Capacity Building initiatives by NTIPRIT

in 5G

for Private and Public Sector Stakeholders

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DDG-NTIPRIT

National Telecommunications Institute for Policy Research, Innovation and Training

Capacity Building initiatives by NTIPRIT in 5G

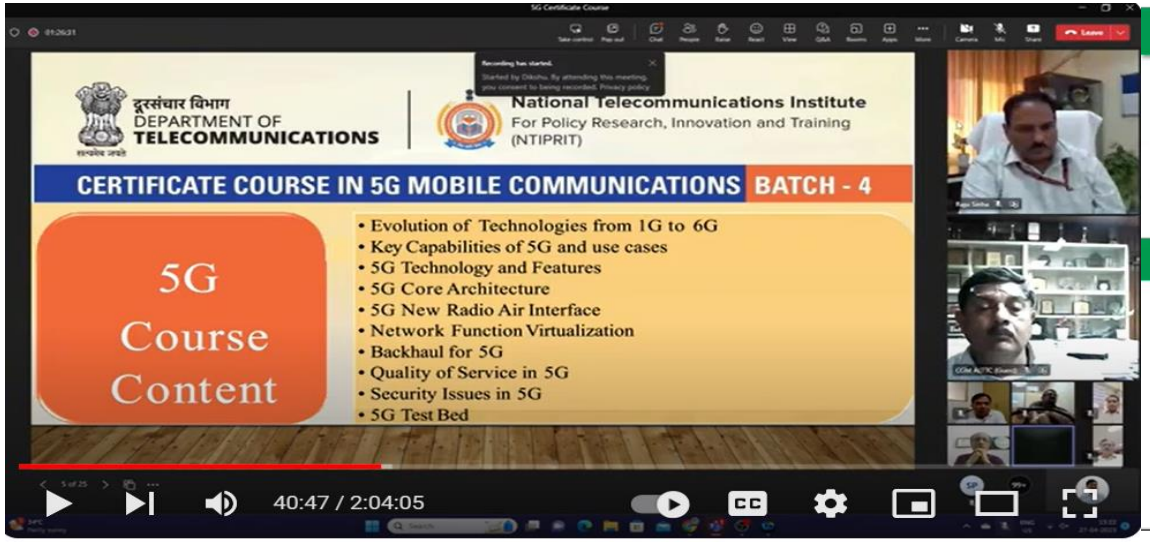
5G Certificate Course Content

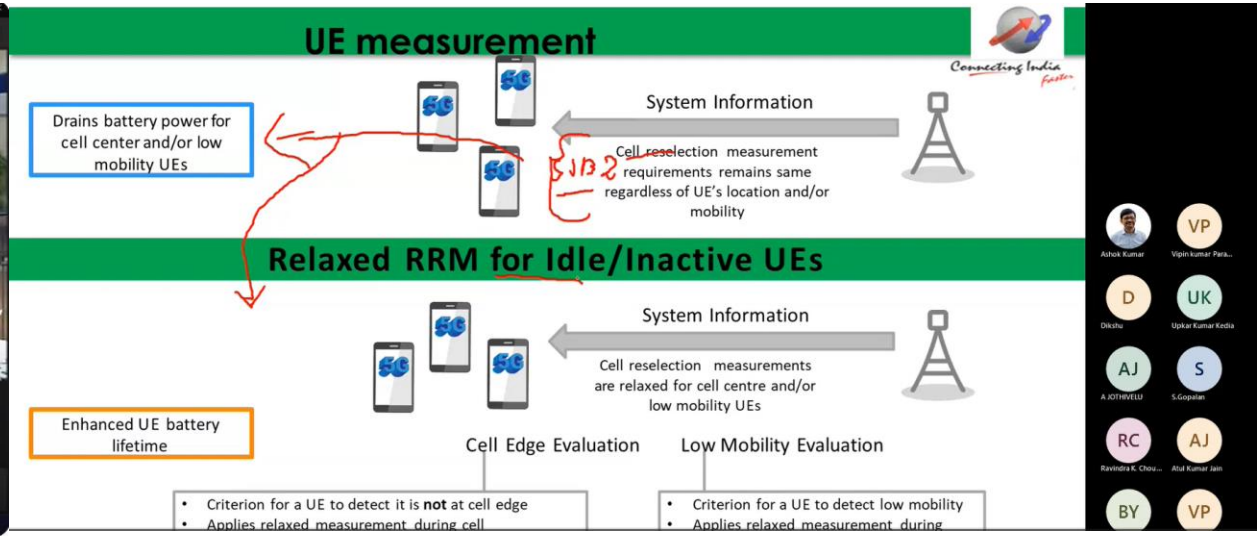
- 5G Key Capabilities and Use cases
- 5G Technology and Features
- 5G Core Architecture
- 5G New Radio Air Interface
- Network Function Virtualization
- Backhaul for 5G
- Quality of Service in 5G
- Security Issues in 5G
- Open RAN
- 5G Test Bed

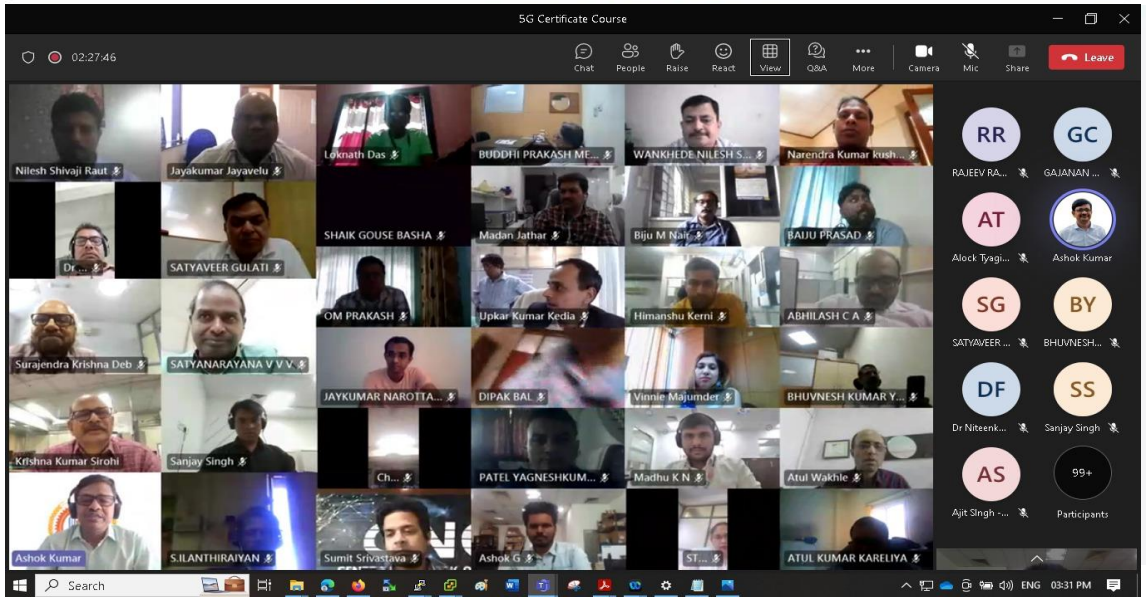
5G Certificate Course

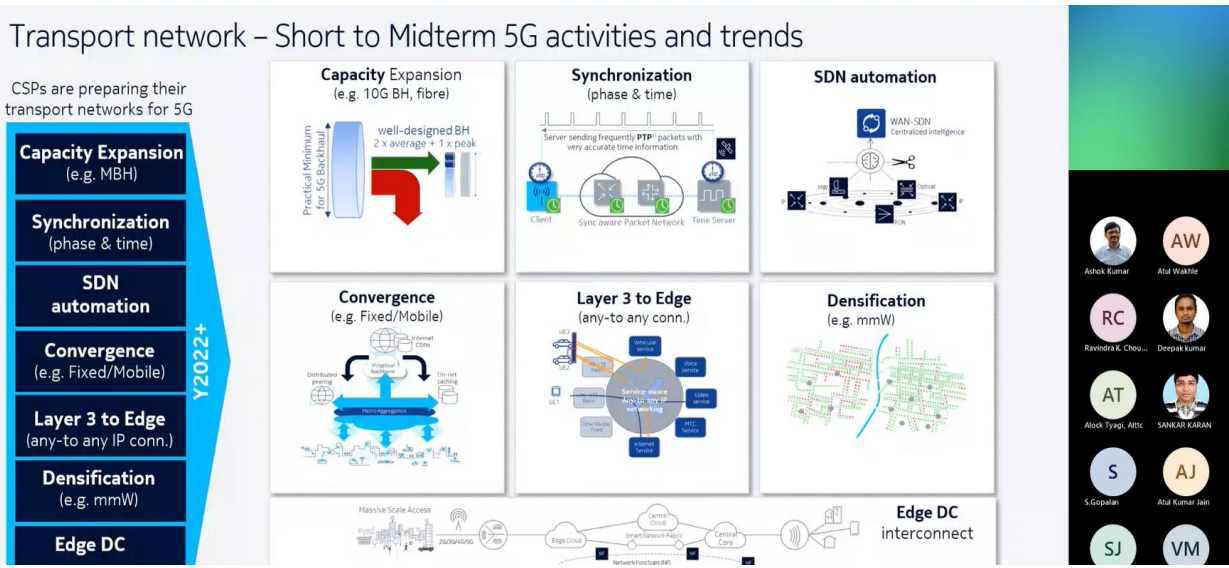
5G Certificate	DoT &Govt Departments	PSU	Academia	Telecom Security Testing Labs	Telecom Sector Skill Council	Course Duration	Total
Batch 1	52	0	0	0	0	36 hrs	52
Batch 2	9	64	0	0	0	36 hrs	73
Batch 3	80	43	0	0	0	36 hrs	123
Batch 4	26	94	45	29	25	15 hrs	209
Batch 5	6	115	59	6	0	36 hrs	186
Total			104	35	25	159	643

5G Certificate On line Course

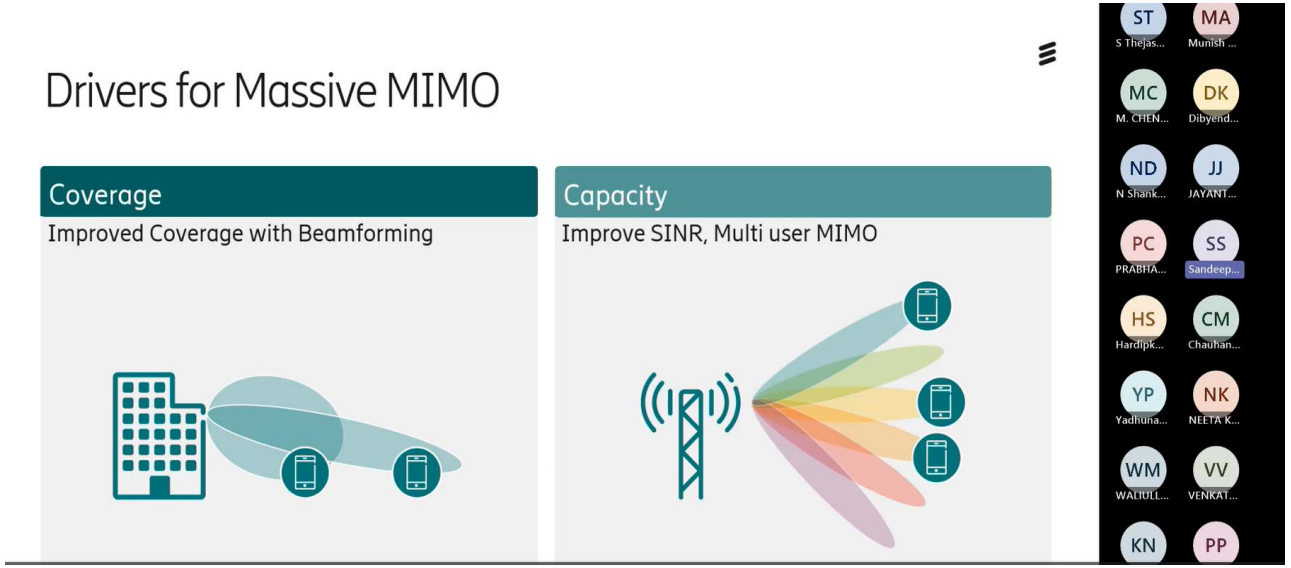


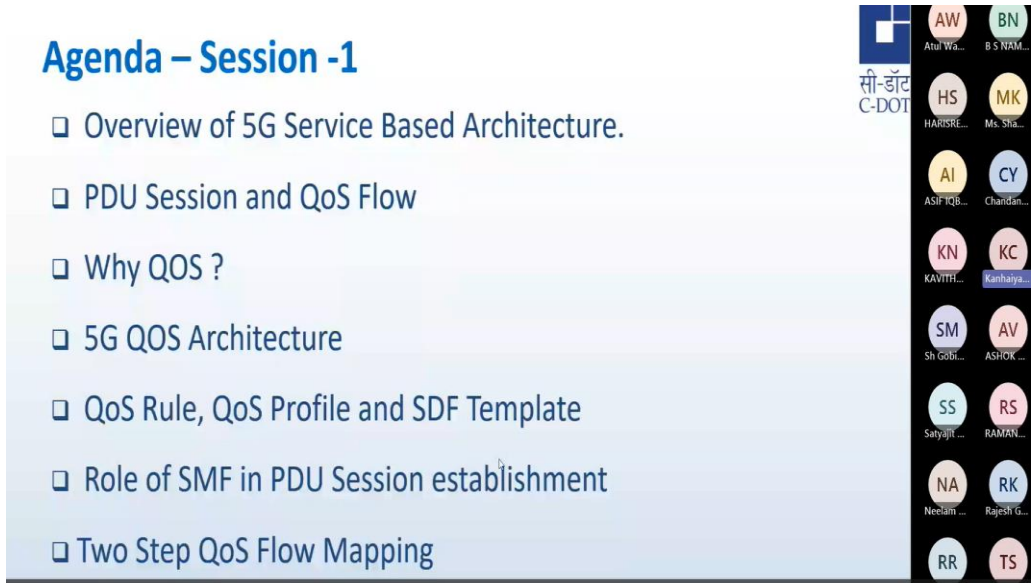


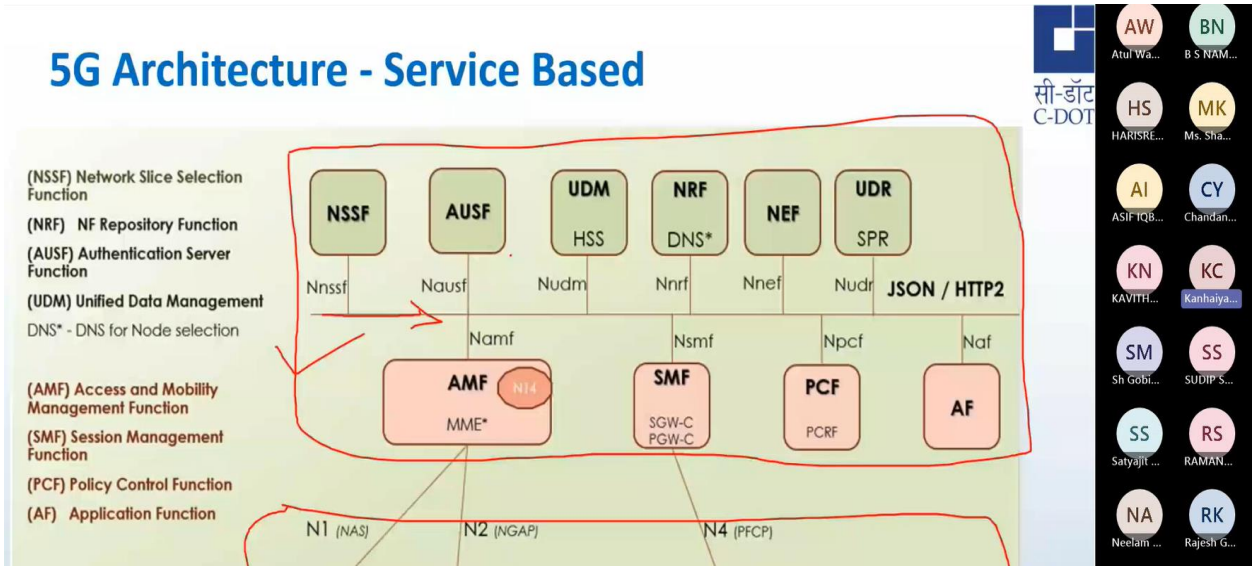




5G Certificate On line Course







5G Use Case Lab Workshops

With an objective to build competencies and engagement in 5G technologies for students and startup communities, 100 5G Use case Labs are being set up by Department of Telecom, India in academic institutes to facilitate the development of applications using 5G services in various socioeconomic verticals e.g. Health, Agriculture, Education, Law & order etc

NTIPRIT organized workshops for 5G Use Case Labs :

- In 4 institutions i.e. IIT Roorkee, IIT Guwahati, IIT Gandhinagar and IIT Madras.
- For 380 Faculty and research scholars of 100 academic institutes of India
- Startups participated in the Workshops showcasing their 5G enabled products
- 5G Labs will pave way for tie up between academic institutes and industry

5G Use Case Lab Workshop at IIT Gandhinagar

5G Use Case Lab Workshop at IIT Madras

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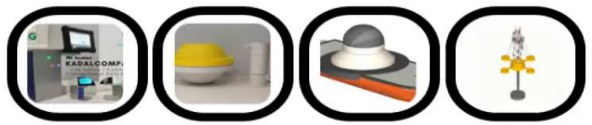
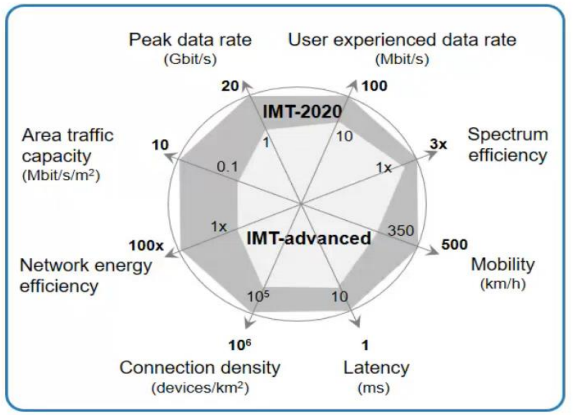
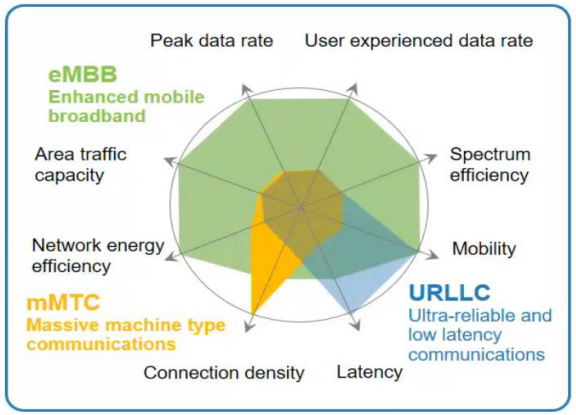


Ocean Mother Device | Under water data mining | Search And Rescue | Ocean Floating Tower

Incorporated On
01/04/2019

Key Capabilities of IMT-2020 Defined by ITU





Source: Recommendation ITU-R M.2083

5G is characterized by increased data rate, enhanced spectrum efficiency and reduced latency.

1000 times higher mobile data volume per geographical area., 10 to 100 times more connected devices.
10 times to 100 times higher typical user data rate., 10 times lower energy consumption.
End-to-End latency of < 1ms.. Ubiquitous 5G access including in low density areas.

Webinar Series

- Overview of 5G Network Architecture and RF Interlace
- 5G Applications and 5G Spectrum - Industry Perspective
- 5G Identities
- Network Function Virtualization and Cloud Native Infrastructure for 5G
- 5G security
- Quality of Service in 5G Network
- OPEN RAN: Opportunities for India
- 6G The Road Ahead
- 5G Use Cases for Logistics and Manufacturing Sector
- 5G Use cases for Power Sector
- 5G Use cases for Health and Agriculture Sector
- Digitally Connected Building

5G for Under Graduate Degree Course

Considering the need for specialized courses and modules on 5G Technology, NTIPRIT, after due consultation with academia and industry, proposed AICTE to include :

- **A full Semester course on "Advanced Mobile Communications" for UG**
- **A 14-hour 5G awareness Program for PG Students**

The course content is

Mobile Communication Overview	Introduction to 5G Communication	5G Network	Current state and Challenges ahead:
• IMT2000, 3G UMTS, W-CDMA, HSPA, HSPA+, 3G services and data rates, • IMT Advanced • 4G, LTE, VoLTE, • OFDM, • MIMO, IMT2020, • LTE Advanced Pro (3GPP Release 13+), • enhancements in comparison to IMT Advanced.	• 5G potential and applications, Usage scenarios, • enhanced mobile broadband (eMBB), • ultra reliable low latency communications (URLLC), massive machine type communications (MMTC), • D2D communications, V2X communications, • Spectrum for 5G, • spectrum access/sharing, millimeter • Wave communication, channels and signals/waveforms in 5G, carrier aggregation, small cells, dual connectivity.	•New Radio (NR), Standalone and non-standalone mode, • non-orthogonal multiple access (NOMA), •massive MIMO, beam formation, PHY API Specification, • Service Data Adaptation Protocol (SDAP), centralized RAN, •open RAN, multi-access edge computing (MEC); •Introduction to software defined networking (SDN), network function virtualization (NFV), network slicing; restful API for service-based interface, private networks.	•5G penetration in developed countries; deployment challenges in low-middle income countries, •stronger backhaul requirements, •dynamic spectrum access and usage of unlicensed spectrum, •contrasting radio resource requirements, large cell usage, •LMLC, possible solutions for connectivity in rural areas (BharatNet, •TVWS, Long-range WiFi, FSO); non-terrestrial fronthaul / backhaul solutions: LEOs, HAP/UAV.

दूरसंचार विभाग
DEPARTMENT OF
TELECOMMUNICATIONS
सत्यमेव जयते

National Telecommunications Institute
For Policy Research, Innovation and Training
(NTIPRIT)

WORKSHOP ON **"5G** AND **CYBER SECURITY"** FOR CENTRAL GOVERNMENT OFFICERS

Date : 27.08.2021 | Time: 10:00 - 17:30 Hours IST | Duration: 1 Day

Venue: Civil Services Officer's Institute (CSOI), Vinay Marg, Chanakyapuri, Delhi - 110021

The programme was attended by over 65 participants of the level of Joint Secretary and above from more than 25 Central Government Ministries.

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DEEPAK CHATURVEDI
SRIVASTAVA

National Telecommunications Institute
For Policy Research, Innovation and Training
(NTIPRIT)

HIPA | HARYANA INSTITUTE OF PUBLIC ADMINISTRATION
GURUGRAM
LEARN TO GOVERN

WORKSHOP ON "5G AND ITS USE CASES" FOR STATE GOVERNMENT OFFICERS

Date : 26.08.2022 | Time: 09:30 - 17:30 Hours IST | Duration: 1 Day

Venue: Haryana Institute of Public Administration, 76 HIPA Complex, Sector 18, Gurugram, Haryana - 122001

The programme was attended by over 45 participants of Haryana State Government and organisations

WORKSHOP ON "5G AND ITS USE CASES" FOR NORTH EASTERN REGION

Date : 12.10.2022 | Time: 10:00 - 13:30 Hours IST

Venue: Conference Hall, North East Council, Nongrim Hills, Shillong- 793003

The programme was attended by over 100 participants North Eastern State, TSPs DoT field units and other stakeholders.

List of YouTube Videos

1. Learn Evolution of Mobile Technologies from 1G to 5G
   - https://youtu.be/2J6j3Rn-SZw

2. Learn 5G in 5 Minutes
   - https://youtu.be/ULEjpsSc5pU

3. 1G to 5G Evolution and 5G Use cases in Hindi
   - https://youtu.be/cLXyvMqaSTI

4. 5G Core Network Architecture Part 1/3
   - https://youtu.be/W4M3_FYO2WY

5. 5G Core Network Architecture Part 2/3
   - https://youtu.be/LXycgJFVkPg

6. 5G Core Network Architecture Part 3/3
   - https://youtu.be/ZaupZZkwTq4

7. Playlist of 5G Radio Interface
   - https://youtube.com/playlist?list=PLupYZ2gCg55FuY0VCUIV2rw9manW0Nvyr

8. Playlist of 5G Radio Frame Structure in byte size videos
   - https://youtube.com/playlist?list=PLupYZ2gCg55F7vJxo8ekOt6voLQDXE0UA

9. Playlist of 7 videos on Open RAN
   - https://youtube.com/playlist?list=PLupYZ2gCg55HD8sY0Ktk9VdvcpWY56HG1

10. 5G Massive MIMO
    - https://youtu.be/qr1phg2Ay6U

11. Integrated Access and Backhaul (IAB)
    - https://youtu.be/8PsM3DF2QTQ

12. Network Function Virtualisation and Network Slicing in 5G
    - https://youtu.be/teVNAcwqCZ8

13. Deep Dive into Network Slicing
    - https://youtu.be/VTI-pGGDGow

14. Quality of Service in 5G
    - https://youtu.be/5_pD92OEKw0

15. 5G Drones
    - https://youtu.be/eG8Eo-gBvk8

16. 5G and Satellite

https://youtube.com/playlist?list=PLupYZ2gCg55GAEd8pzV9Fd3su5qlmVyzs

Thank You