

STLescope

TechTalk

Wireless Technologies - A Disruptive Future Awaits

4th September 2020

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Introduction to Digital Networks

STL 25
YEARS OF OPTICAL FIBRE

1

**Digital
Networks**

2

**Future of
Wireless
Technologies**

3

**Next Generation
WiFi Networks**

4

Role of STL

5

Q&A

Three Key Trends Driving Growth of Digital Networks

1. New era of Digitization

Unprecedented exponential growth in data

2. Powered by various Technologies

IoT, 5G, FTTx, Immersive content

3. Hyperconnected World

The need for gigabit connectivity

**Advanced
Digital
Networks**

Future of Wireless Technologies

1

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Networks**

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Wireless
Technologies**

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Q&A

Rajesh Gangadhar

CTO and Head of Access Solutions

Rajesh drives disruptive wireless technologies for last-mile connectivity at STL

In this role, he is responsible for driving new business growth through development of advanced **Access Products (5G, Software Defined Networking, Virtualisation & Artificial Intelligence)** leveraging open innovation and customer-centric R&D.

He has completed his Master of Sciences from Villanova University, Pennsylvania. In his previous stints, he has worked with companies like Sprint, Nextel, Cable Labs, and Clearwire



Open Source Standard, Virtualisation and Software Defined Networking to gain traction across Industry

77%

enterprises are expected to increase their use of **Open Source Software**

95%

of enterprises will adopt **Virtualisation Platforms**

93%

of enterprises will adopt **Software Defined Networking** for cloud networks

GLOBAL TELCOS ARE RAPIDLY ADOPTING THESE TECHNOLOGIES

- Global telecom players to invest nearly **tens of billions** in **Software Defined Networking** and **Network Function Virtualisation technologies** by **2021**
- **Global telecom majors** such as BT, AT&T, Verizon, Jio, Airtel, Rakuten are **moving to Open RAN and conducting several trials in partnership with other technology players**

What is the disruption in wireless all about?

MONOLITHIC PROPRIETARY SYSTEMS

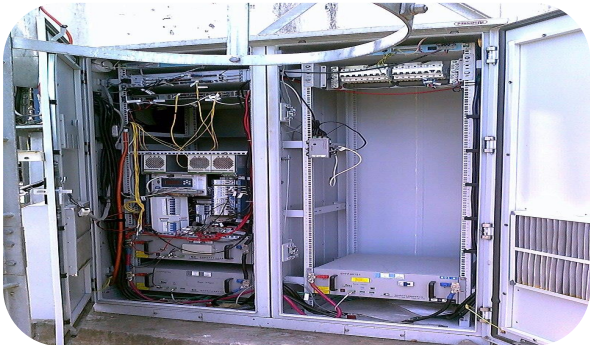


OPEN DISAGGREGATED VIRTUALIZED WEB SCALE SYSTEMS



Industry Witnessing Technological Shift

Transition to Open Disaggregated and Virtualized Solutions



**MONOLITHIC PROPRIETARY
SYSTEMS**



**OPEN DISAGGREGATED VIRTUALIZED
WEB-SCALE SYSTEMS**

Closed interfaces

Vendor specific hardware

Monolithic and proprietary

Localized control and data plane

Expensive

Standardized open interfaces

Programmable white boxes

Cloud native, disaggregated

Centralized control plane

Better TCO

OPEN STANDARD

O

DISAGGREGATED

D

VIRTUALISATION

V

Open and Disaggregated Virtualized Solutions

OPEN SOLUTION

- Open interfaces
- Open source codes
- Non-proprietary
- Aligned with standards developed by open forums

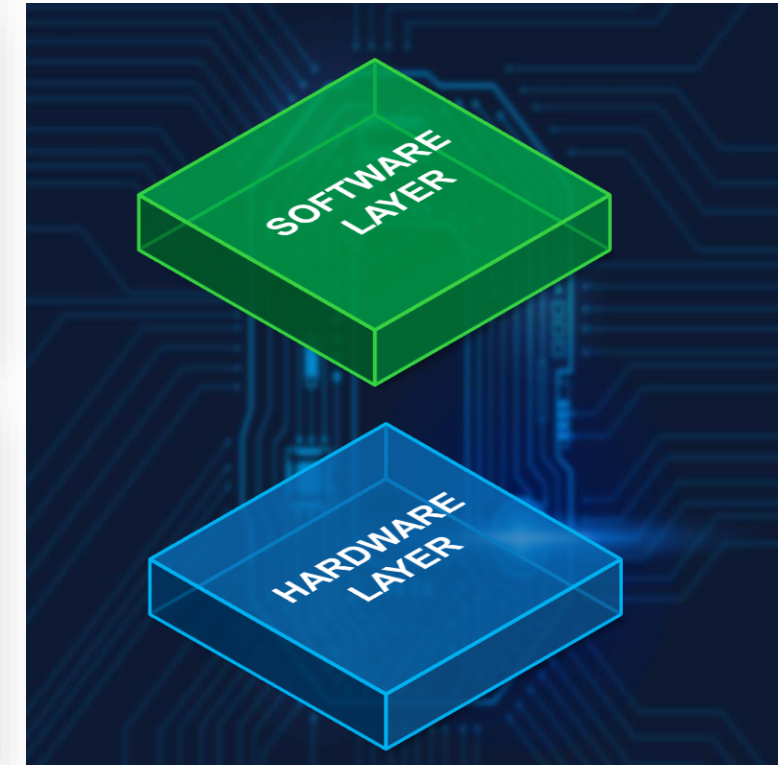


DISAGGREGATED

- Abstraction of hardware from software layer
- Centralized control plane
- Individual data plane

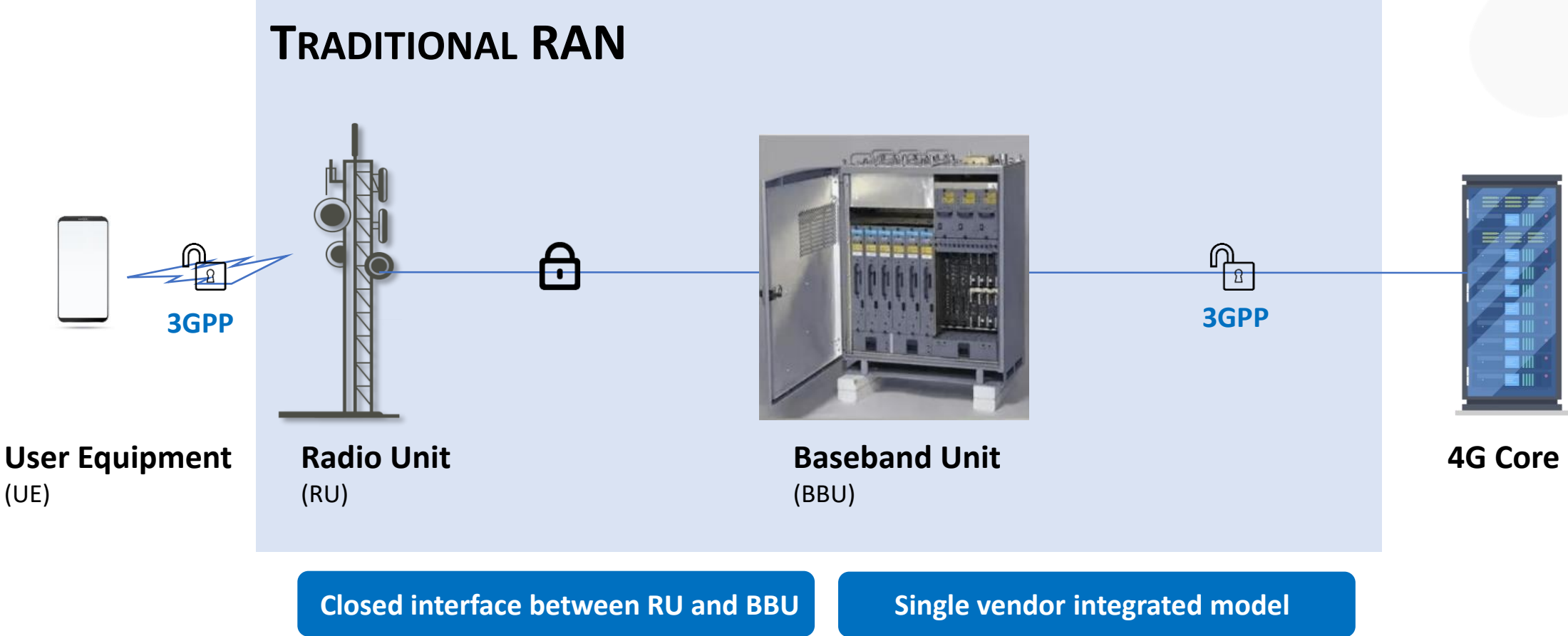
VIRTUALISATION

- Software defined networking
- Optimized use of hardware resources
- Scalable on the go



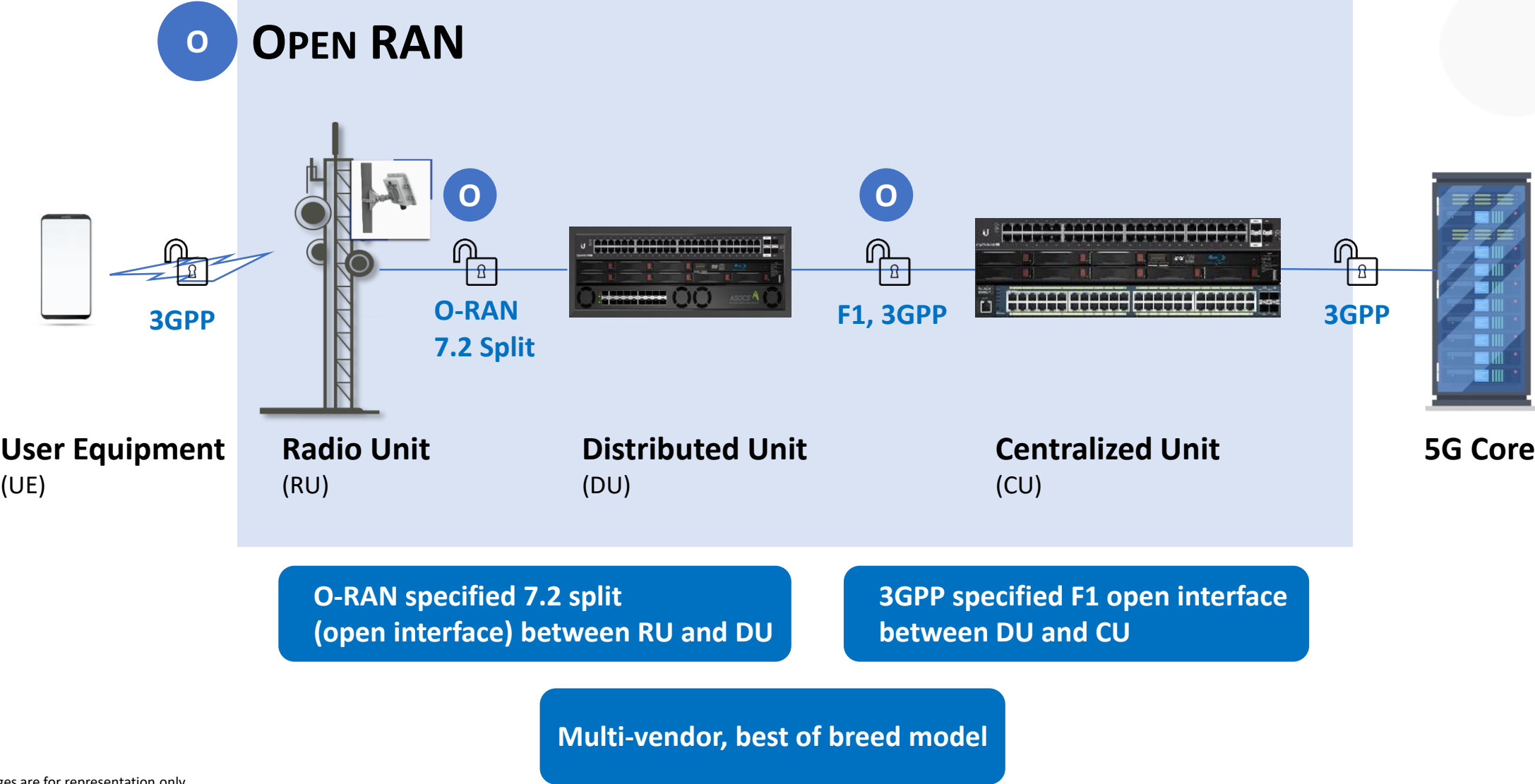
Transition from traditional RAN to Open and Virtualized RAN:

Network with traditional RAN



* Images are for representation only

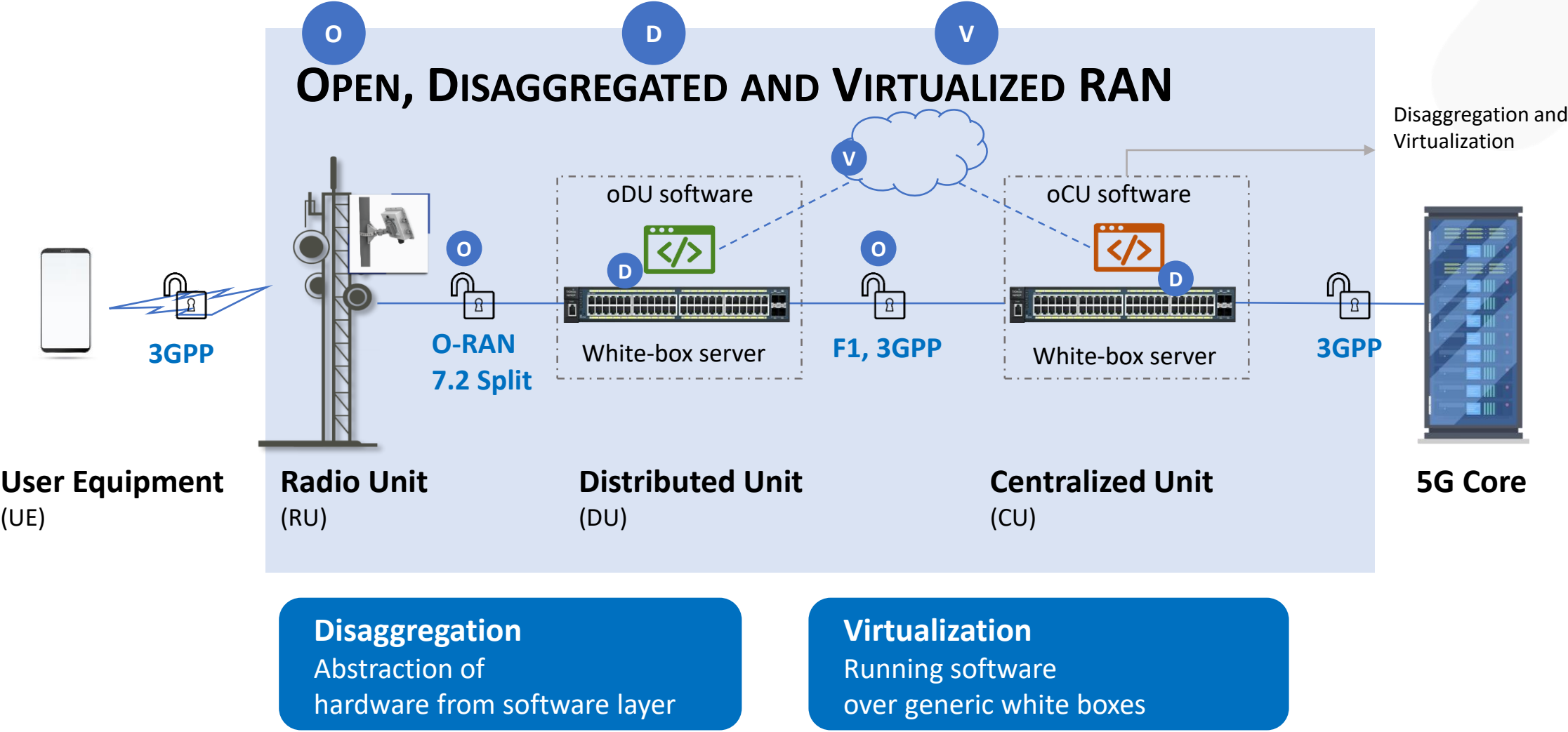
Transition from traditional RAN to Open and Virtualized RAN: Network with Open RAN



* Images are for representation only

Transition from traditional RAN to Open and Virtualized RAN

Network with Open, Disaggregated and Virtualized RAN



* Images are for representation only

Benefits of Open RAN Solutions



***MULTIVENDOR
ECOSYSTEM***



COST OPTIMIZATION



FLEXIBILITY



***ENHANCED
SECURITY***



VIRTUALIZATION

Next Generation WiFi Networks

1

Digital
Networks

2

Future of
Wireless
Technologies

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Next Generation
WiFi Networks

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Q&A

Shantanu Kulkarni

Head of Network Software Solutions



Shantanu leads Telecom Business Support System/Operating Support System product suite development at STL.

He has more than 20 years' experience in Telecom domain with **strong expertise in Business Support System architecture and product management**. His technical specialties are: Solution Architecture and Software Development.

Before his stint with STL, he was leading the Research and Development division of Amdocs India.

What is happening in WiFi industry ?

WiFi continues to gain momentum.... By 2023

51%

IP traffic to be
contributed by WiFi

18x

Increase in Public
WiFi Traffic

4x

Will be the Speed

628 Mn

WiFi Hotspots
Globally

Source: Cisco

WiFi is an integral means of everyday communication and has huge impact on our daily life

Indoor



Home



Hotels



Airports



Malls



Offices



Smart City



Railway
Stations

Outdoor



Travelling



Commuting

WiFi

5G

Existing WiFi Ecosystem Challenges and Current Offerings

Existing Challenges



***POOR USER
EXPERIENCE***



***NETWORK
CONGESTION***



***INCREASING
COST***



***UNSECURED ACCESS
AND POOR
COVERAGE***



CURRENT OFFERINGS

- **Free Public WiFi**
- **Mobile Data offload**
- **Seamless Authorization and Connectivity**
- **WiFi Calling**

Next Generation Networks

Building a strong WiFi Backbone

Key Imperatives for Next Generation Networks



*SEAMLESS USER
EXPERIENCE*



*INCREASED
NETWORK CAPACITY*



*EFFICIENT
OPERATIONS AND
REDUCED COST*



*SEAMLESS ACCESS
AND
AUTHENTICATION*



NEXT GENERATION NETWORKS

1. **WiFi 6**
2. **Next Generation Hotspots**
3. **Open Roaming**

Generating new opportunities and growth in market

1



WiFi 6

**254 Million WiFi 6
Access Points
(2024)**

Access points: includes routers and switches

2

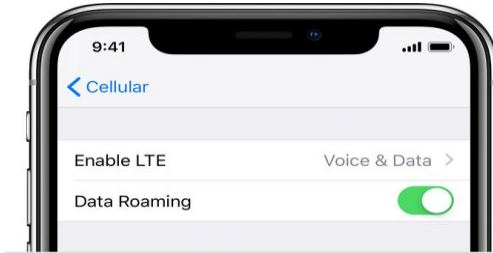


Hotspot 2.0

Next Generation Hotspot

**\$5.1 Billion
(2023)**

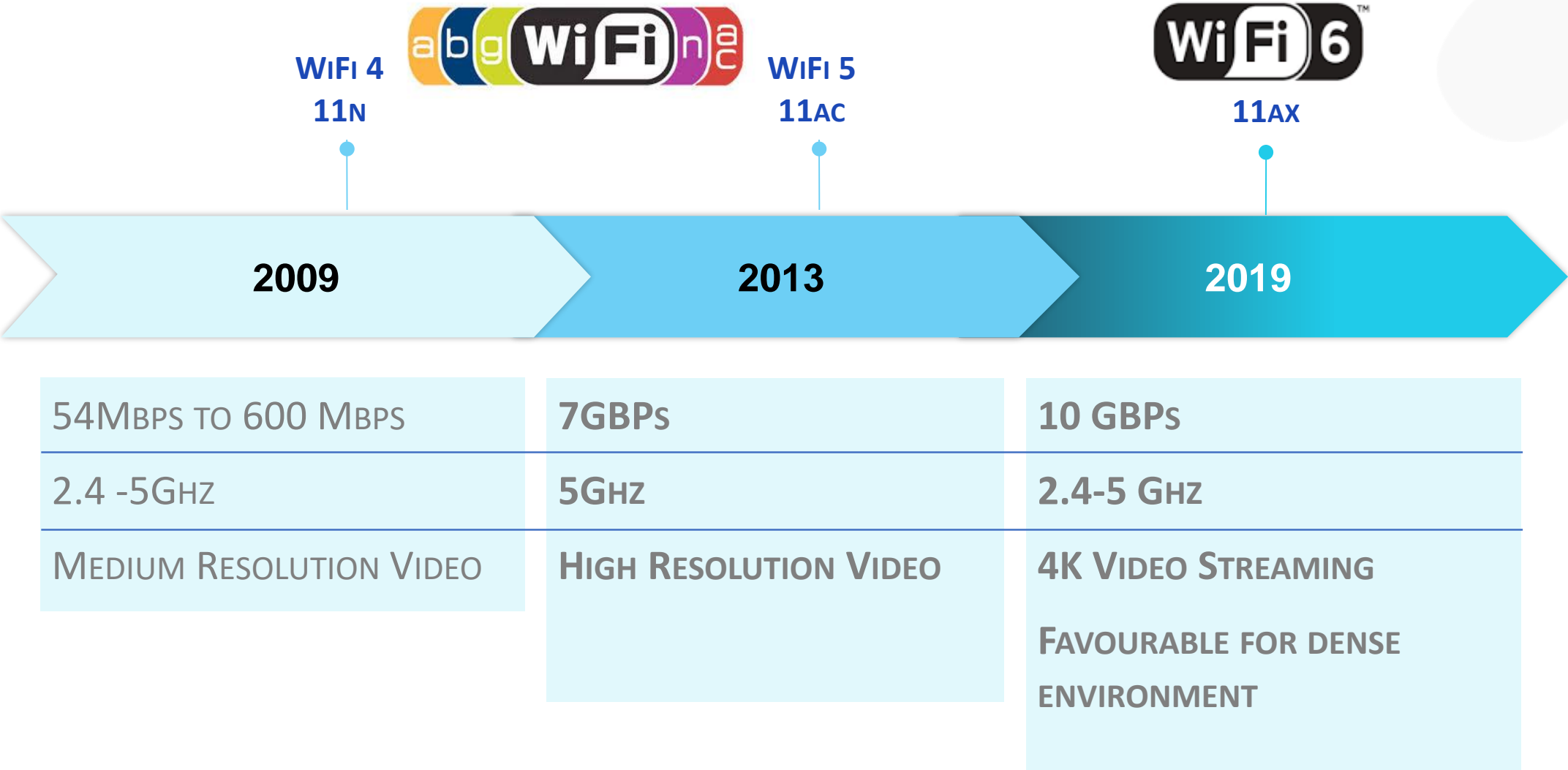
3



Open Roaming

**15% Adoption in
WiFi Networks
(2023)**

Evolution of WiFi 6



What is WiFi 6 and how it is better than previous generation of networks



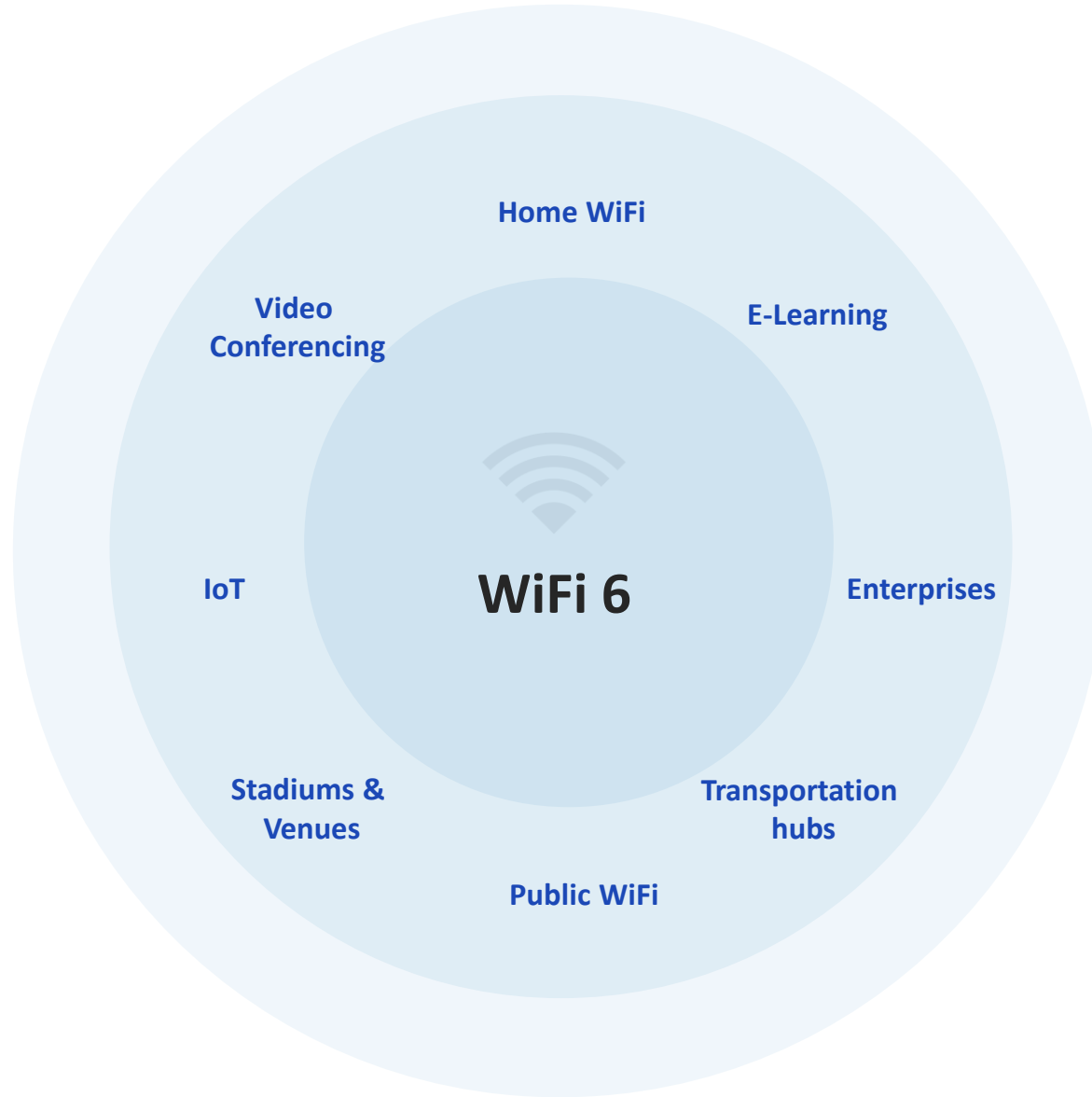
Increased network capacity & throughput

Upto 4 times improved performance with 25% increase in data rates and 2x increase in throughput



Improved battery efficiency

Scheduled sleep/wake time which allows devices to plan communication in advance thus improving power saving



IoT Connectivity

Faster speed, improved security and increased scalability to connect multiple IoT devices at a time



Built for dense environment

Easing WiFi congestions in dense environments (expand capacity, extends coverage, enhances experiences)

What is the relationship between WiFi 6 and 5G

WiFi 6 and 5G are complementary and brings next-level, seamless functionality to the wireless world

HIGH SPEED	10+ GBPS	Social, video and cloud applications
LOW LATENCY	<1ms	Augmented Reality, Virtual Reality, 3D Video, Cloud and Mission Critical Applications
POWER EFFICIENCY	Support IoT standards	Battery-Powered IoT, Industrial and Home Automation
HIGHER CAPACITY	> 12 MBPS per meter square	Good performance in dense deployments
COVERAGE	>200 meter	Low deployment and service costs

WiFi 6 – Five Technology Building Blocks

Better Network Capacity

1

**Orthogonal
Frequency
Division
Multiple Access
(OFDMA)**

2

**Multiple Unit –
Multiple Inputs
and Multiple
Output
(MU-MIMO)**

3

**Basic Service
Set Coloring
(BSS-Coloring)**

Device Battery Life

4

**Target Wake
Time
Technology
(TWT)**

Peak Throughput

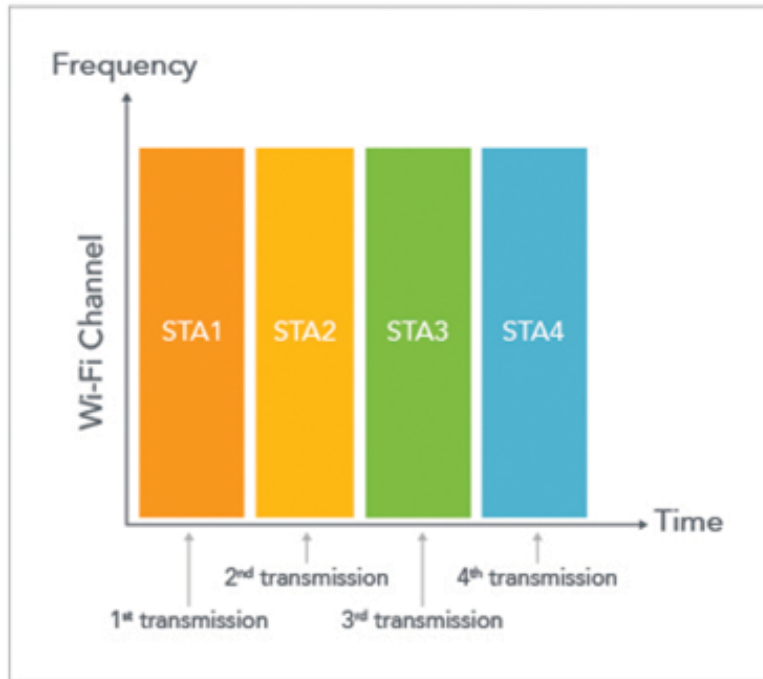
5

**Quadrature
Amplitude
Modulation
(1024-QAM)**

Orthogonal Frequency Division Multiple Access OFDMA

TRADITIONAL METHOD

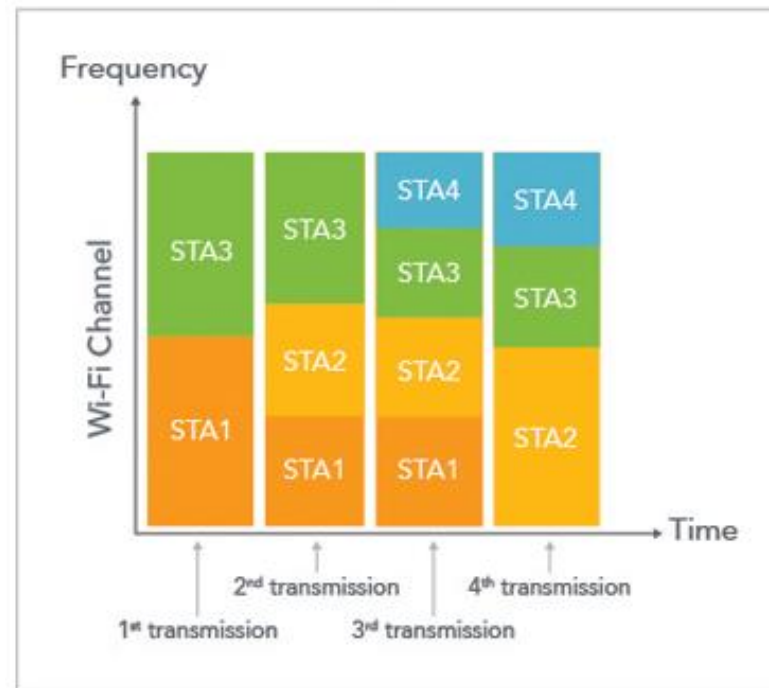
ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING (OFDM)



- Single Transmission on Single Channel

NEXT GENERATION

ORTHOGONAL FREQUENCY DIVISION MULTIPLE ACCESS (OFDMA)



- Multiple Transmissions on Multiple Channels

STA: Station/User

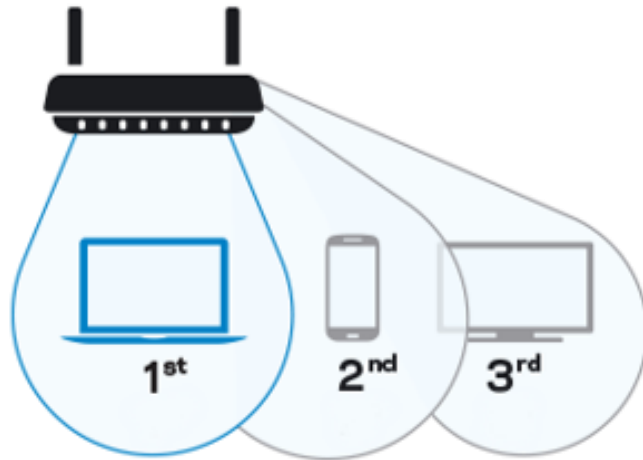
Key Benefits

- Channel efficiency
- High network throughput
- Faster speed

Multiple User–Multiple Input and Multiple Output MU-MIMO

TRADITIONAL METHOD

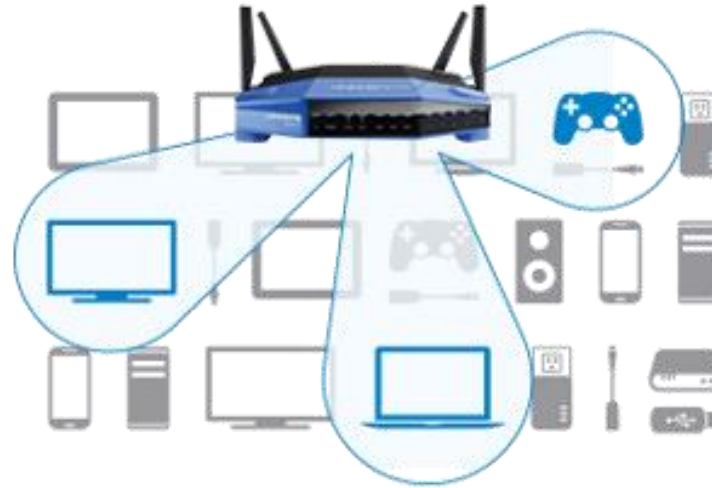
SINGLE USER - MIMO



- Communicates with one device at a time

NEXT GENERATION

MULTI USER - MIMO



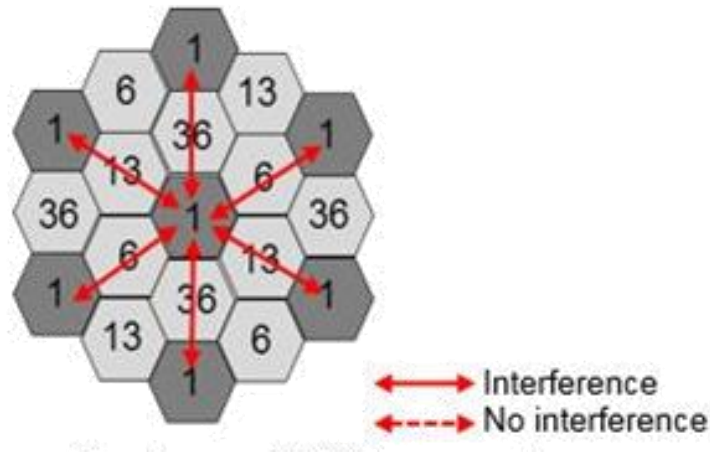
- Communicates to multiple devices at a time

Key Benefits

- Network multitasking
- Better speed
- Higher capacity

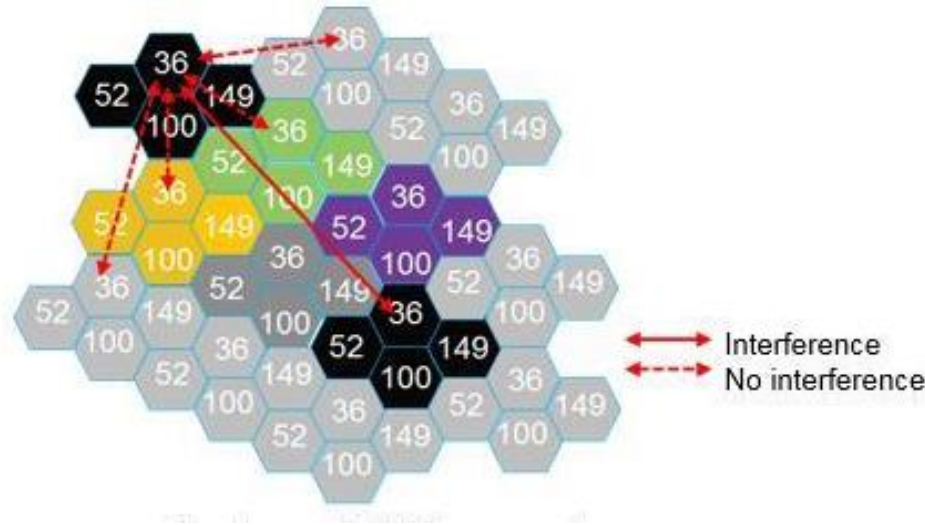
Basic Service Set Coloring – BSS Coloring

TRADITIONAL METHOD



- Co-Channel BSS Congestion

NEXT GENERATION



- Co-Channel BSS Congestion with same color

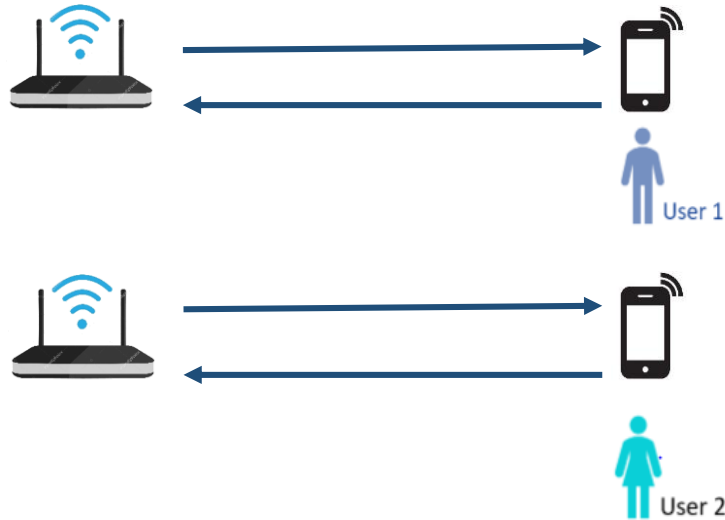
Key Benefits

- Less signal Interference
- Reduced network congestion
- Faster speed

Target Wake Time Technology

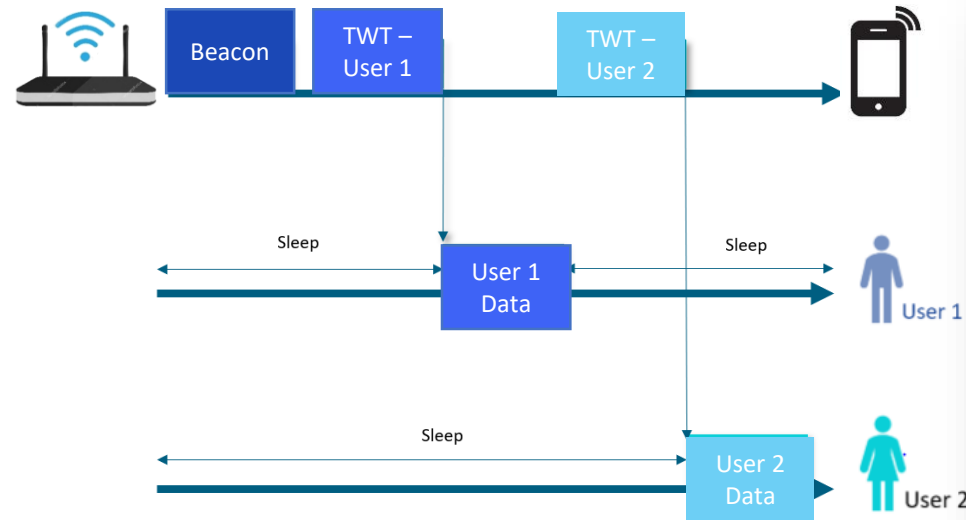
TWT

TRADITIONAL METHOD



- Data transfer between Access Points and User Devices
- Power Drainage

NEXT GENERATION



- Determines specific time to communicate between Access Points and Devices
- Power Efficiency

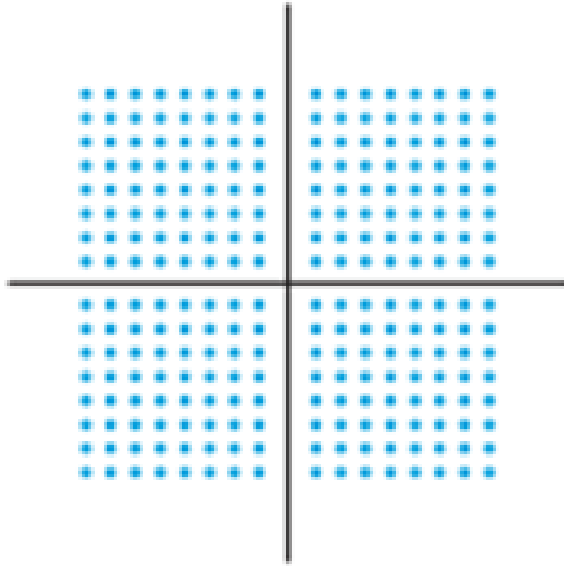
Key Benefits

- Reduced congestion and overlap between users
- Significantly increases the device sleep time to reduce power consumption

Quadrature Amplitude Modulation

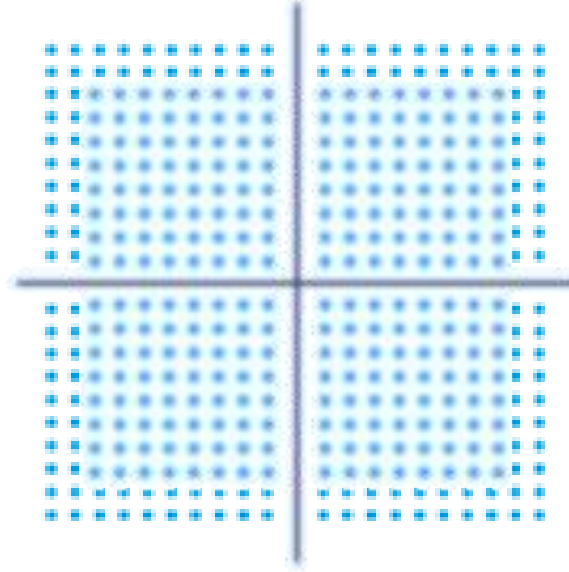
1024-QAM

TRADITIONAL METHOD: 256 QAM



- 8 Bits to Induce capacity

NEXT GENERATION: 1024 QAM



- Encoding 10 bits to enable 25% higher Capacity

Key Benefits

- Increased network throughput
- Reduced congestion in high density deployment scenarios
- Faster data rates
- Better Quality of Service (QoS)

Role of STL

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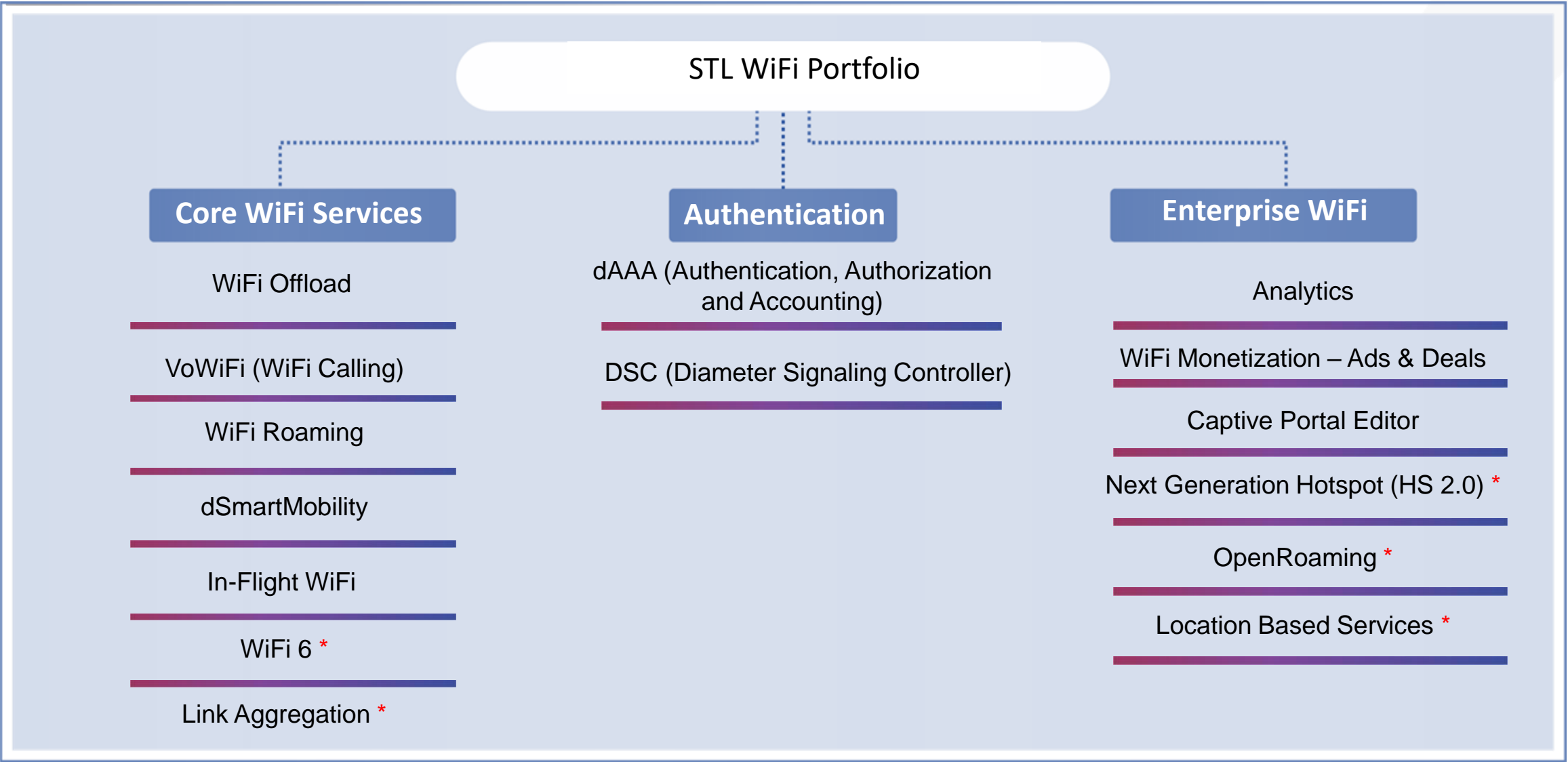
4

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Q&A

STL in the WiFi 6 space



* Roadmap

STL dWiFi Excellence : Expertise & Experience



40+

Operators have chosen
STL
for WiFi deployments

2500

ISP & Hotspot
deployments
globally

TOP 3 TELECOM OPERATORS IN INDIA

dSmartMobility, VoWiFi, WiFi
Monetization, AAA, Analytics

TOP TELECOM OPERATOR IN DUBAI

WiFi Monetization, dAAA, Captive
Portal Editor, Analytics

TOP TELECOM OPERATORS IN SOUTH EAST ASIA

WiFi Monetization, dAAA, Captive
Portal Editor, Advertisement,
Analytics

STL open and virtualized RAN solutions to enable 5G



PRODUCTS

Software:

- O-CU
- O-DU
- RIC
- Orchestrator

Hardware:

- Small cell Indoor, Outdoor and Macro RU
- COTS servers
- Switches
- Passive components

SERVICES

E2E integration & managed services

- Design
- Build
- Manage

USE CASES

- Small Cells
- Network Slicing
- Mobile load balancing
- Fixed wireless access

Our 5G NR Sub 6GHz Radio Portfolio



4G vRAN ready supporting 7.2x and split 2 RU with software upgrade to 5G NR

Indoor Small Cell



- SMB Indoors
- 1W 4x4 MIMO

Outdoor Small Cell



- Attach Outdoor
- 20W 4x4 MIMO

Dual/Triband Macro Radio



- Multi Band RU
- 160W 4x4 MIMO
- 320W 4x4 MIMO

1

Own Hardware
And Software

2

Ability To Provide
Scaled Solutions

3

E2E Offering -
Greater Control

4

Cloud Native
Solutions

Let's Play Online Quiz

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