



# Enchanted Reality with 5G and IoT

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**5G**

# 5G Requirements & Standards

Enable New Services through Convergence  
of Radio/Network Technologies

enhanced  
Mobile-Broadband



- Peak 20 Gbps
- Edge 100 Mbps

Ultra Reliable  
& Low Latency

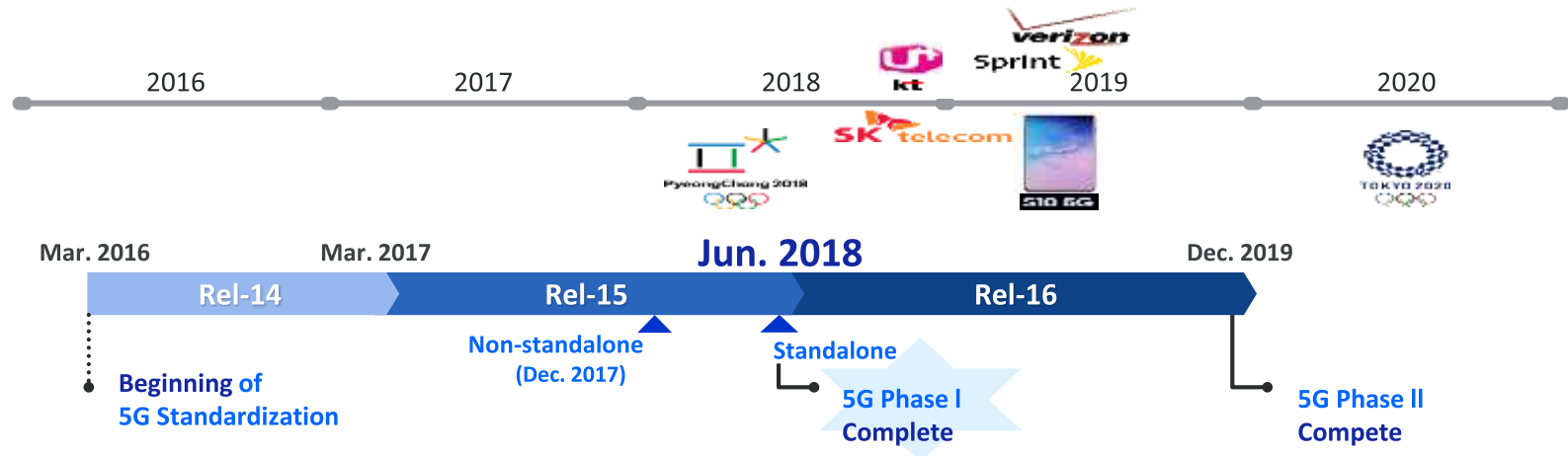
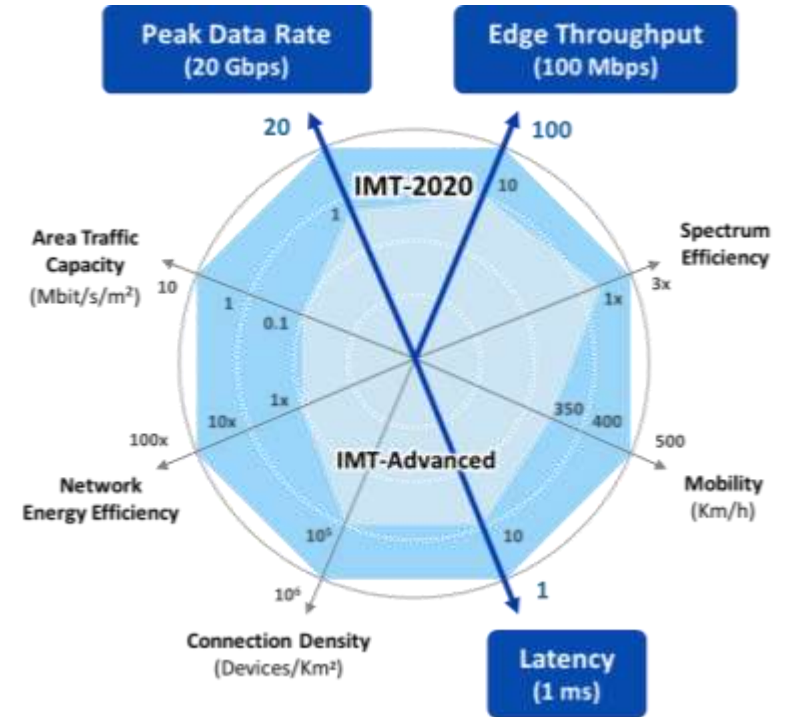


- $10^{-9}$  Error-rate
- 1ms Latency

massive Machine-Type  
Communications

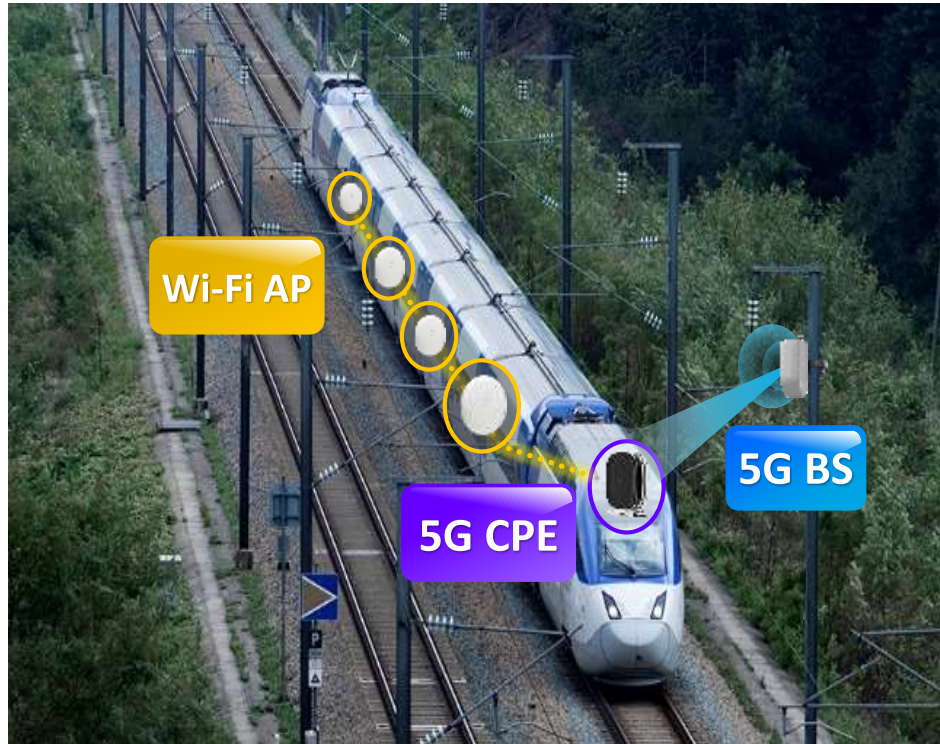


- $10^6$  Connections/km<sup>2</sup>
- 10 year Battery-life



# 5G Train: Trial to Full Service

## Providing Multi-Gigabit Mobile Backhaul Solution to Trains



### For Passenger



**Internet on Board**  
(HD Video Streaming)



**Passenger Assistance & Info.**



**Entertainment**  
(Movie & TV)

### For Train Operator



**Security**



**Train Control**  
(Real-time Monitoring)



**Crew Assistance**  
(Video Call, Ticket sales)

# Korea & US: Early 5G Deployment from Samsung



The first country to adopt 5G on a large scale was South Korea, in April 2019 – 2.5M Users

Samsung is the largest supplier for 5G base stations in South Korea at launch - 53000/86000 base stations



- AT&T, Verizon, Sprint, T-Mobile
  - Trials ongoing (Ericsson, Samsung, Nokia)
- Verizon Speed Test
  - 1.4 Gbps in Chicago
    - Samsung NW and Samsung S10 5G
      - Stranger Things (entire first season) on 5G: 38.78 seconds
      - Stranger Things (entire first season) on 4G: one hour 16 minutes
    - Latency ranges from 30ms down to 17ms on 5G

<https://www.techgenyz.com/2019/08/27/lg-u-launches-geforce-5g-cloud-game-with-nvidia/>

<http://koreajoongangdaily.joins.com/news/article/article.aspx?aid=3067287>

[http://www.uplus.co.kr/ent/fiveg/5GServiceDetailGeforce.hpi?utm\\_campaign=brandcomm2\\_geforce&utm\\_medium=portal\\_blog&utm\\_source=naver&utm\\_content=alliance\\_blogger20](http://www.uplus.co.kr/ent/fiveg/5GServiceDetailGeforce.hpi?utm_campaign=brandcomm2_geforce&utm_medium=portal_blog&utm_source=naver&utm_content=alliance_blogger20)

# Commercial 5G in 2019 – Its Real Now!

## 55 'Early' Commercial 5G networks in operations by end of 2019



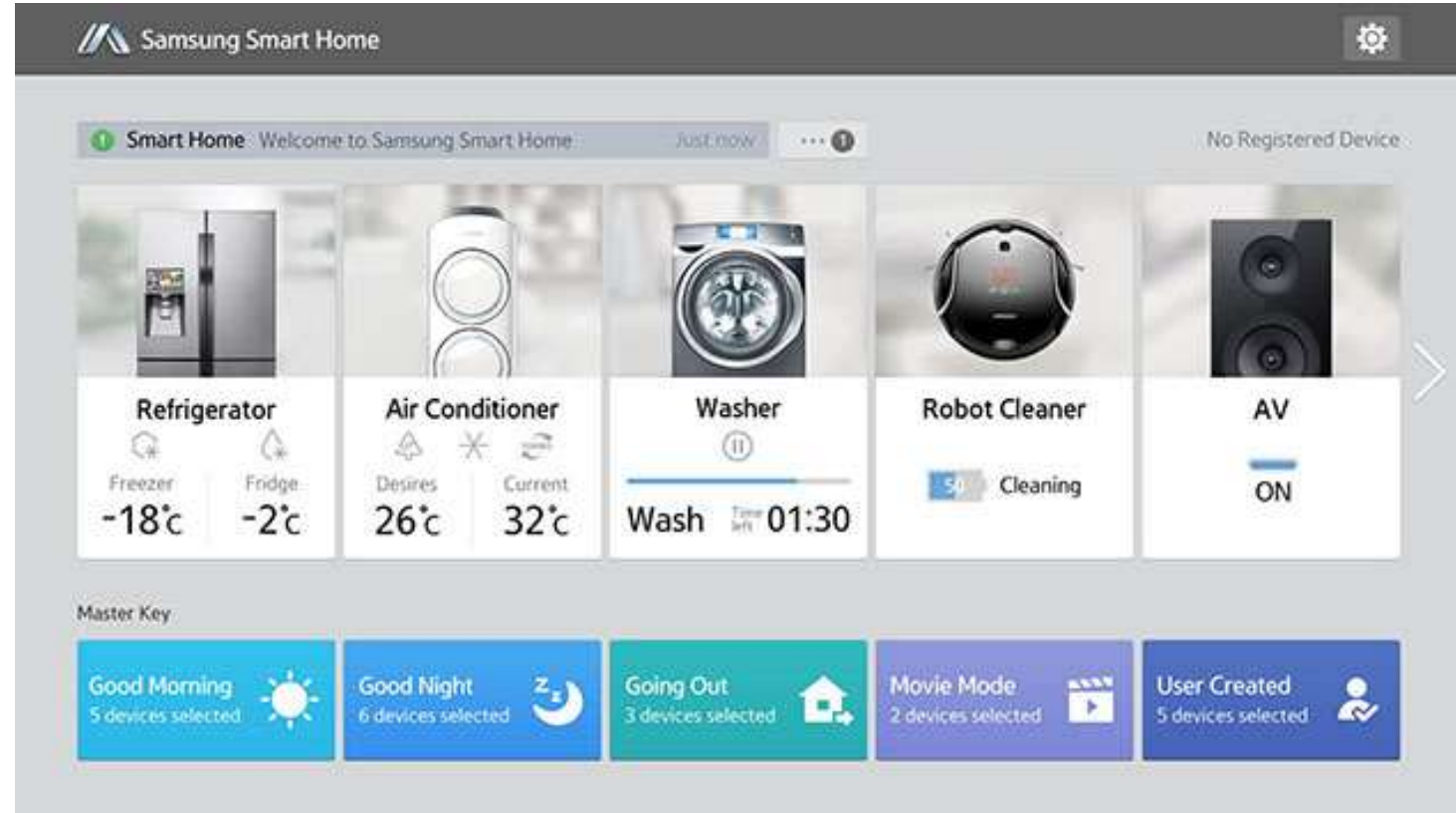
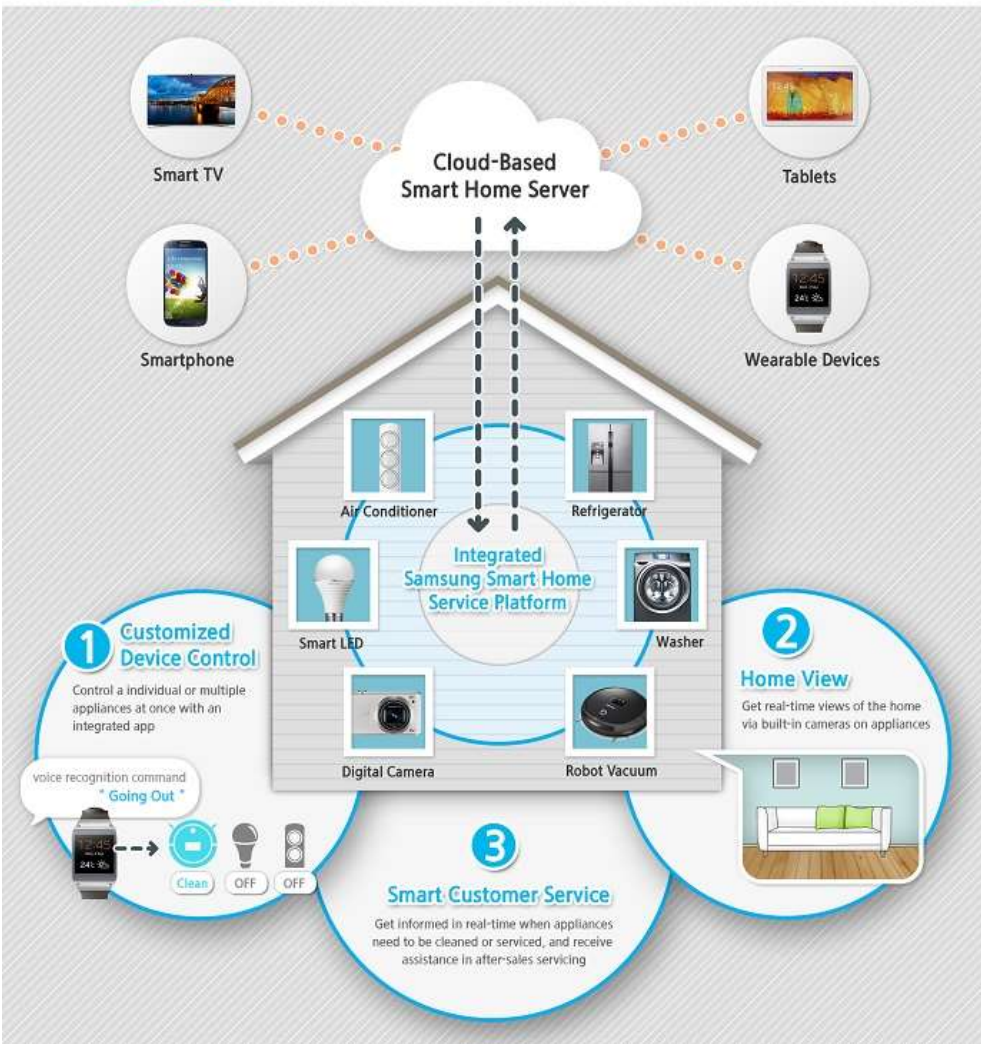
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**IoT**

# Smart Home

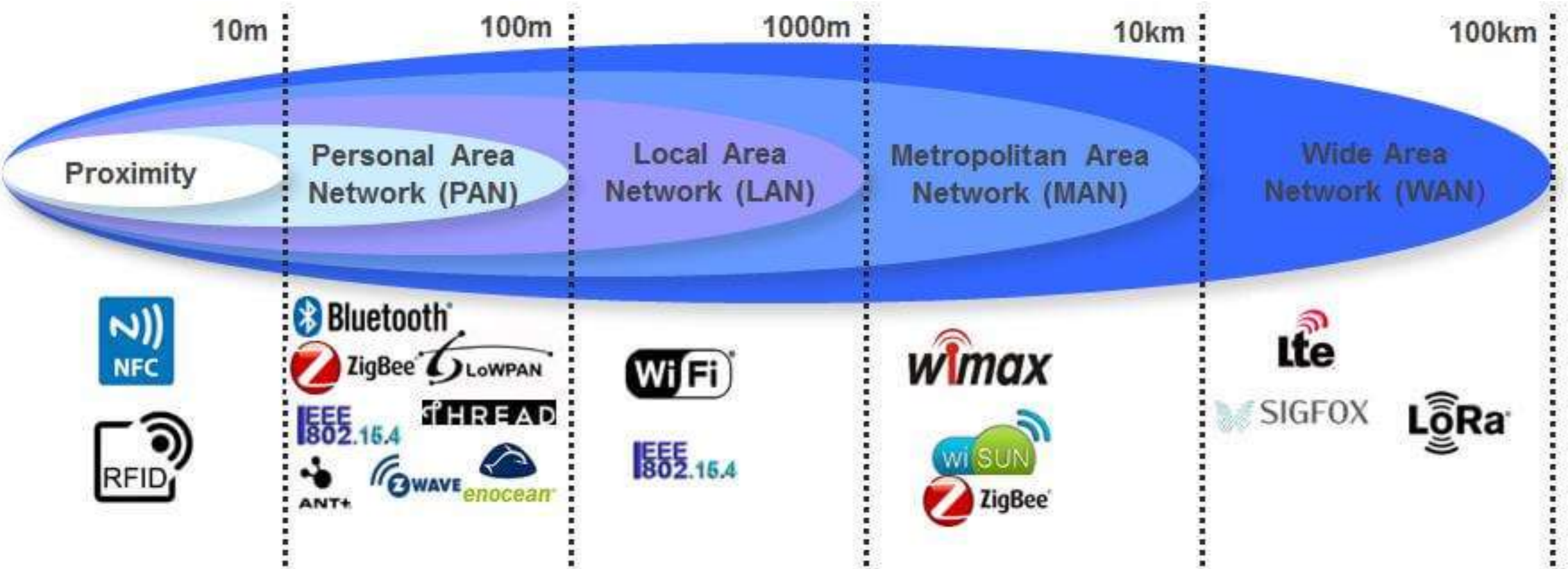


Samsung Smart Home | 'Smart Living & Beyond'



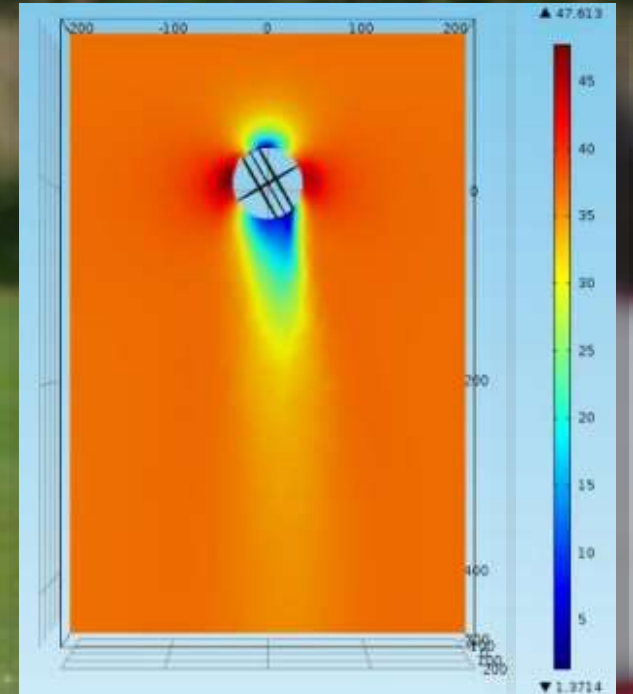


# IoT Connectivity

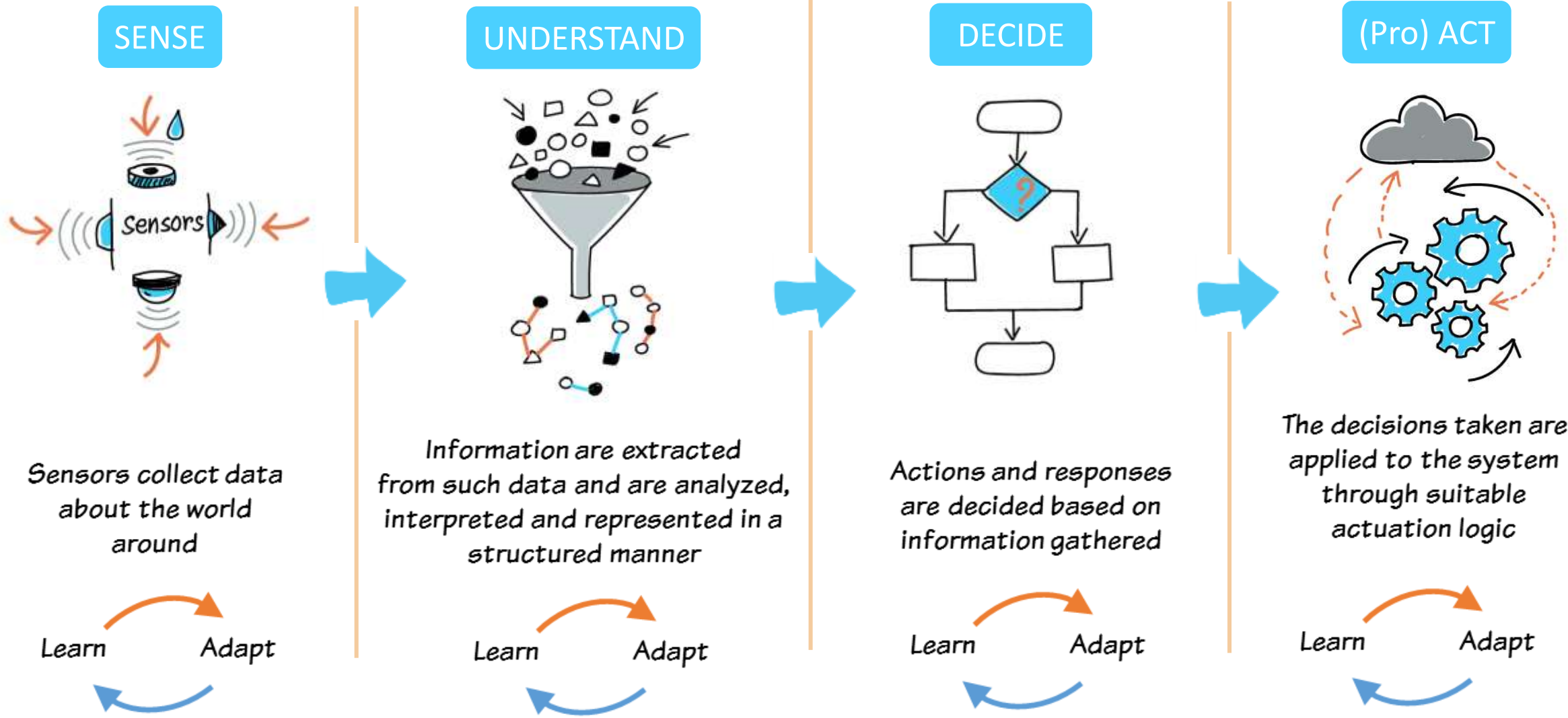


Source: <https://www.imgtec.com/blog/how-low-powered-wi-fi-sensors-are-the-future-of-iot/>

# Smart Cricket Ball



# Sense, Analyze & (Pro)Act



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# Reality and Enchantment

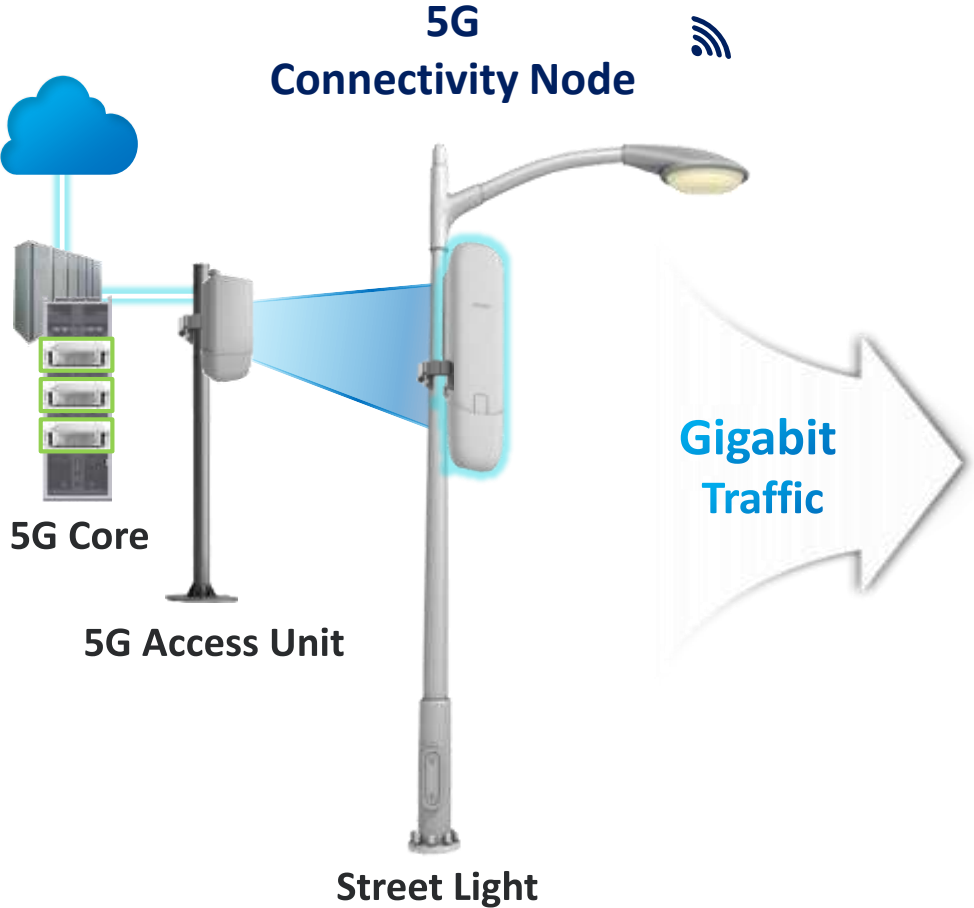
# 5G FWA (Fixed Wireless Access)

5G "Wireless Fiber" at Home for High Speed Internet, VoD etc








# 5G Connectivity Node for Smart City

## 5G Connectivity Node Provides Gigabit Connectivity for Smart City



**In Dense Urban (500m radius)**

-  **LTE Small cell (Cat.M1 & Cat.NB1)**  
5 x 240Mbps = 1.2Gbps
-  **Public Wi-Fi**  
5 x 300Mbps = 1.5Gbps
-  **IoT Sensor**  
250 x 256kbps = 62.5Mbps
-  **Intelligent Surveillance (CCTV)**  
10 x 24Mbps = 240Mbps
-  **Digital signage**  
5 x 24Mbps = 120Mbps

# 5G V2X

High-definition Map Update



Remote Driving



Vision (Camera/LiDAR) Sharing



Connected Traffic Light



5G V2X

# Immersive Services

## Immersive Service Experiences Enabled by Innovative "5G" Devices



Ubiquitous Health Care

### Wearable/Flexible Mobile Device



Mobile Cloud



UHD Video Streaming



Smart Map/Navigation



Real-Time Interactive Game