Quectel EM12xR-GL&EM160R-GL Module

Introduction

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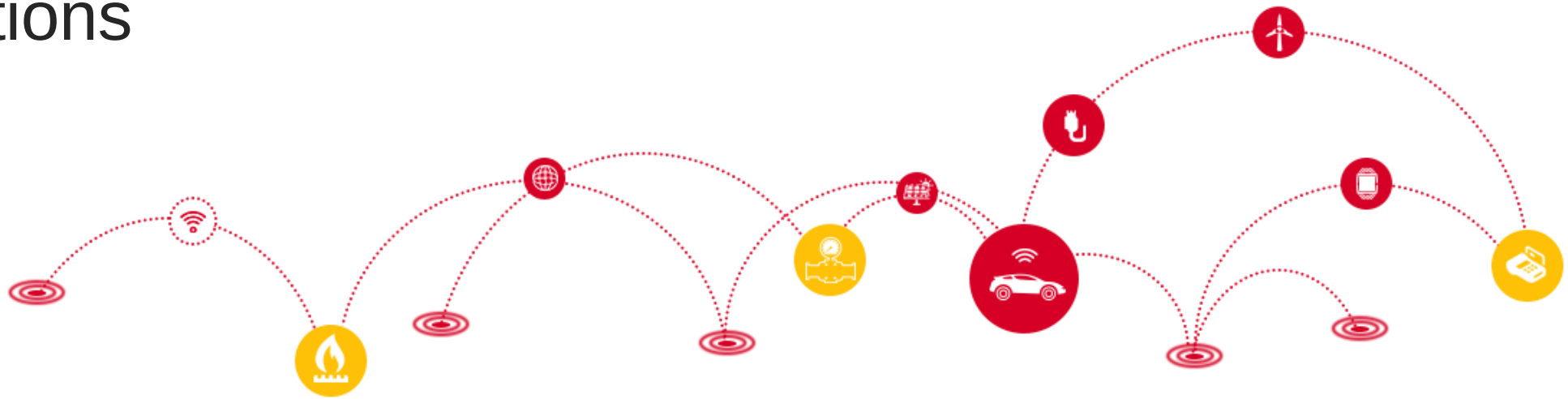
Product Overview

Highlights & Specifications

Development Schedule

Technical Details

Applications



LTE-A/ LTE-A Pro Roadmap

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Cat 16/18

EG18 Series
- LGA Form Factor
- 5CA, 4 × 4 MIMO
- LTE Cat 18

EM160R-GL
- M.2 Form Factor
- 5CA , 4 × 4 MIMO
- Cat 16

Cat 12

EG512R-EA
- LGA Form Factor
- 3CA, 4 × 4 MIMO
- Cat 12

EM12xR-GL
- M.2 Form Factor
- 3CA
- Cat 12

EG12 Series
- LGA Form Factor
- 3CA, 4 × 4 MIMO
- Cat 12

EM12-G
- M.2 Form Factor
- 3CA
- Cat 12

Cat 6

EG06 Series
- LGA Form Factor
- LTE with CA
- Cat 6

EP06 Series
- Mini PCIe Form Factor
- LTE with CA
- Cat 6

EM06 Series
- M.2 Form Factor
- LTE with CA
- Cat 6

EG060V-EA
- LGA Form Factor
- LTE with CA
- Cat 6

LTE-A Pro Module Overview (Cat 12/16/18)

Cat 16/ Cat 18

EG18 Series

- LGA Form Factor
- Variants:
  - EA
  - NA

EM160R-GL

- M.2 Form Factor
- Variant:
  - GL Engineering Sample

Cat 12

EG12 Series

- LGA Form Factor
- Variants:
  - GT
  - EA

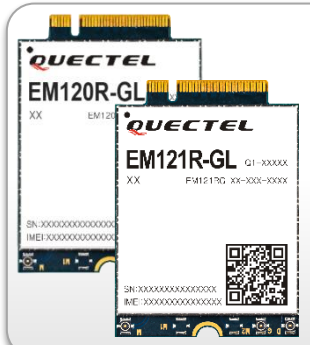
EG512R-EA

LGA Form Factor

- Variant:
  - EA Commercial Sample

EM12-G

- M.2 Form Factor
- Variant:
  - G



EM12xR-GL

- M.2 Form Factor
- Variant:
  - GL Engineering Sample

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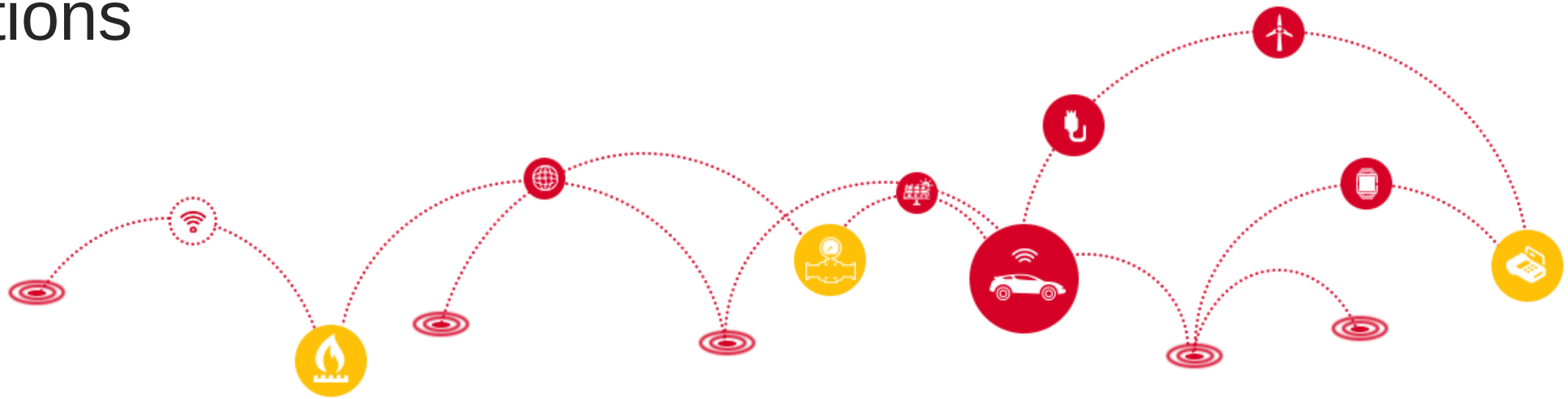
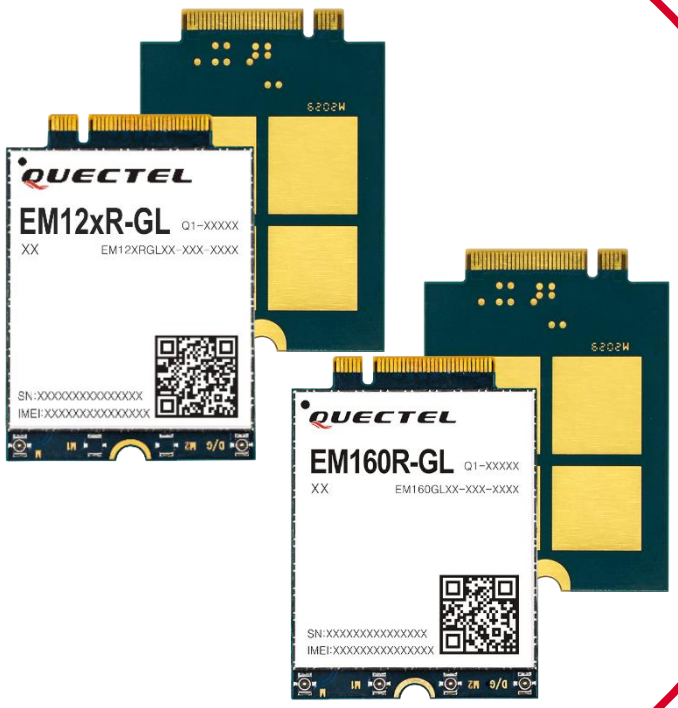


EM12xR-GL/EM160R-GL Main Highlights



Compatible

- Pin-to-pin compatible with EM06 /EM12-G/ RM500Q/ RM502Q series modules, which ensures easy migration among the modules.

Optimized

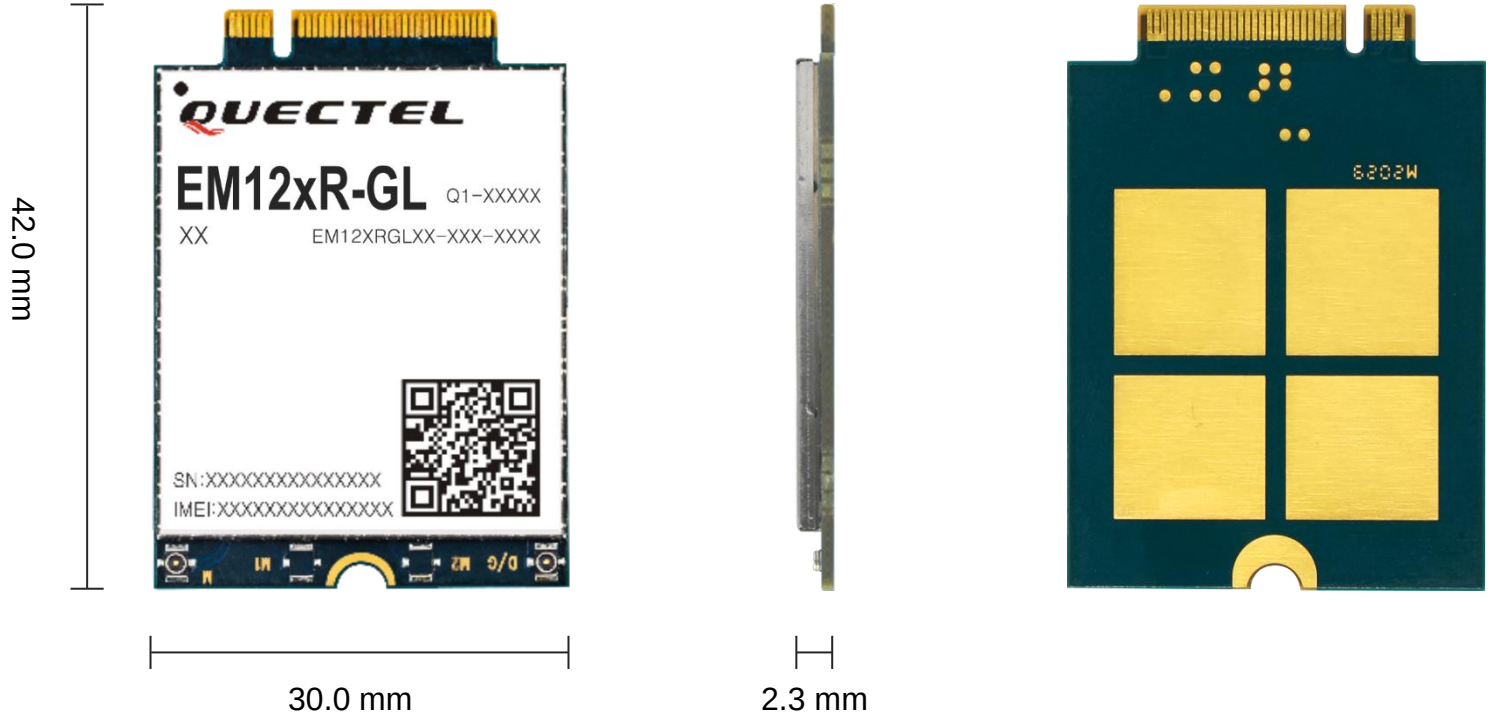
- Support mainstream four-mode LTE-TDD/ LTE-FDD/ WCDMA/ DC-HSPA+ bands.
- Multiple-constellation positioning meets more customers' needs.

Reliable

- High stability meets Quectel quality standards with Qualcomm chips adopted.
- Meet the needs of the Internet of Things industry and pass certification in many countries or regions.

EM12xR-GL Mechanical Dimensions

Multi-Mode LTE-A Module (LTE Cat 12)

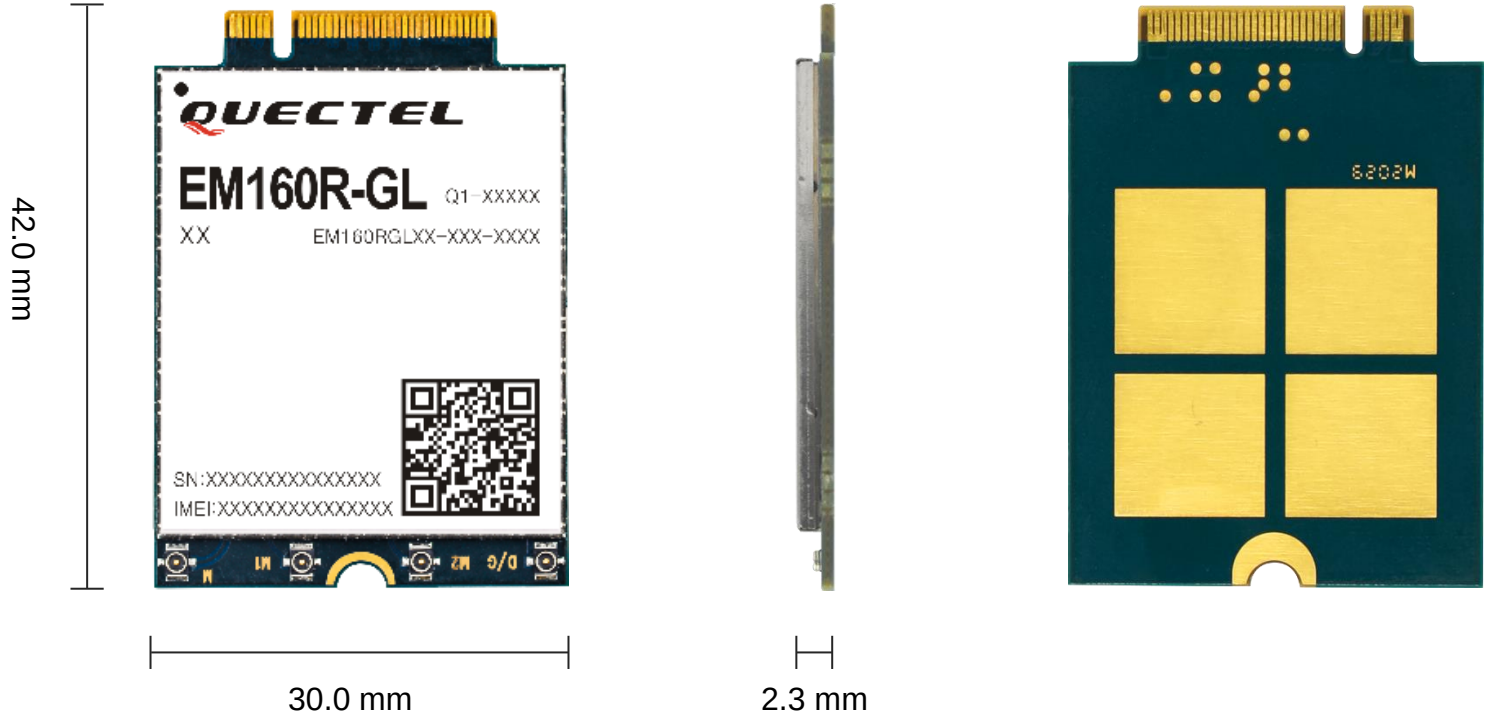


Length: 42.0 mm (±0.15 mm)
Width: 30.0 mm (±0.15 mm)
Height: 2.3 mm (±0.10 mm)
M.2 Package, Key-B

EM12xR-GL refers to EM120R-GL and EM121R-GL

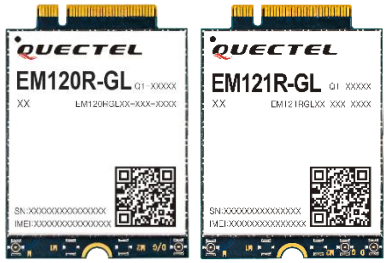
EM160R-GL Mechanical Dimensions

Multi-Mode LTE-A Module (LTE Cat 16)



Length: 42.0 mm (±0.15 mm)
Width: 30.0 mm (±0.15 mm)
Height: 2.3 mm (±0.10 mm)
M.2 Package, Key-B

EM12xR-GL Specifications



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42.0 mm × 30.0 mm × 2.3 mm
LTE Cat 12, 600 Mbps DL/150 Mbps UL

Multi-Mode LTE-A Pro Module

Variant		EM120R-GL	EM121R-GL (Preliminary)
Category		DL/UL: 12 /13	DL/UL: 12 /13
LTE	LTE-FDD	B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/ B32/B66	B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/ B32/B66
	LTE-TDD	B38/B39/B40/B41/B42/B43/B46(LAA)/B48(CBRS)	B38/B39/B40/B41/B42/B43/B46(LAA)/B48(CBRS)
	DL 2CA	Intra-band and Inter-band	Intra-band and Inter-band
	DL 3CA	Intra-band and Inter-band	Intra-band and Inter-band
	DL 256QAM	Supported	Supported
	UL 2CA	Intra-band	Intra-band
	UL 64QAM	Supported	Supported
UMTS	WCDMA	B1/B2/B3/B4/B5/B6/B8/B19	B1/B2/B3/B4/B5/B6/B8/B19
Embedded GNSS		Supported/ L1 (Passive Antenna)	Supported/ L1 + L5 (Active Antenna)
PCIe Interface		Supported	Supported
USB 3.0 Interface		Supported	Supported
eSIM		Supported / Built-in eSIM (optional)	Supported / Built-in eSIM (optional)
Region		Global	Global
Certification		**Carrier:** Vodafone/ British Telecom/ Verizon*/ AT&T/ T-Mobile/ Sprint/ China Mobile/ China Unicom/ NTT DOCOMO/ SoftBank*/ KDDI/ Telstra*/ Swisscom **Regulatory:** GCF/ CE/ FCC/ PTCRB/ IC/ Anatel/ IFETEL/ SRRC/ NAL/ CCC/ KC/ NCC/ JATE/ TELEC/ RCM/ ICASA	**Carrier:** Vodafone*/ British Telecom*/ Verizon*/ AT&T*/ T-Mobile*/ Sprint*/ SoftBank TBD/ Telstra* **Regulatory:** GCF*/ CE*/ FCC*/ PTCRB*/ IC*/ JATE*/ TELEC*/ RCM*

Notes: 1. "": Under development/ In progress.*
2. TBD: To Be Determined

EM160R-GL Specifications

QUECTEL
Build a Smarter World

42.0 mm × 30.0 mm × 2.3 mm
LTE Cat 16, 1.0 Gbps DL/150 Mbps UL

■ Multi-Mode LTE-A Pro Module

Variant		EM160R-GL
Category		DL/UL: 16 /13
LTE	LTE-FDD	B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66
	LTE-TDD	B38/B39/B40/B41/B42/B43/B46(LAA)/B48(CBRS)
	DL 2CA	Intra-band and Inter-band
	DL 3CA	Intra-band and Inter-band
	DL 4CA	Intra-band and Inter-band
	DL 5CA	Intra-band and Inter-band within 4 bands
	DL 4 × 4 MIMO	B1/B2/B3/B4/B7/B25/B30/B32/B66/B38/B39/B40/B41
	DL 256QAM	Supported
	UL 2CA	Intra-band
	UL 64QAM	Supported
UMTS	WCDMA	B1/B2/B3/B4/B5/B6/B8/B19
Embedded GNSS		Supported
PCIe Interface		Supported
USB 3.0 Interface		Supported
eSIM		Supported / Built-in eSIM (optional)
Region		Global
Certification		**Carrier:** Vodafone/ British Telecom/ Verizon/ AT&T/ T-Mobile/ Sprint/ China Mobile/ China Unicom/ NTT DOCOMO/ SoftBank*/ KDDI/ Telstra*/ Swisscom **Regulatory:** GCF/ CE/ FCC/ PTCRB/ IC/ Anatel/ IFETEL/ SRRC/ NAL/ CCC/ KC/ NCC/ JATE/ TELEC/ RCM/ ICASA

Note: "": Under development/ In progress.*

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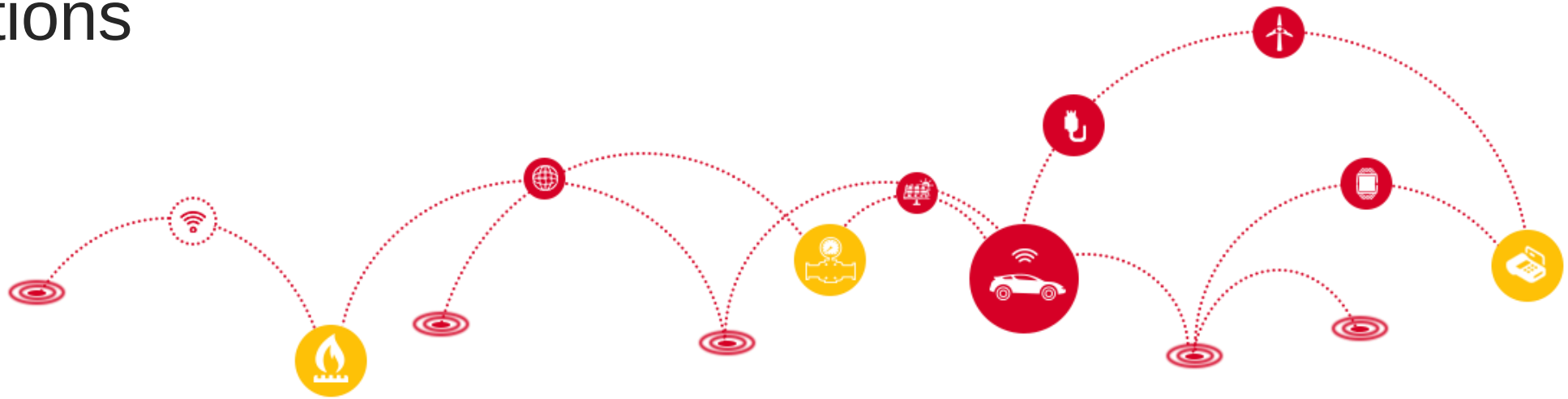

EM120R-GL Timeline (1)

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

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

Vodafone/ British Telecom/ AT&T/ T-Mobile/ Sprint/ China Mobile/ China Unicom/ NTT DOCOMO/ KDDI/ Swisscom — **Completed**

Verizon: Start → Complete (Planned)

Telstra

SoftBank

EM120R-GL Timeline (2)

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

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".

Regulatory Certification

GCF/ CE/ PTCRB/ FCC/ IC/Anatel/ IFETEL/ SRRC/ NAL/ CCC/ KC/ NCC/ JATE/ TELEC/ RCM/ ICASA **Completed**

EM121R-GL Timeline (Preliminary) (1)

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

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

Vodafone	Start	Complete (Planned)
British Telecom		
Verizon		
AT&T		
T-Mobile		
Sprint		
Telstra		
SoftBank	TBD	

Note: TBD: To Be Determined

EM121R-GL Timeline (Preliminary) (2)

2020								2021								
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.
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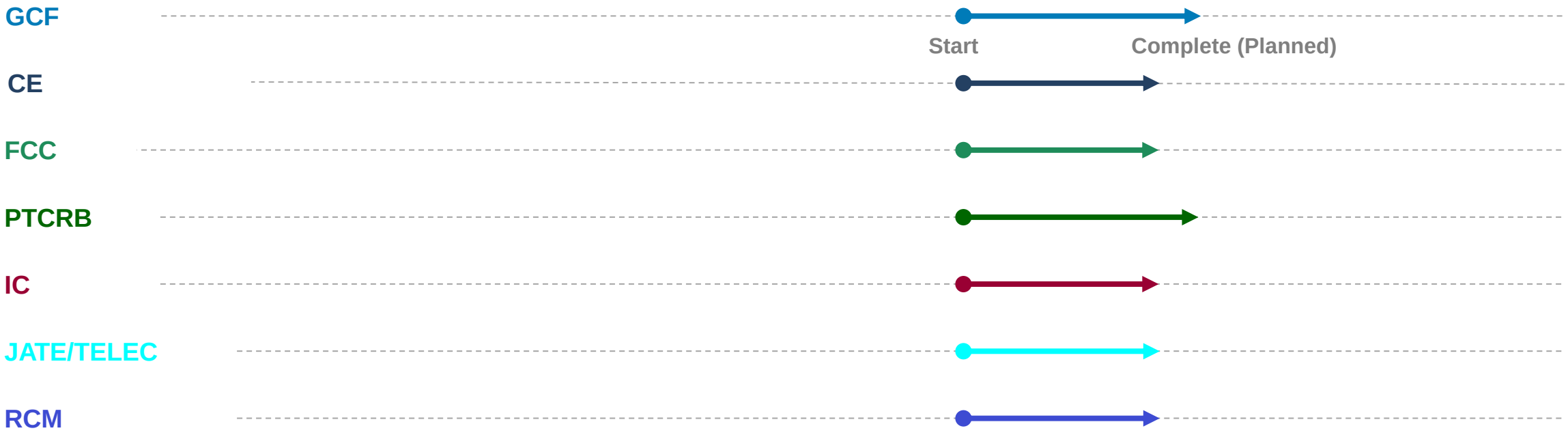
MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Regulatory Certification



EM160R-GL Timeline (1)

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

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

Vodafone/ British Telecom/ AT&T/ T-Mobile/ Sprint/ Verizon/ China Mobile/ China Unicom/ NTT DOCOMO/ KDDI/ Swisscom — **Completed**

Telstra — Start → Complete (Planned)

SoftBank — Start → Complete (Planned)

EM160R-GL Timeline (2)

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

Project Schedule

ES — CS — MP

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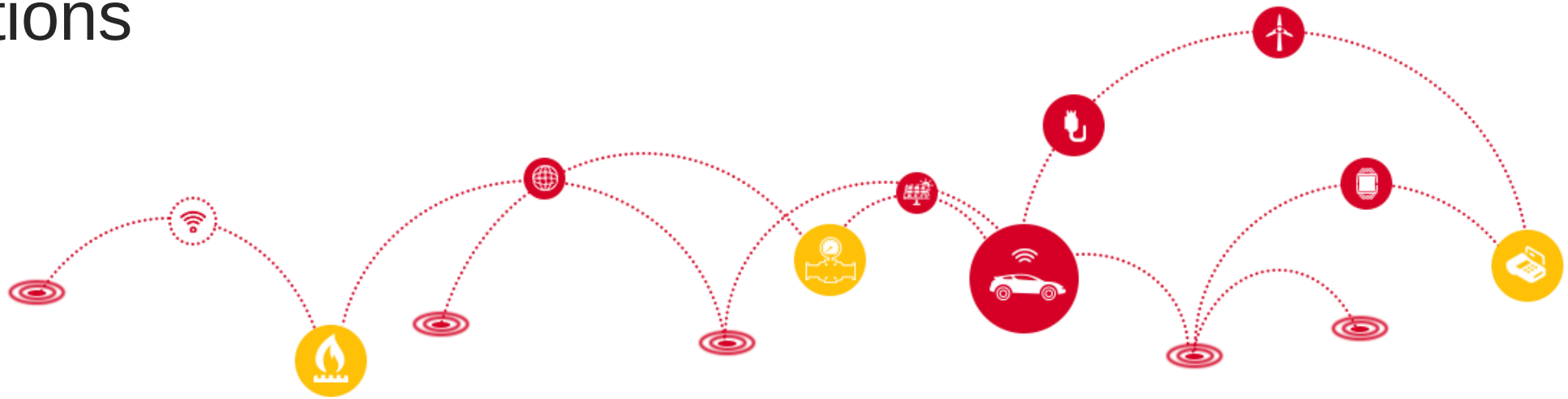
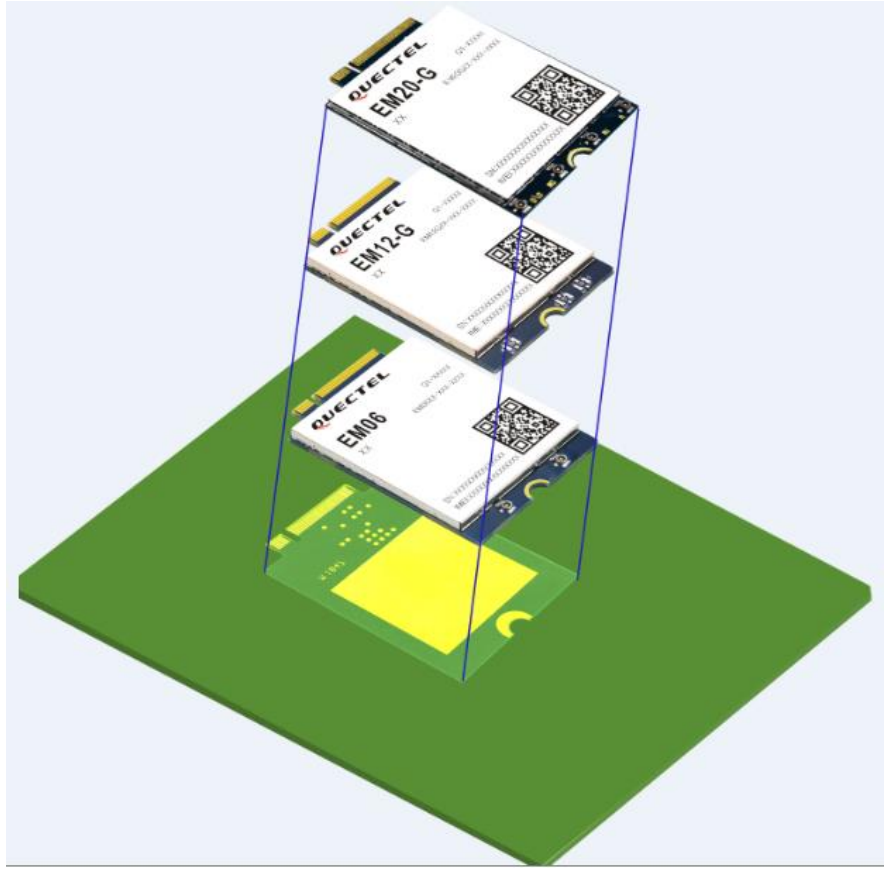


M.2 Series Footprint Compatibility

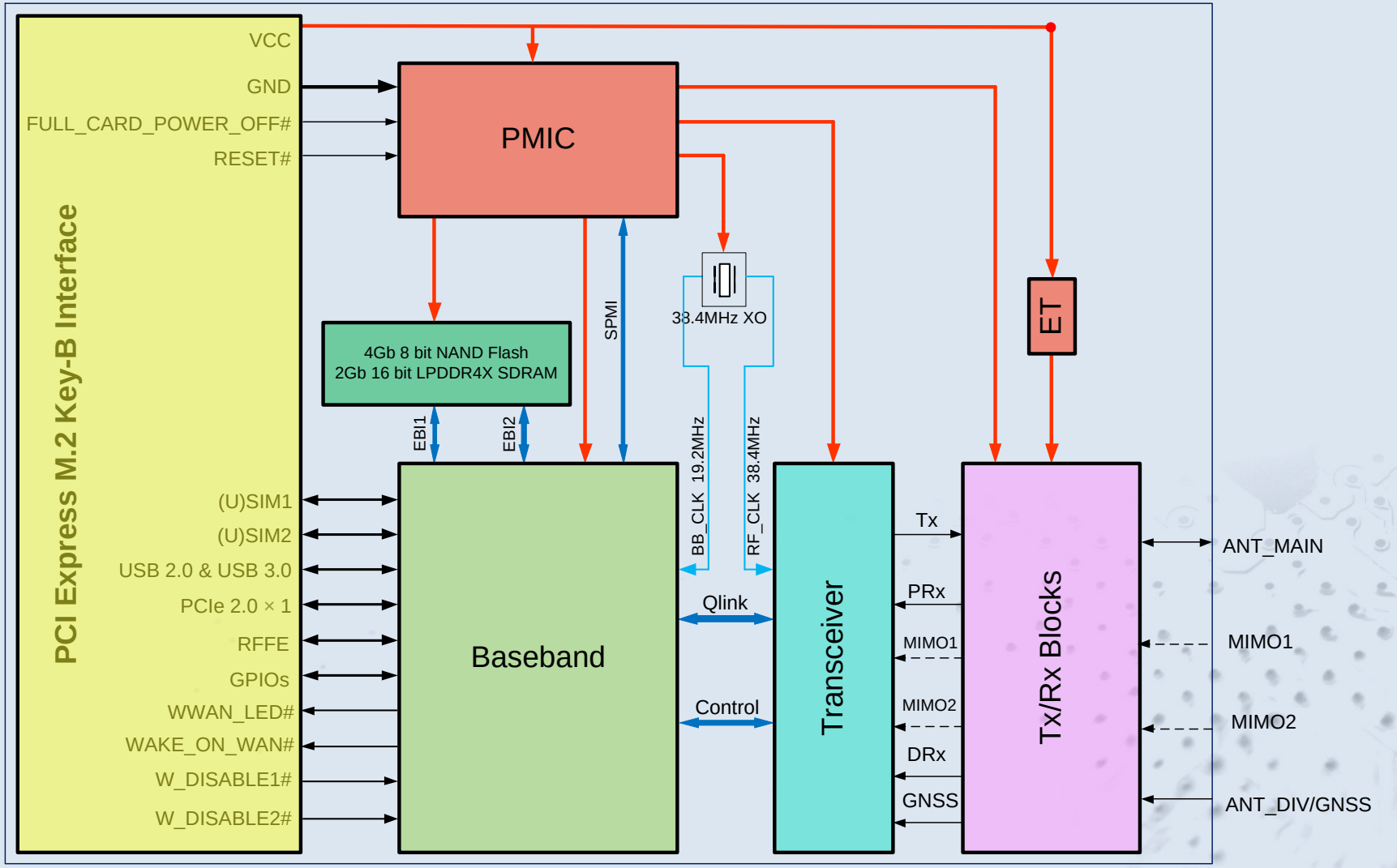
Quectel EM120R-GL/EM160R-GL module is compatible with the following LTE-A modules:

- Quectel LTE Cat 6 EM06 series modules
- Quectel LTE Cat 12 EM12-G module



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

Hardware Block Diagram



1. *The block diagram is for reference only and varies among different modules.*
2. *MIMO1 and MIMO2 antennas are only applicable to the EM160R-GL module.*

Software Advantages

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 & NDIS & MBIM & GobiNet & QMI_WWAN Drivers

- 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/10.x
- NDIS Driver:
  Windows 7/8/8.1/10
- MBIM Driver:
  Windows 10, Linux 3.18~5.4
- GobiNet Driver:
  Linux 2.6~5.4
- QMI_WWAN Driver:
  Linux 3.4~5.4

Quality Guarantee

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

Abundant Protocols

QMI/ MBIM/ NITZ/ PING/ HTTP/ HTTPS

Flexible Applications

- eCall*
- (U)SIM card detection

Special Features

- Over Temperature & Voltage Protection
- ESD Protection

Notes: "": Under development/ In progress.*

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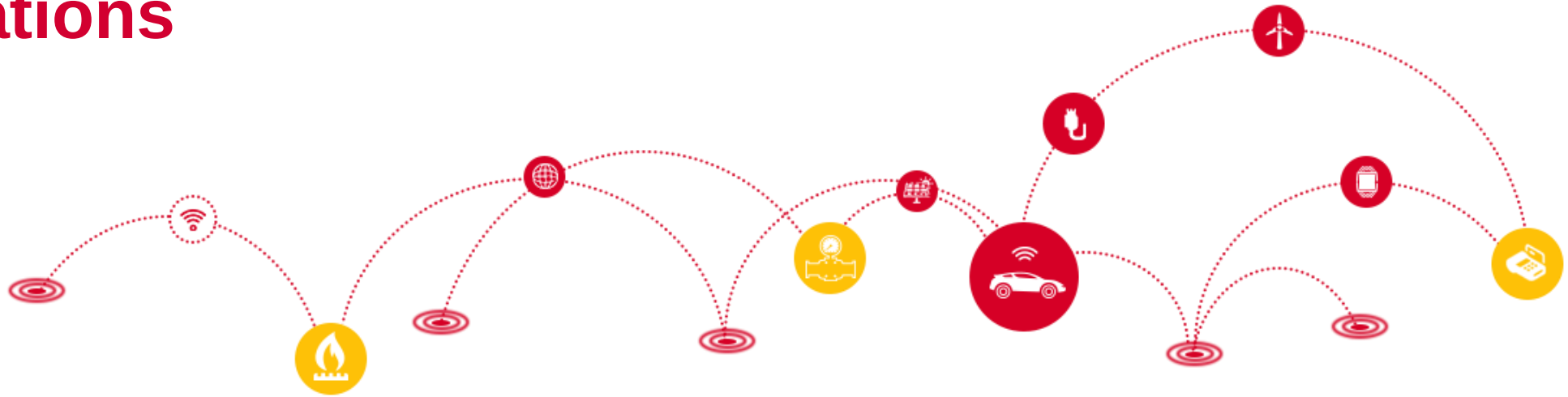
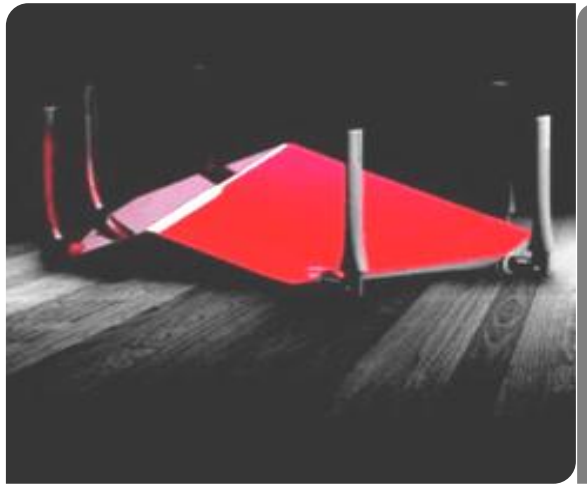


Target Applications

Router

Surveillance

Gateway



Set-top Box

Target Applications

Fixed Wireless Wideband Services

- Home/Enterprise Gateways
- Consumer/Industrial Routers
- CPE
- DTU
- VoIP
- Servers
- Portable MiFi

Mobile Wideband Devices

- Consumer Laptops
- Industrial Laptops
- Notebooks/Tablets
- High-Definition Live Broadcast
- AR/VR
- Delivery Drones

Industrial Automation

- Robots
- AGV
- Industrial Energy
- Edge Computers
- Vehicle-Mounted Terminals

Thank you!

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