5G Transport Requirement for Indian Telecom

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Transmission Capacity Evolution 2G --- 5G

2G	3G	4G	5G
			
XX kbps	XX Mbps	XXX Mbps	X Gbps
Voice Era	**Video Era**	**Video Era – Superior Experience**	**Virtual Reality**

Transmission capacity increase – n x 1000 times

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5G Network – Transport Requirement

Is 5G transport is the game of high capacity only?

5G Network Service Requirement

- Ultra high reliability
- Extreme broadband
- Low latency
- 5G base stations are TDD, collaboration within and outside base station requires higher clock synchronization precision

1 Enormous Capacity at Low Latency

Network Requirement	Fronthaul	Backhaul
Capacity*	100-200G	10-30G
Latency	100 micros	1ms (one way latency from 5G base station-gNB to new core)

* Depends on spectrum

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5G Network – Transport Requirement – 1/2

2

High Precision Clock

Service	Latency Requirement	Impact
Basic 5G Service (sub-6G)	⩽ ±1.0 µs	Basic service unavailability
Basic 5G Service (above-6G)	⩽ ±500 ns	Basic service unavailability
Coordinated feature (SMP/DMP)	⩽ ±150 ns	Performance detoriation or zero gain

3

Network Slicing

- Traditional QoS cannot meet the requirement of E2E bandwidth, latency, reliability requirement of services like eMBB, uRLLC, and mMTC.
- Challenge of meeting different type of management and O&M
- Network slicing addresses the issue of SLA requirement of various services and users

 # 5G Networks standard is in draft stage and yet to be finalized

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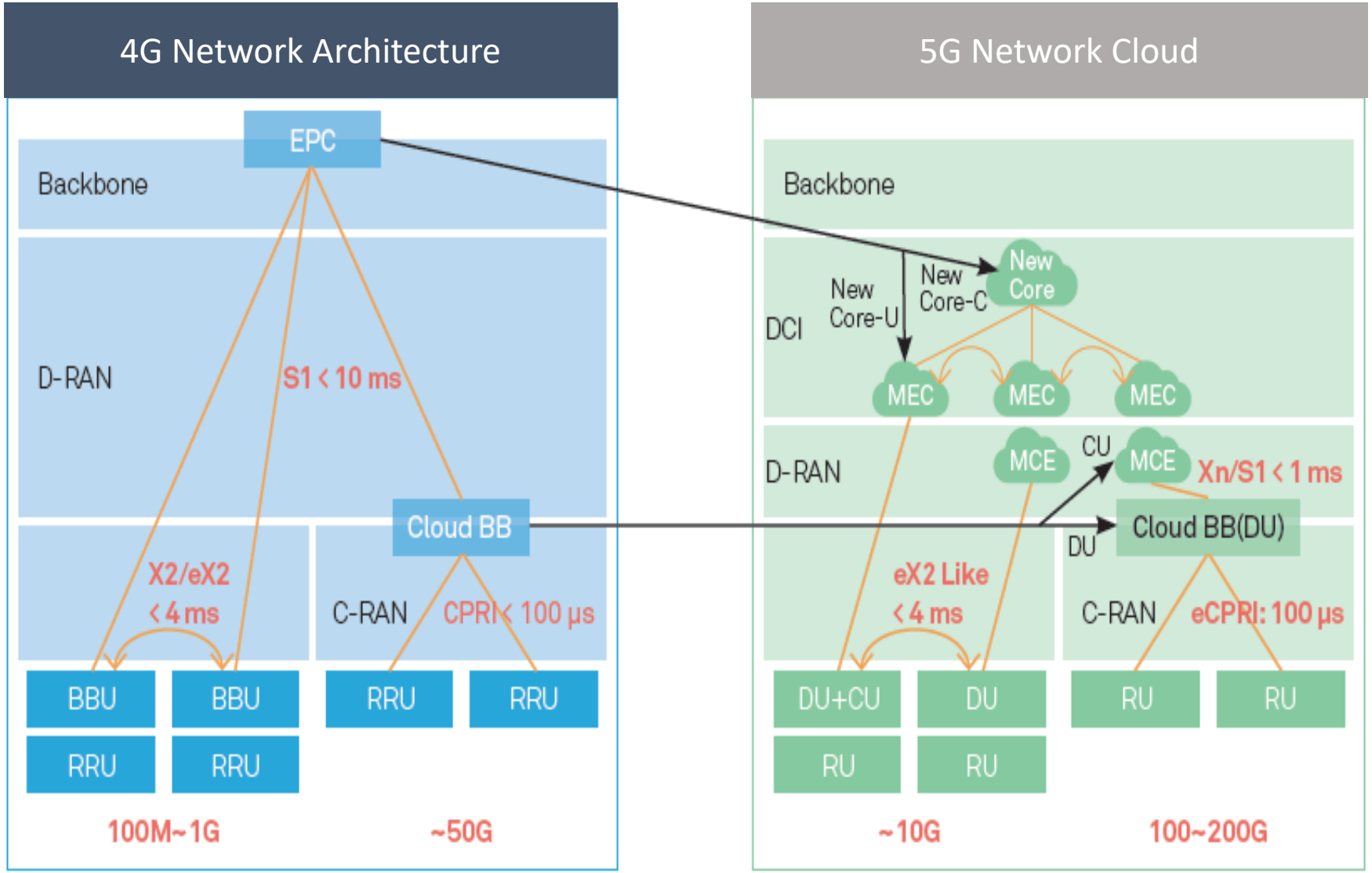
5G Network Model Architecture Evolution



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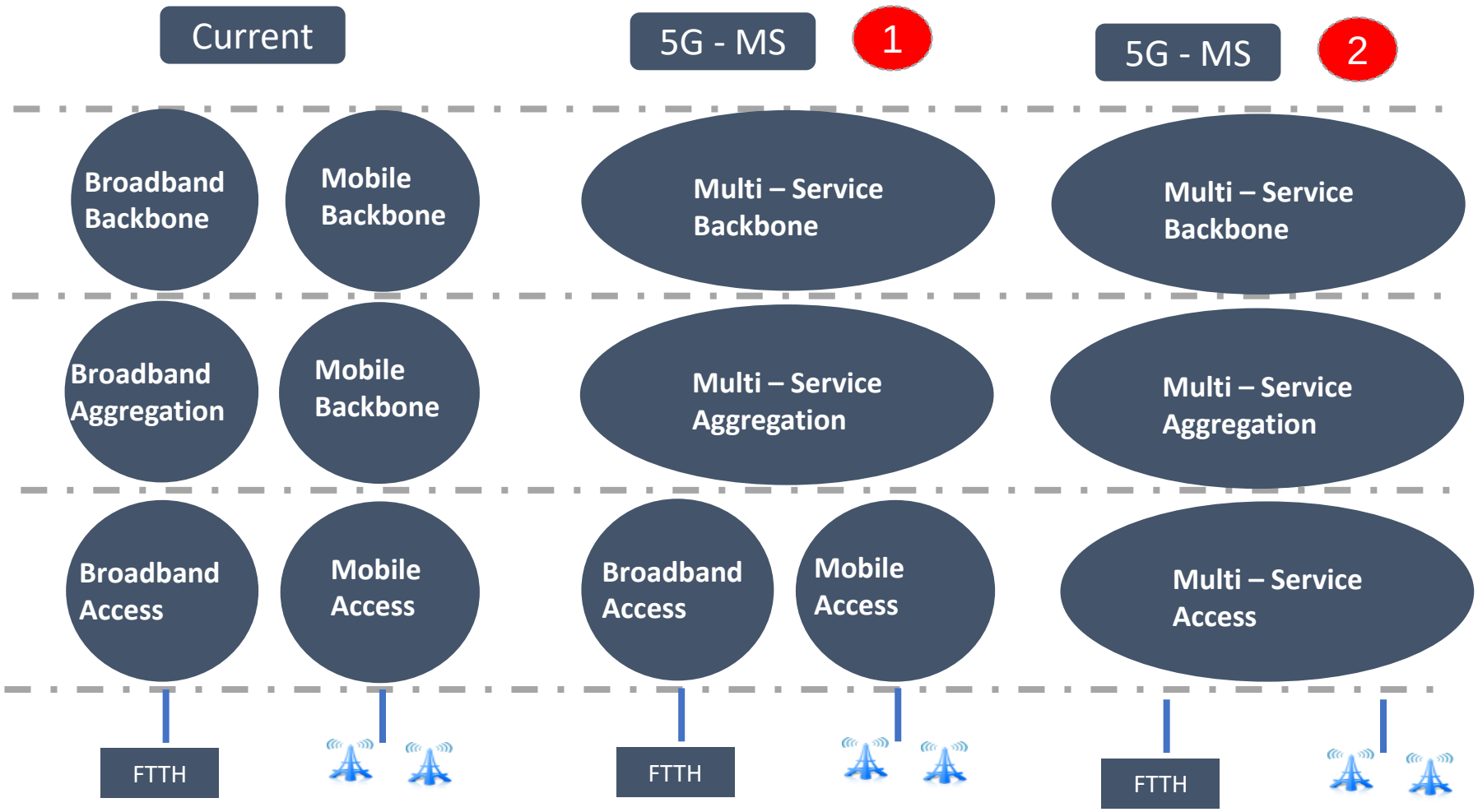
5G Transport Network Architecture Evolution



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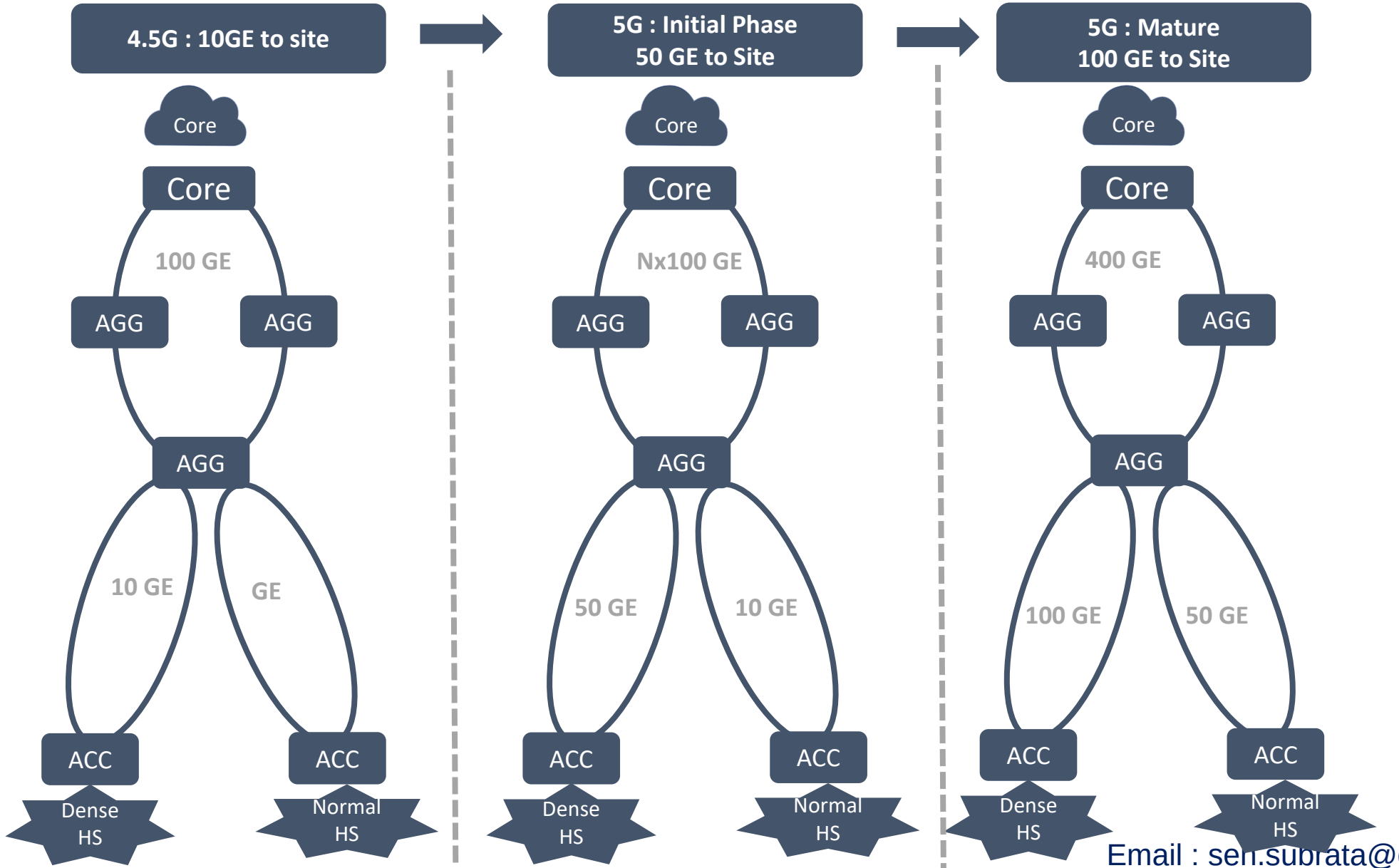
5G Transport Network Capacity Evolution



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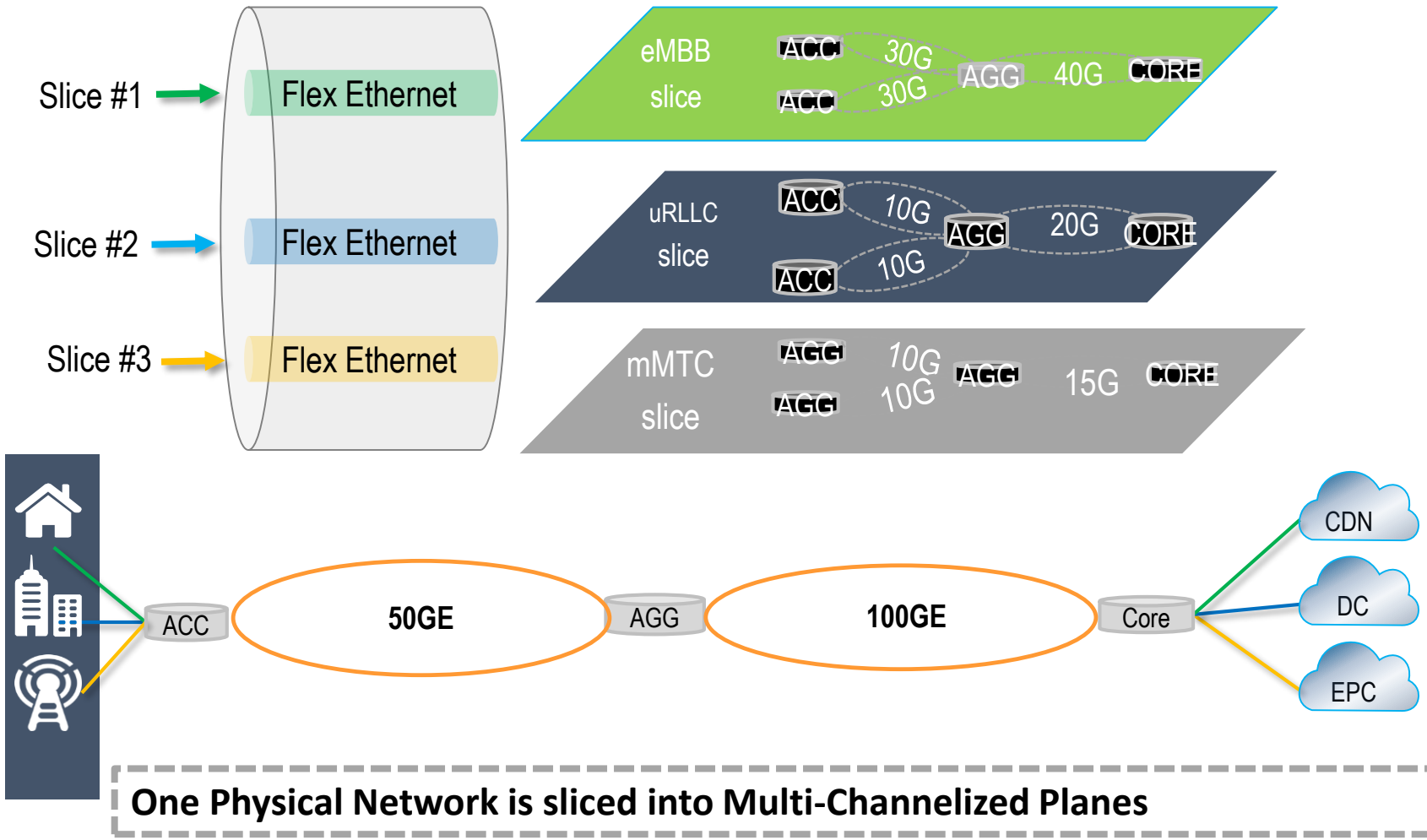
Network Slicing – New Way of Service Delivery



One Physical Network is sliced into Multi-Channelized Planes

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5G Transport Network Capacity Requirement

Is Microwave Network a long term option?

High Order Modulation

4096 QAM	262
2048 QAM	251
1024 QAM	224
256 QAM	251
< 32 QAM	25

262 Mbps

LOS 4x4 MIMO

X4 Capacity

1 Gbps over

Single Channel

28 MHz

1 Gbps

E Band

- Carrier Grade
- C-RAN Supported

10 Gbps

Microwave network and E band in particular will be very effective stop gap arrangement but eventually 5G cell sites has to move to fiber

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5G Transport Network – Fiber to Towers

- Mature 5G network requires all towers to be connected with fiber
- Current fiber penetration of sites/tower is about 20%
- Balance about 350,000 tower need to be connected with fiber
- More than a million km fiber need to be deployed close to the total amount of fiber all the service provider currently have put together

Sl No	Company	Towers No (Approx)
1	Bharti Infratel	90646*
2	Indus	125000
3	BSNL	80000
4	ATC	60000
5	Reliance Infratel	43000
6	JIO	40000
7	GTL	32000
8	Voda + Idea	21000
9	Tower Vision	11000
10	Others	3000
	Grand Total	**455000**

* The Bharti Infratel no is as on 31st March 2017

#The above figure are approximate and does not represent the actual figure

In India, over 80% of cell sites are connected through microwave backhaul, while under 20% sites are connected through fiber : EY

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5G Network Challenges in India

1. **At a time when India is trying to align itself with the global markets for 5G technology, industry stakeholders and experts believe that the migration from existing networks to 5G will be full of roadblocks with backhaul being the major challenge – ET Telecom**

2. **5G launch in India is 4 to 5 years away due to high capex, debt and dearth of fiber backhaul: EY**

3. **5G a distant dream for India when backhaul takes a back-seat: Experts**

4. **India would have to invest $60 billion-$70 billion for 5G : EY**

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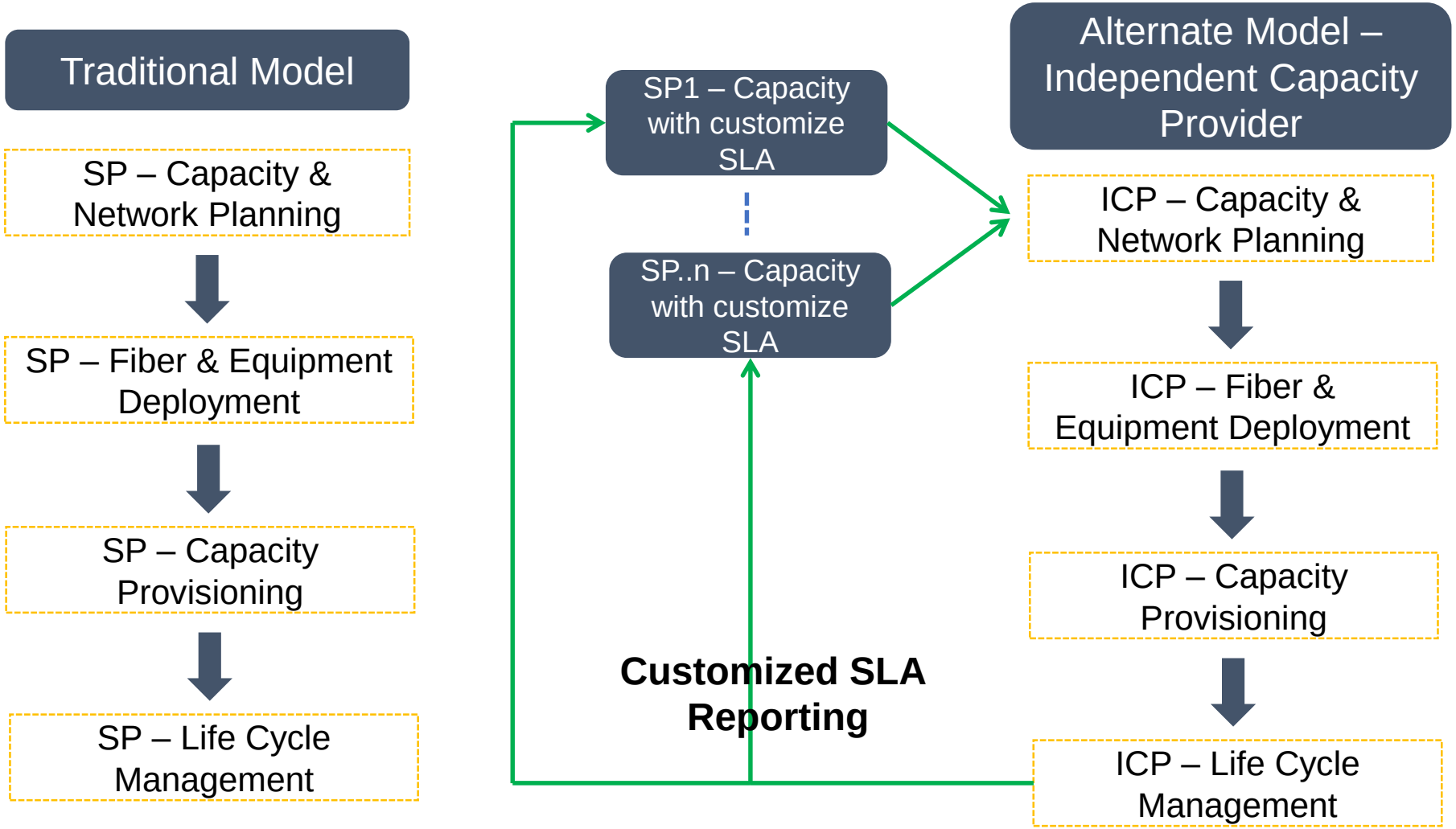
5G Transport Network – Way Forward



Transport Network should evolve from current Network Centric to in future to Demand Centric

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5G Transport Network – Way Forward

Value Proposition of Independent Capacity Provider

1. Minimize duplication of fiber routes
2. Deploy very large capacity in least cost per bit to serve
3. One stop solution for SP for all type of capacity and SLA requirement
4. National NOC to monitor and ensure service wise SLA fulfillment
5. Significant OPEX efficiency in Fiber & Equipment life cycle & NOC management

SP can focus on its core business area of customer acquisition and customer satisfaction and allow ICP to manage its capacity piece

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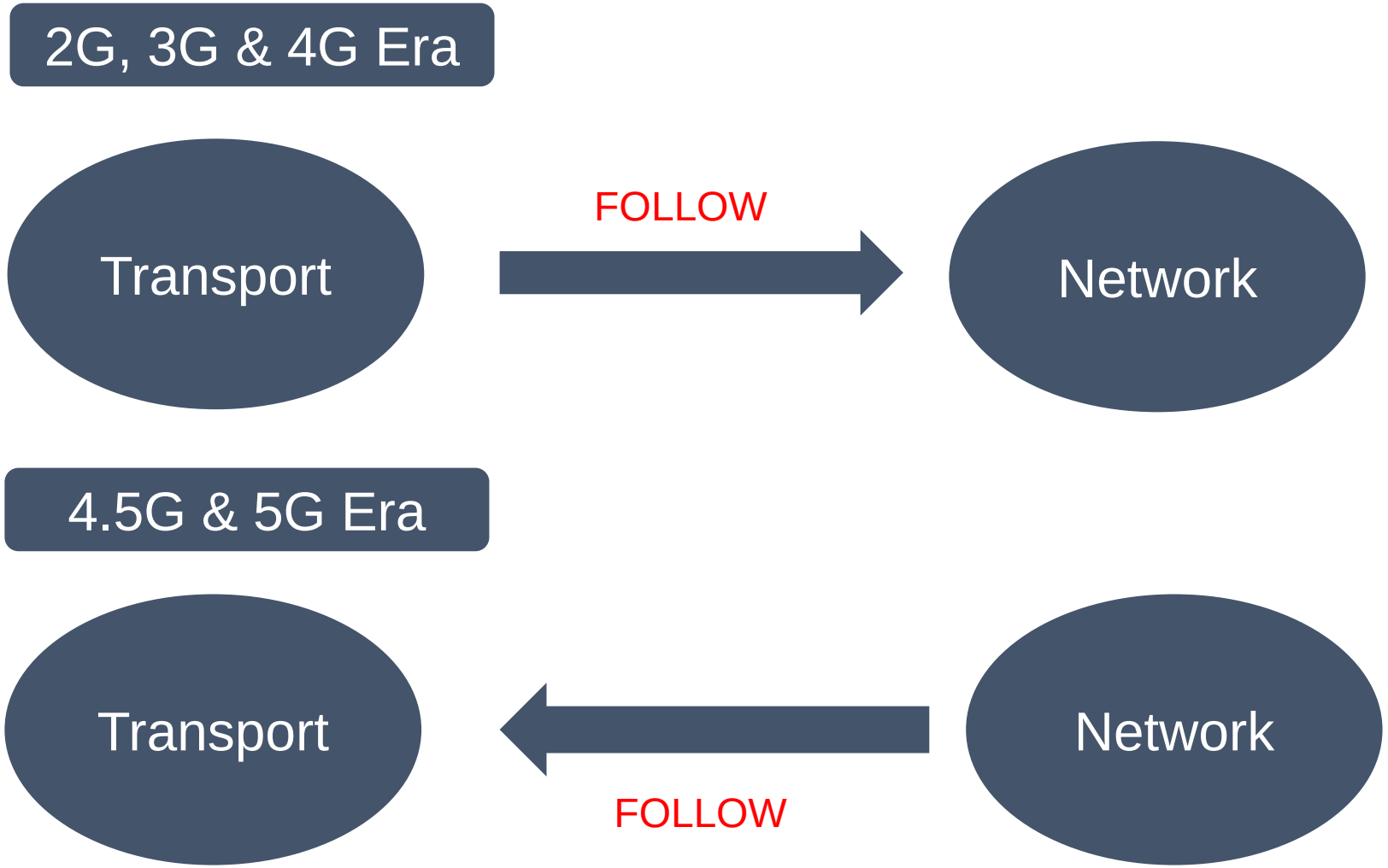
5G Network Deployment Strategy



Will the 5G Network deployment strategy challenge the conventional model?

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Thanks

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