

# Quectel Wireless Solutions

## Antenna Design and Service

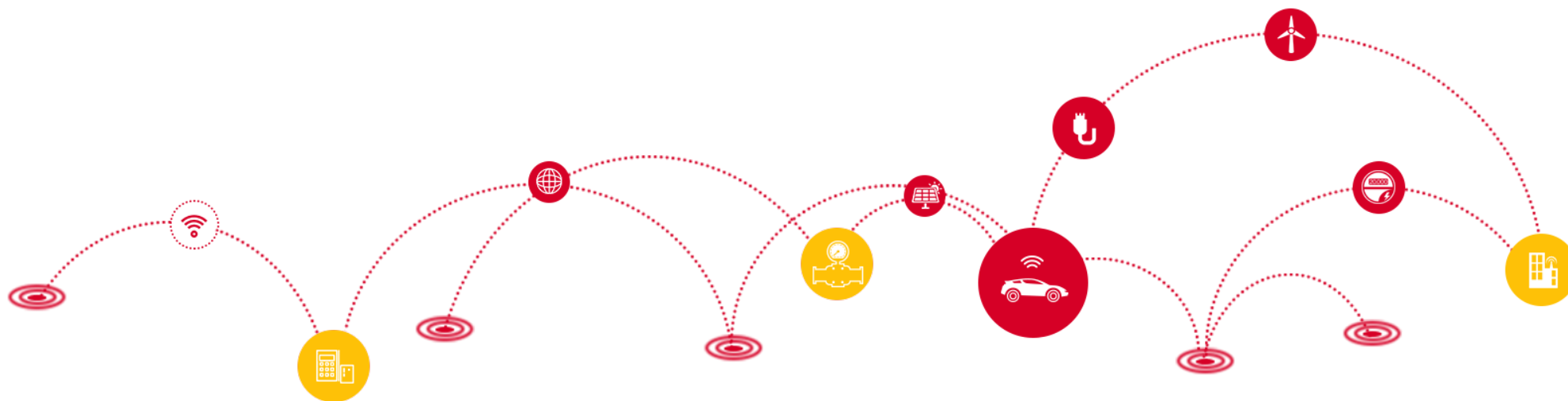
January, 2020

# Quectel Antenna Services

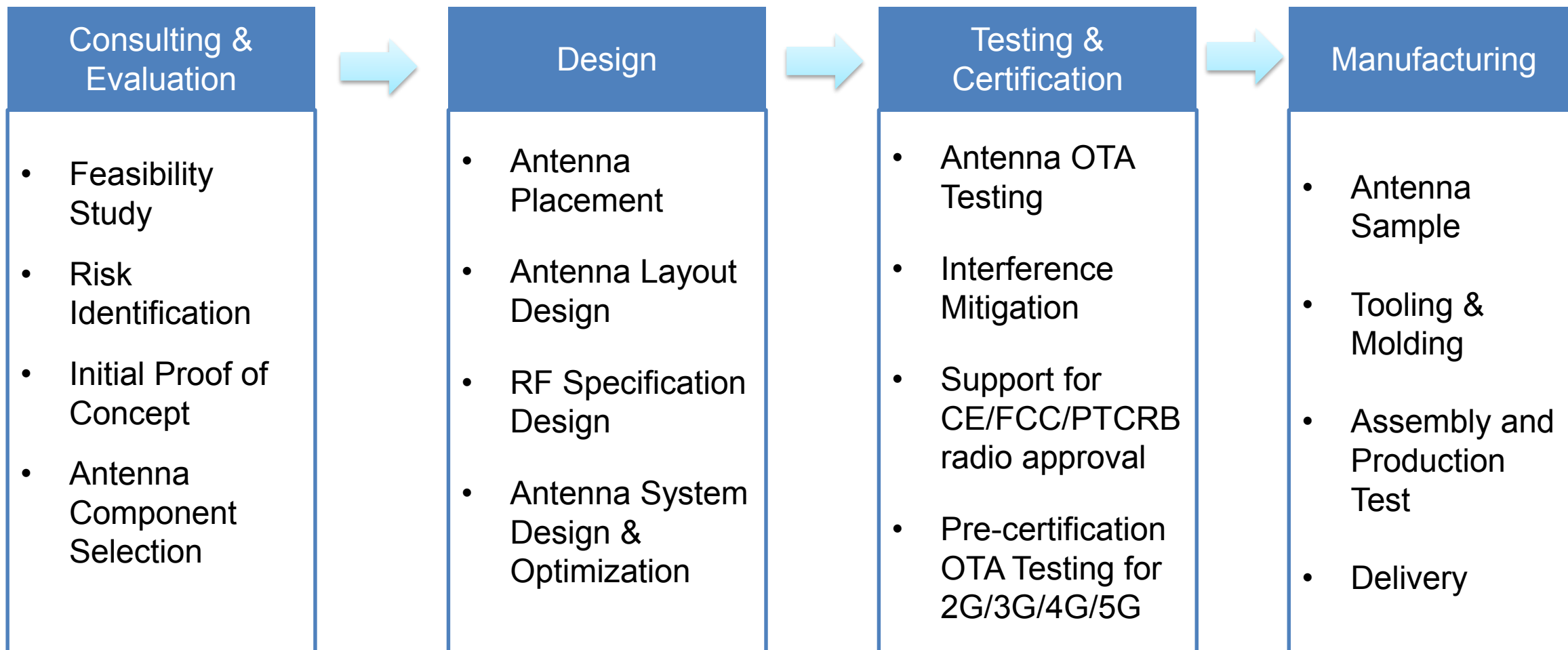
Antenna Technologies

Antenna Solutions

Quectel Advantages

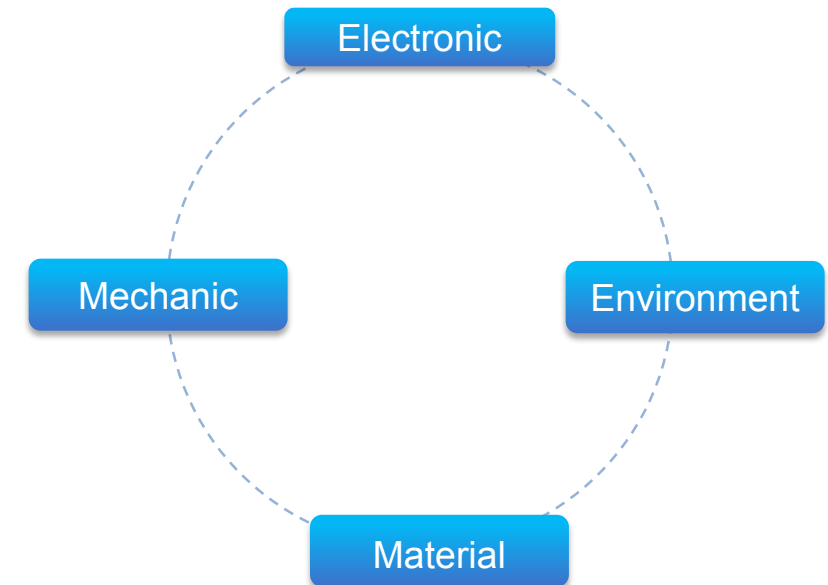
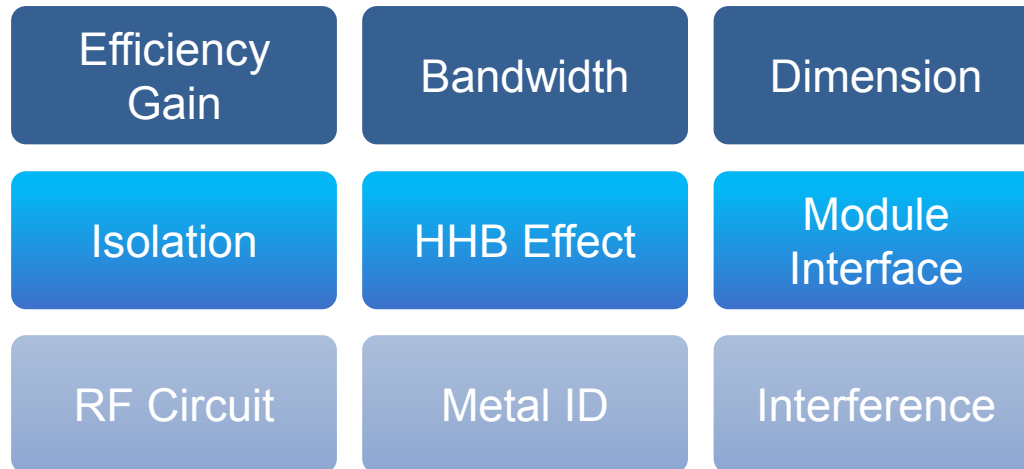


Work with customers' team through the entire product cycle, from a concept to production



# Quectel Antenna Services

It should be evaluated comprehensively for the antenna placement.

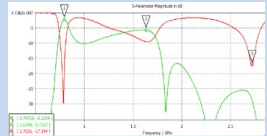
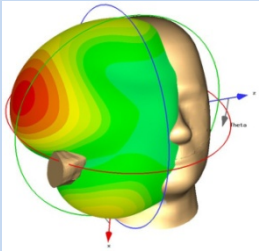


## **Strongly Recommend:**

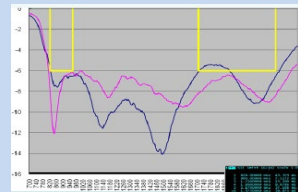
Invite Quectel or antenna vendor to join in the design from the beginning of the project.

# Quectel Antenna Services – Conception to MP

## Evaluation



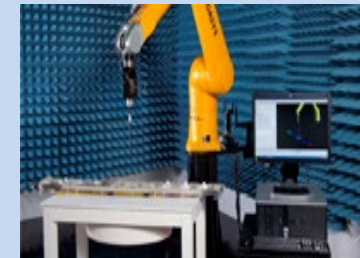
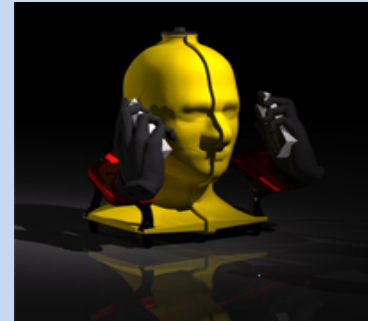
## Initial Mockup



## Layout Design



## OTA Performance Test & Optimization



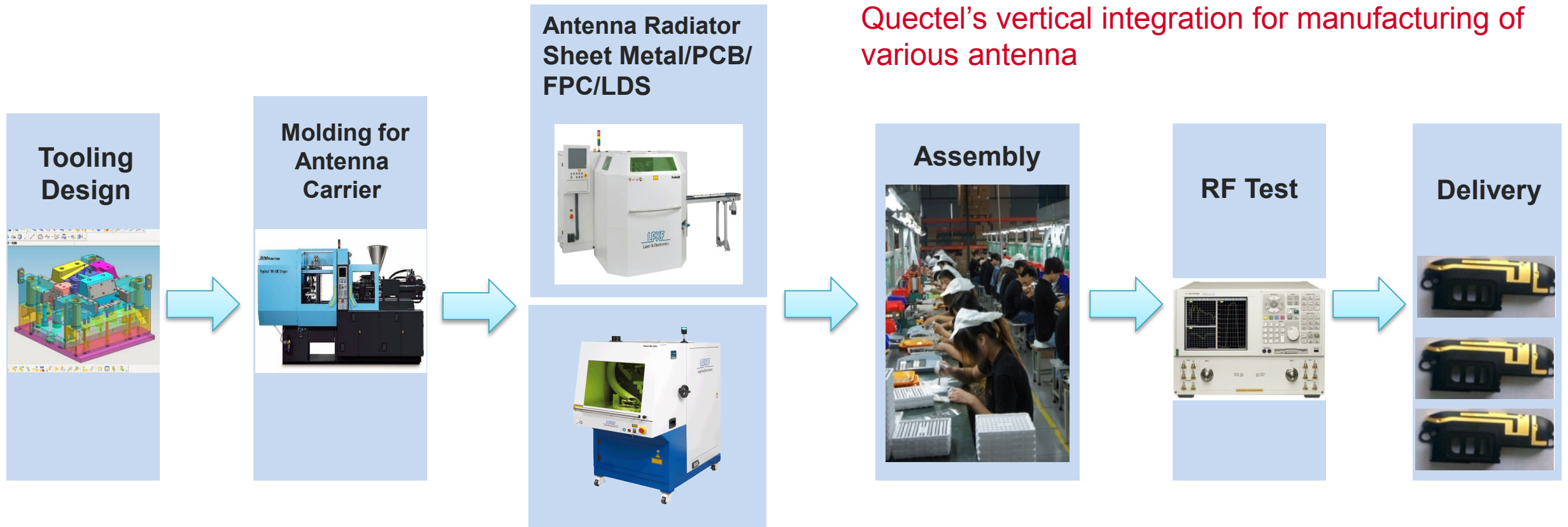
Quectel participates in the design from conceptual phase to mass production.

## Sample Confirmation



## Mass Production

# Quectel Antenna Services – Vertical Integration

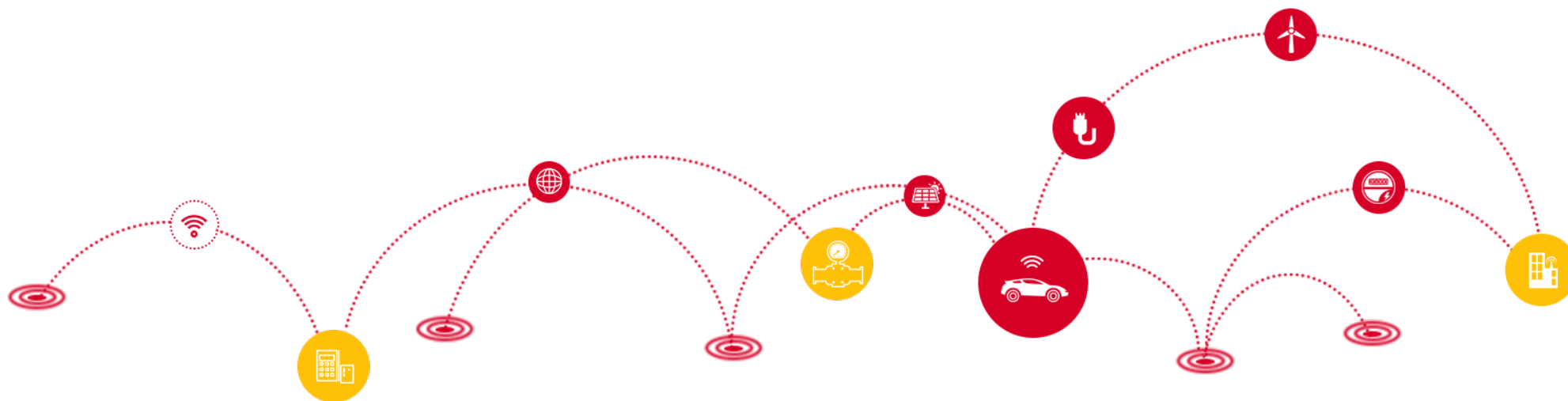


# Quectel Antenna Services

## **Antenna Technologies**

### Antenna Solutions

### Quectel Advantages



# Antenna Technologies – Standard Antennas



4G/5G



4G/5G



GNSS



4G Antenna Box



5G Antenna Box



# Antenna Technologies – Customized Antennas



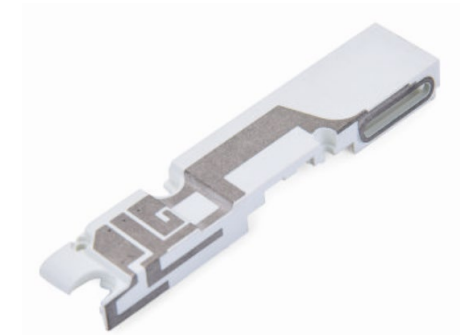
Sheet Metal



FPC



PCB

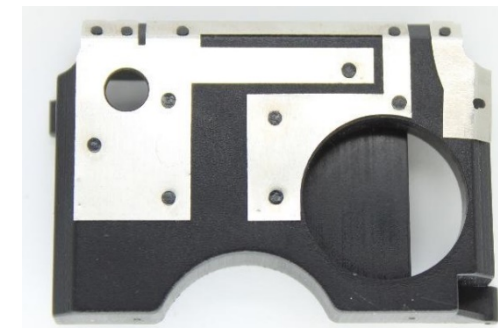


LDS

# Antenna Technologies – Customized Antenna Technologies

## Sheet Metal

- Traditional antenna manufacturing technology
- The most cost-effective way for simple pattern antennas in mass production
- Possible to be integrated with spring contacts
- Limitation in design:
  - Layout complexity limited
  - Double-curved pattern design limited
- Higher tooling cost than that of FPC and LDS
- Sample manufacturing cycle time in 7 days



# Antenna Technologies – Customized Antenna Technologies

## FPC (Flexible Printed Circuit)

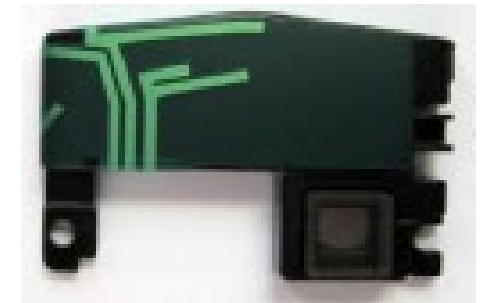
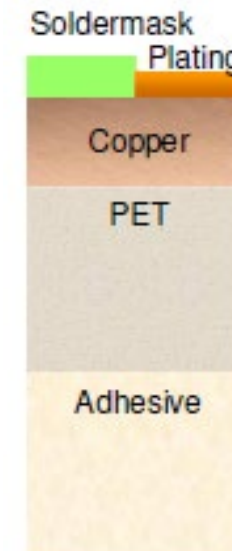
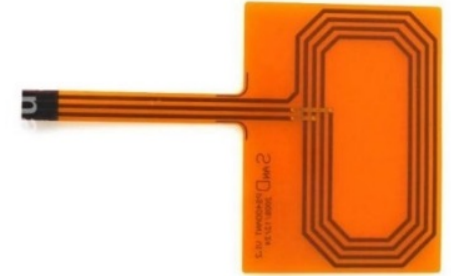
- The prevailing antenna manufacturing technology on the market

High yield with low deviation

- The most effective way for antennas with complex layout
- High design flexibility but double-curved surface is not possible

SMT component integration possible

- Cost between that of Sheet Metal and LDS
- Sample manufacturing cycle time in 7 days



# Antenna Technologies – Customized Antenna Technologies

## LDS (Laser Direct Structuring)

- The most capable 3D antenna manufacturing technology on the market

- Design flexibility guaranteed

- Double-curved surface

Antenna volume and RF performance improved

- Conformal geometric with chassis

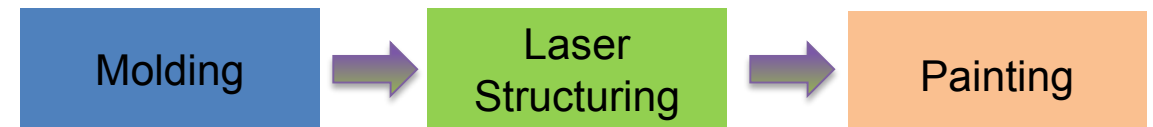
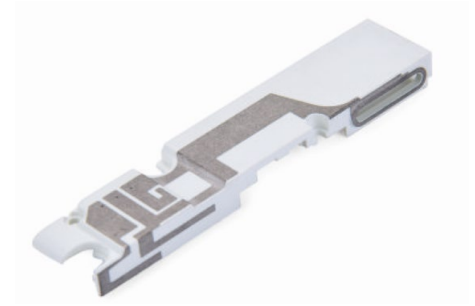
Lower assembly cost

Lower customer-specific tooling costs

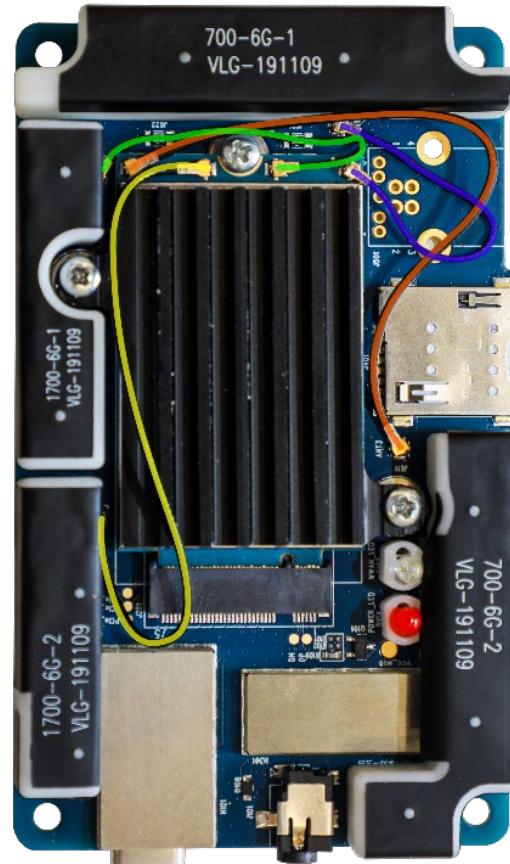
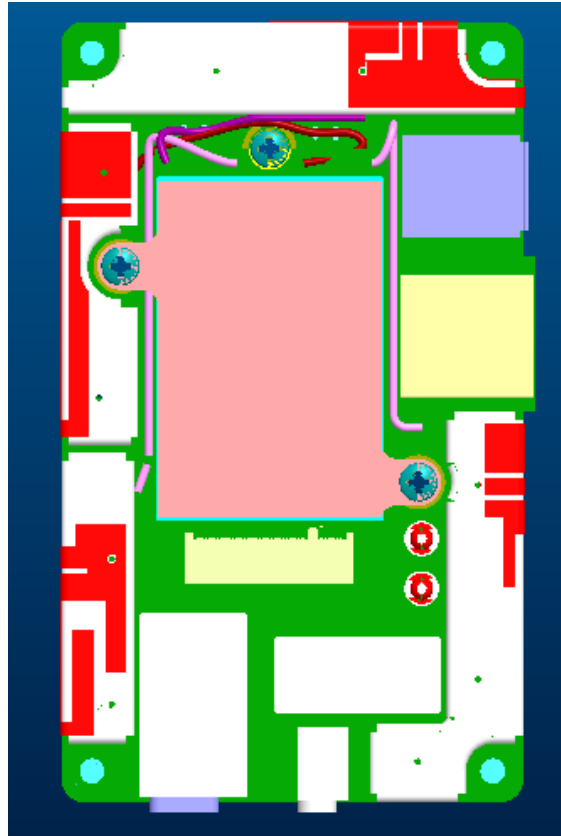
- Higher yield

- More expensive than FPC and Sheet Metal

- Sample manufacturing cycle time in 12 days



# Antenna Technologies – Customized Antenna Technologies



Dimension: 120mm x 60mm x 8mm

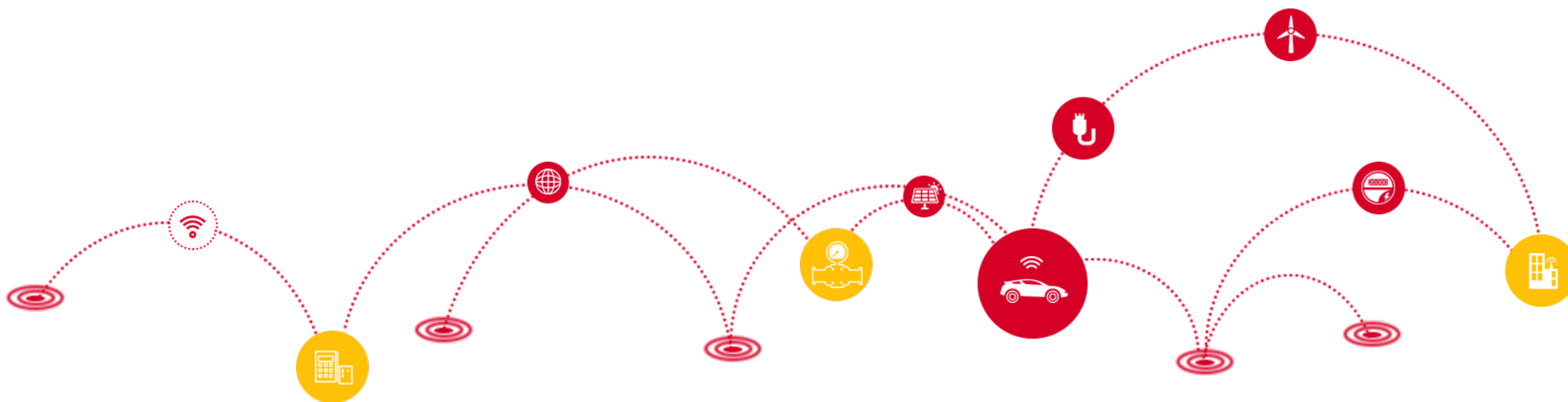
5G Dongle  
Compact Antenna Design

# Quectel Antenna Services

## Antenna Technologies

## **Antenna Solutions**

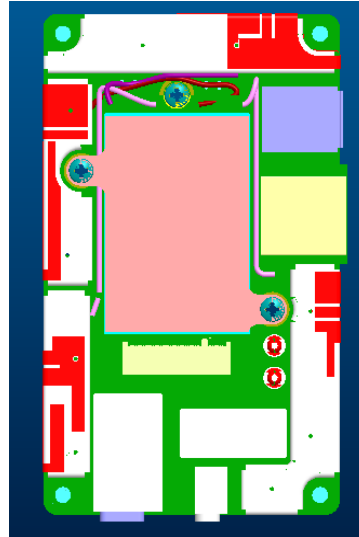
## Quectel Advantages



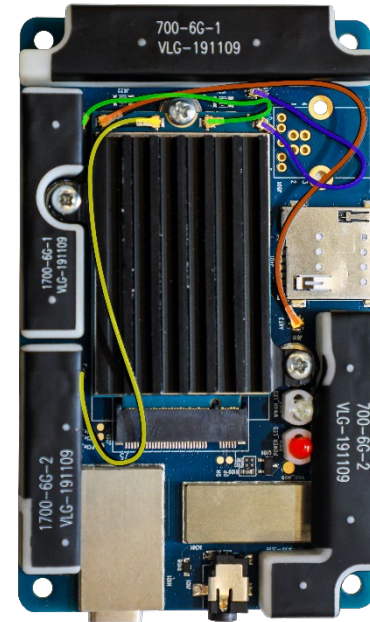
# Antenna Solutions – 4G/5G Solutions



External Sub-6GHz Antenna



Internal Sub-6GHz Antenna



mmWave Antenna Module



mmWave LCP Antenna

# Antenna Solutions – 4G/5G Solutions

## Antenna Catalogue 1

Type	Part Number	Size	Frequency	VSWR	Average Efficiency	Gain (dBi)	Application
Rubber Duck Antenna	QT0027201039	222 x 27 mm	699~6000 MHz	≤3.0	699~960 MHz: 50% 1710~2690 MHz: 50% 3000~5900 MHz: 50%	5.6 (Peak)	5G/4G/3G/2G
Rubber Duck Antenna	12Q001H	177 x 19 mm	699~2690 MHz	≤2.9	699~960 MHz: 50% 1710~2690 MHz: 60%	8.7 (Peak)	4G/3G/2G
Rubber Duck Antenna	12C001D	190 x 16 mm	699~2690 MHz	≤4	699~960 MHz: 35% 1710~2690 MHz: 45%	3.2 (Peak)	4G/3G/2G
Rubber Duck Antenna	1Y001C	208 x 14 mm	699~2690 MHz	≤4	699~960 MHz: 40% 1710~2690 MHz: 60%	4.9 (Peak)	4G/3G/2G
Rubber Duck Antenna	5Q004D	115 x 17.8 mm	699~2690 MHz	≤4	699~960 MHz: 35% 1710~2690 MHz: 70%	5.9 (Peak)	4G/3G/2G



# Antenna Solutions – 4G/5G Solutions

## Antenna Catalogue 2

Type	Part Number	Size	Frequency	VSWR	Average Efficiency	Gain (dBi)	Application
PCB Antenna	TBD	108 x 16 mm	600~5000 MHz	≤4	699~960 MHz: 40% 1700~5000 MHz: 50%	3.9 (Peak)	5G/4G/3G/2G
PCB Antenna	TBD	95 x 16 mm	1100~5000 MHz	≤4	1100~5000 MHz: 50%	4.5 (Peak)	5G, GNSS
PCB Antenna	TBD	73 x 16 mm	2500~5000 MHz	≤4	2500~5000 MHz: 50%	4.6 (Peak)	5G
FPC Antenna	TBD	83.94 x 50.98 mm	LTE: 824~2690 MHz Wi-Fi: 2412~2484 MHz 5150~5850 MHz	≤6.1	800~960 MHz: 21% 1700~2700 MHz: 55% 2400~2500 MHz: 45% 5000~6000 MHz: 42%	5.1 (Peak)	4G/3G/2G, 2.4G/5.8G Wi-Fi
FPC Antenna	1	60.10 x 12.25 mm	0.7~6 GHz	≥1.4	0.7~6GHz: 35%	2.7 (Peak)	5G/4G/3G/2G
	2	50.25 x 20.10 mm	0.7~6 GHz	≥1.0	0.7~6GHz: 30%	4.2 (Peak)	
	3	41.25 x 10.25 mm	1.7~6 GHz	≥1.0	1.7~6GHz: 30%	2.0 (Peak)	
	4	37.35 x 9.75 mm	1.7~6 GHz	≥1.26	1.7~6GHz: 35%	3.7 (Peak)	

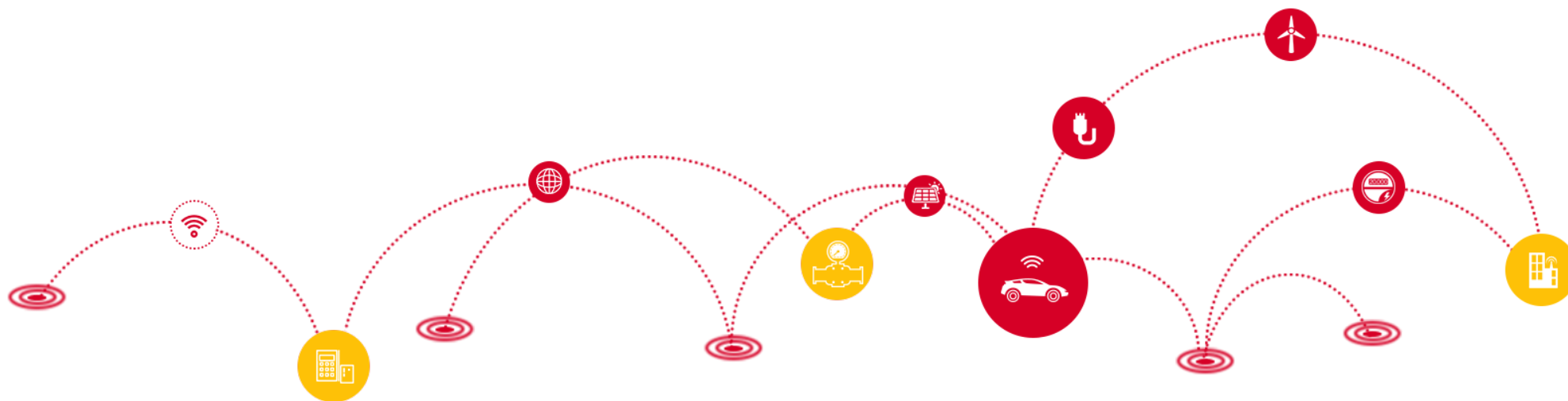
Quectel will develop more than 50 types of standard antennas in 2020

# Quectel Antenna Services

## Antenna Technologies

## Antenna Solutions

## **Quectel Advantages**



# Advantages of Quectel Antenna Solution



- Quectel provides solutions for the entire wireless system (module, RF path and antenna).
- Antenna solutions are customized for Quectel modules.
- Quectel ensures all components interact and integrate within tolerances of the final antenna product.

# Thank you!

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