



# lmt

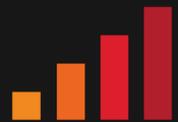


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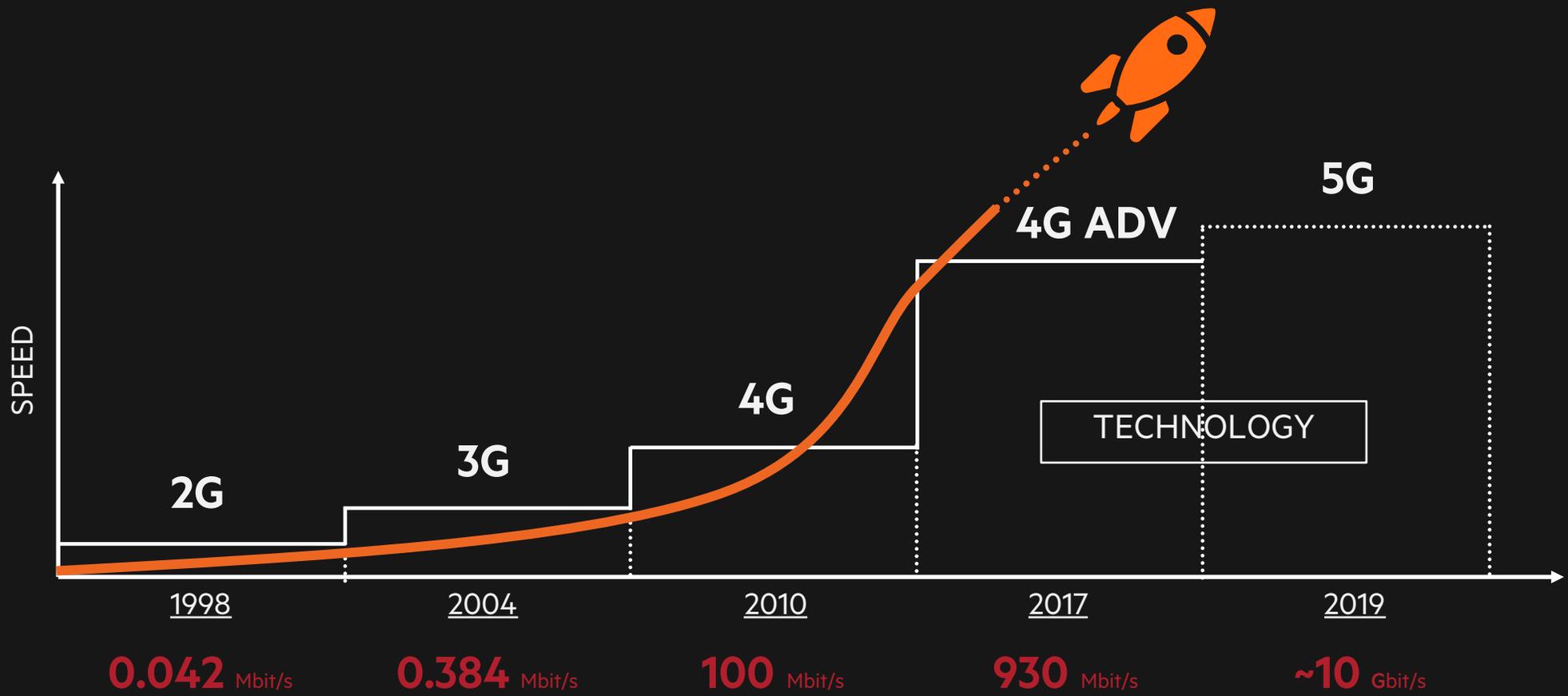
## 5G LAUNCH

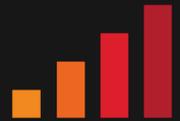
### Myths and demyths

Aigars Benders  
*LMT Technical Director*



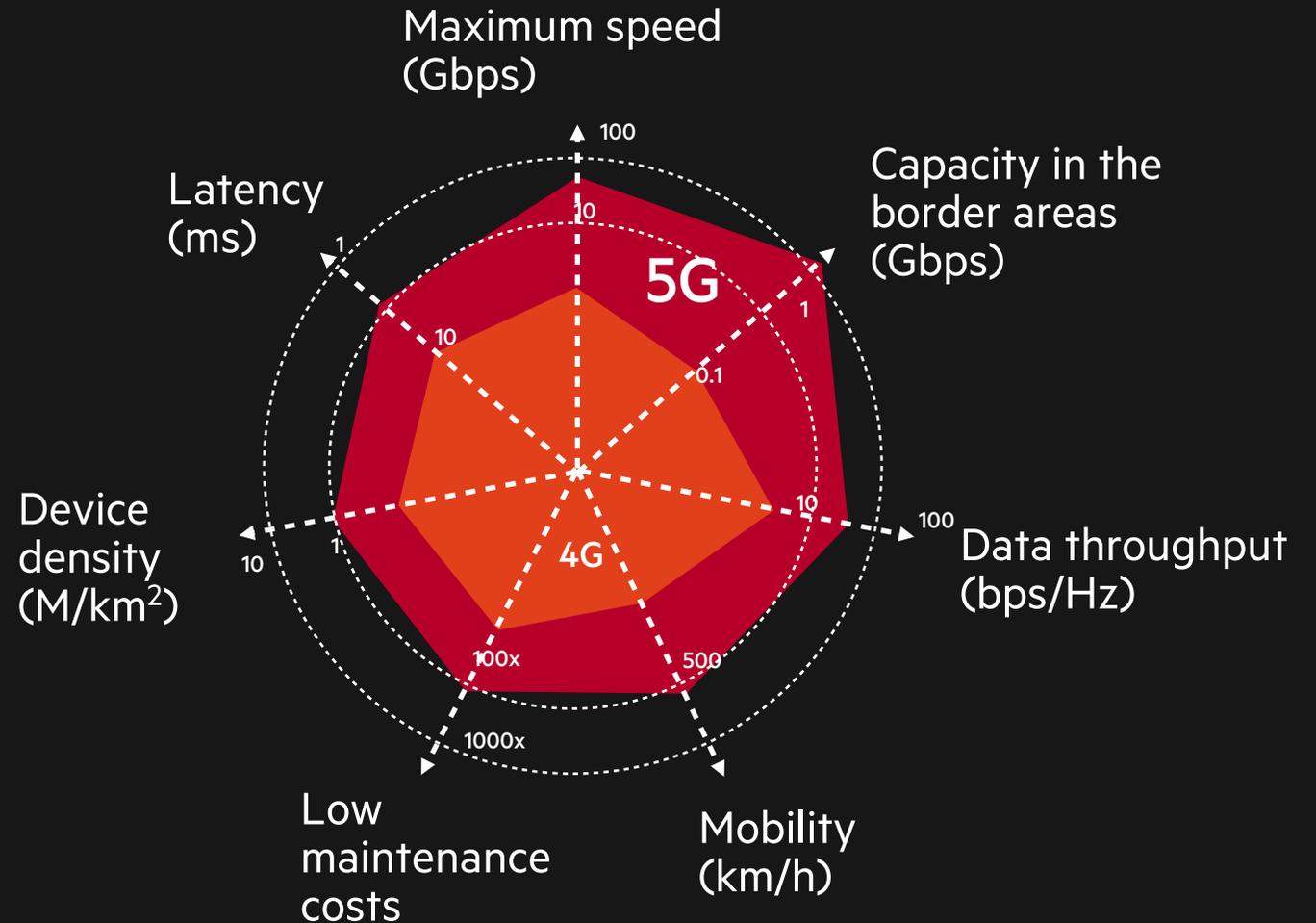
# GENERATIONS OF MOBILE COMMUNICATIONS



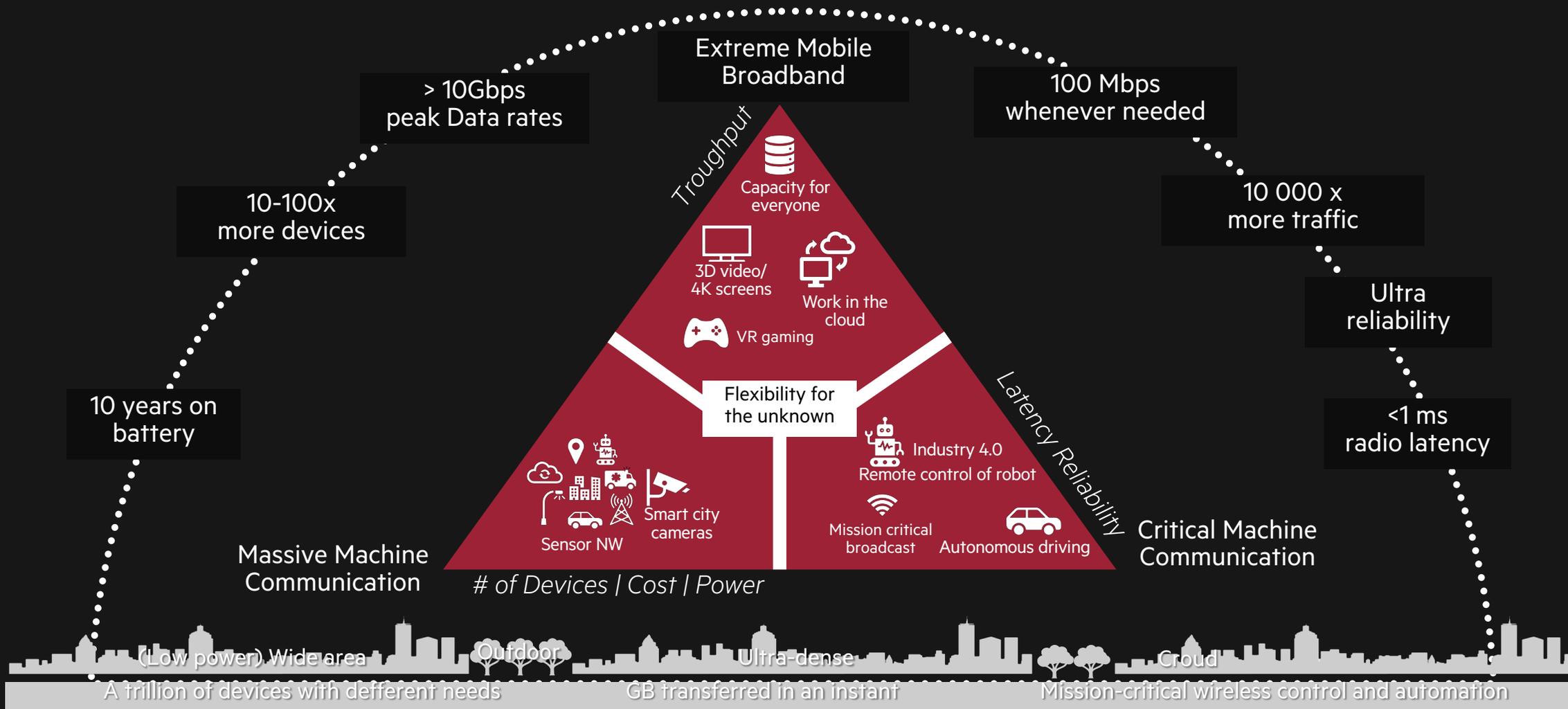


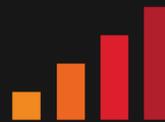
# 5G REQUIREMENTS BACK TO BASICS

**ITU-R recommendation  
M. 2083 defines 8 key  
requirements for 5G  
networks**



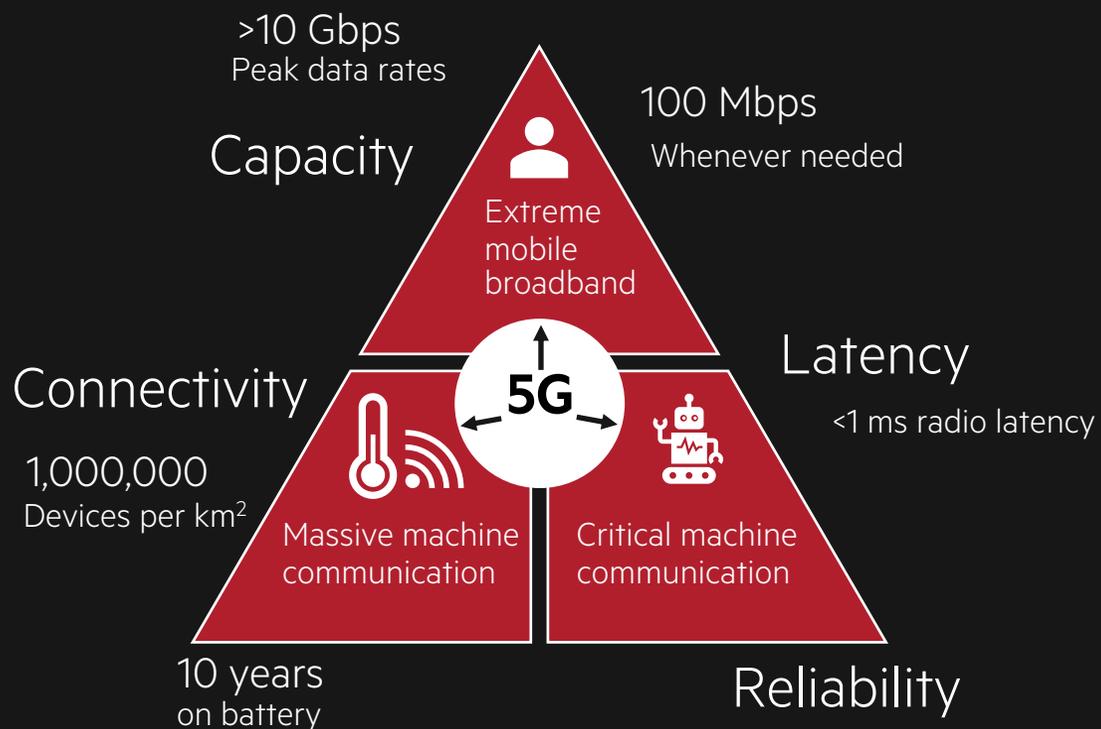
# 5G USE CASES



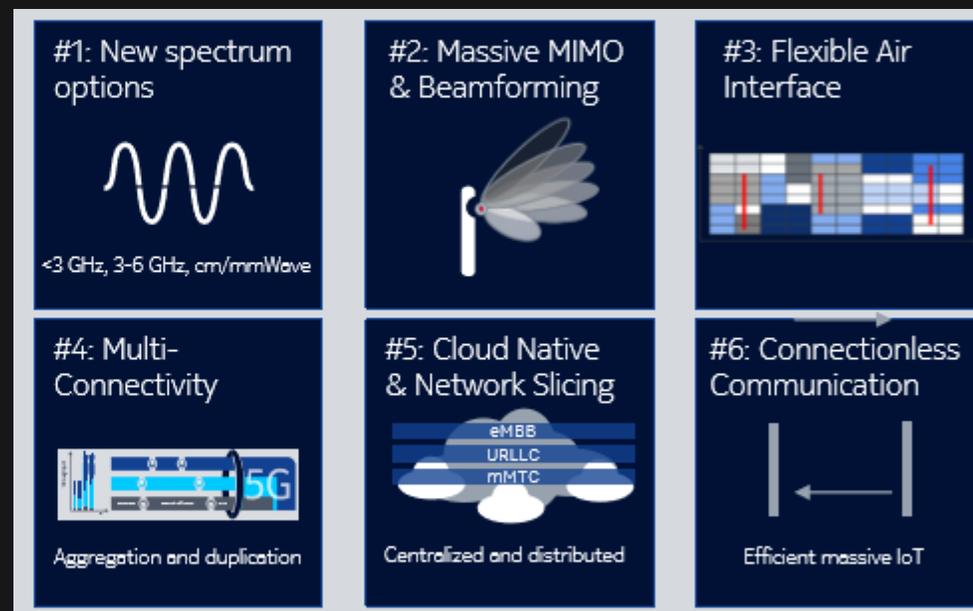


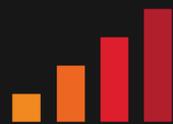
# 5G IS A GIANT LEAP, POWERED BY A SET OF NEW TECHNOLOGIES...

## Requirements

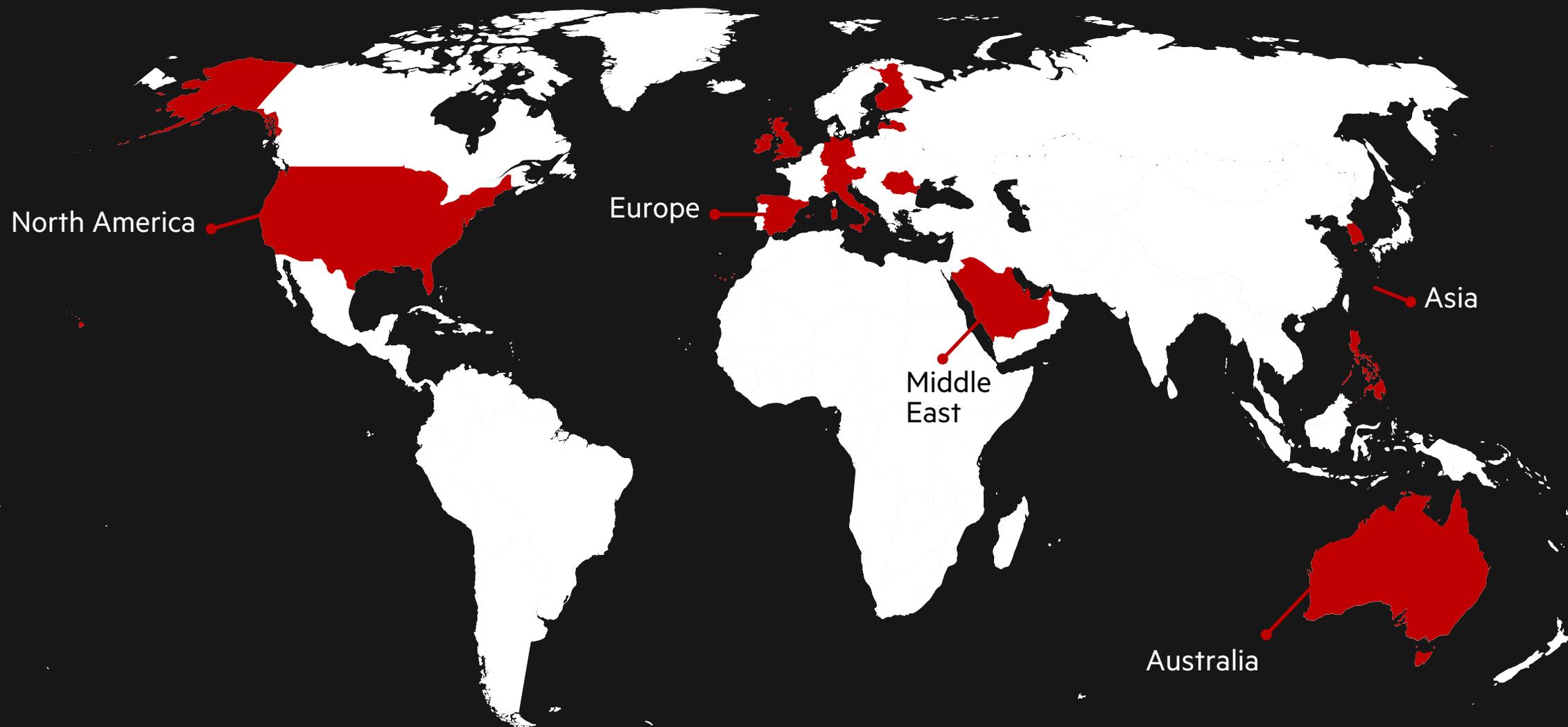


## New 5G technology building blocks





# 5G EARLY DEPLOYMENTS





Liepājā pirmais **5G** internets



Imt 

# 5G EARLY DEPLOYMENTS



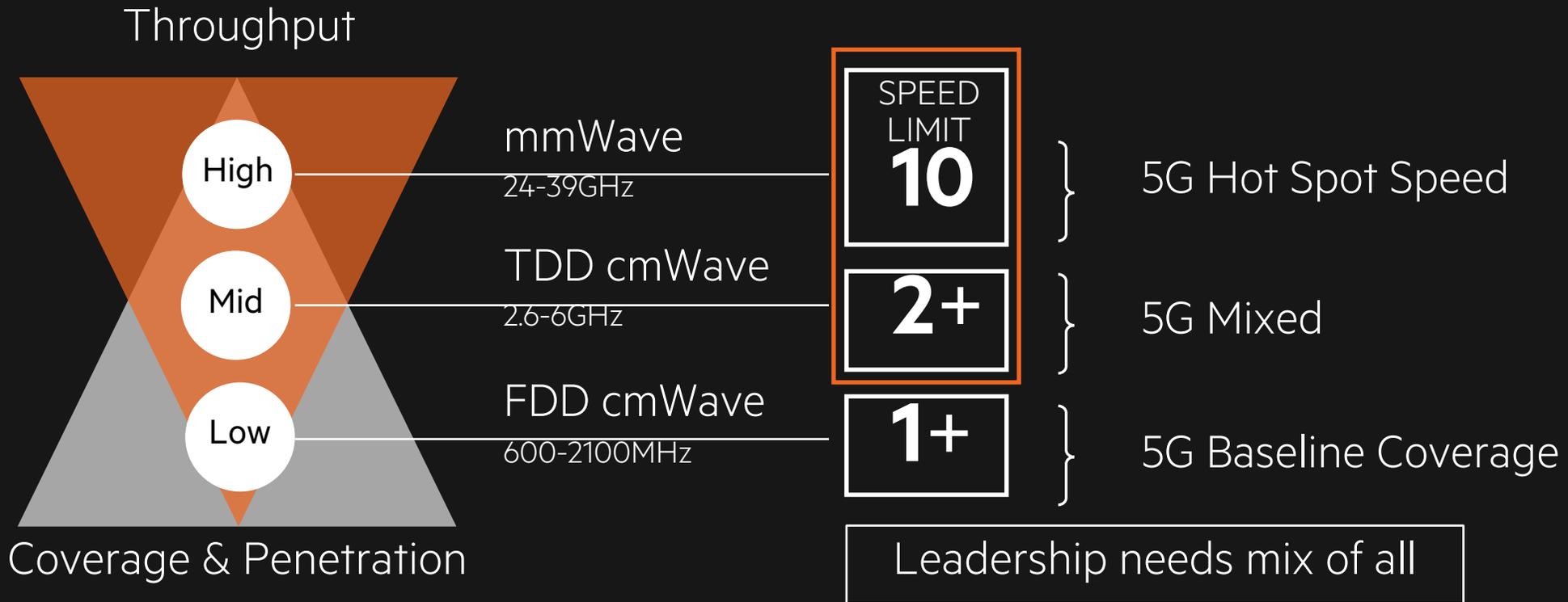
49 commercial 5G agreements in key markets  
Market leading momentum

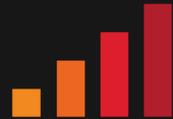


Over  
**100**  
5G  
engagements

**70+**  
technical  
engagements  
planned or on the  
way in 2019

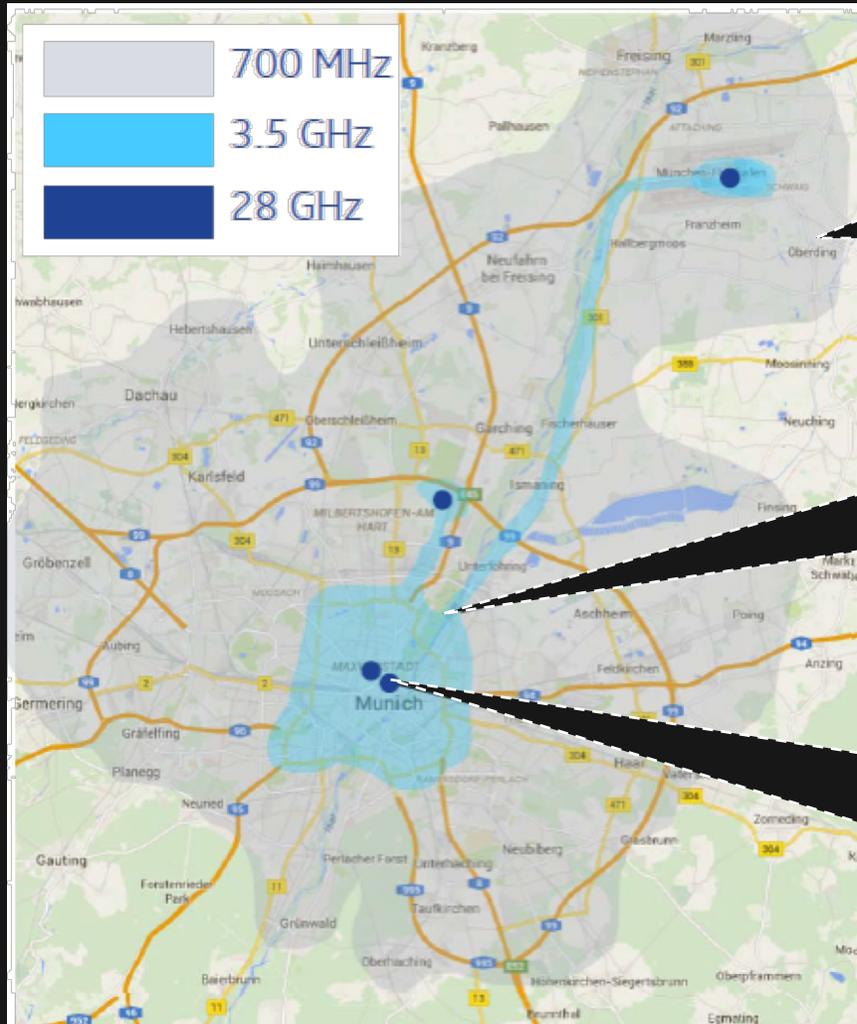
# 5G DEPLOYMENT PRINCIPLES





# 5G DEPLOYMENT SCENARIOS

## Scenario



### 700MHz band

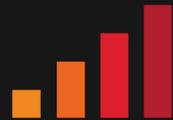
- Wide coverage, incl. indoor
- Wide application IoT, low delay, safe
- 800/900 MHz range is used as well

### 3.5GHz band

- High data capacity
- Supports improved broadband internet
- Uses the existing 2GHz base station range

### 26GHz (mm waves) band

- Extremely high data capacity (10Gbps) in local areas
- Supports improved broadband internet

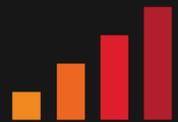


# 5G EARLY DEPLOYMENTS

## Technical early setup during 2019 and early 2020

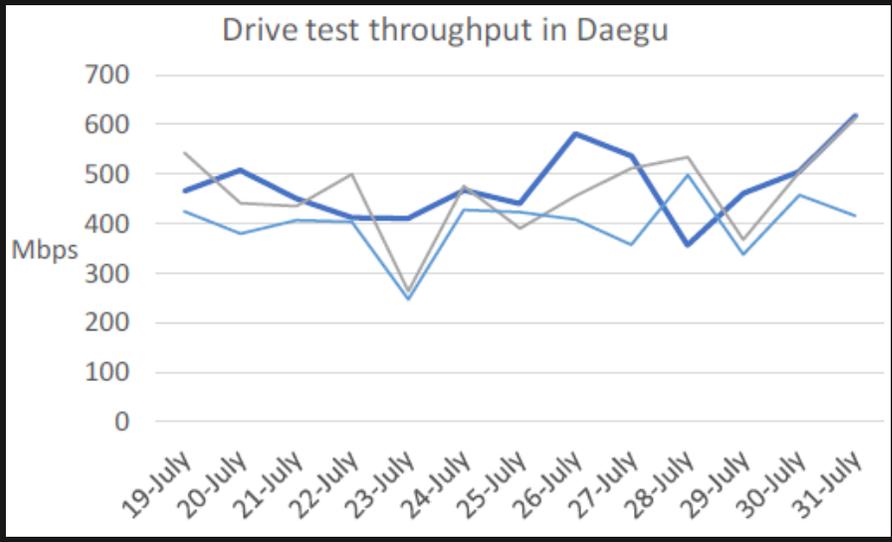
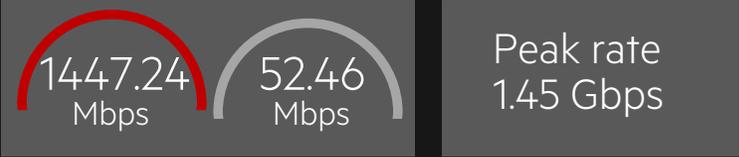
Examples of launch configurations

Operator	Initial use cases	Rollout requirements
Operator A	<ul style="list-style-type: none"> <li>eMBB</li> <li>FWA</li> <li>Leadership</li> </ul>	<ul style="list-style-type: none"> <li>90% 8T8R</li> <li>10% 64T64R</li> <li>Two antennas per sector for both mMIMO and 8T8R</li> </ul>
Operator B	<ul style="list-style-type: none"> <li>eMBB</li> <li>Leadership</li> </ul>	<ul style="list-style-type: none"> <li>100% 64T6R</li> <li>Two antennas per sector</li> </ul>
Operator C	<ul style="list-style-type: none"> <li>eMBB</li> <li>FWA</li> <li>Leadership</li> </ul>	<ul style="list-style-type: none"> <li>80% 8T8R</li> <li>20% 64T64R</li> <li>Single antenna per sector must be possible</li> </ul>



# 5G DEPLOYMENT LEARNINGS

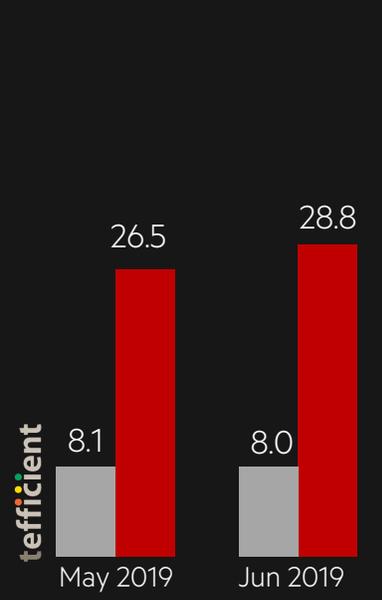
## 5G Throughputs and Data Usage with 3.5 GHz in Korea



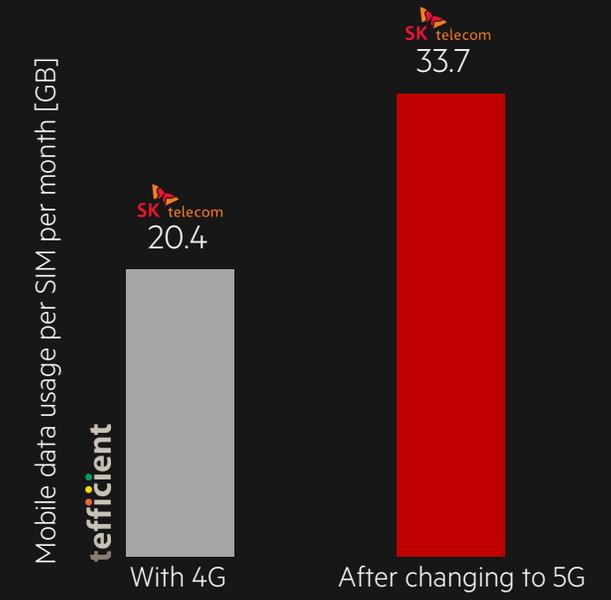
Average throughput 400-600Mbps in the field (5G+LTE)

Average data consumption 3.5x in 5G

Same user data consumption +65% in 5G



Data usage increased from 20GB to 34GB after upgrading to 5G



## 26 GHz measurements

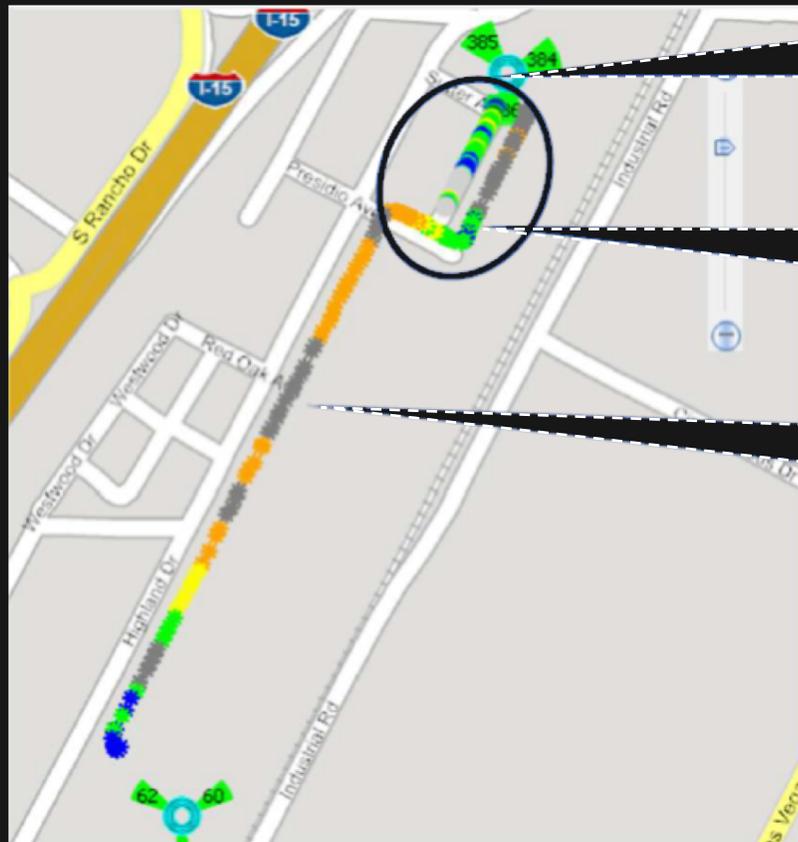


## Propagation learnings

- Roof edge: 108 dB at 100 m and 127 dB at 350 m
  - Roof setback 123 dB at 100 m and 130 dB at 350 m
  - Around-corner attenuation 14 dB after 10 m
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- mmWave propagation is limited in practice to 100-150 meters
  - mmWave coverage can be extended with tight low band integration

# 5G DEPLOYMENT SUMMARY

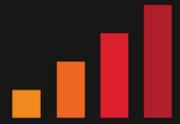
## mmWave Coverage and Data Rate in Las Vegas



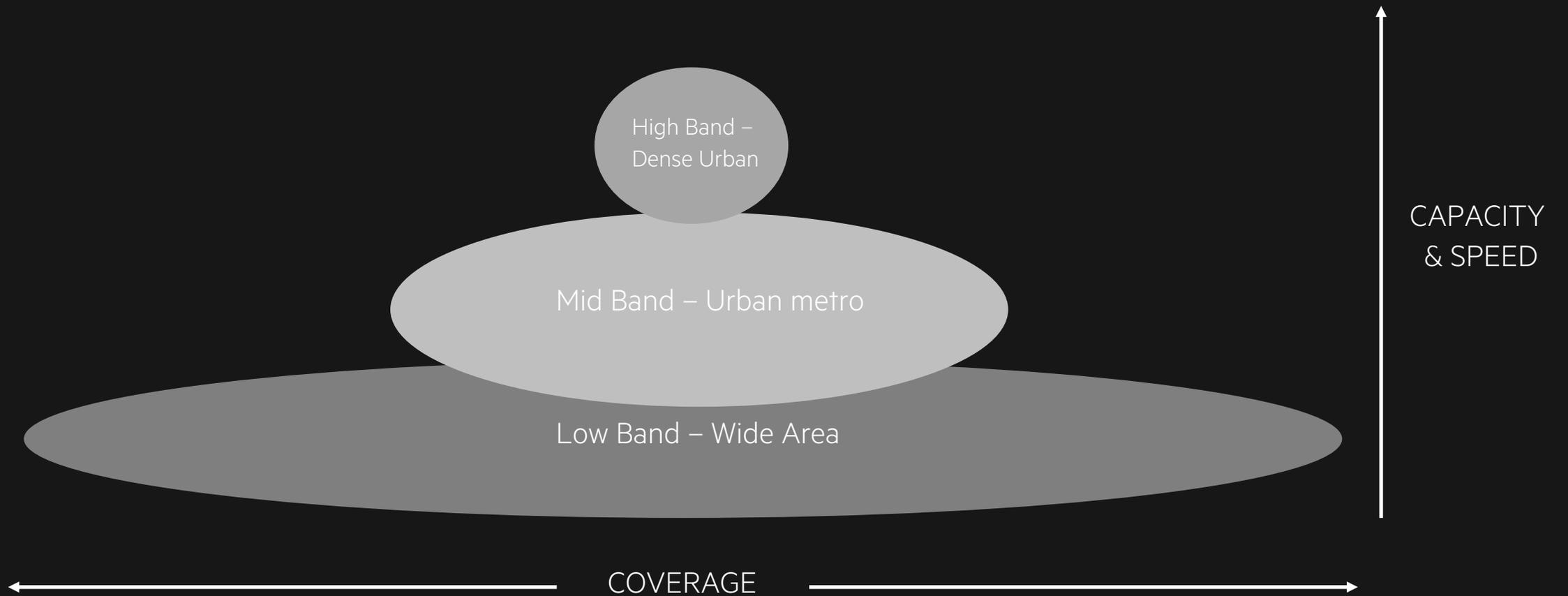
- mmWave base station
- mmWave range approx. 150m
- UE connented to LTE



- Peak rate 1.5Gbps with 400MHz
- Cell edge rate 630Mbps
- Range up to 150 meters



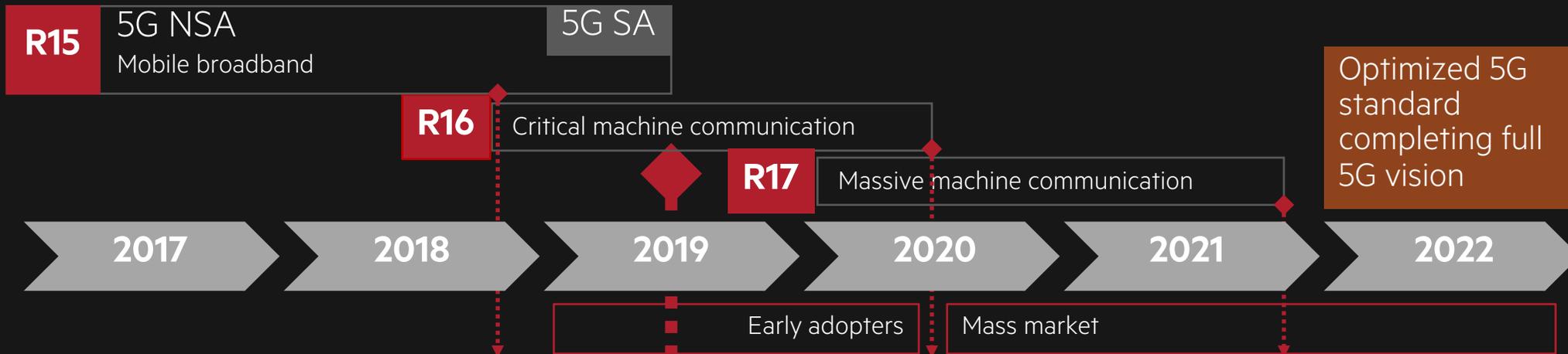
# 5G WILL CO-EXIST WITH 4G CREATING CAPACITY AND COVERAGE



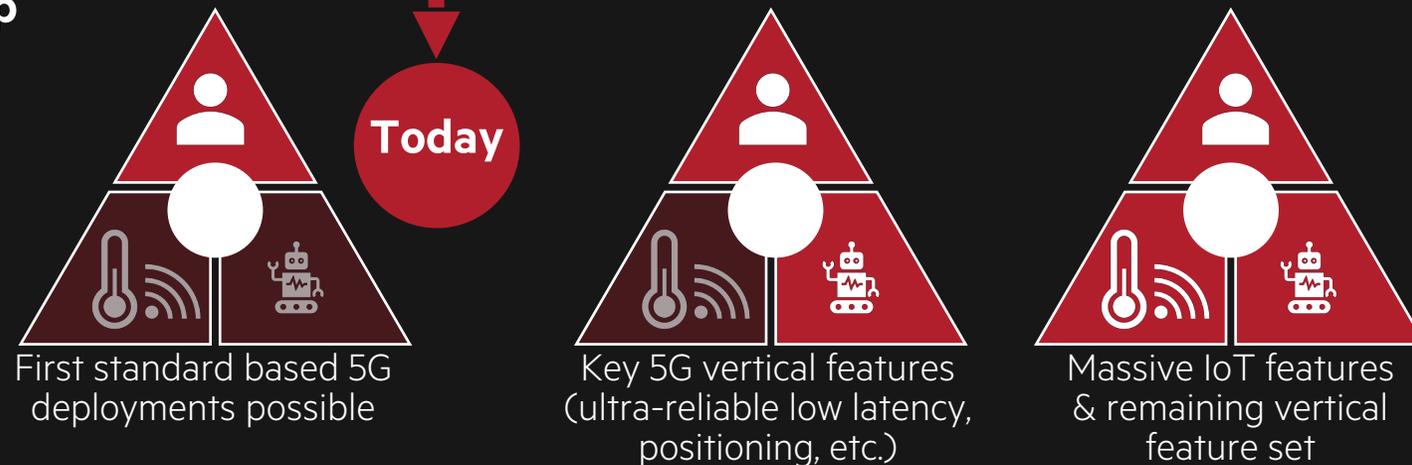
# 5G DEVELOPMENT TIMELINE

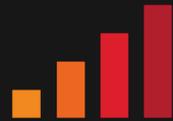


## 5G standards roadmap

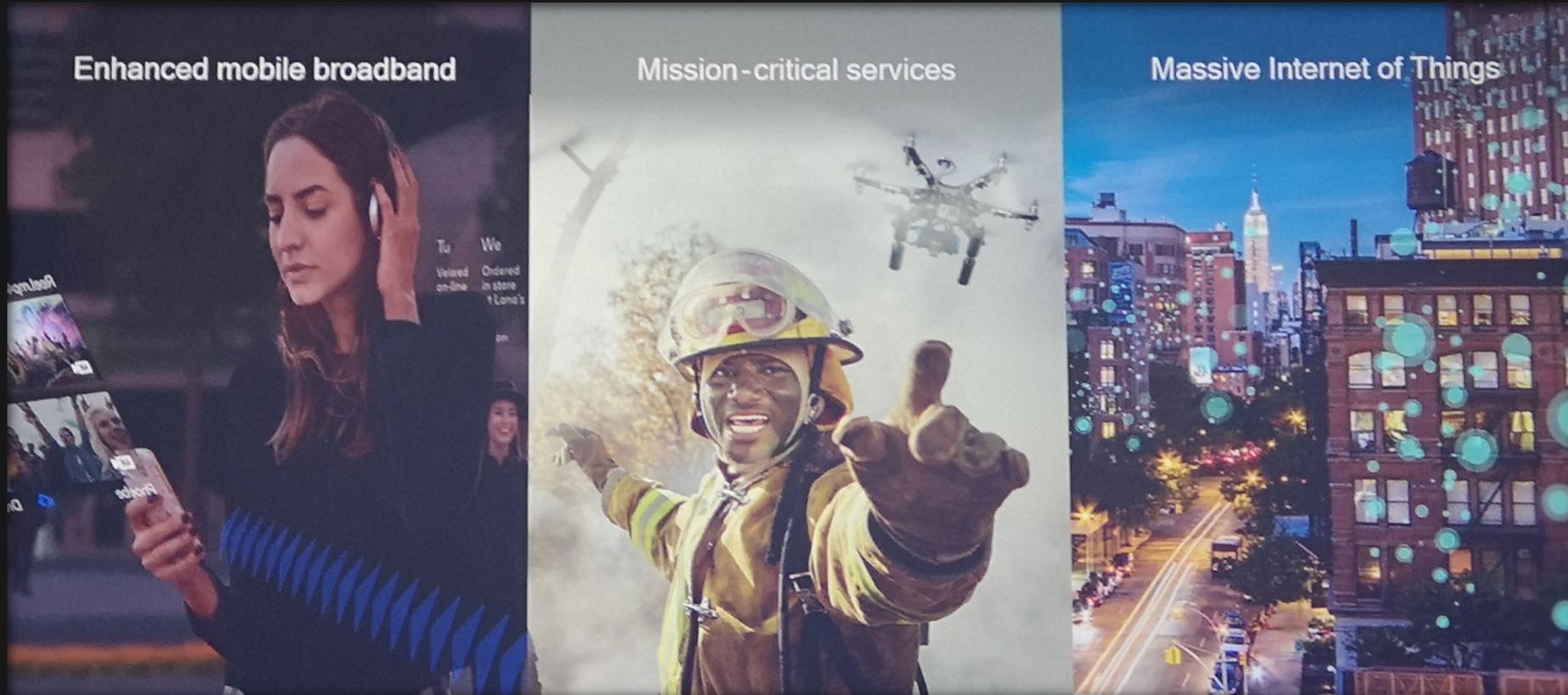


## 5G industry roadmap





# 5G IS FOUNDATIONAL TO WHAT'S NEXT



A unified connectivity fabric that will fuel a new era of innovation



**THE FUTURE  
IS MOBILE ONLY**

