

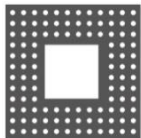


# Production Test of cm and mmWave devices

Xcerra Corporation

Salland Symposium & Opening

September 2018



**Semiconductor Test**  
most comprehensive  
test solutions for the  
semiconductor industry



**Electronic Interconnects**  
enabling products for the electronic  
industry: spring probes and  
compliant connectors



**PCB/PCBA Test**  
state-of-the-art solutions  
for test of bare boards and  
test of loaded boards

# Xcerra - Solutions of Four Leading Brands



**Leading supplier of Bare Board  
PCB Test Solutions**



**PCB Test**



**Established electronic  
interconnects leader and global  
supplier for PCBA test fixtures**



**Interconnect & PCBA Fixtures**



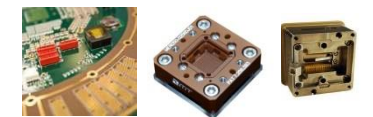
**Global provider of focused, cost-  
optimized ATE solutions**



**Semiconductor ATE**



**Most comprehensive provider of  
handling and interface solutions  
for semiconductor test**



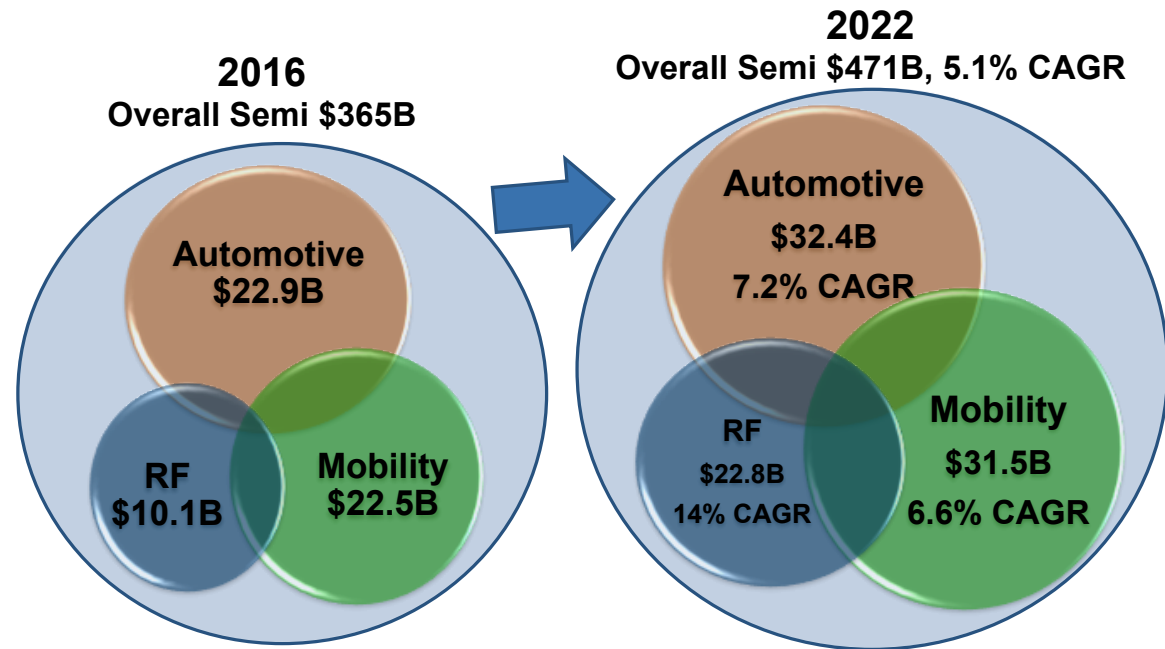
**Semiconductor Test Interface  
Products**



**Semiconductor Test Handlers**

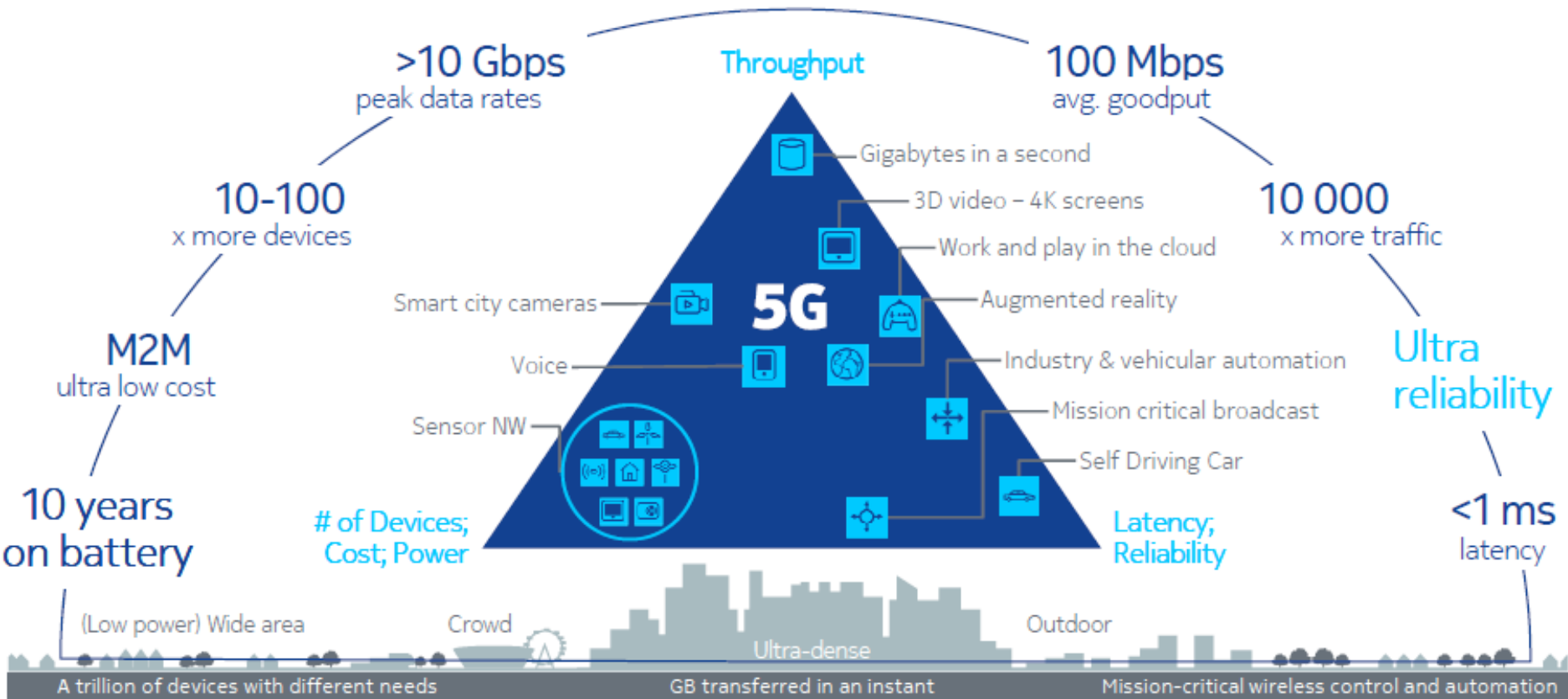
# Growth Markets

- Automotive - ADAS
- Cellular Communication – 5G
- IoT



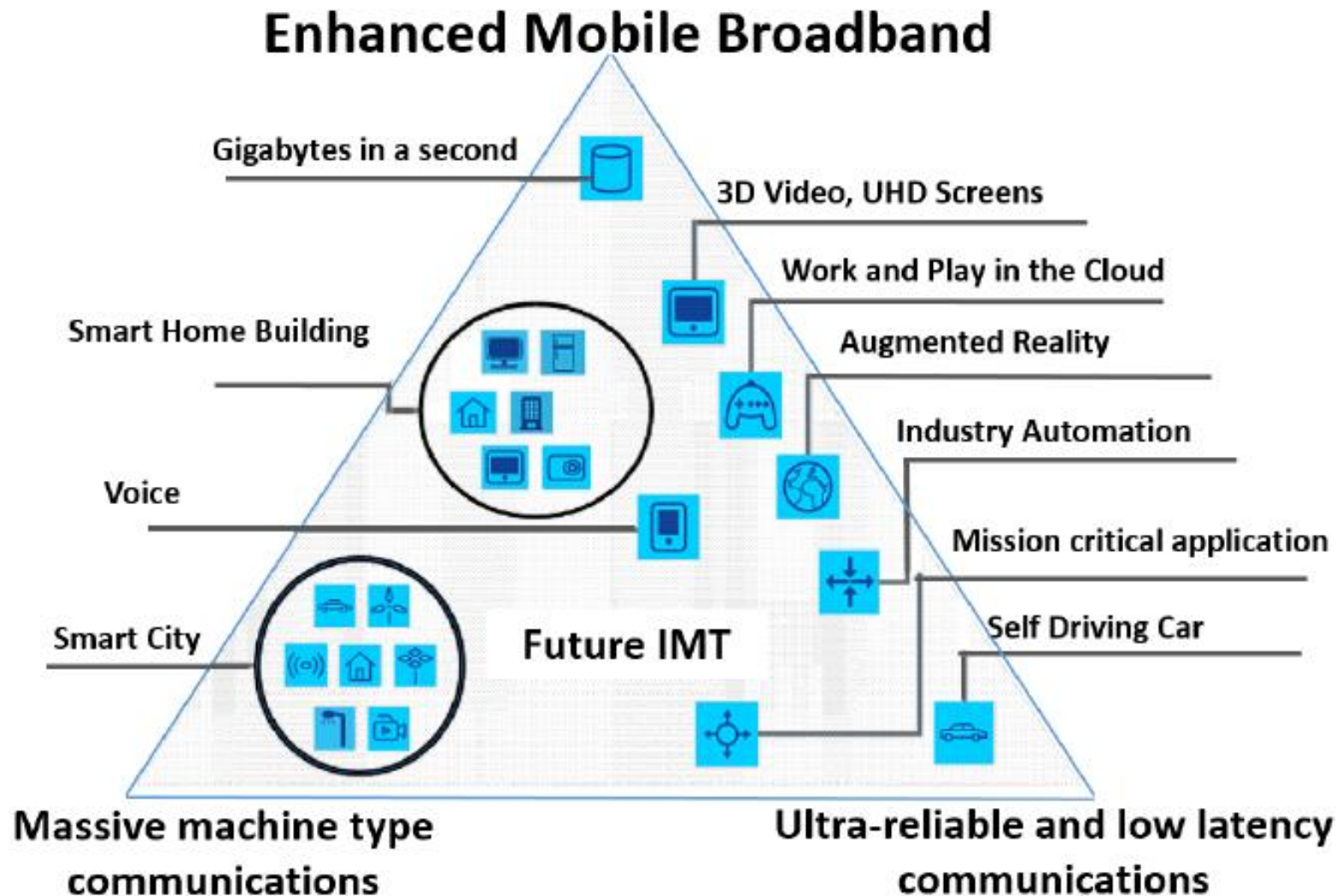
***RF Component Market Growth Strongest Over Next 5 Years  
Automotive + WLCSP Markets Already Large with Healthy CAGRs***

# 5G Capability Goals

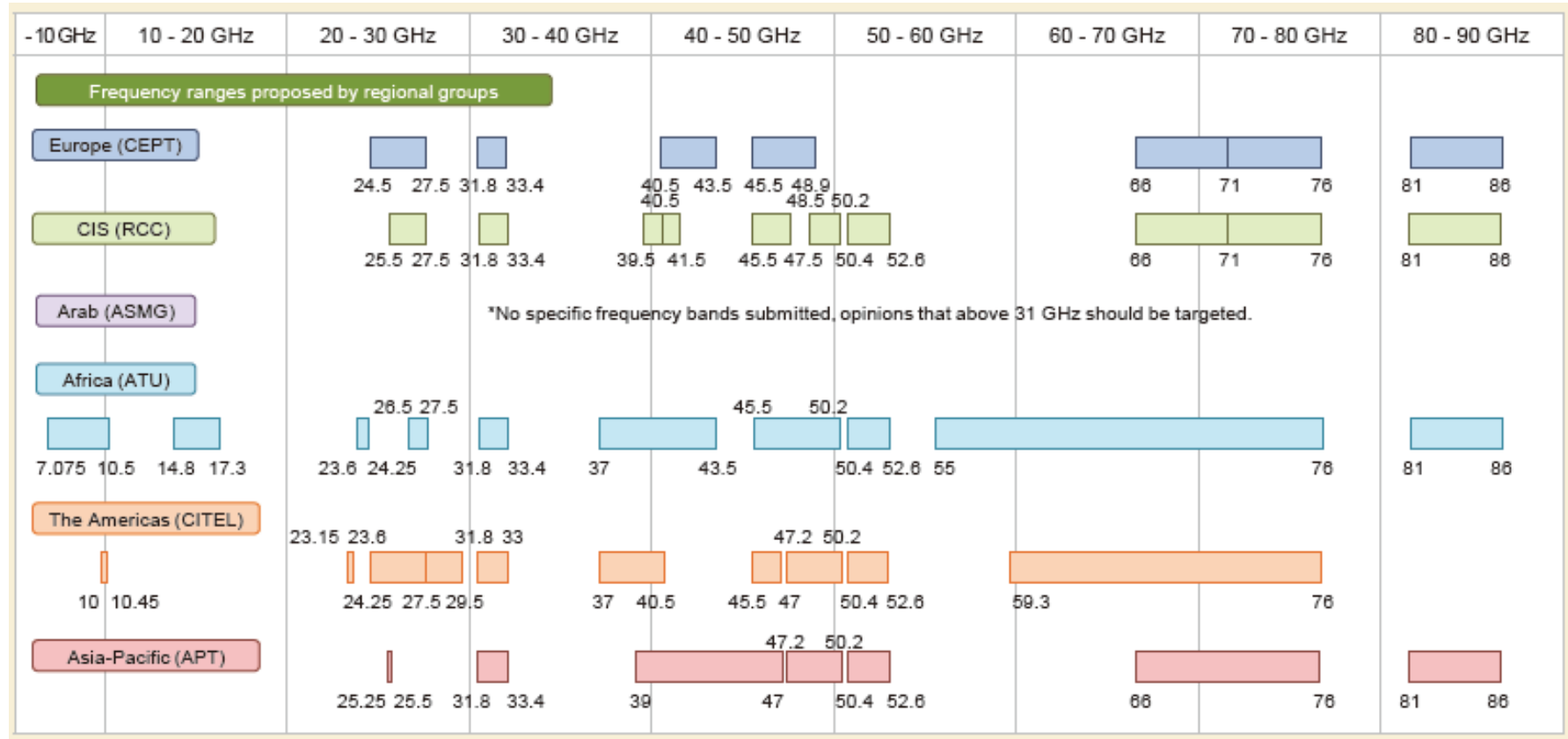
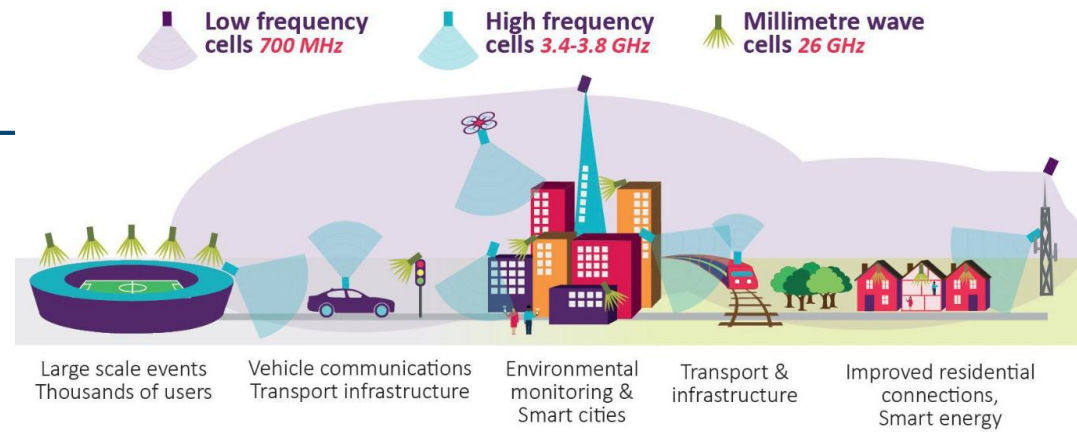


Source: 5G Day at MIT Wireless Center, May 8, 2015

# 5G Use Cases



# 5G Frequencies



# ADAS Use Cases

Vehicle-to-infrastructure (V2I)

e.g. traffic signal timing / priority



Vehicle-to-network (V2N)

e.g. real-time traffic / routing, cloud services



Vehicle-to-vehicle (V2V)

e.g. collision avoidance safety systems



Vehicle-to-pedestrian (V2P)

e.g. safety alerts to pedestrians, bicyclists

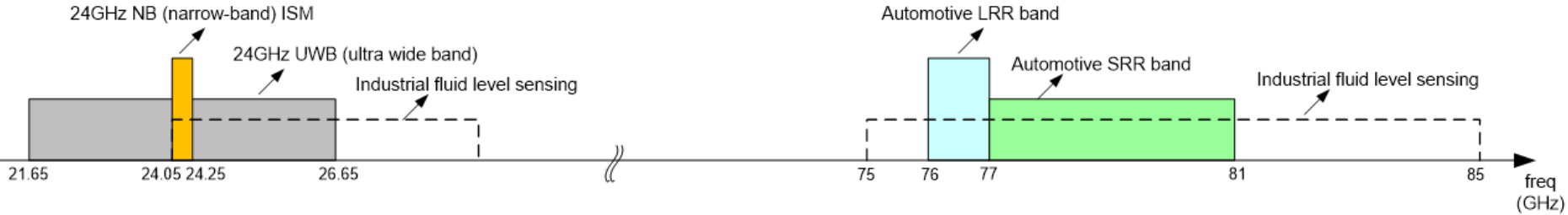


Picture courtesy of Qualcomm

[WWW.5GAA.ORG](http://WWW.5GAA.ORG)

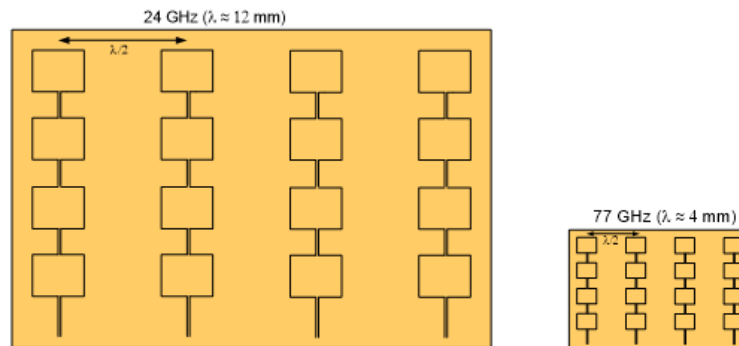
Source: 5G V2X, The automotive use-case for 5G. Dino Flores, 5GAA General Director (Qualcomm Technologies Inc.)

# ADAS Car Radar Frequencies



## – From 24GHz to 77GHz

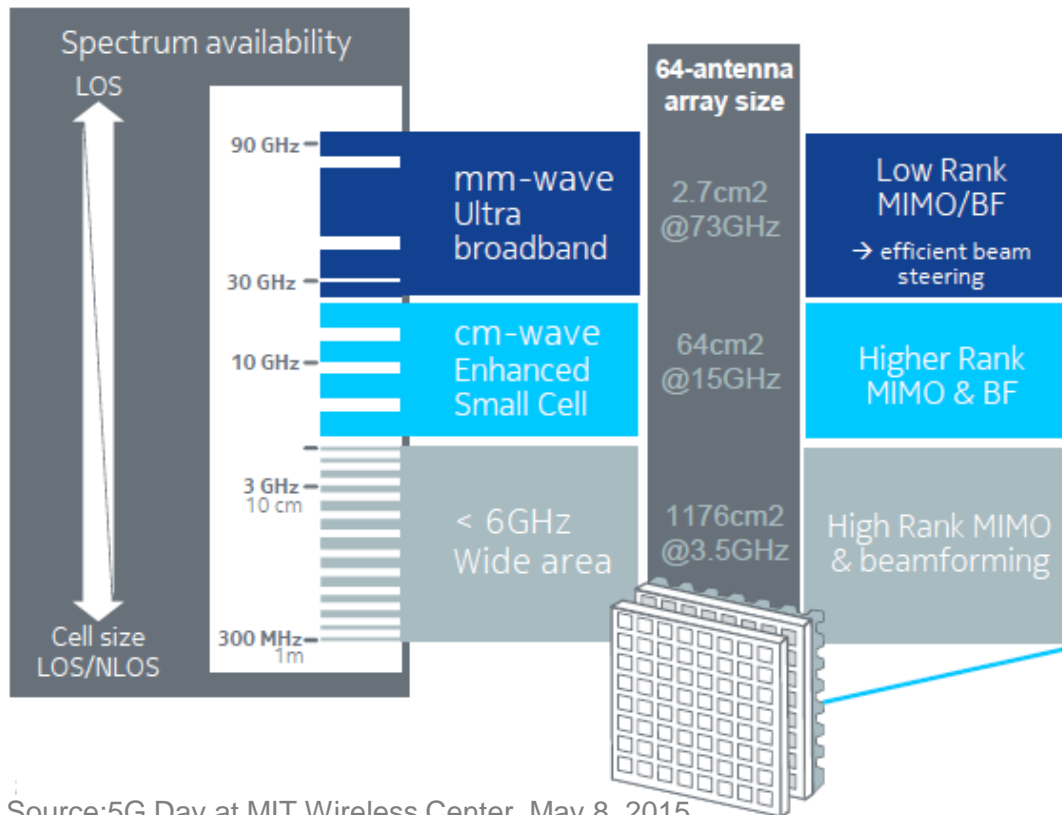
- Available bandwidth provided by authorities
- 20x Improved resolution/accuracy in distance measurements
- Velocity measurements improve 3x
- Smaller antennas





# More Antennas and smaller Antenna Geometries

MIMO and massive MIMO will be core technologies in 5G



In mm-wave bands, most of the spatial dimensions from large antenna arrays will be used to overcome pathloss rather than to provide higher data rates  
High data rates will be the result of the large bandwidths available at these bands

Hybrid /RF(digital & analog) beamforming architecture can be used to reduce the transmitter cost and energy consumption when using massive number of antennas

IC technologies suitable for various frequencies is an active area of research together with our suppliers and academic partners



Source:5G Day at MIT Wireless Center, May 8, 2015

# Impact on Backend Operations

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## – Test Equipment

- Instrumentation to cover cm and mmWave applications

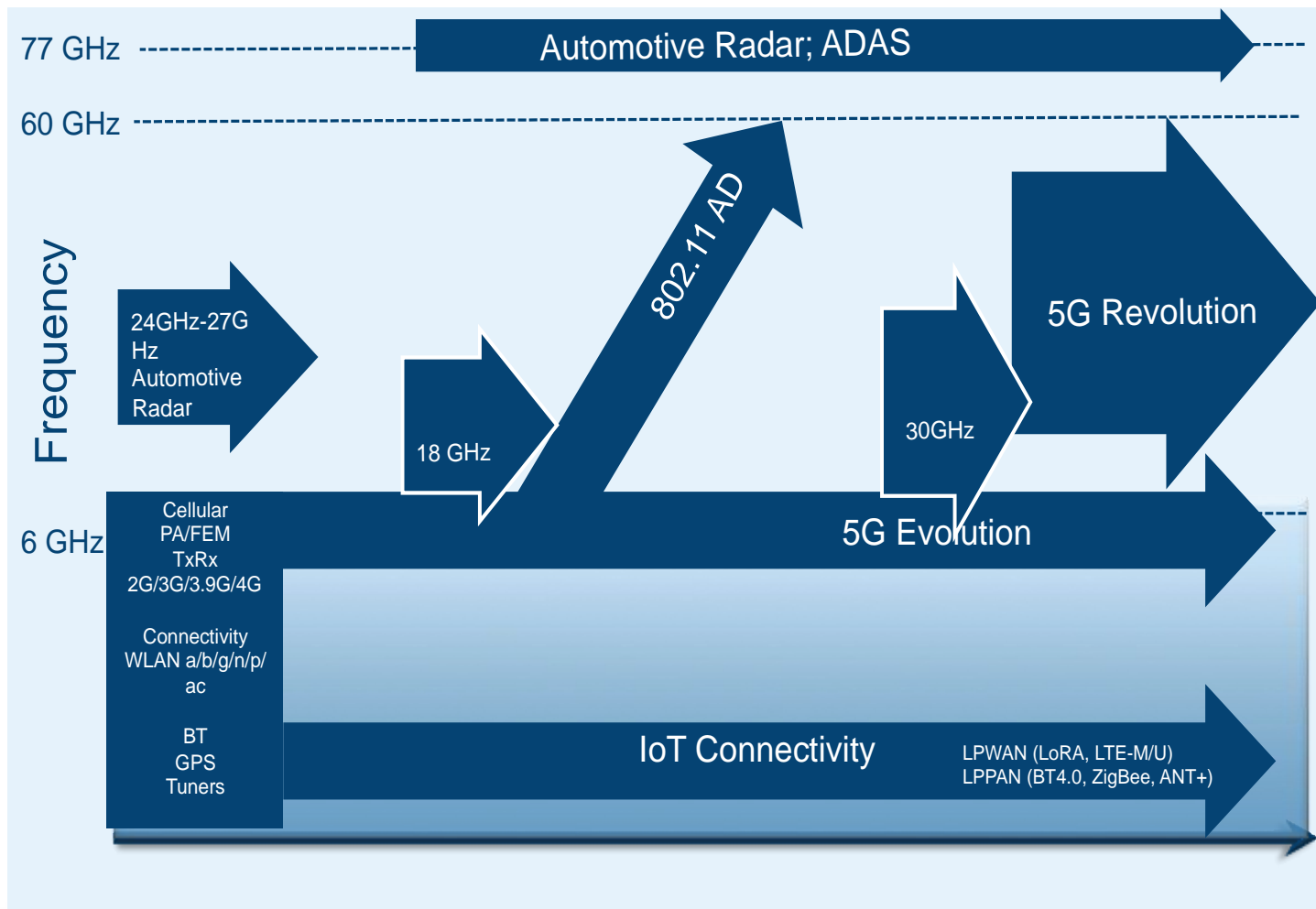
## – Contactors

- High insertion count – Lifecycle
- Broadband solution up to 100GHz
- Integration of baluns, loop paths, termination..

## – Handlers

- Support waveguide return path for top emitting embedded antennas

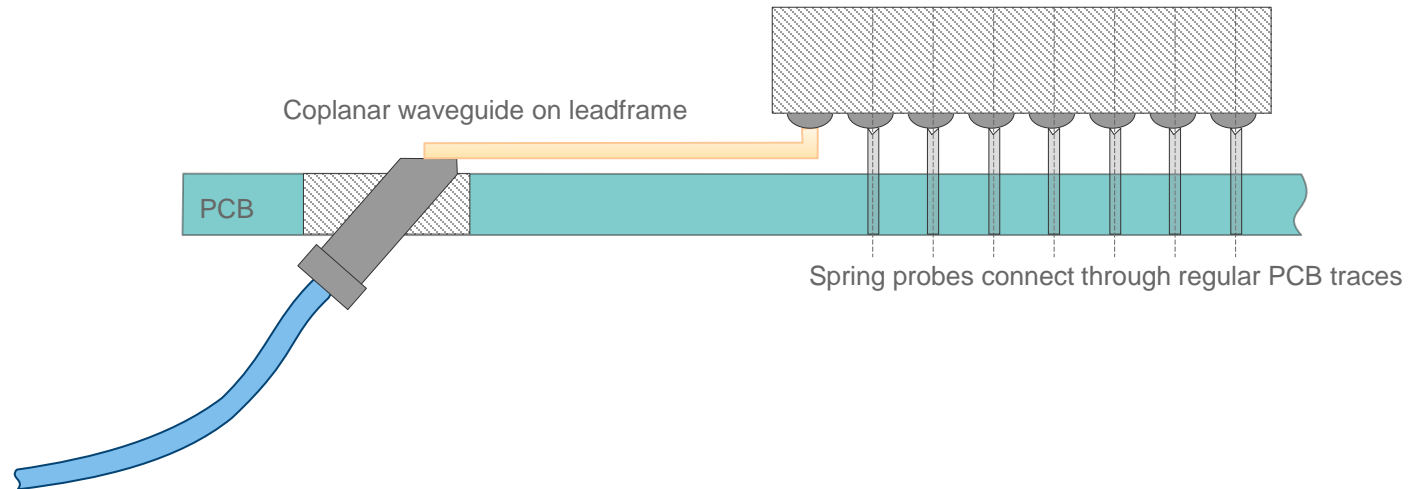
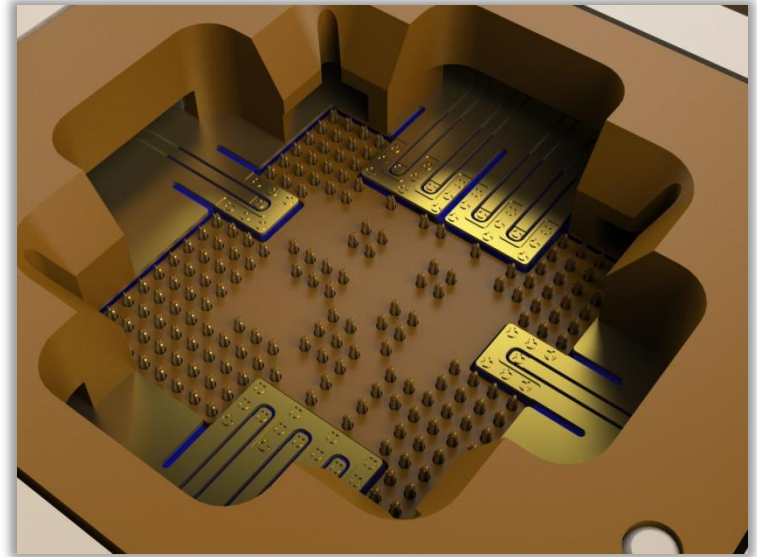
# Tester - Diamond<sub>x</sub>



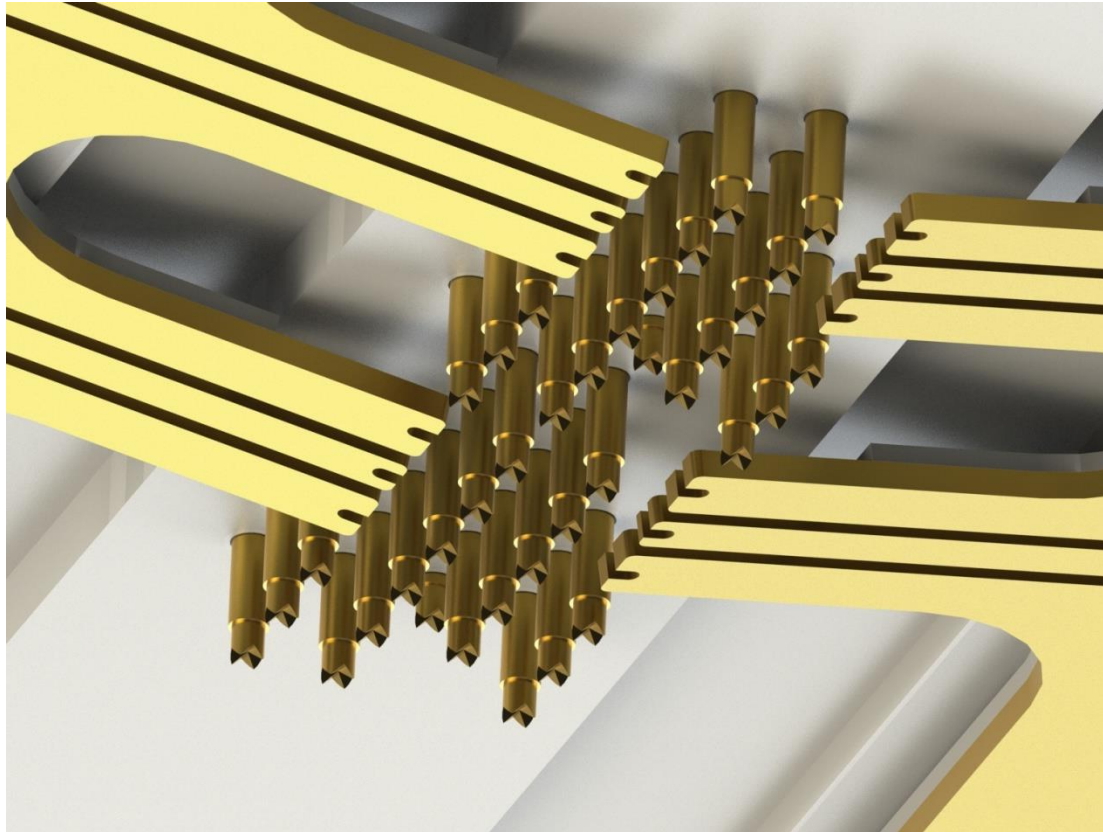
# Contactor - xWave

## Minimized number of connection interfaces

- Best signal quality
- Highly reliable and robust
- Best suited for production environments
- Patent # 9842793
- Additional Patents Pending



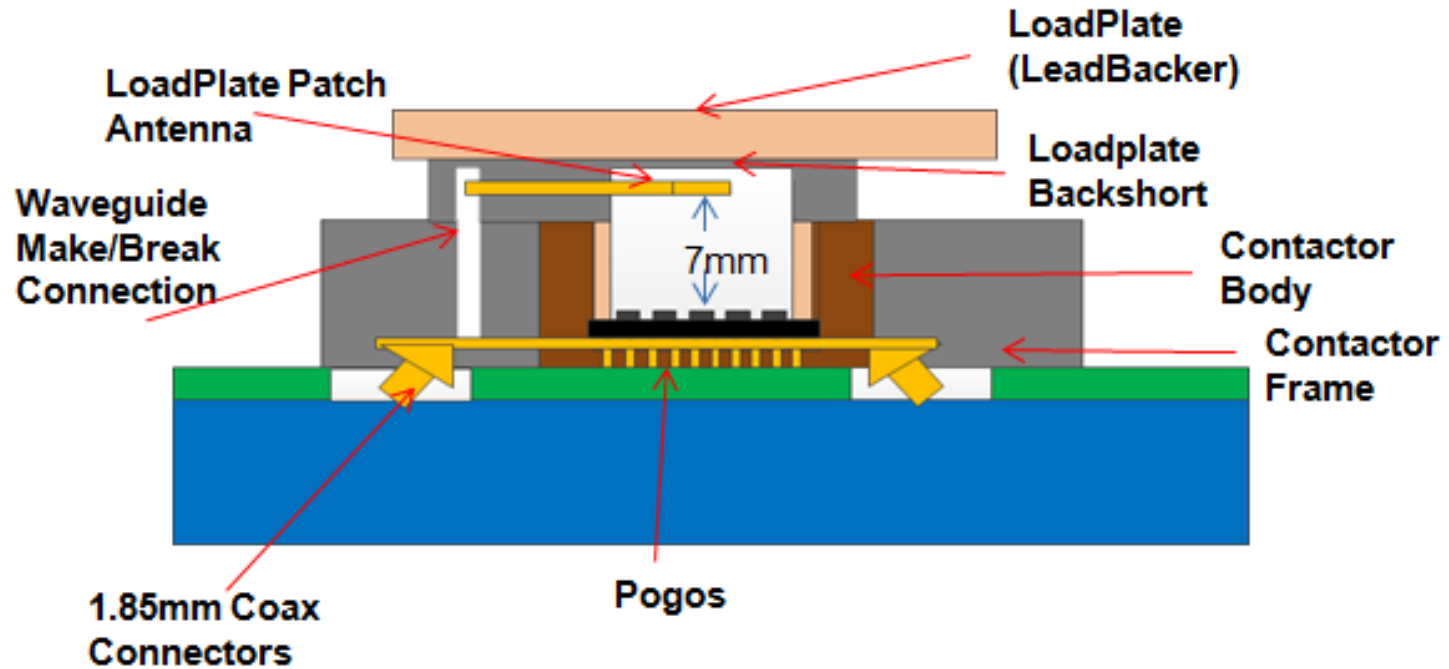
# Contactor - xWave



*Wafer level probe solution up to 100GHz and pitches down to 100um*

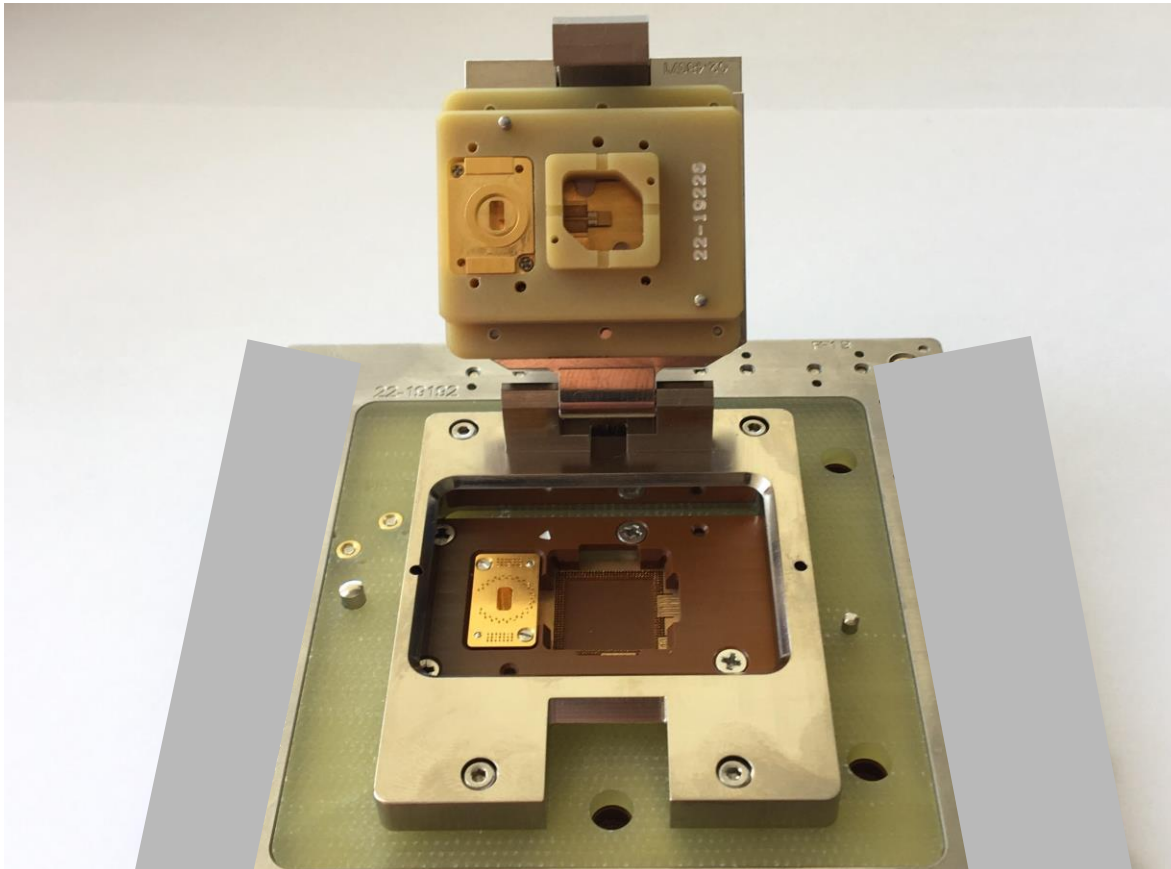
- Shortest signal path from die to tester bypassing PCB*
- Same core technology used for package test on handler*
- Field replaceable spring probes, leadframes, connectors/waveguides*

# Handler : Pick& Place



MT2168 P&P Handler's leadbacker is part of the return path for a top emitted OTA signal

# Handler : Pick& Place



OTA is actively running in volume production at a European IDM

# Summary

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## – Main growth markets

- Diffuse market boundaries
- Both IoT and ADAS applications use 5G infrastructure

## – Production equipment

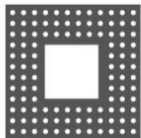
- Diffuse boundaries – Handler/Contactor/Tester are an integral part of the cm and mm wave test solution
- Contactors and test instrumentation both define test quality
- Embedded antennas require handling equipment to offer part of the signal conduit





**Thank you**

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