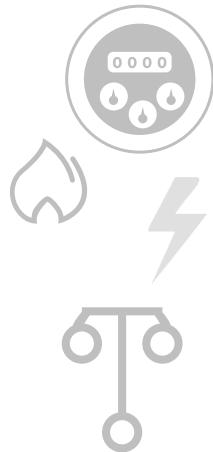
LPWA Technology

LPWA Modules Summary

Product Overview

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
-
- A circular icon containing four icons: a gas detector, a soil sensor, a machine alarm, and an irrigation controller.



Personal Life

- Asset Tracking
 - Wearable Devices
 - Person/Pet Tracking
-
- A dashed-line box containing three icons: a delivery truck, a person silhouette, and a wristwatch.

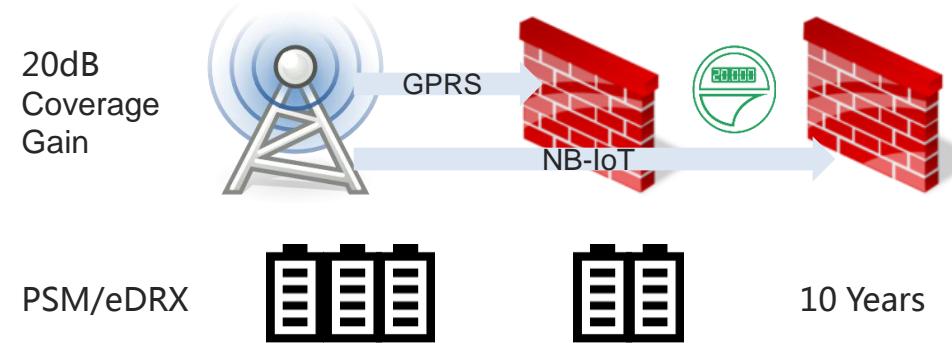
Smart Home

- Intelligent Door Lock
 - Intelligent Control
-
- A dashed-line box containing a house icon.

Smart Metering



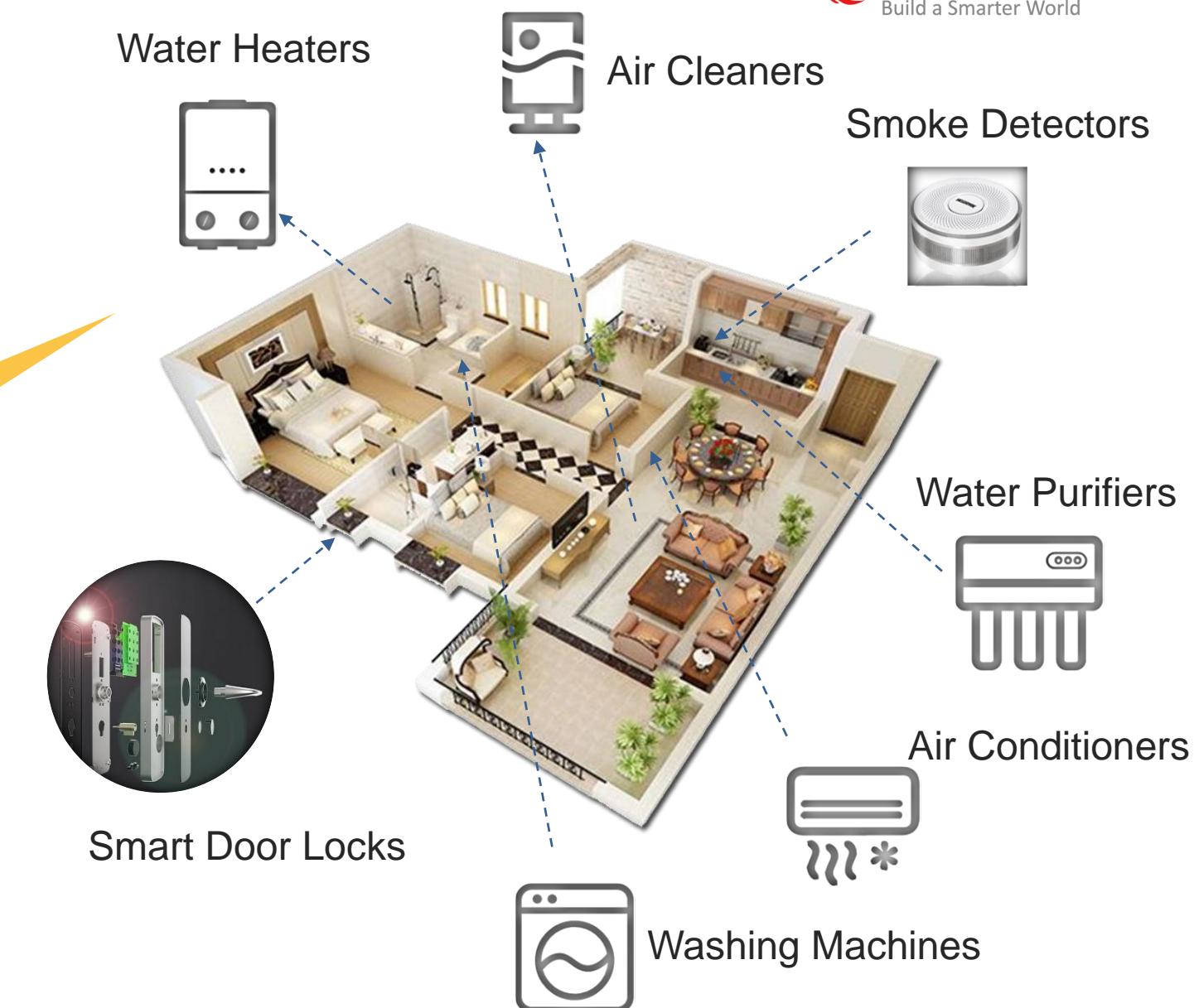
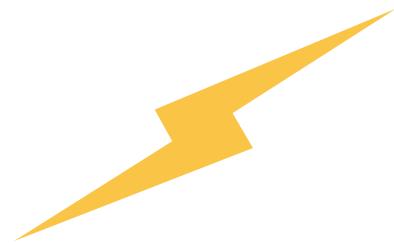
The most suitable solution for water meters



- Battery driven
- Daily water data collection
- Automatically pipeline leakage, burst, blockage and temperature detection

Smart Home

- NB-IoT smart locks
- Smart smoke detectors
- NB-IoT white goods
- Higher safety, more convenient
- Easy connection to NB-IoT platform

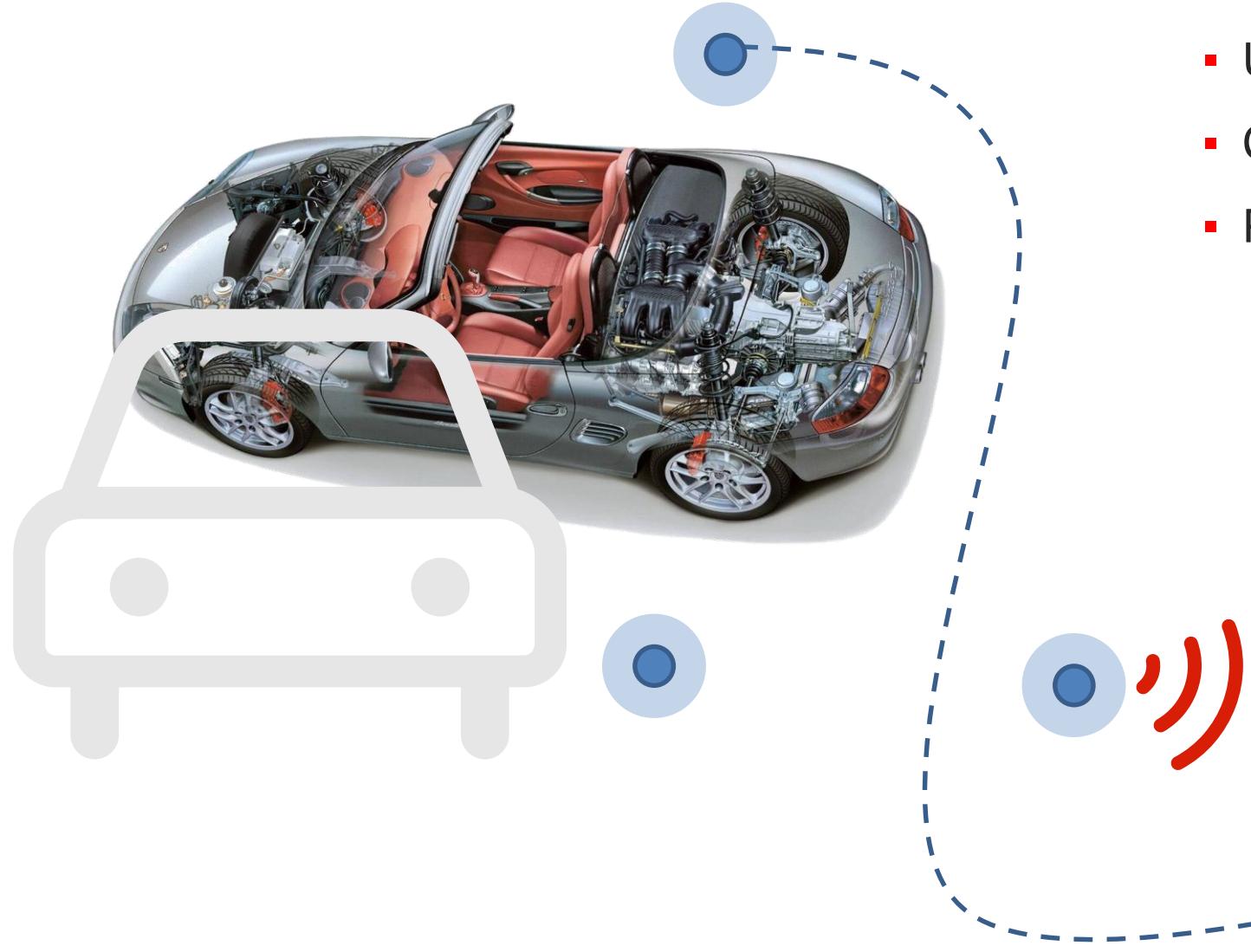


Street Lighting



- Real time data feeds directly to the operation center
- Manual brightening of lighting when required
- Improved energy efficiency

Parking



- Unlock parking lock with App
- Check occupancy by WeChat
- Private parking space sharing



Bike Sharing



Animal Testing



- Monitor health and safety of the cattle
- Improve milk yield and ensure in time cow breeding

Multi-gas Detector



- Hazardous gas monitoring, including VOCs, combustibles and toxics, etc.
- Real-time gas concentration reading, location, alarm and status indication



Thank you!

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Website: www.quectel.com



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<https://www.facebook.com/quectelwireless>



https://twitter.com/Quectel_IoT