

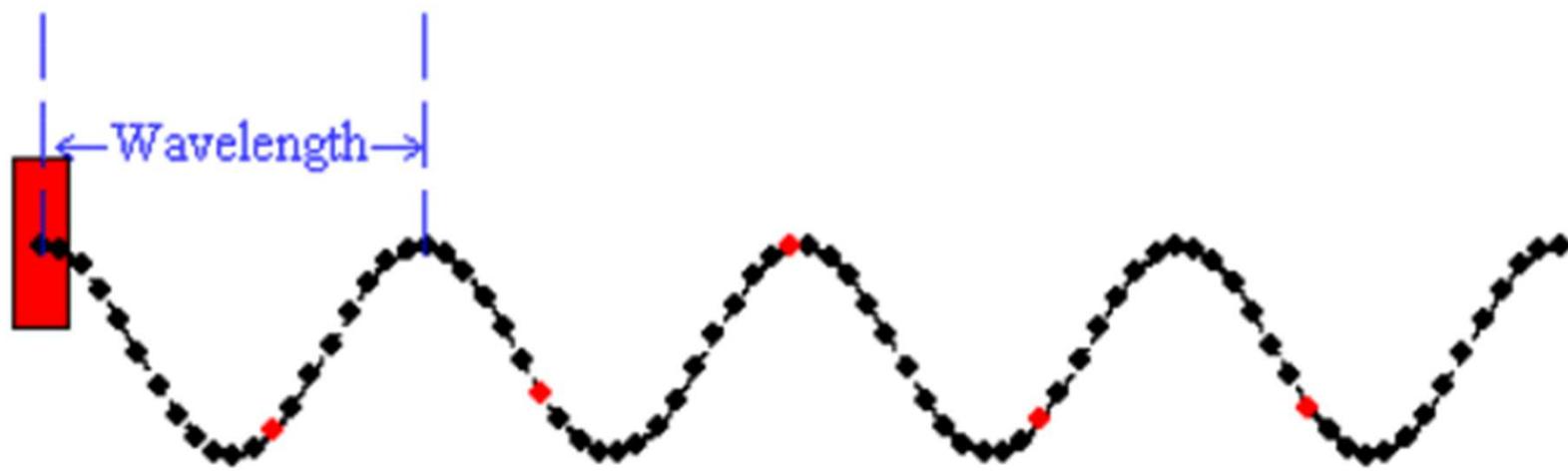
Science and Technology



Topics

- 5G
- Super Computing, Cloud Computing and Edge Computing
- Quantum Technologies
- Blockchain Technology and Cryptocurrencies
- Internet – ICANN, Net neutrality, Dark Net, Space Based Internet
- Deep Learning, Machine Learning, AI
- Data Localization and Data Protection Regime
- Robotics

Transverse Wave



isvr

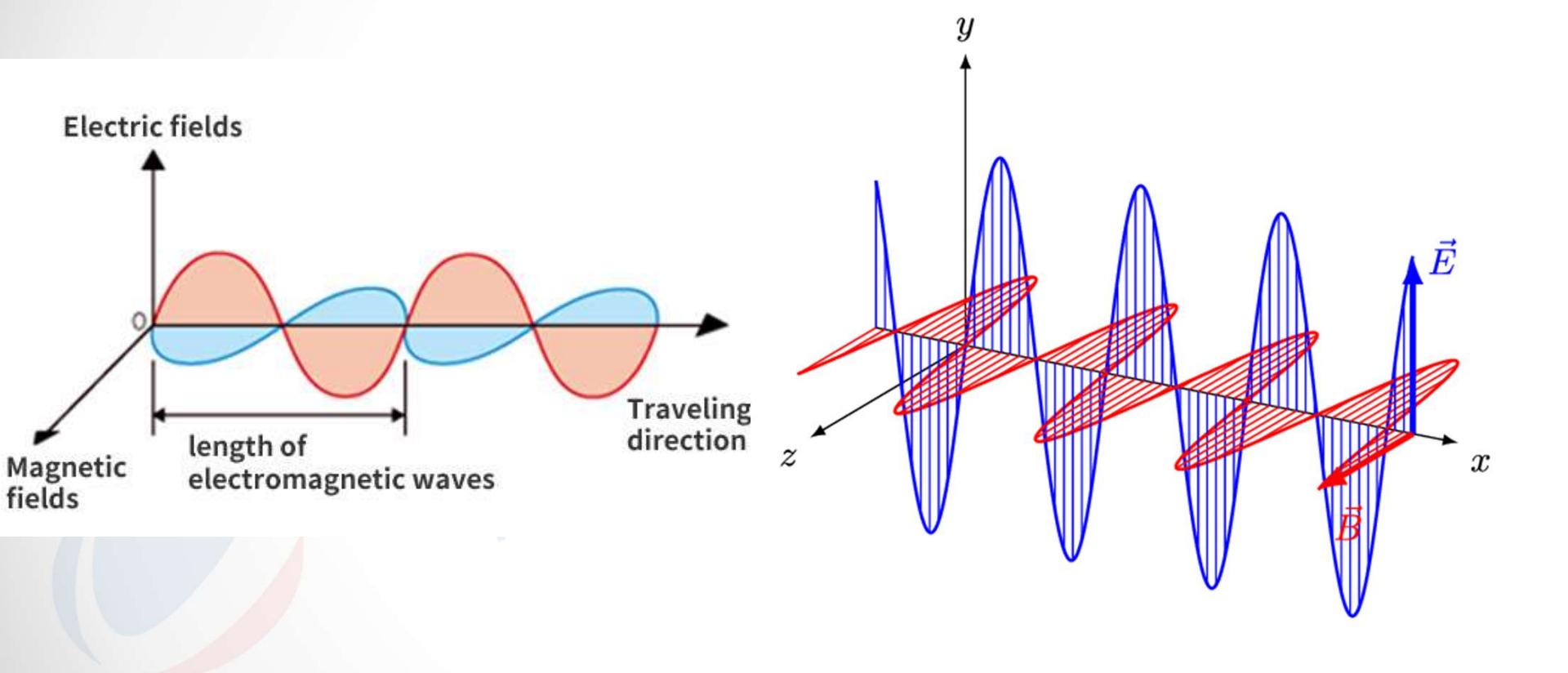


Longitudinal Wave

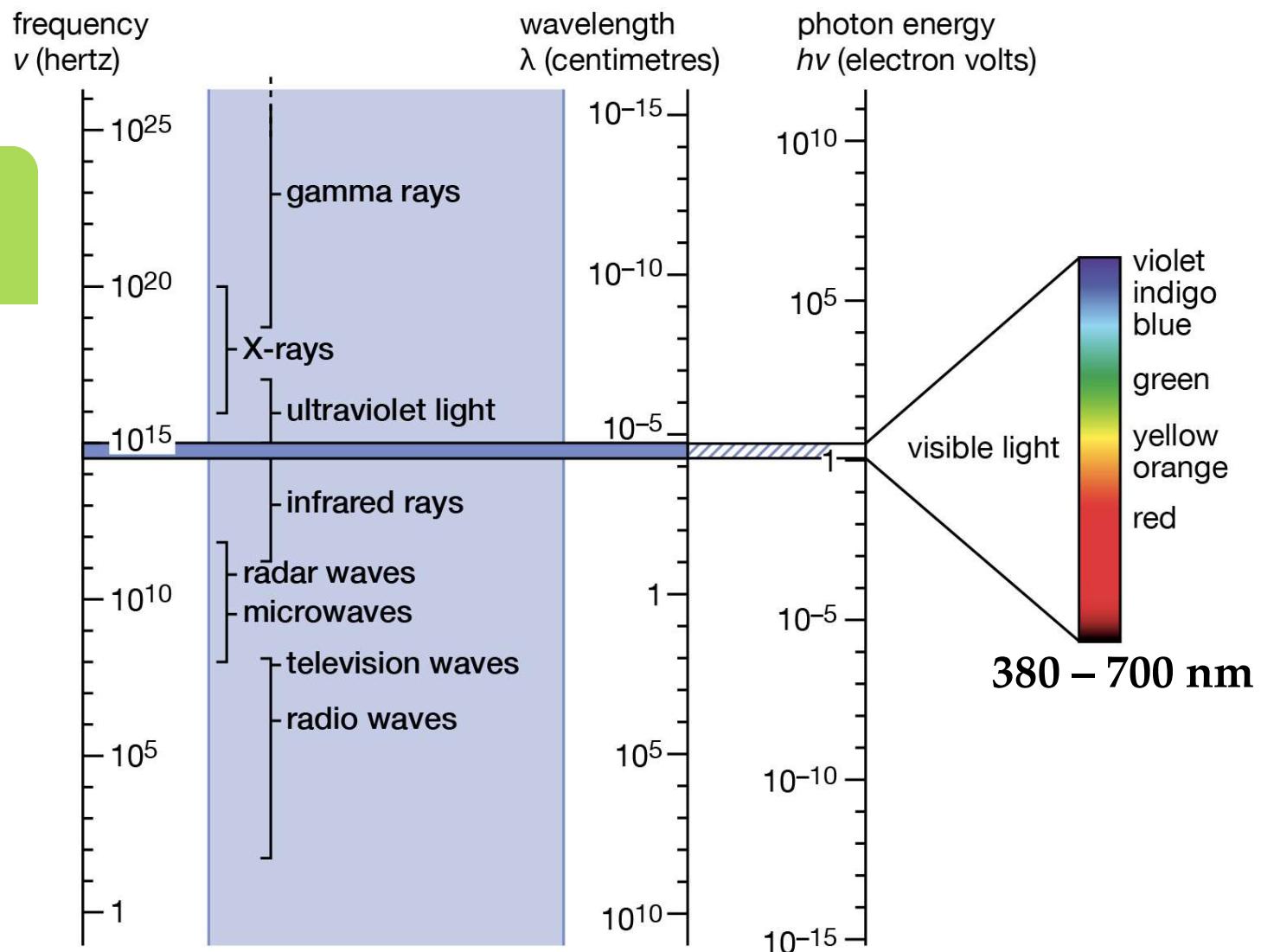


Transverse Wave

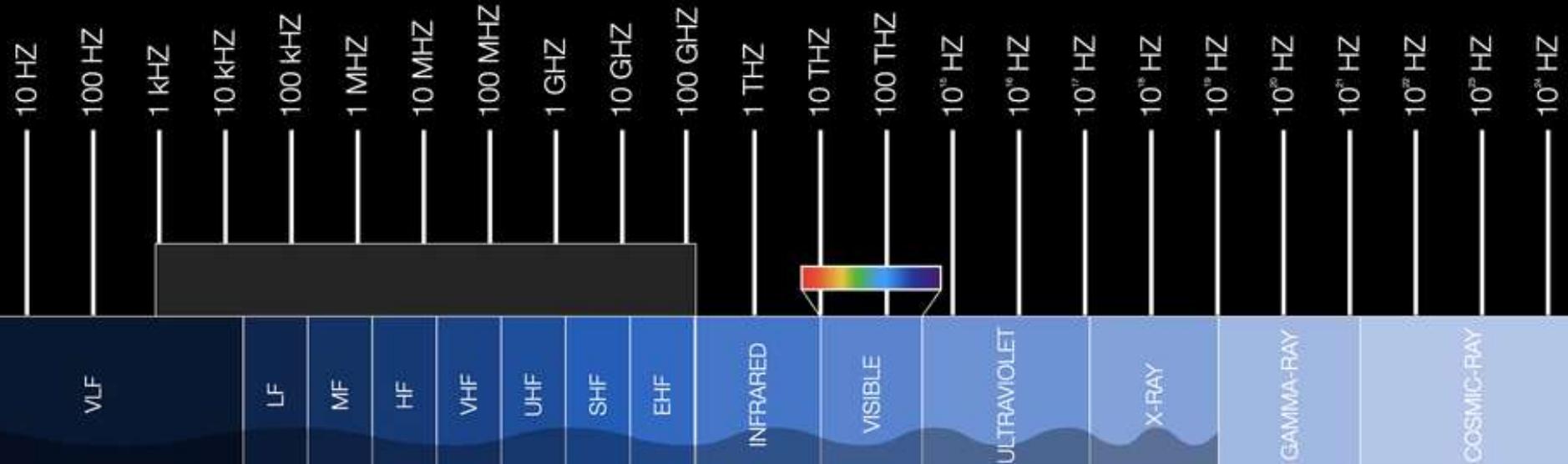
Electromagnetic Waves



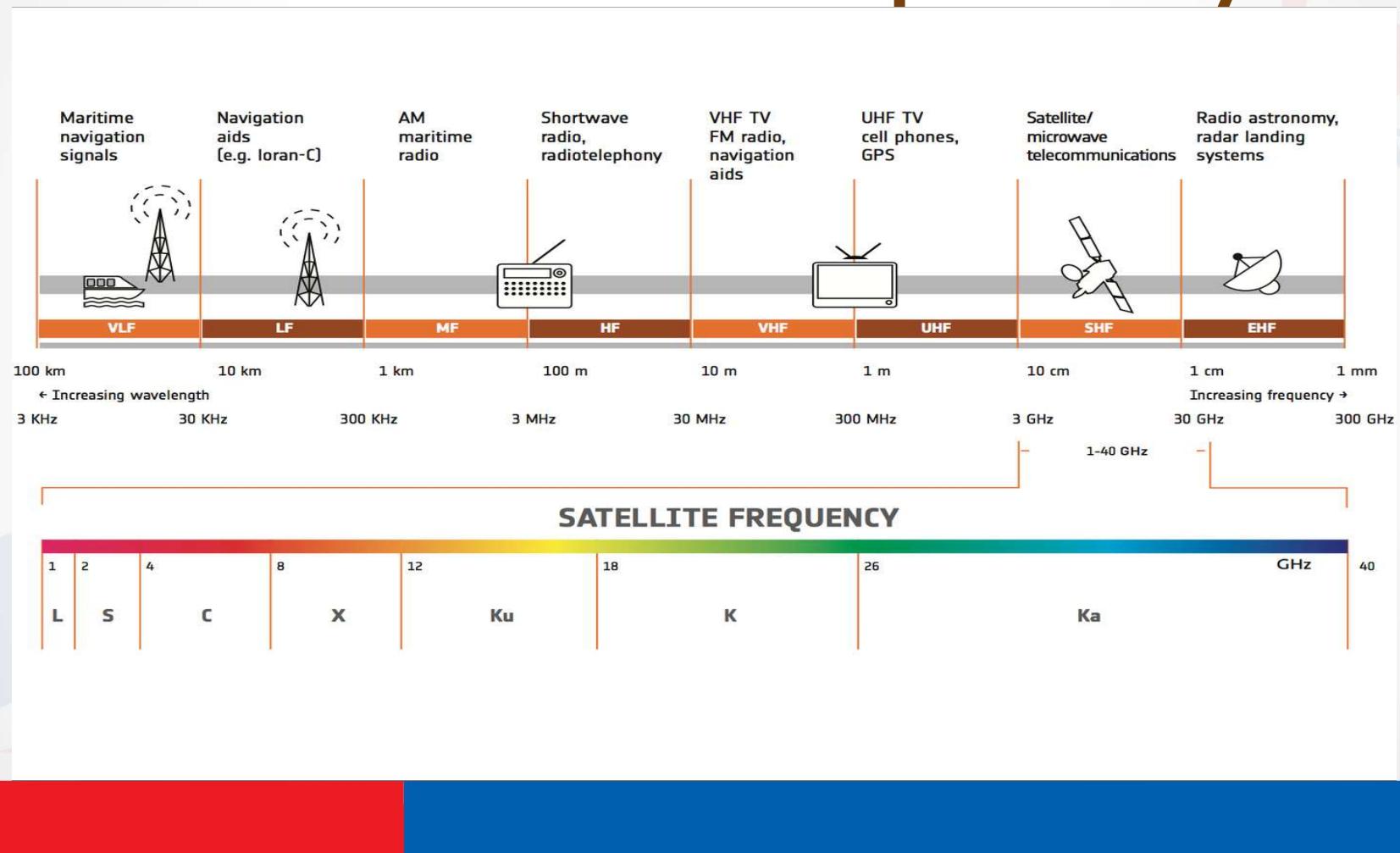
Electromagnetic Spectrum



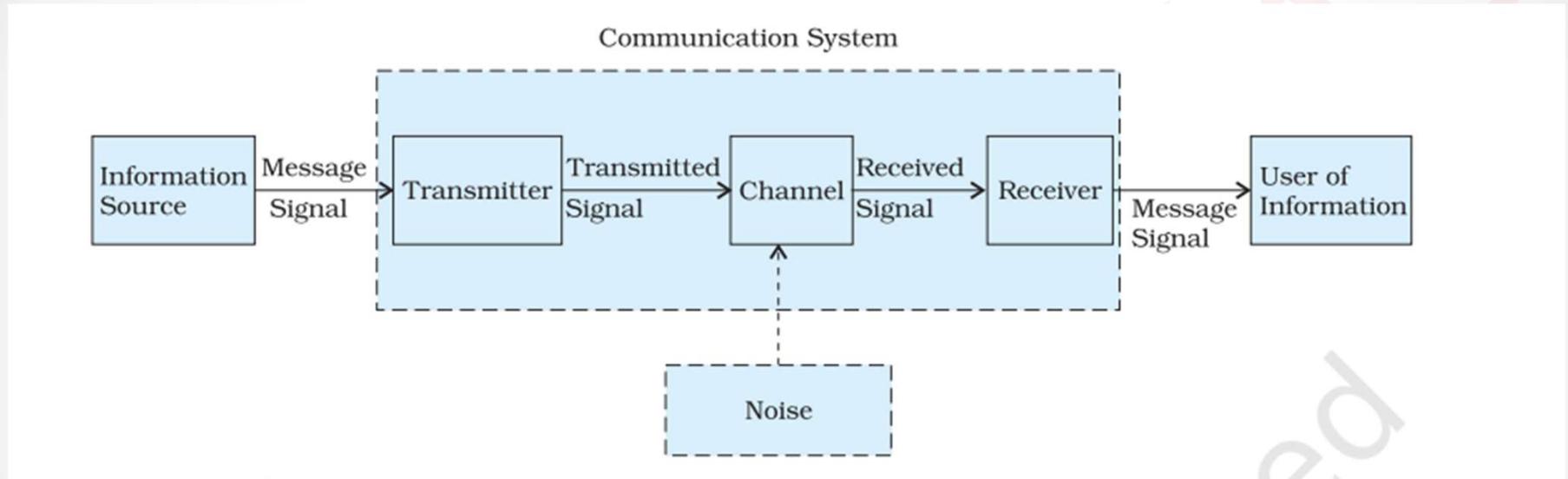
Electromagnetic Spectrum



Satellite Frequency

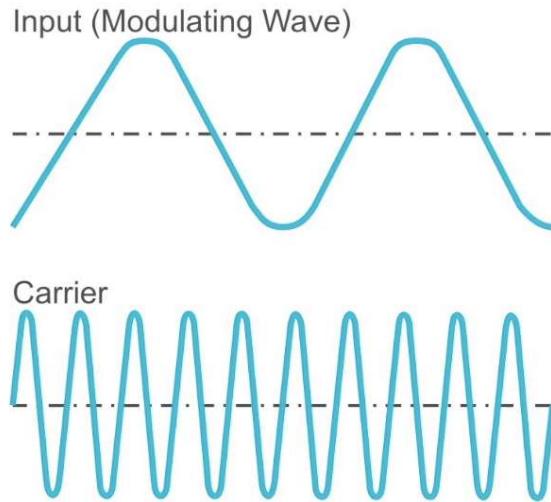


Generalized Communication System

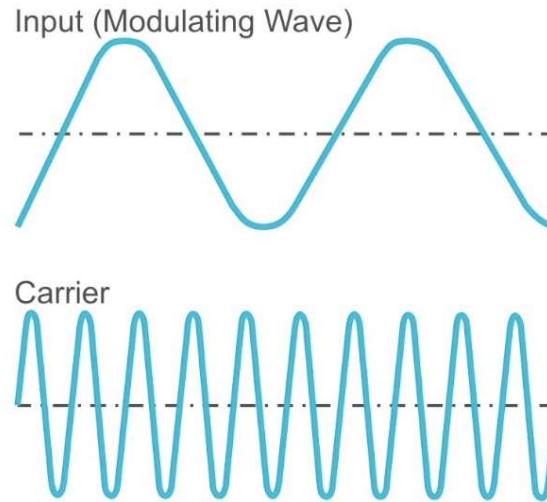


Modulation

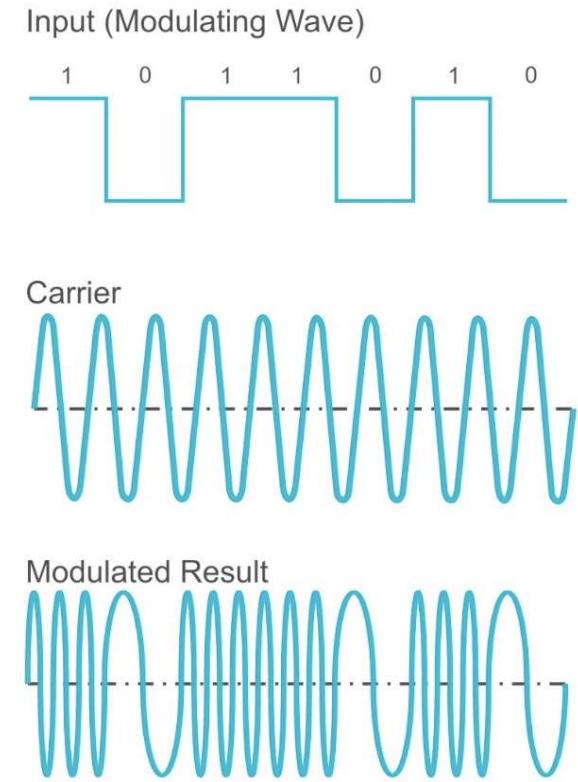
Amplitude Modulation (AM)



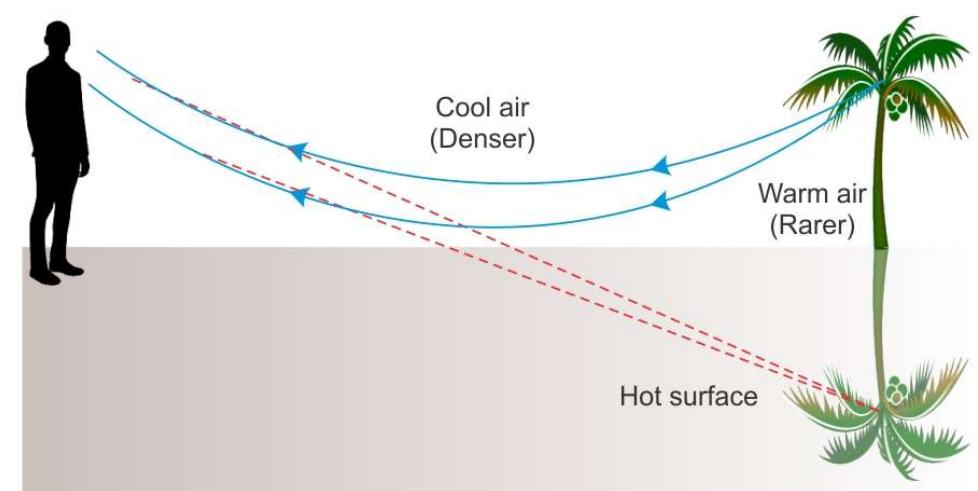
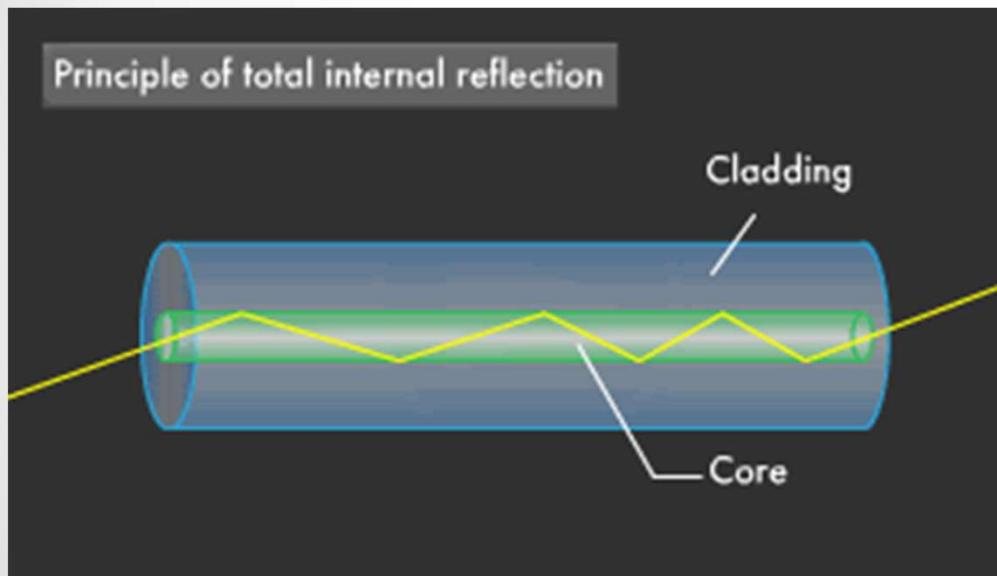
Frequency Modulation (FM)

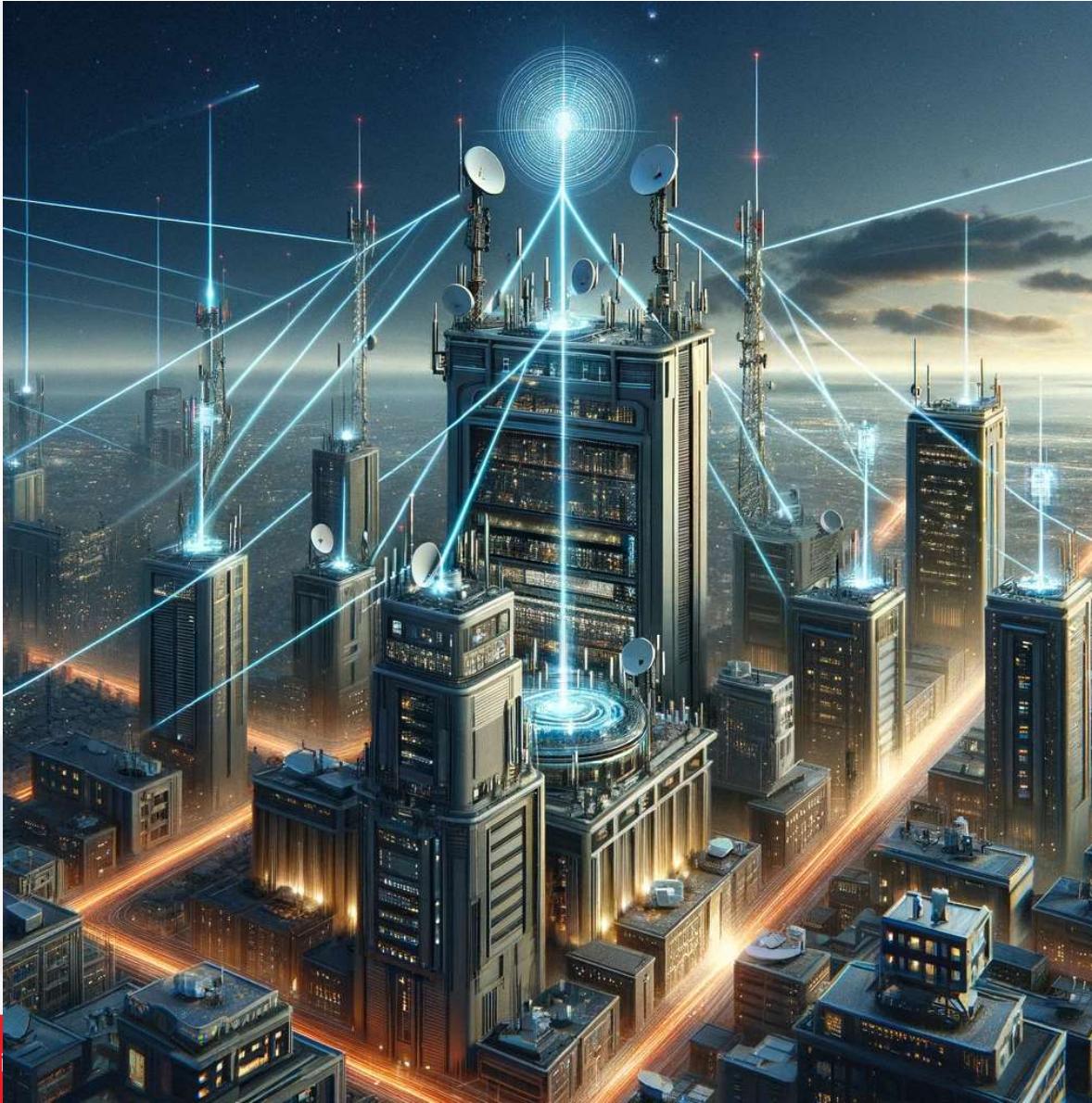


Digital Modulation



Optical Fibre Cables



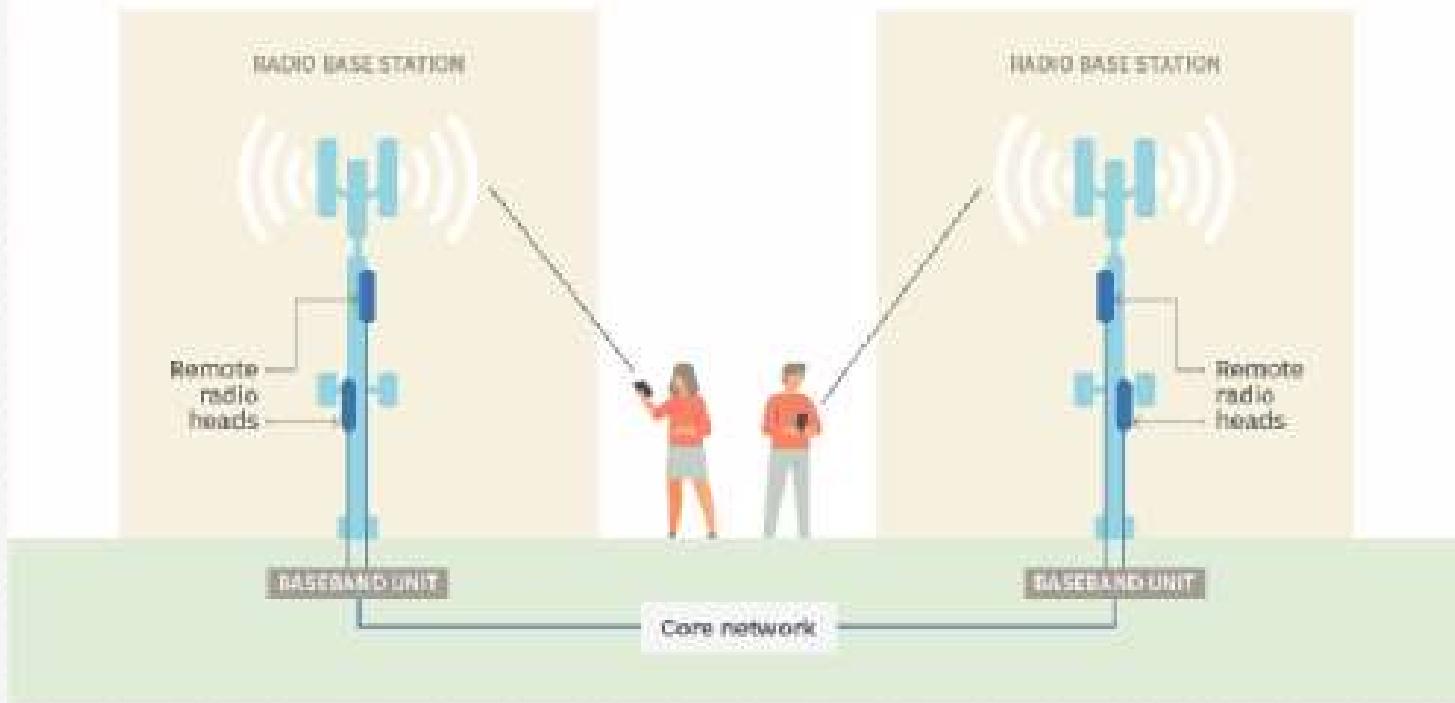


FSOC



LiFi

Basic RAN architecture



History of Mobile Technology

SYNOPSYS®

1G



Analog
Technology



2G



Digital
Technology



3G



Wireless
Capability



4G



Phones Became
Computers



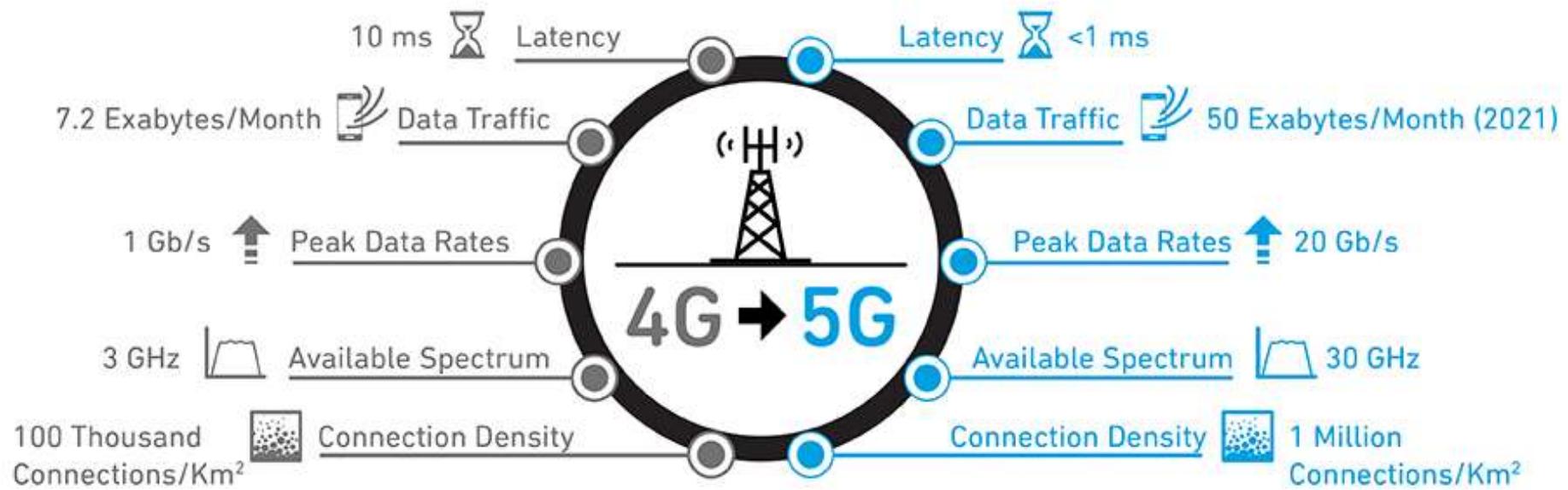
5G

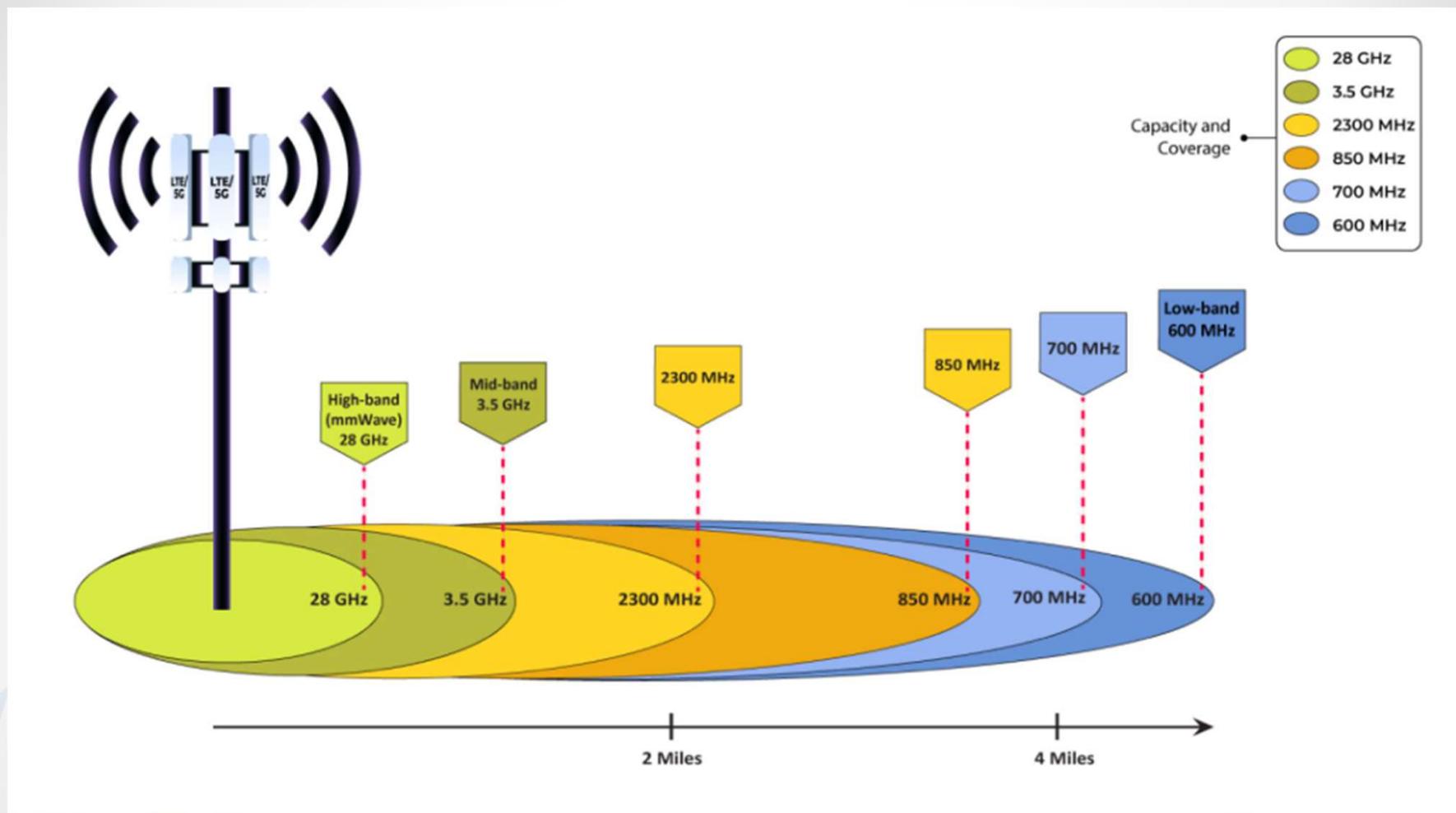


Unparalleled
Latency



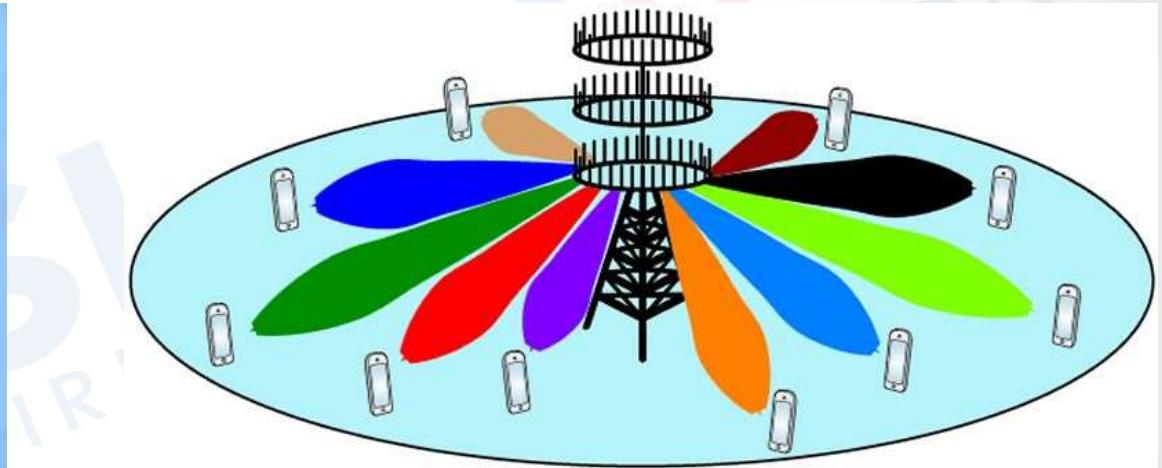
Comparing 4G and 5G

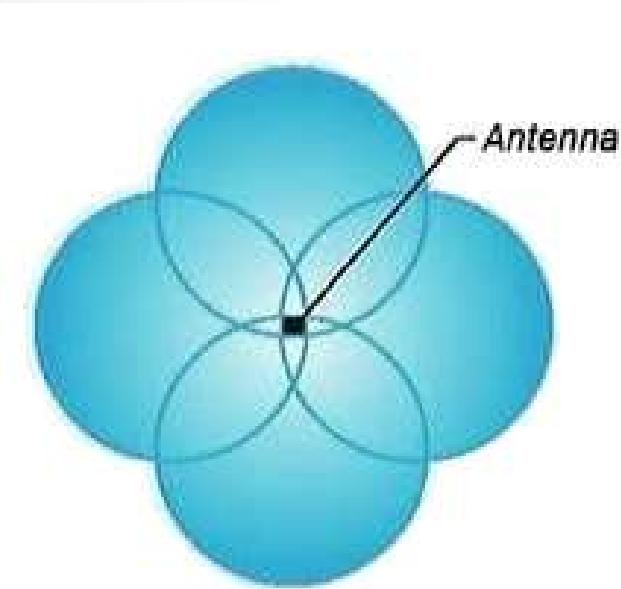




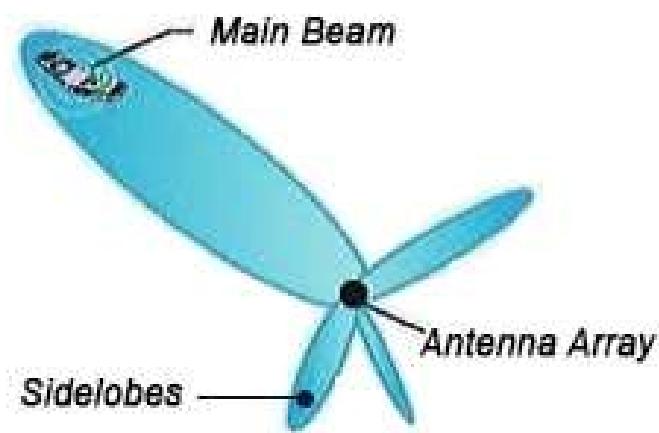
5G Frequency Bands

5G Technologies



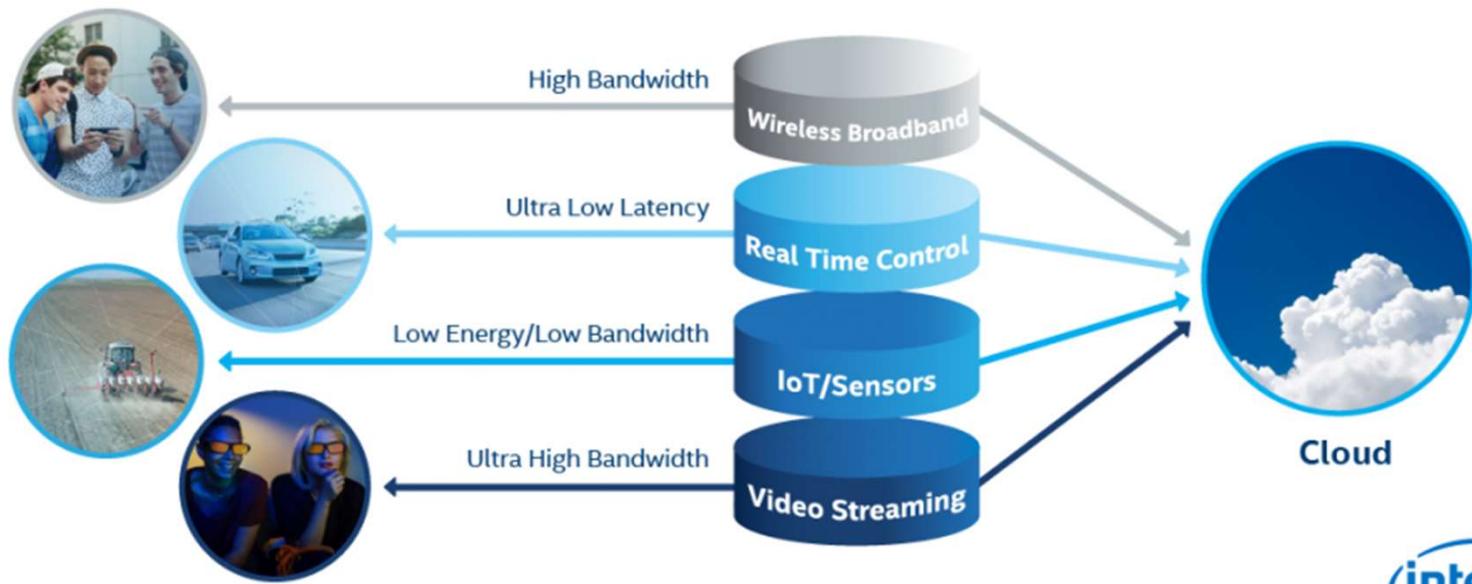


Conventional Array

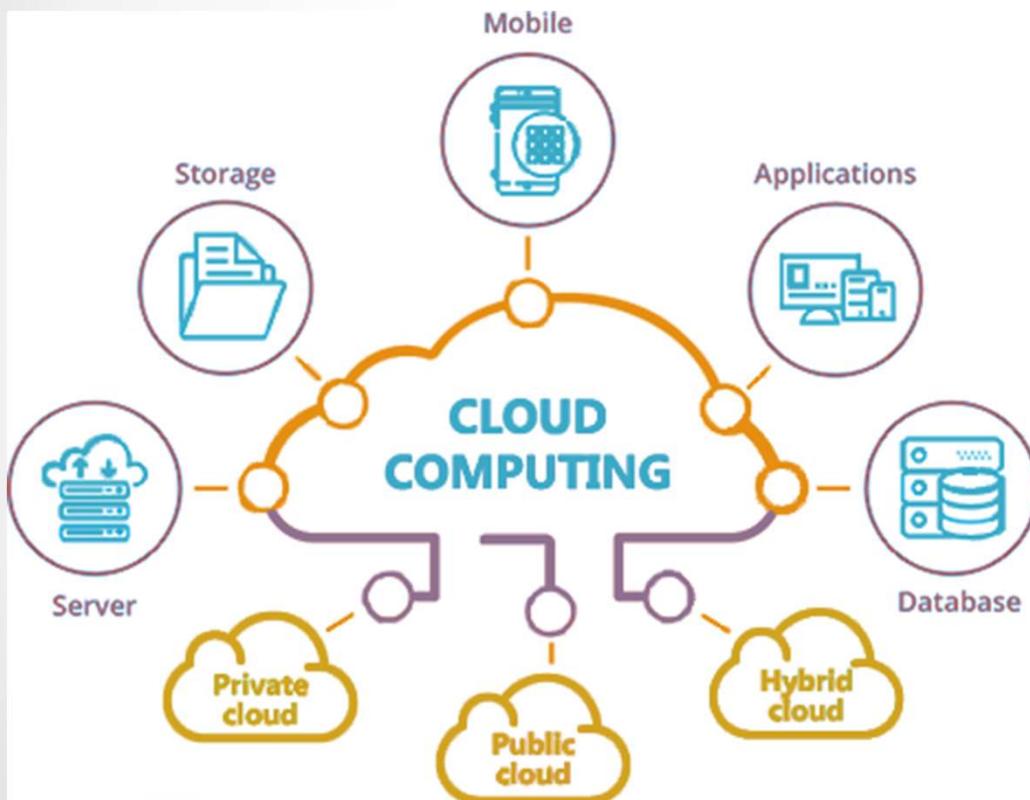


Beamforming Array

5G Network Slices

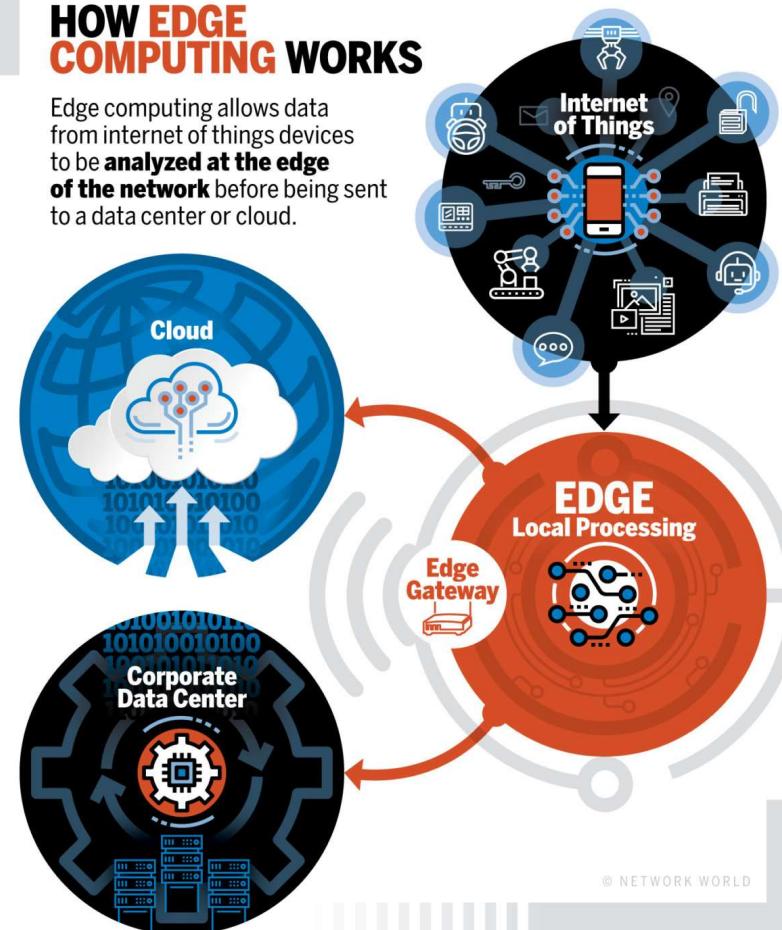


Cloud and Edge Computing



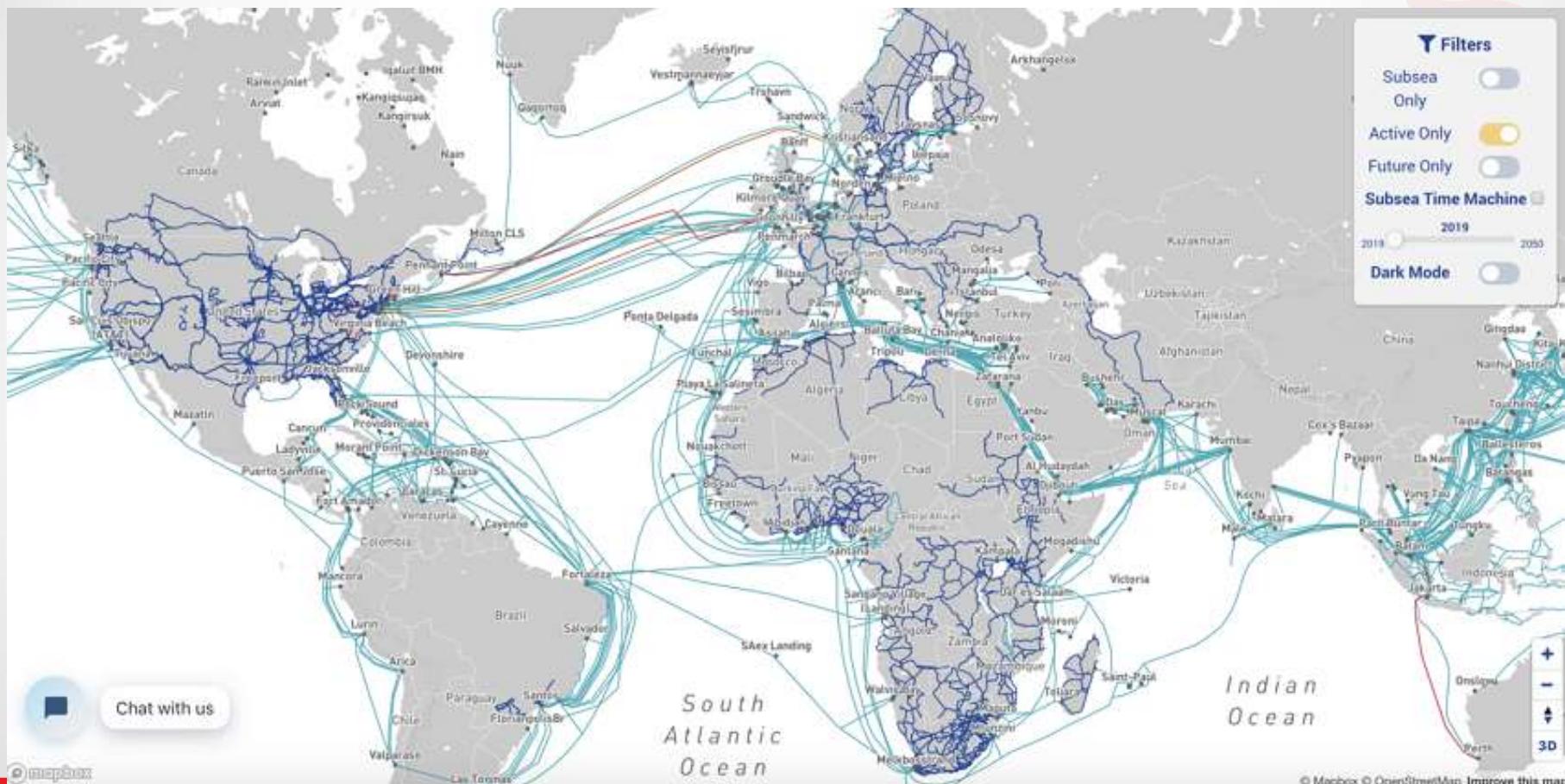
HOW EDGE COMPUTING WORKS

Edge computing allows data from internet of things devices to be **analyzed at the edge of the network** before being sent to a data center or cloud.



© NETWORK WORLD

Subsea Network



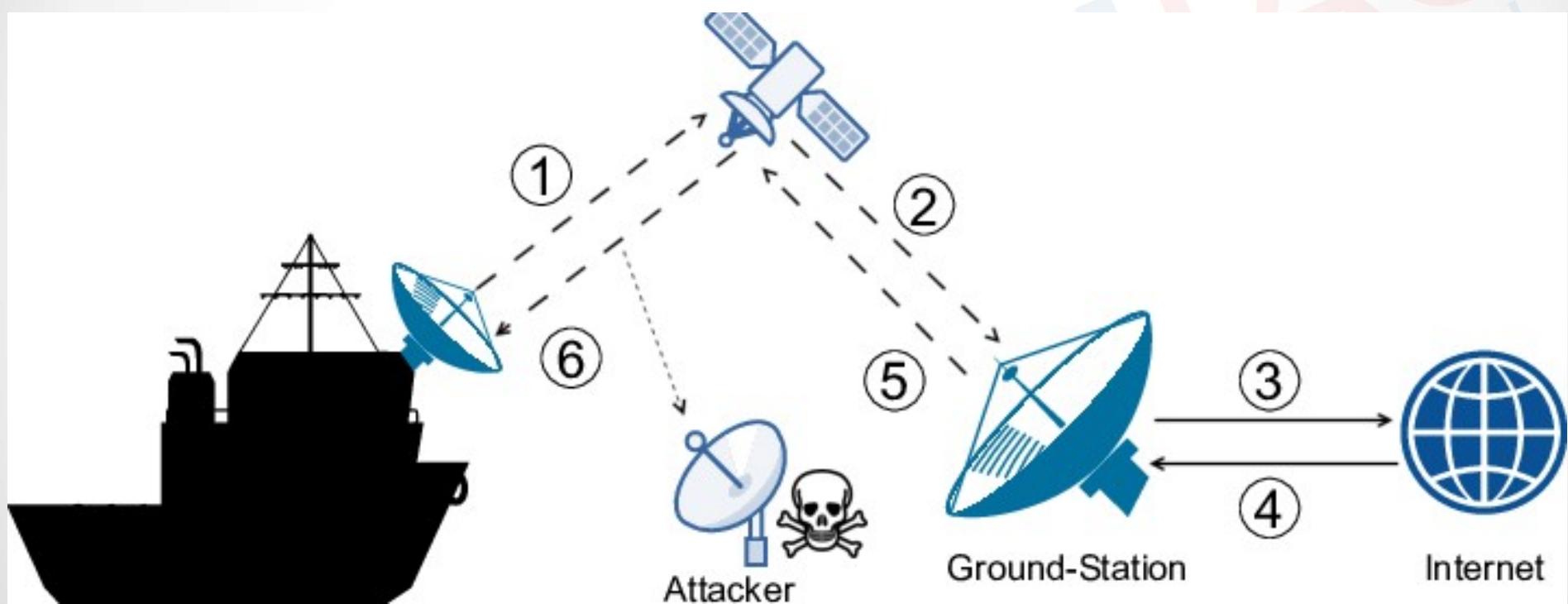
Chat with us



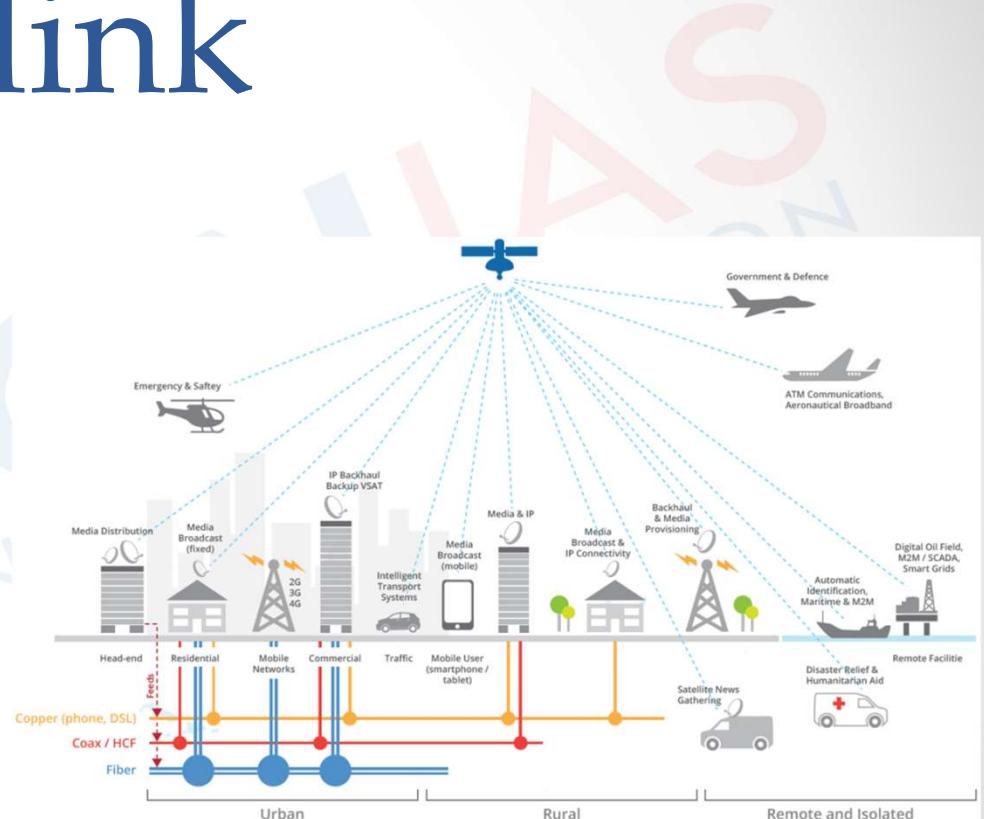
Internet of Things



Maritime VSAT Network



Starlink



Q4. With reference to Visible Light Communication (VLC) technology, which of the following statements are correct?

1. VLC uses electromagnetic spectrum wavelengths 375 to 780 nm
2. VLC is known as long range optical wireless communication.
3. VLC can transmit large amounts of data faster than Bluetooth
4. VLC has no electromagnetic interference.

Select the correct answer using the code given below:

- (a) 1, 2 and 3 only
- (b) 1, 2 and 4 only
- (c) 1, 3 and 4 only
- (d) 2, 3 and 4 only

Q5. With reference to communications technologies, what is/are the difference/differences between LTE (Long-Term Evolution) and VoLTE (Voice over Long-Term Evolution)?

1. LTE is commonly marketed as 3G and VoLTE is commonly marketed as advanced 3G.
2. LTE is data-only technology and VoLTE is voice-only technology.

Select the correct answer using the code given below.

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q5. With reference to 'LiFi', recently in the news, which of the following statements is/are correct?

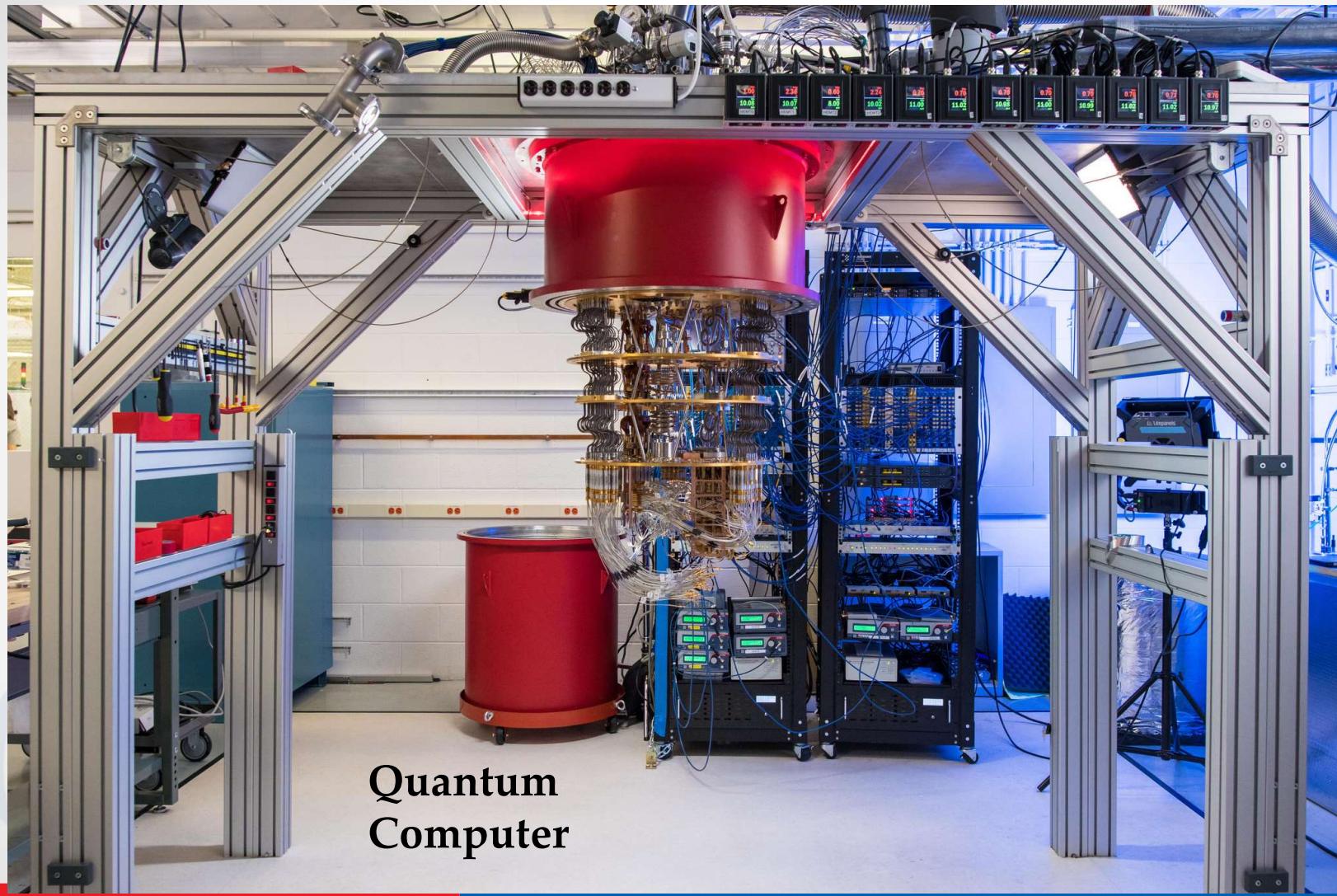
1. It uses light as the medium for high-speed data transmission.
2. It is a wireless technology and is several times faster than 'WiFi'.

Select the correct answer using the code given below.

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

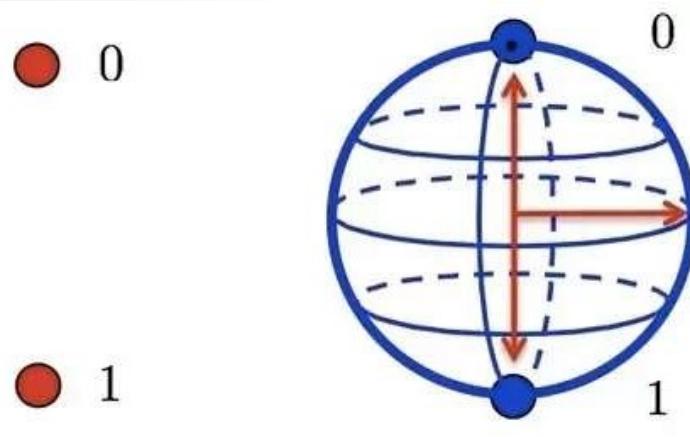
Param Siddhi Supercomputer





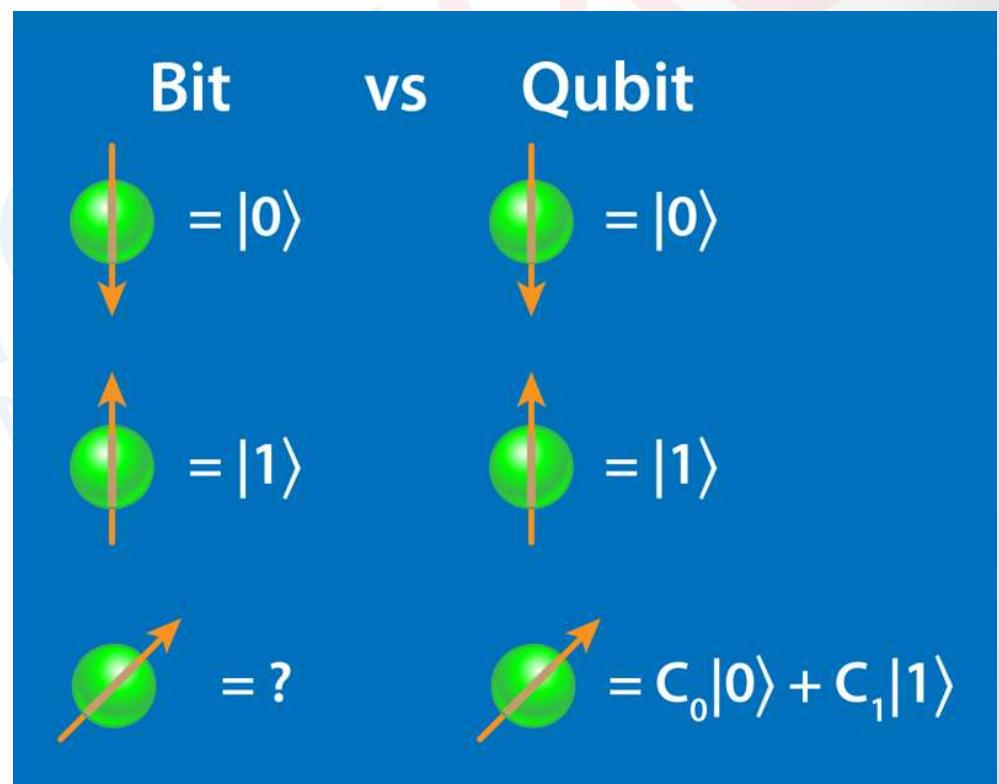
Quantum
Computer

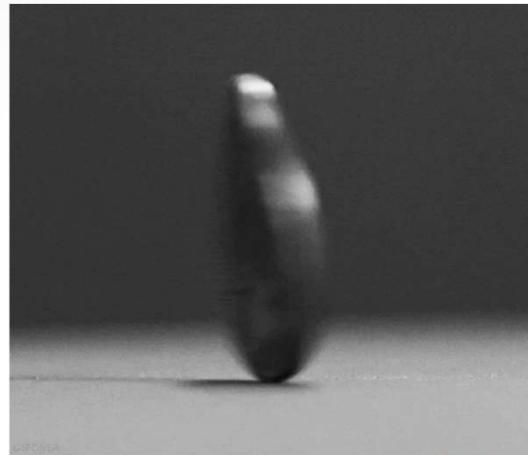
Bit vs Qubit



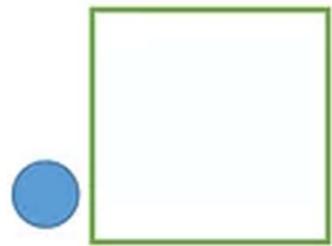
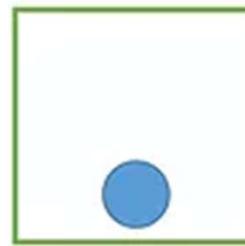
Classical Bit

Qubit

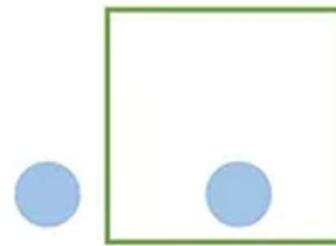




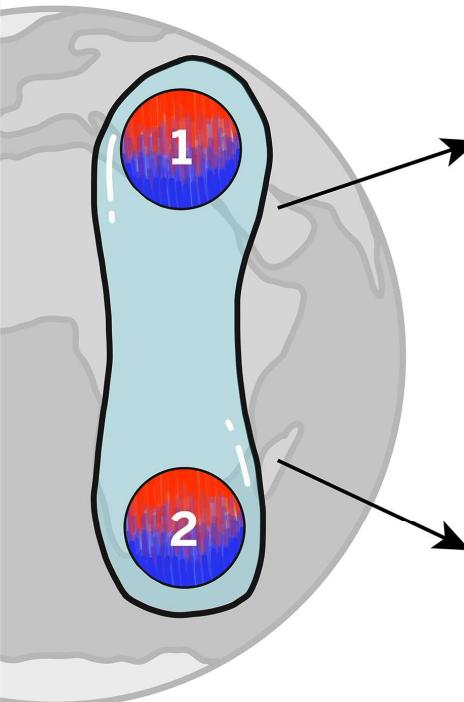
Classical states

 $|0\rangle$  $|1\rangle$

Quantum superposition state

 $|0\rangle + |1\rangle$

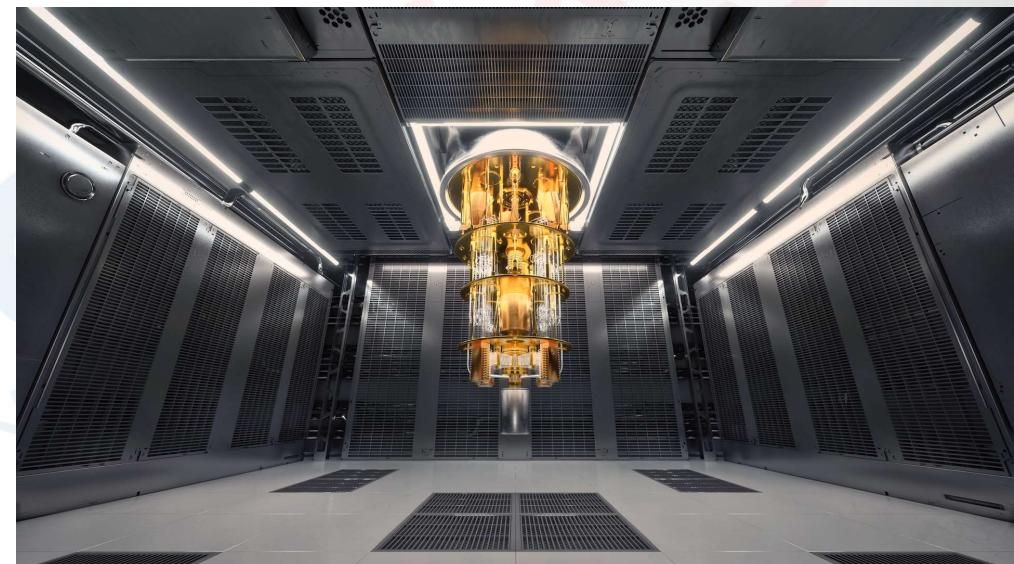
Measuring a Pair of *Entangled Photons*



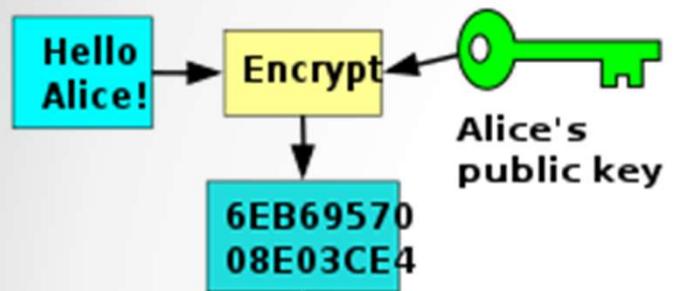
**if 1 is
red then 2 must
be blue**



**if 1 is
blue then 2 must
be red**



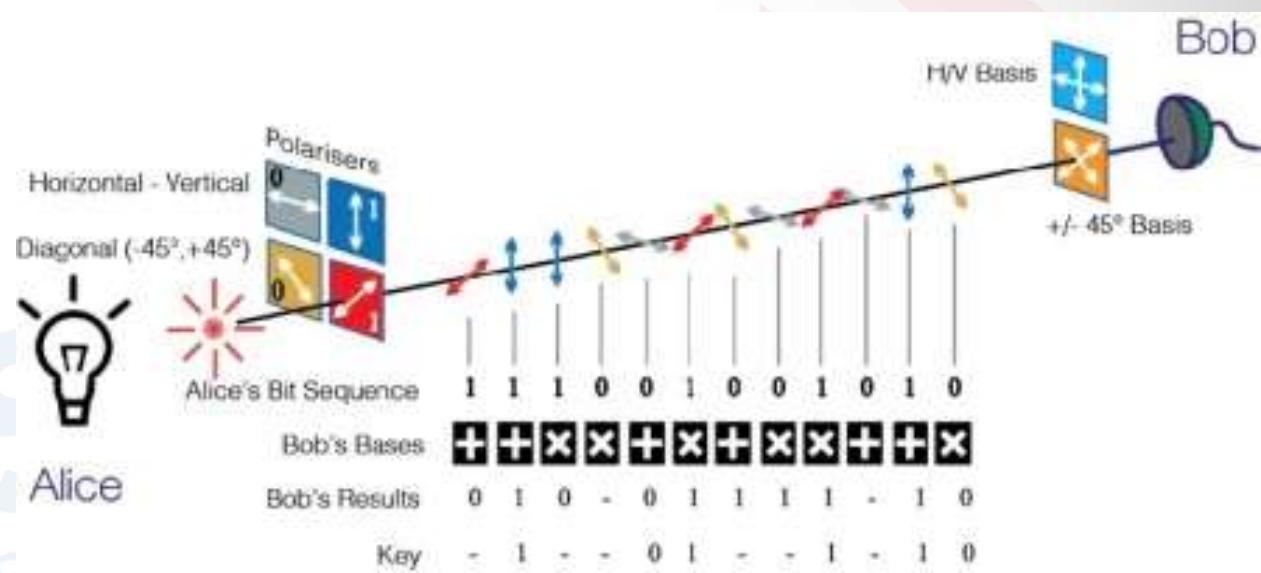
Bob



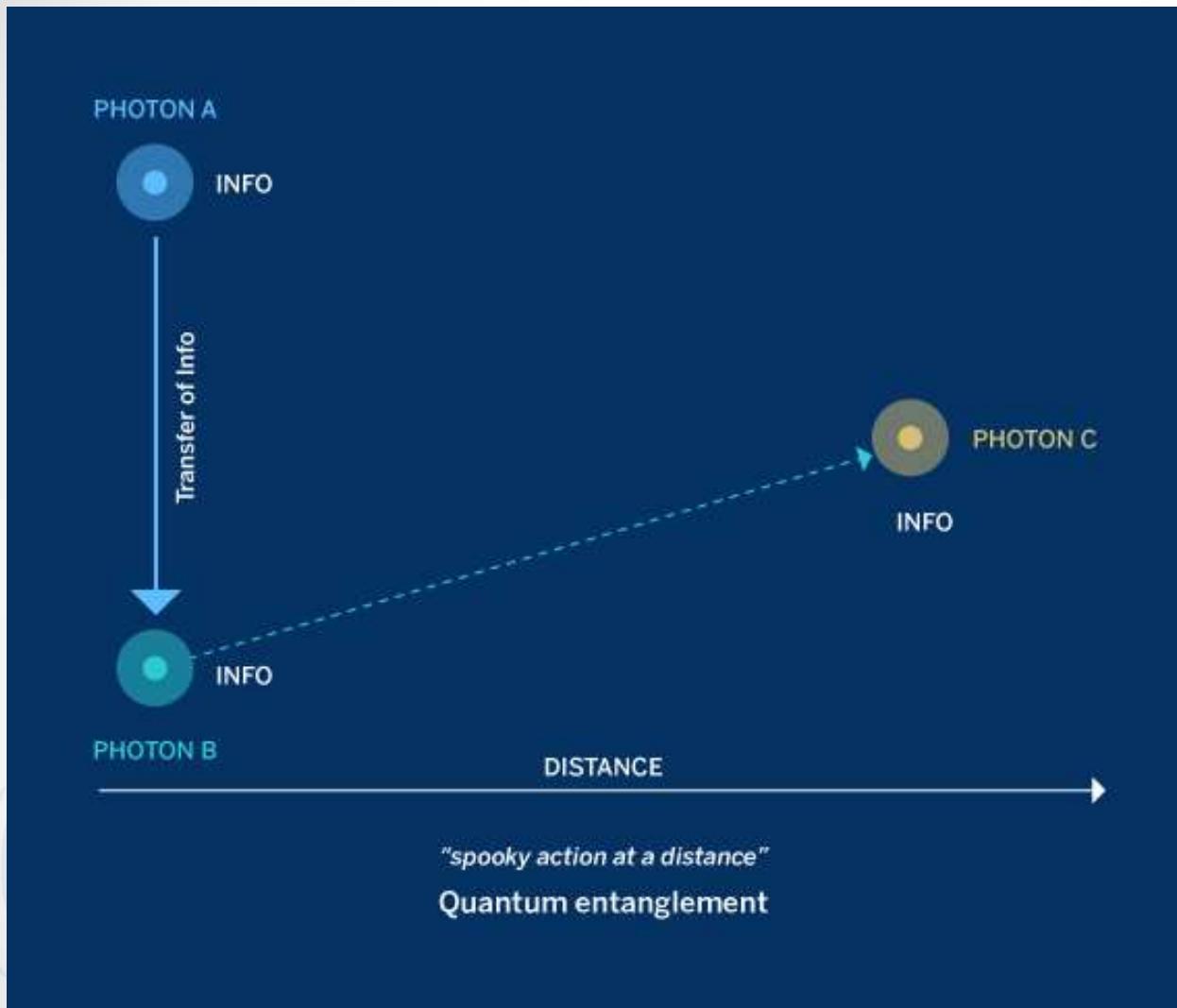
Alice



Public Key
Distribution



Quantum Key Distribution



VISION
IAS
INNOVATION

Quantum Teleportation

3 PARTS OF THE WEB

SURFACE WEB

Only represents about 5% of total internet content

Sites that can be indexed and accessed from search engines

Visible to average users without using The Onion Router (Tor) or any special software

Made up of popular .com, .net, and .org sites

DEEP WEB

Represents about 90% of total internet content

Sites that can't be accessed from search engines

Examples: email inboxes, banking information, credit card accounts

These sites are protected by authentication forms, passwords, and security firewalls

DARK WEB

5% of total internet content

Sites that exist within the deep web

Can only be accessed with a Tor browser

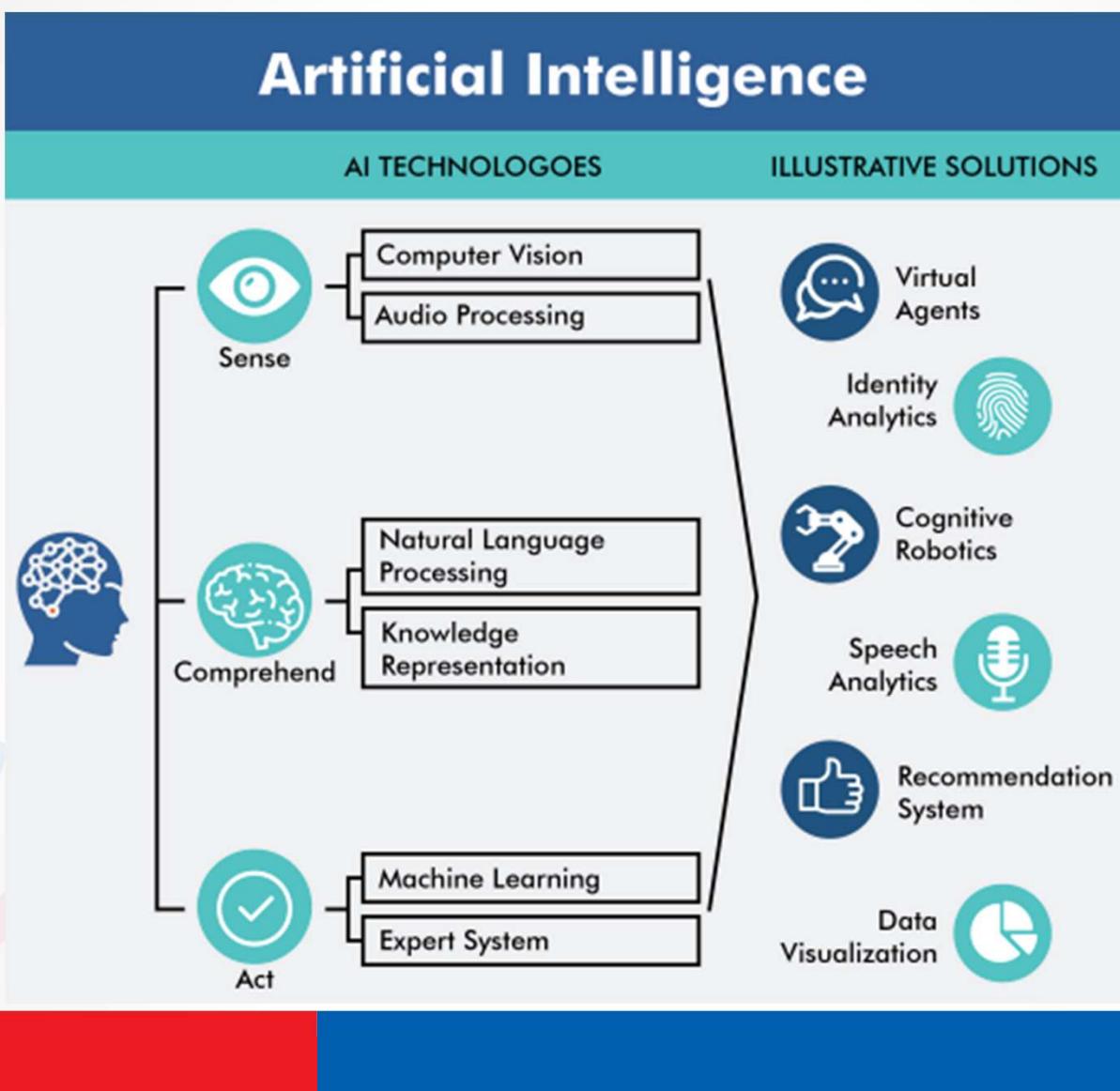
Used for both legal and illegal purposes



Metaverse



Artificial Intelligence



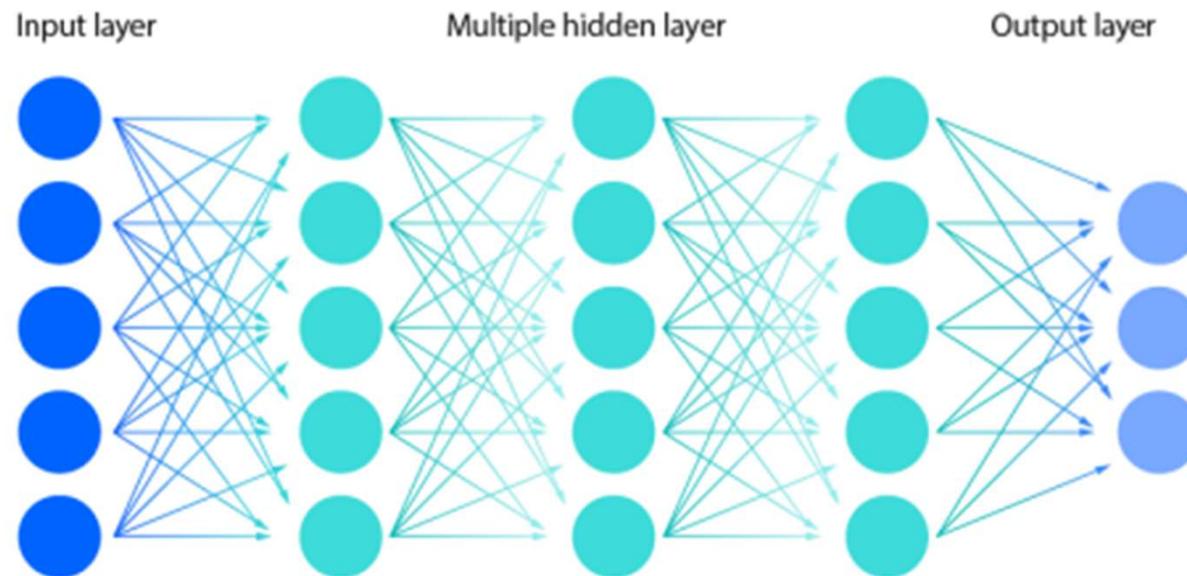
AI Regulation

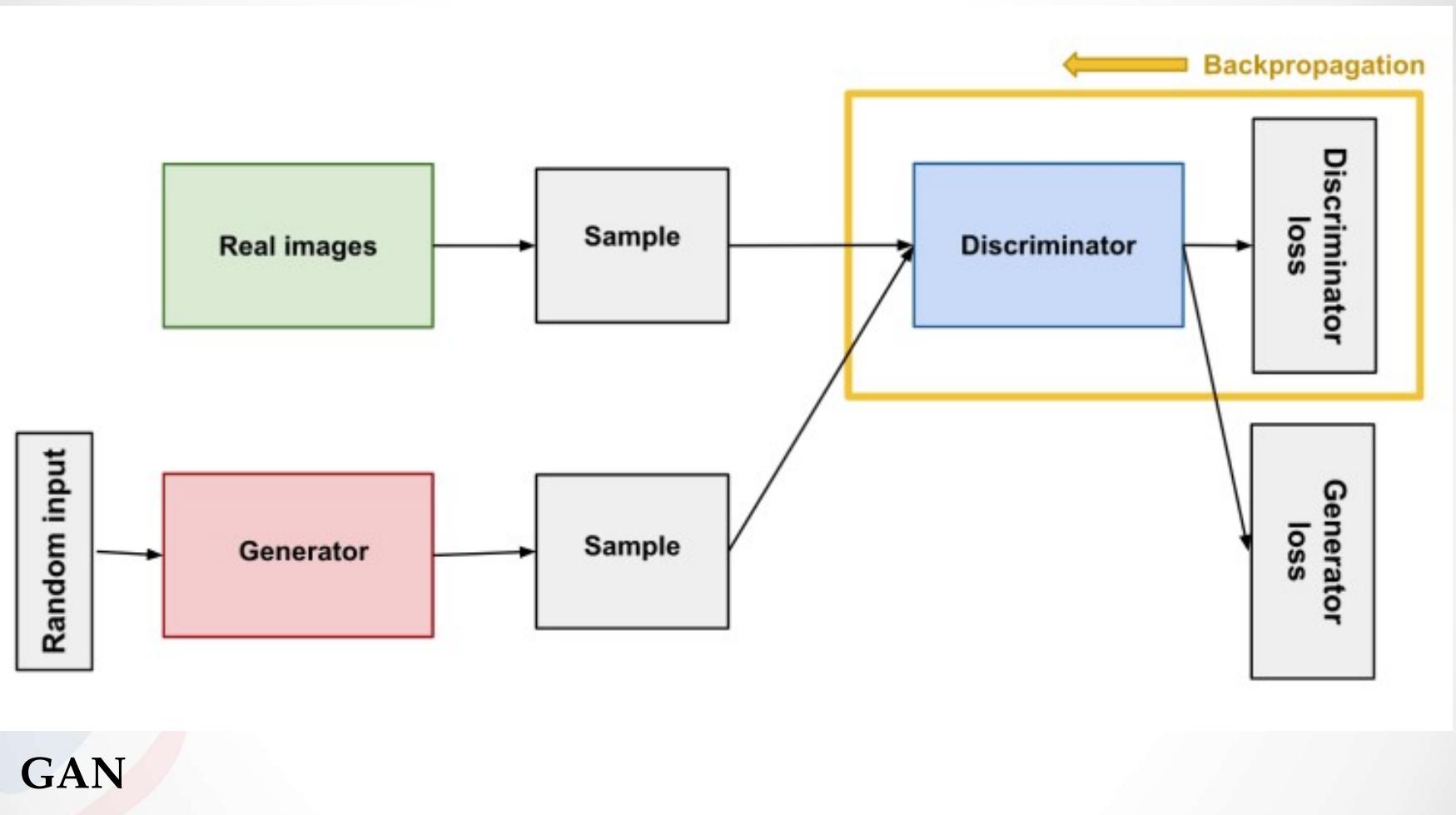


<https://indianexpress.com/article/explained/explained-sci-tech/delhi-declaration-gpai-regulation-ai-explained-9067865/>

<https://gpai.ai/about/>

Deep neural network

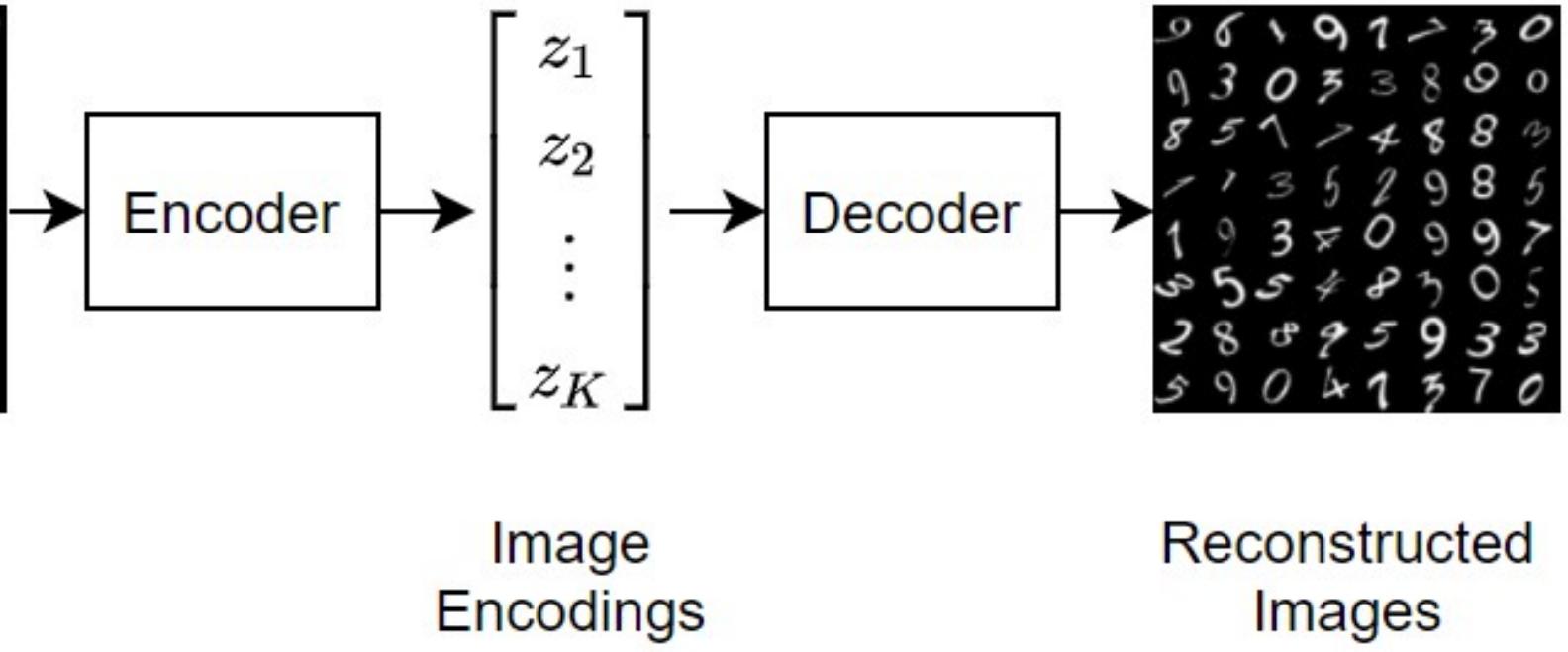




GAN



Input Images



Variational Auto Encoders

The Properties of Distributed Ledger Technology (DLT)

Programmable

A blockchain is programmable (i.e. Smart Contracts)

Secure

All records are individually encrypted

Anonymous

The identity of participants is either anonymous or pseudonymous



Unanimous

All network participants agree to the validity of each of the records

Distributed

All network participants have a copy of the ledger for complete transparency

Immutable

Any validated records are irreversible and cannot be changed

Time-stamped

https://www.youtube.com/watch?v=_160oMzbIY8

Proof of Work VS Proof of Stake



Mining capacity depends on computational power



Validating capacity depends on the stake in the network



Miners receive block rewards to solve a cryptographic puzzle



Validators do not receive a block reward, instead, they collect transaction fees as reward



Hackers would need to have a computer powerful than 51% of the network to add a malicious block, leading to 51% attack

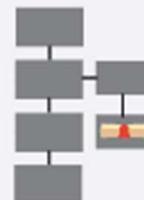


Hacker would need to own 51% of all the cryptocurrency on the network, which is practically impossible and therefore, making 51% attacks impossible.

Smart Contracts



Option contract written as code into a blockchain.



Contract is part of the public blockchain.



Parties involved in the contract are anonymous.



Contract executes itself when the conditions are met.



Regulators use blockchain to keep an eye on contracts.

Happy Hustlin'

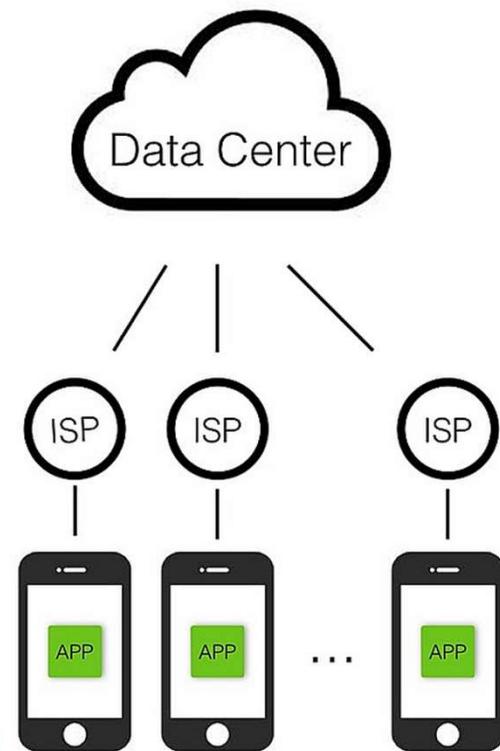
Copyright © 2016 by Vision IAS. [www.visionias.in]



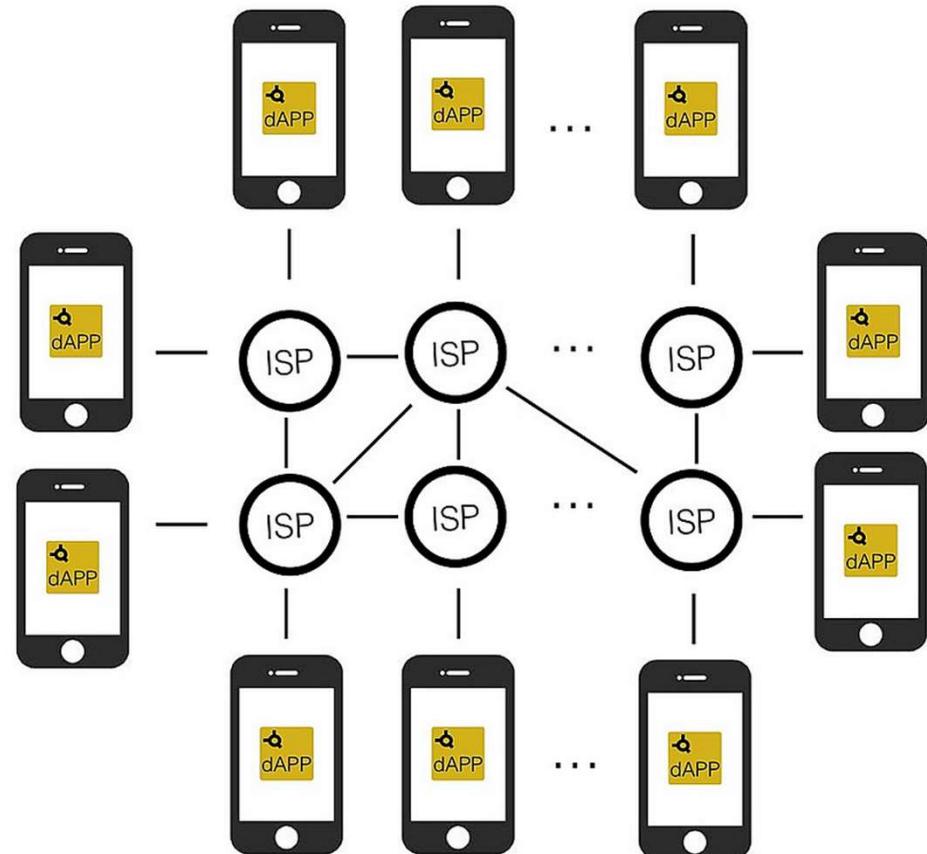
<https://codebrahma.com>

Subject, Topic & Expert

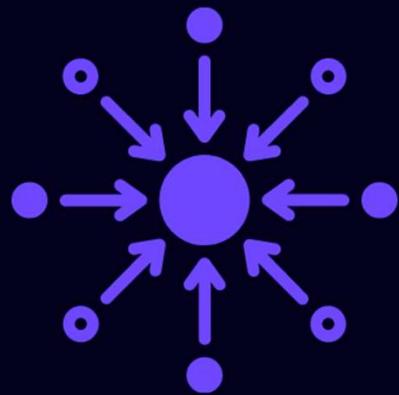
Apps



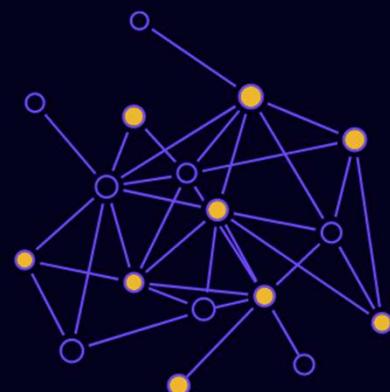
dApps



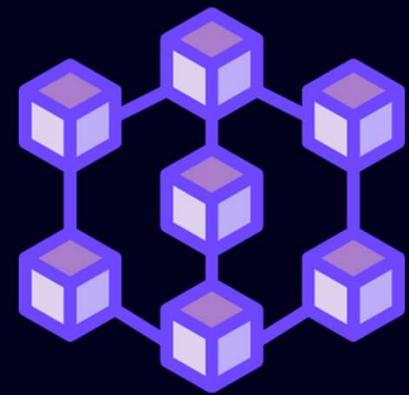
Web 1.0



Web 2.0



Web 3.0



Q. In the context of digital technologies for entertainment, consider the following statements:

1. In Augmented Reality (AR), a simulated environment is created and the physical world is completely shut out.
2. In Virtual Reality (VR), images generated from a computer are projected onto real-life objects or surroundings.
3. AR allows individuals to be present in the world and improves the experience using the camera of smartphones or PC.
4. VR closes the world, and transposes an individual, providing complete immersion experience.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 3 and 4
- (c) 1, 2 and 3
- (d) 4 only

66. When the alarm of your smartphone rings in the morning, you wake up and tap it to stop the alarm which causes your geyser to be switched on automatically. The smart mirror in your bathroom shows the day's weather and also indicates the level of water in your overhead tank. After you take some groceries from your refrigerator for making breakfast, it recognises the shortage of stock in it and places an order for the supply of fresh grocery items. When you step out of your house and lock the door, all lights, fans, geysers and AC machines get switched off automatically. On your way to office, your car warns you about traffic congestion ahead and suggests an alternative route, and if you are late for a meeting, it sends a message to your office accordingly.

In the context of emerging communication technologies, which one of the following terms best applies to the above scenario ?

- (a) Border Gateway Protocol
- (b) Internet of Things
- (c) Internet Protocol
- (d) Virtual Private Network

66. With reference to 'Bitcoins', sometimes seen in the news, which of the following statements is/are correct?

1. Bitcoins are tracked by the Central Banks of the countries.
2. Anyone with a Bitcoin address can send and receive Bitcoins from anyone else with a Bitcoin address.
3. Online payments can be sent without either side knowing the identity of the other.

Select the correct answer using the code given below.

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 3 only
- (d) 1, 2 and 3

Q. With reference to "Blockchain Technology" consider the following statements:

1. It is a public ledger that everyone we inspect, but which no single user controls
2. The structure and design of blockchain is such that all the data in it are about crypto currency only.
3. Applications that depend on basic features of blockchain can be developed without anybody's permission.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 only
- (d) 1 and 3 only

Q. With reference to Non- Fungible Tokens (NFTs), consider the following statements:

1. They enable the digital representation of physical assets.
2. They are unique cryptographic tokens that exist on a blockchain.
3. They can be traded or exchanged at equivalency and therefore can be used as a medium of commercial transactions.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Q: With reference to Web 3.0, consider the following statements:

1. Web 3.0 technology enables people to control their own data.
2. In Web 3.0 world, there can be blockchain based social networks.
3. Web 3.0 is operated by users collectively rather than a corporation.

Which of the statements given above are correct ?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

In the context of wearable technology, which of the following tasks is/are accomplished by wearable devices?

1. Location identification of a person
2. Sleep monitoring of a person
3. Assisting the hearing impaired person

Select the correct answer using the code given below.

- (a) 1 only
- (b) 2 and 3 only
- (c) 3 only
- (d) 1, 2 and 3

In India, the term “Public Key Infrastructure” is used in the context of

- (a) Digital security infrastructure
- (b) Food security infrastructure
- (c) Health care and education infrastructure
- (d) Telecommunication and transportation infrastructure

2019

2020

54. Consider the following actions :

1. Detection of car crash/collision which results in the deployment of airbags almost instantaneously
2. Detection of accidental free fall of a laptop towards the ground which results in the immediate turning off of the hard drive
3. Detection of the tilt of the smart-phone which results in the rotation of display between portrait and landscape mode

In how many of the above actions is the function of accelerometer required?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

2023

32. With reference to 'Near Field Communication (NFC) Technology', which of the following statements is/are correct?

1. It is a contactless communication technology that uses electromagnetic radio fields.
2. NFC is designed for use by devices which can be at a distance of even a metre from each other.
3. NFC can use encryption when sending sensitive information.

Select the correct answer using the code given below.

- (a) 1 and 2 only
- (b) 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

2015

Subject, Topic & Expert

Q: With reference to Web 3.0, consider the following statements:

1. Web 3.0 technology enables people to control their own data.
2. In Web 3.0 world, there can be blockchain based social networks.
3. Web 3.0 is operated by users collectively rather than a corporation.

Which of the statements given above are correct ?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Q. Which one of the following-is the context in which the term "qubit" is mentioned ?

- (a) Cloud Services
- (b) Quantum Computing
- (c) Visible Light Communication Technologies
- (d) Wireless Communication Technologies

48. Which one of the following words/phrases is most appropriately used to denote “an interoperable network of 3D virtual worlds that can be accessed simultaneously by millions of users, who can exert property rights over virtual items” ?
- (a) Big data analytics
 - (b) Cryptography
 - (c) Metaverse
 - (d) Virtual matrix