BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Department Of Information Science & Engineering

TECHNICAL SEMINAR-(18CSS84)

The impact of 5G on Media and Entertainment

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CONTENTS:

INTRODUCTION

- 5G is the fifth generation of cellular networks. Up to 100 times faster than 4G, 5G is creating never-before-seen opportunities for people and businesses. Faster connectivity speeds, ultra-low latency and greater bandwidth is advancing societies, transforming industries and dramatically enhancing day-to-day experiences. Services that we used to see as futuristic, such as e-health, connected vehicles and traffic systems and advanced mobile cloud gaming have arrived.
- We start to see a significant impact on traditional media usage, mass scale adoption of AR and VR, and the emergence of new use cases such as 3D holographics, haptic suits, and advanced interactive entertainment. Immersive and new media applications will reach an unprecedented scale by 2028, generating in excess of $67bn annually.

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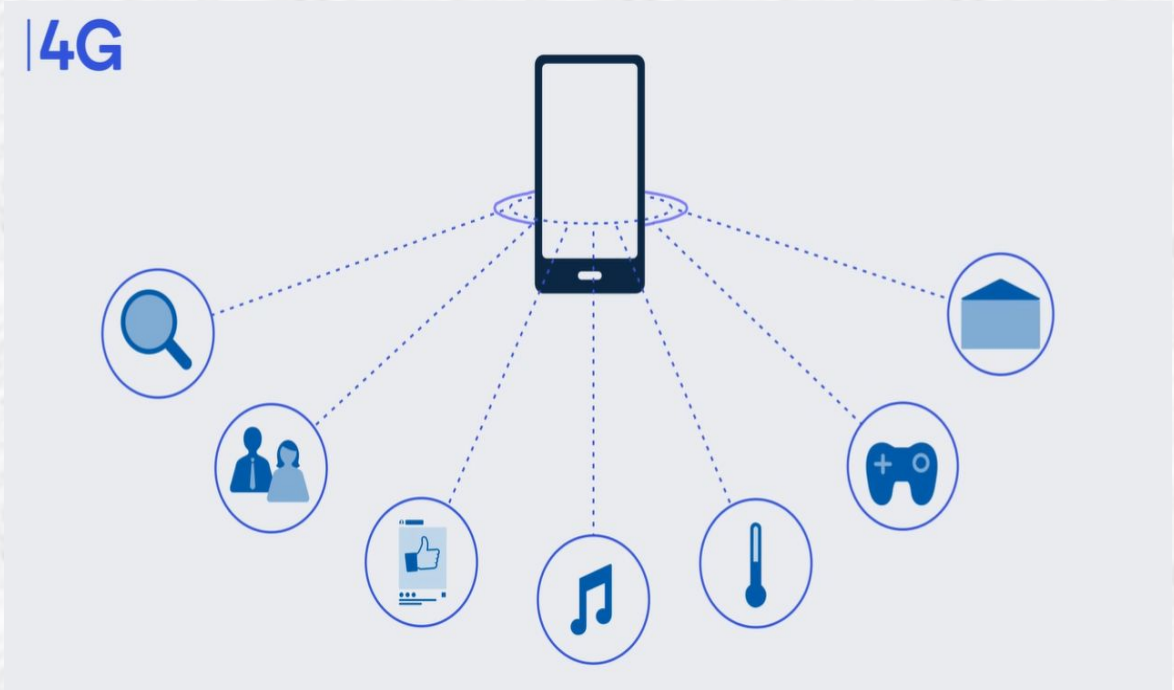


- Connecting with your friends, family and information

- Connecting you to virtually everything around you

ABSTRACT

The Indian media and entertainment sector is expected to grow by 17% in 2022 to reach the 2019 pre-pandemic levels of $25.2 billion, according to the latest report by the Federation of Indian Chambers of Commerce and Industry (Ficci) and consultancy EY.

By 2024, it is expected to grow at a compound annual growth rate (CAGR) of 11% to touch $30.9 billion. 5G will bring tremendous growth to the media and entertainment industry in the coming years. 5G will grow the global mobile media market from $170bn in 2018 to $420bn in 2028.

5G revenues will overtake 3G/4G revenues by 2025 globally (2023 in the US) and total net new revenues coming from 5G will account for $200bn in 2028 ($67bn in the US).

MOTIVATION

4G was launched in the year 2012 which became a massive success in terms of Internet Speeds for downloading and uploading content onto the internet. This decade has shown massive breakthroughs in terms of Augmented Reality and Virtual Reality as well. However, the latency and the bandwidth is still considered less till date.

We are now in the era of 5G, the applications and impact of 5G will be massive on the media and entertainment industries. This means the scope of this technology has also increased and this seminar is to understand the applications of 5G in various aspects of Media and Entertainment.

OBJECTIVES

- To analyze the use of 5G in the fields of Media and Entertainment
- To understand the scope of applications of 5G in IoT
- To be able to implement reliable and secure solutions in the domains of IoT
- To bring about faster response times of critical services with advancements in 5G
- To bring about enhancements in the IT Sector

LITERATURE SURVEY

SL no	PAPER DETAILS	AUTHORS	INNOVATIVE IDEA	LIMITATIONS	GAPS IDENTIFIED
1	Internet of Things (IoT) for Next-Generation Smart Systems: A Review of Current Challenges, Future Trends and Prospects for Emerging 5G-IoT Scenarios, *IEEE Access, 2020*	Kinza Shafique, Bilal A. Khawaja, Farah Sabir, Sameer Qazi, Muhammad Mustaqim	5G-IoT based architecture should provide an independent HetNet, that is self-configurable as per the application requirement.	Conventional methods to deploy cellular technology are generally hardware-based.	There is a major gap in the actual implementation of a 5G technology and the promises made by the next-generation wireless network.
2	5G Evolution: A View on 5G Cellular Technology Beyond 3GPP Release 15, *IEEE Access, 2019*	Amitabha Ghosh, Andreas Maeder, Matthew Baker, Devaki Chandramouli	5G will focus where enhancements to features are introduced in Rel-15 & Rel-16	The efficiency of the produced module is not up to the mark.	Introduction of new features like: ultra-high data rate, low-latency, time-bound and reliable comms

LITERATURE SURVEY

SL no	PAPER DETAILS	AUTHORS	INNOVATIVE IDEA	LIMITATIONS	GAPS IDENTIFIED
3	Toward Tactile Internet in Beyond 5G Era: Recent Advances, Current Issues, and Future Directions, *IEEE Access, 2020*	Shree Krishna Sharma, Isaac Woungang, Alagan Anpalagan, Symeon Chatzinotas	Realization of TI over wireless media in 5G creates various requirements in like ultra-low latency, high reliability, high data-rate connectivity, resource allocation,	various challenges due to fast time varying channels, short stationary interval, distributed data and limitations on computation	The use of technologies like AR,VR will help in bridging the gaps present in tactile internet and the implementation of 5G
4	The impact of Internet of Things supported by emerging 5G in power systems: A review, *CSEE Journal of Power and Energy Systems, 2020*	Jinsong Tao; Muhammad Umair; Muhammad Ali; Jian Zhou	5G is providing numerous advantages to Power IoT (PIoT) by offering greater opportunities in progress and improvements	Fluctuation, Interoperability and Compatibility, Authentication, Security, Scalability	Using 5G is the exchange of information between electrical devices distributed in the PIoT network.

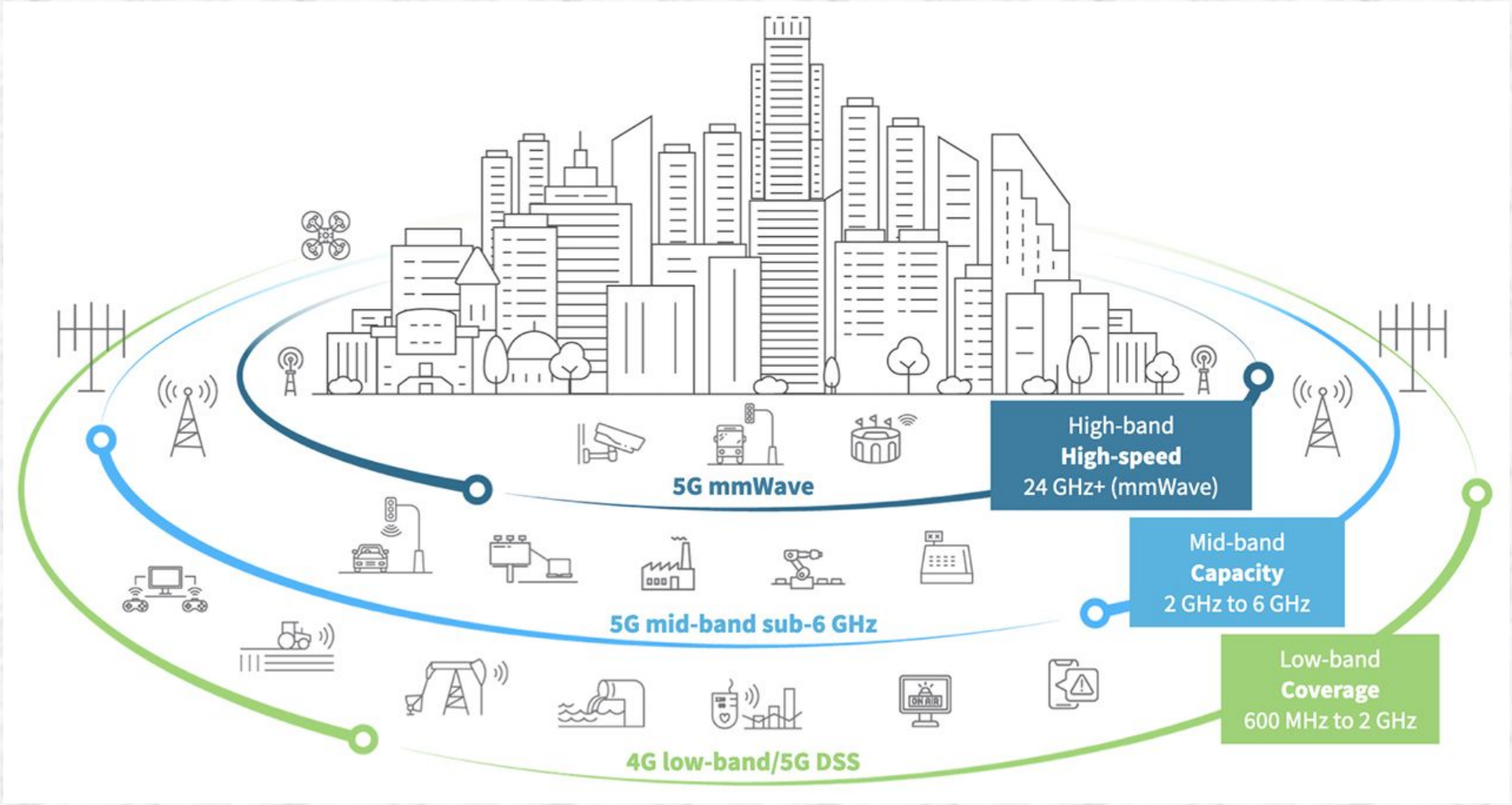
LITERATURE SURVEY

SL no	PAPER DETAILS	AUTHORS	INNOVATIVE IDEA	LIMITATIONS	GAPS IDENTIFIED
5	AI, 5G, and IoT, IEEE 2022	Abdulrahman Yarali	Integration of AI, 5G and IoT	Automobile industry unable to support latest tech	Scope of applications using the 3 areas mentioned
6	5G-IoT Architecture for Next Generation Smart Systems, *2021 IEEE 4th 5G World Forum (5GWF)*	Kar, P. Mishra and K. -C. Wang	Mass adoption of 5G will bring enhancements in IoT which can handle future 5G - IoT systems	High Latency, low throughputs	The use of 5G - IoT to support mass applications using reliable systems

LITERATURE SURVEY

SL no	PAPER DETAILS	AUTHORS	INNOVATIVE IDEA	LIMITATIONS	GAPS IDENTIFIED
7	The impact of Internet of Things supported by emerging 5G in power systems: A review, *CSEE Journal of Power and Energy Systems, 2020*	J. Tao, M. Umair, M. Ali and J. Zhou	Use of 5G along with IoT for connectivity of heterogeneous devices	Security, Power management, reliability and big data	Role of 5G in progress of IoT and power systems
8	Enabling Millimeter-Wave 5G Networks for Massive IoT Applications: A Closer Look at the Issues Impacting Millimeter-Waves in Consumer Devices Under the 5G Framework, *IEEE Consumer Electronics Magazine, 2019*	Kar, P. Mishra and K. -C. Wang	Applications of Massive IoT and how the use of a technology like 5G can enable the advancements in the fields of Massive IoT	Limitations of wearable devices through 5G POV	The use of 5G - IoT to support massive IoT

DESIGN/METHOD



IMPLEMENTATION

Case Study on Qualcomm: Intelligently connecting our world in the 5G era.

Vision Statement:

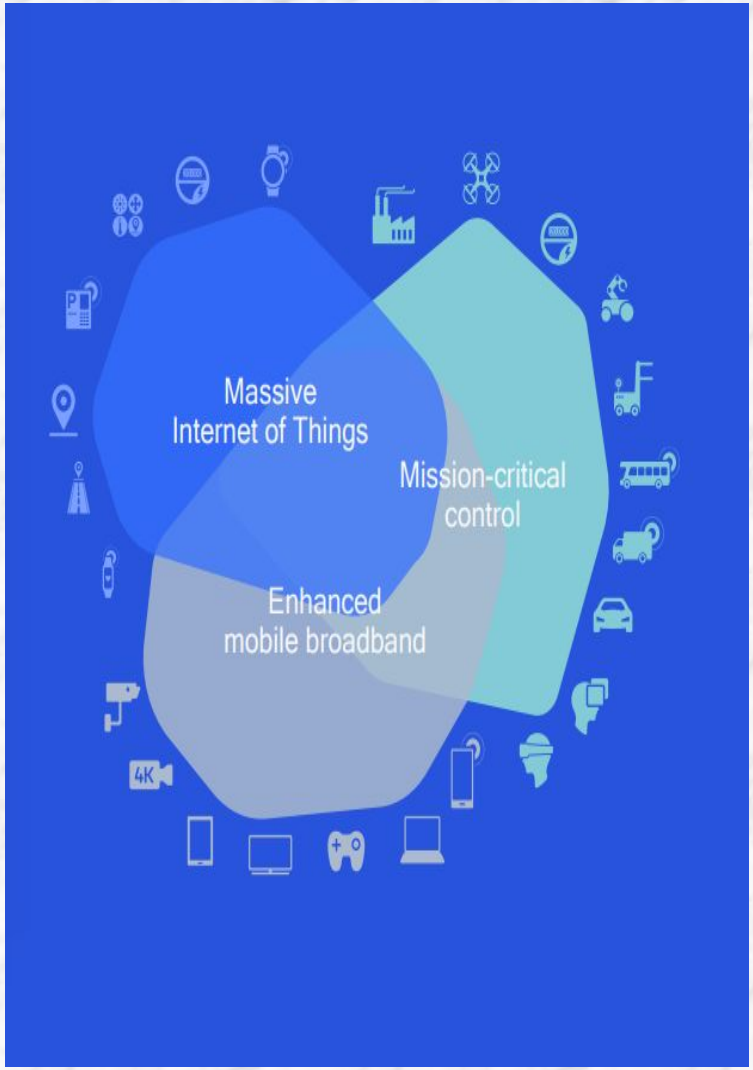
"Our vision for 5G is a unified connectivity fabric that will connect virtually everything around us. 5G is rapidly evolving to meet diverse IoT requirements and use cases, and we are driving a rich roadmap of system innovations for the IoT expansion."

But why 5G?

- Extreme Capacity
- Multi Gigabit speed
- Ultra-low latency
- Ultra-high reliability

Other reasons why 5G is essential:

5G is the common connectivity platform



Massive IoT:

- Massive IoT primarily consists of wide-area use cases, connecting massive numbers of low-complexity, low-cost devices with long battery life and relatively low throughput speeds

Mission Critical Control:

- 5G NR (New Radio) has been designed by Qualcomm engineers to satisfy or exceed requirements for mission-critical control

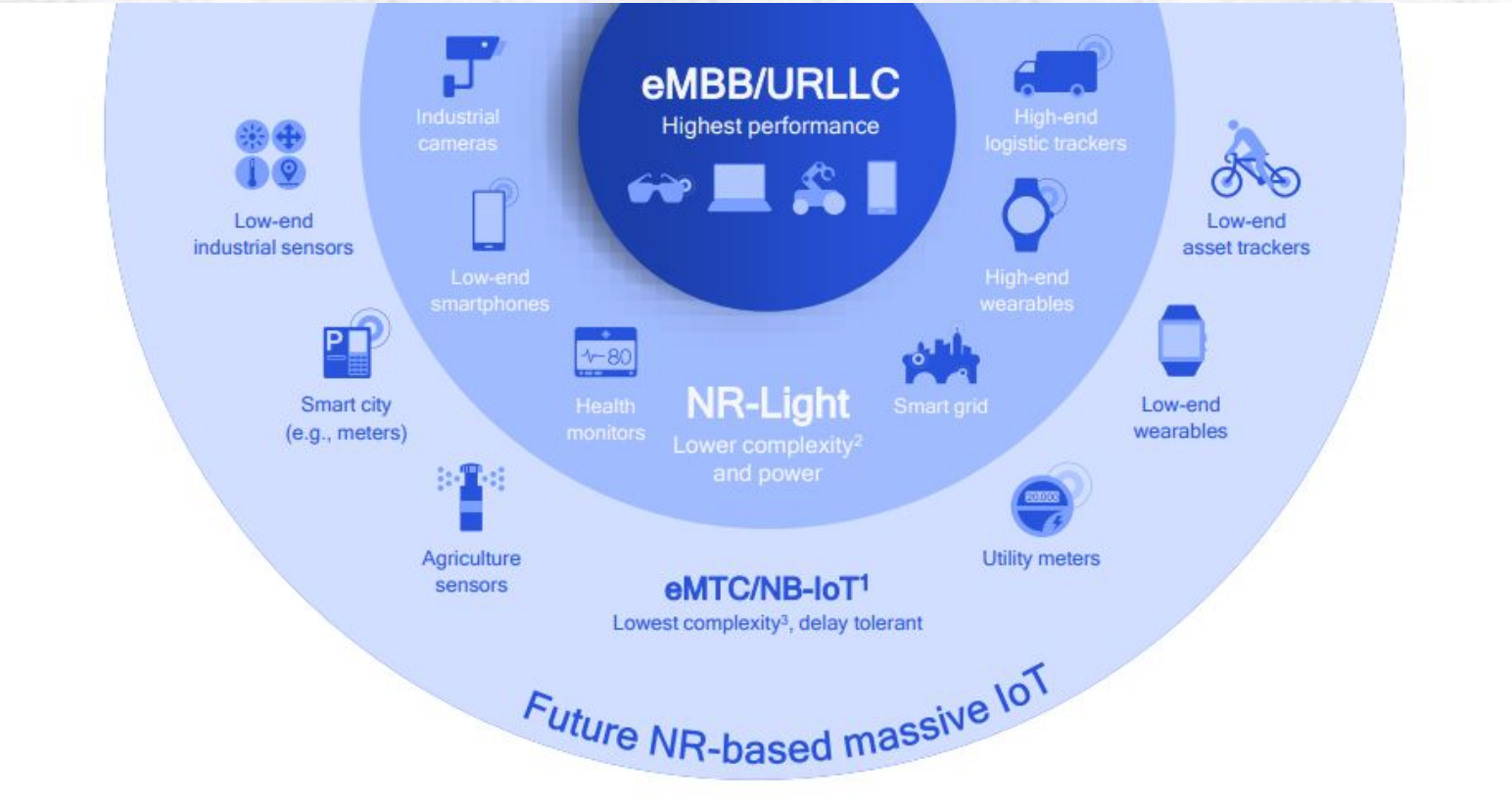
Enhanced Mobile Broadband:

- Essentially talks about the increased speeds, lesser latency

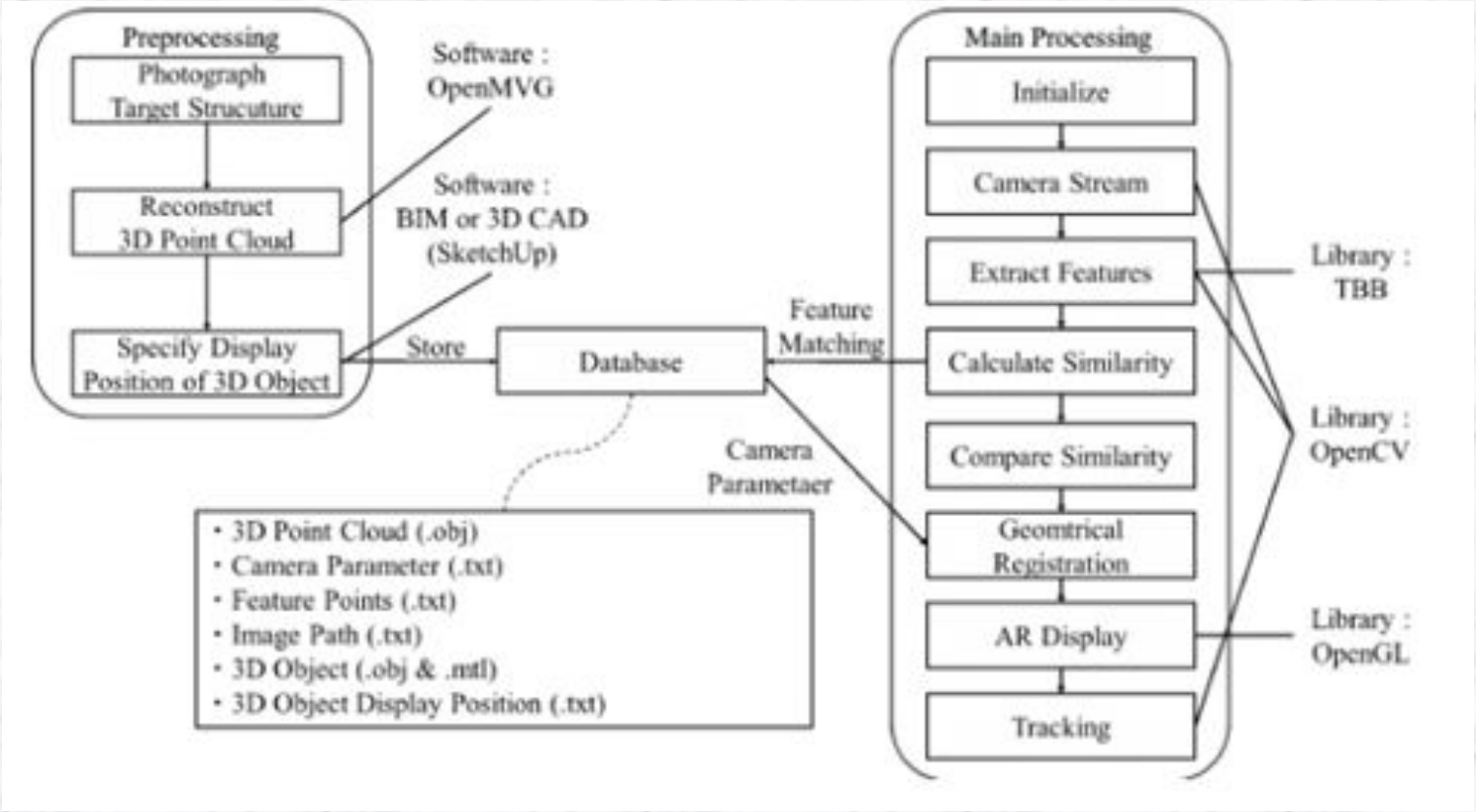
Use case: *Smart Glasses for XR (X->Augmented/Virtual)*

- The use of 5G NR(New Radio Standard) makes connectivity a faster and a much more reliable network.
- 5G New Radio (NR) is the global standard for a unified, more capable 5G wireless air interface.
- It will deliver significantly faster and more responsive mobile broadband experiences, and extend mobile technology to connect and redefine a multitude of new industries.

Use of 5G NR


eMBB/URLLC
Highest performance
Industrial cameras
High-end logistic trackers
Low-end industrial sensors
Low-end asset trackers
Low-end smartphones
High-end wearables
Smart city (e.g., meters)
Health monitors
NR-Light
Lower complexity[2] and power
Smart grid
Low-end wearables
Agriculture sensors
Utility meters
eMTC/NB-IoT[1]
Lowest complexity[3], delay tolerant
Future NR-based massive IoT

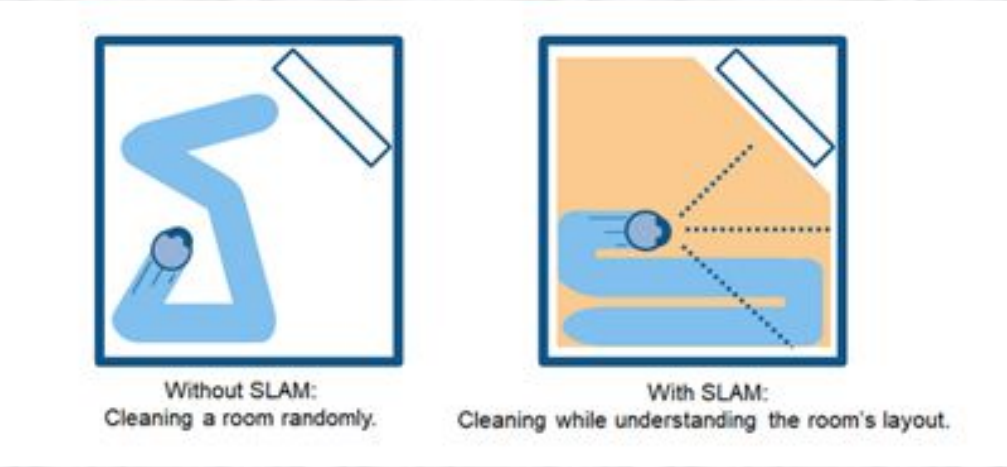
Marker-less AR System



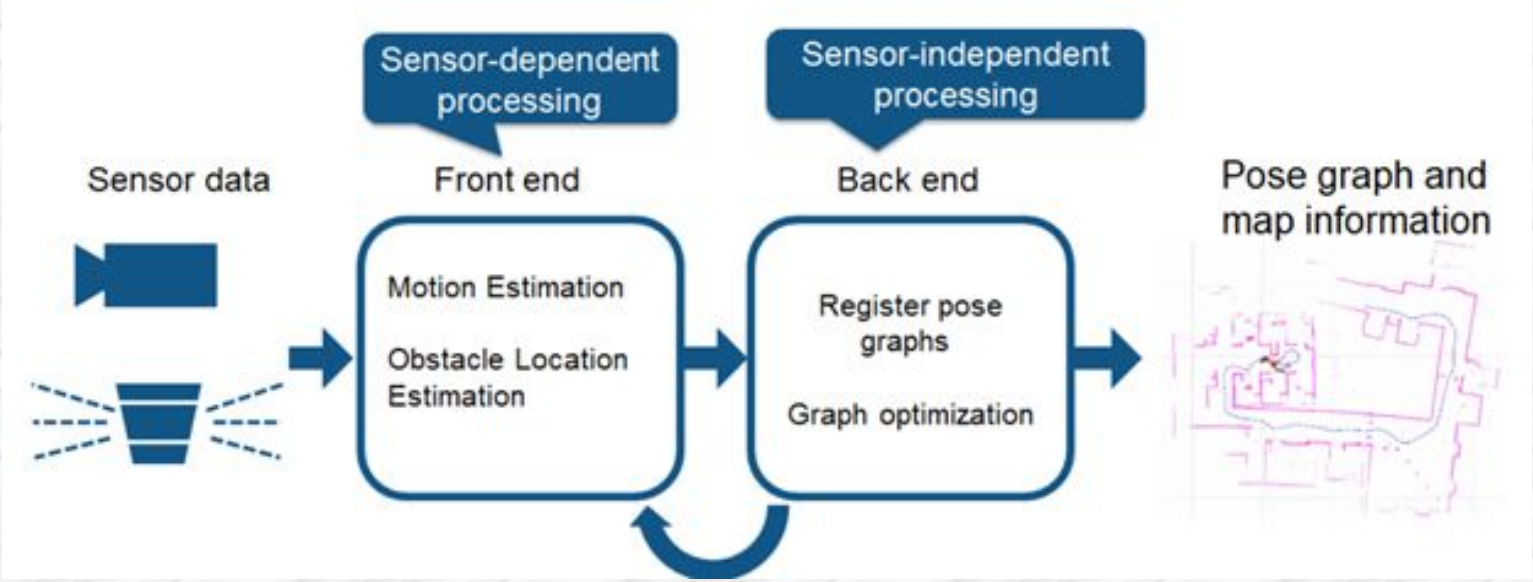
Markerless AR merges digital data with input from real-time, real-world inputs registered to a physical space. The technology combines software, audio, and video graphics with a smartphone's camera or headset's cameras, gyroscope, accelerometer, haptic sensors, and location services to register 3D graphics in the real world.

SLAM Algorithm

- **SLAM** (simultaneous localization and mapping): a computer vision algorithm that compares visual features between camera frames in order to map and track the environment. In combination with sensor data from the smartphone gyroscope and accelerometer, it is possible to achieve very reliable tracking.
- Consider a home robot vacuum. Without **SLAM**, moves randomly within a room and will not be able to clean the entire floor. In addition, this approach uses a lot of power, so the battery runs out more quickly.
- On the other hand, robots with **SLAM** can use information like number of wheel revolutions and the data collected from cameras and other imaging sensors to determine the scope of movement required. This is called **localization**. The robot can use the camera and other sensors to create a map of the obstacles in its vicinity simultaneously and avoid cleaning the same area twice. This is called **mapping**.



SLAM Algorithm in action

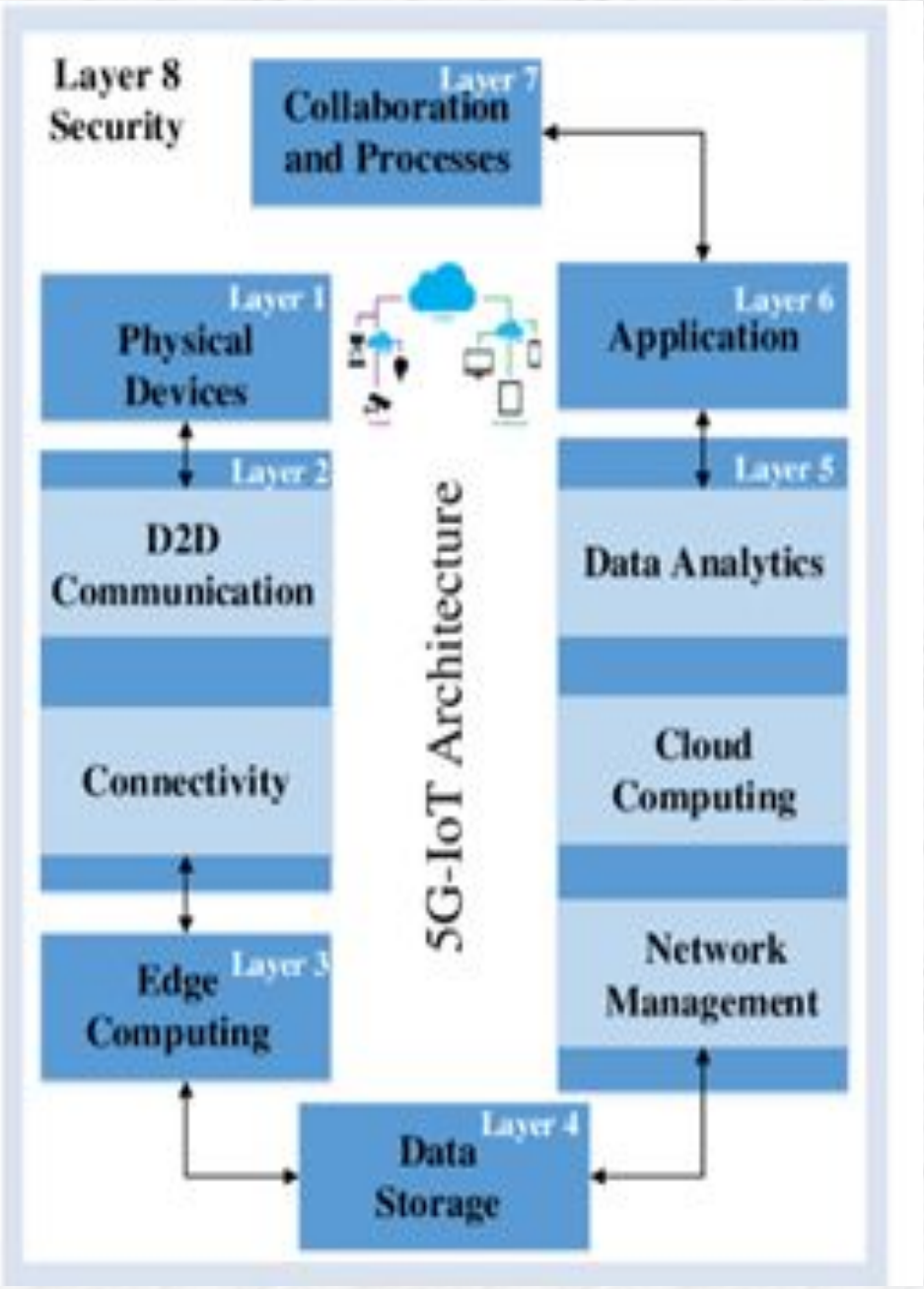


Working of SLAM Algorithm


mojo

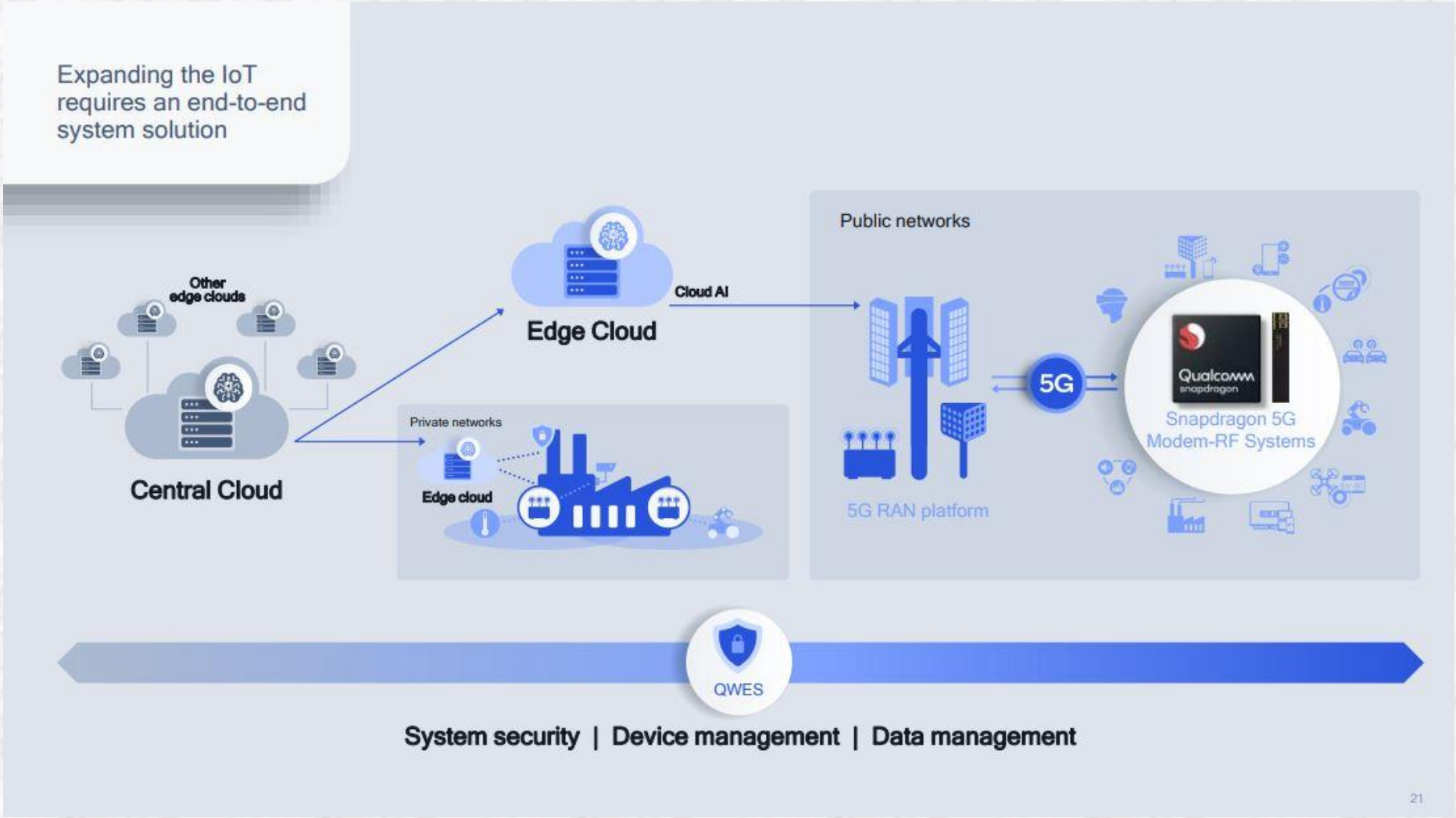
Mojo Lens' revolutionary design uses a tiny microLED display the size of a grain of sand to share critical information, and smart sensors powered by solid-state batteries built into a scleral lens that also corrects your vision. By overlaying digital information onto our world, Mojo Lens empowers each of us to be our best self in any situation.

- Many augmented reality (AR) solutions try to create immersive experiences that can clutter reality. Mojo Lens is different.
- It quietly provides you with crucial data while you're engaged in events that demand your attention.
- You can see trails on a ski slope, your pace for your last mile of a run, or talking points for a presentation, all without holding a device or looking down at a screen.
- With its invisible, wearable display, Mojo Lens helps you keep your concentration by providing information heads-up and hands-free.



5G - IoT Architecture

An end to end solution



EXPERIMENTAL STUDY

- On March 24, 2022: Bharti Airtel (“Airtel”), India’s premier communications solutions provider, today showcased 5G’s high-speed, low latency capabilities to transform the future of video entertainment and take the user experience to the next level.
- Using cutting edge immersive video technologies over its high speed 5G test network, Airtel recreated the in-stadia experience of Kapil Dev’s famous 175 not out vs Zimbabwe, during the 1983 Cricket World Cup.

- A special 175 Replayed video, in 4K mode, brought to key moments from the match to life, which had no video footage due to a strike by TV technicians.

APPLICATIONS

- Enhanced mobile media in terms of increased speed and reduced latency leading to almost negligible or slight delay in video streaming.
- Advanced and Immersive media like Augmented Reality (AR) and Virtual Reality (VR) have a head start.
- Helping in improved Mission Critical Services by higher networking speeds and accurate location tracking leading to perfect or 99% correct ETA(s).
- Social sharing at Crowded venues. There is no longer a need to fight for a good bandwidth in crowded venues as the speeds you will be getting upto 20Gb/s
- Gaming experiences will be redefined. Fully interactive gaming can be made both technologically and economically possible with 5G.

CONCLUSIONS

- 5G has massive uses in the domains of IoT as discussed before and it will enable a lot more advancements in other domains as well.
- 5G will pave a path for future technologies to build upon which will make the entire ecosystem a much more reliable and secure.
- IoT at the moment is limited because of low transmission speeds, latency and primarily, lack of infrastructure. These drawbacks can be easily overcome with the use of IoT.
- The media and entertainment industry will benefit from 5G because of all the advancements it will bring in from other domains.

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Thank you!!