

Operating & Monetizing 5G Networks

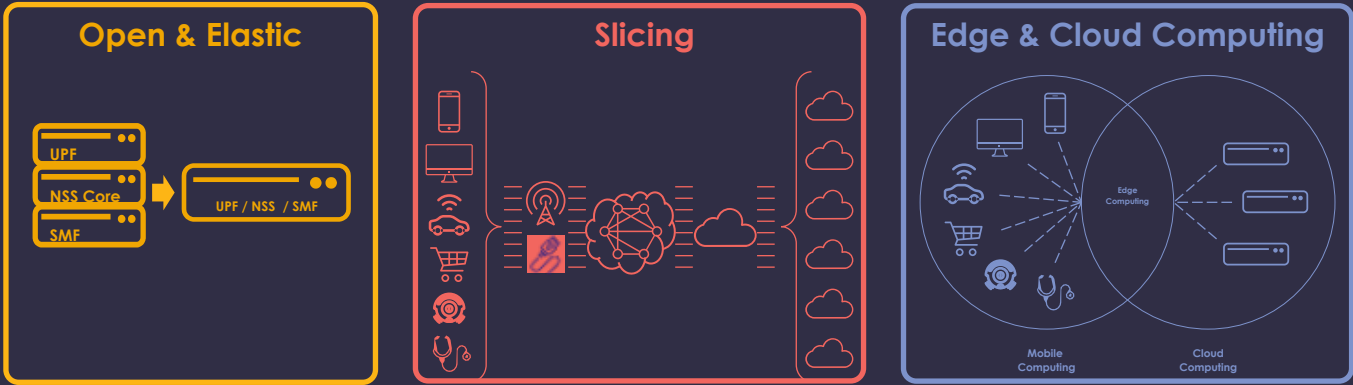
Insights and Opportunities



Change in the monetization paradigm

Quality focus - pay for what you need, when you need it
Capacity Enhancement
Massive Connectivity
Ultra-low latency

5G will be more 'tailorable' for wide range of services



5G

BSS & OSS impacts

Increase in devices

New business models

New chargeable elements

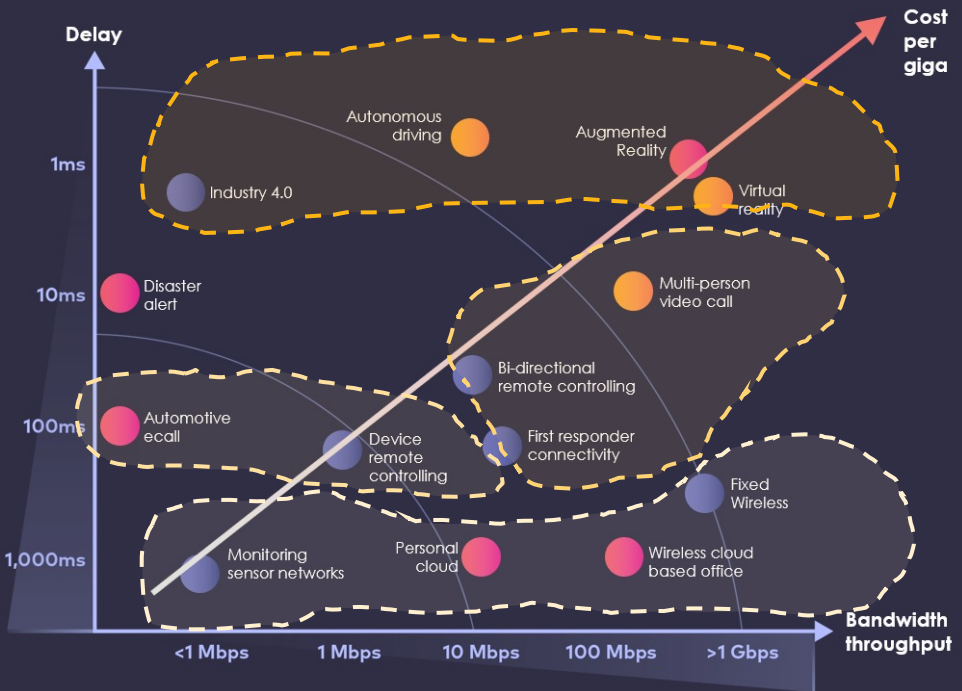
New services

Multiple partners

Ongoing permutations

Real-time transparency

Slice & edge monetization

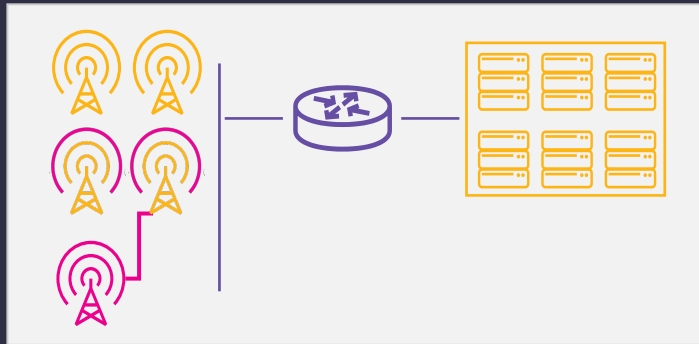


5G rollout is happening in stages

2019 - 2020

Increase capacity across access networks

5G NSA (Non Stand Alone)



5G NR
Fiber, MFH/MBH, CBRS

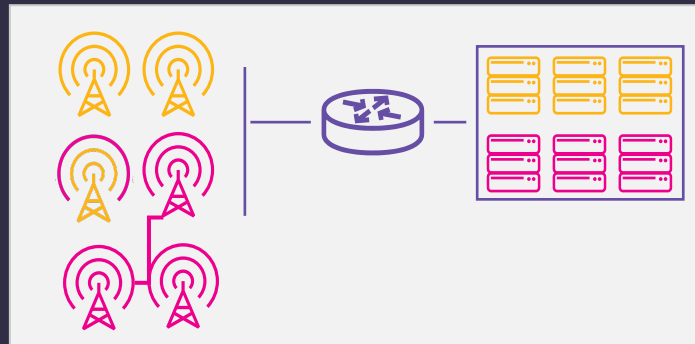
4G packet core

**RAN Optimization
Densification**

~2021-2022

Improve agility & expand capability in core

5G SA (Stand Alone)



5G NR
Fiber, MFH/MBH, CBRS

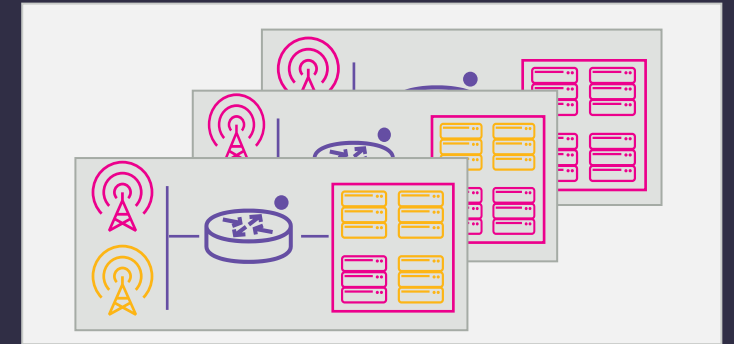
4G packet core
5G packet core

**Network Slicing
Ecosystem Apps.**

2022+

Operate an adaptive and intelligent network

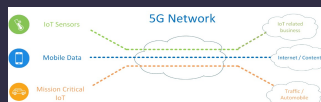
5G 'At-Scale'



AI / ML, IoT, Smart Spaces, Private Networks

**Automated Operations
New Operations Models**

Slices per Service/App Type



Smaller number of shared slices – eMBB, URLCC, mMTC, gaming, video, etc.

Dynamic / elastic resource management across slices

Slices per Enterprise / Organization



Larger number of slices – dedicated per enterprise, organizations, verticals

Template driven, on-demand resource allocation, orchestration and balancing for slices



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Data tiers to data & speed tiers pricing

Trend 1 – Sustaining Innovation

Charging Impacts

- Process volume, time, speed, **and** one-time events in real-time
- **User centric** vs. device centric
- Realtime **rating of QoS** events

Network Impacts

- Signal **QoS to charging function**
- Assure minimum **QoS per plan**
- PC(R)F processing of QoS “**throttling**”
- Network **slice selection** to meet product definition

Catalog Impacts

- **Data and Speed/Latency** based offers
- Content **bundles of speed/latency**
- Standards-based and Extensible **service model**

Billing Impacts

- Bill **presentment** of Data, Speed, and Streaming products
- **Speed rebates** and customer transparency when QoS is not maintained

Extra Small	Small	Medium	Large
5 GB	10 GB	50 GB	100 GB
\$15/month	\$25/month	\$50/month	\$75/month
Bonus 10,000 Vodafone Plus points	Bonus 10,000 Vodafone Plus points	Bonus 10,000 Vodafone Plus points	Bonus 10,000 Vodafone Plus points
5G network access free trial until 30 June 2020. Then opt in for 25 months.	5G network access free trial until 30 June 2020. Then opt in for 25 months.	5G network access free trial until 30 June 2020. Then opt in for 25 months.	5G network access free trial until 30 June 2020. Then opt in for 25 months.
No lock-in plan	No lock-in plan	No lock-in plan	No lock-in plan
No excessive data charges in Australia	No excessive data charges in Australia	No excessive data charges in Australia	No excessive data charges in Australia

Considerations

1. Data + Speed tiered NPI, catalog driven, no software development
2. Hierarchical/Overlay quota for hotspot, smart watch, etc.
3. Self-care presentation of hierarchical/overlay usage to customers
4. Low latency service for streaming – Edge Charging, Content caching

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Personalized & value-added content on mobile

Trend 2 – Service Differentiation

Charging Impacts

- Zero **rate content** bundles
- **Differential rating** scheme for customer and content-providers
- **Contextual event** based charging – start/stop, unlimited to capped, ..
- **Self-service** changes in real-time

Network Impacts

- Application **flow identification**
- **QoS allocation** to UHD flows
- **Complex self-service** changes mid cycle, in real-time
- Content caching, **select network slices** for specific applications

Catalog Impacts

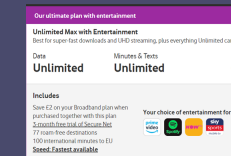
- Integration with **third party “content”** catalog(s)
- Conflict/Eligibility **rules** for regional/product combinations
- **Real-time distribution** to PC(R)F, CHF, and DPI/Application GW

Billing Impacts

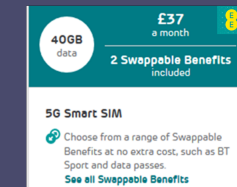
- Two-sided **business model** for consumer and content provider
- **On-bill** and **Off-bill** charges for bundled products
- Modernized **bill presentment**

Partner ecosystem management:

Content onboarding, identity management and settlement



- Included:
- Inclusive roaming in Europe - cap
 - Daily flat roaming pass -cap
 - 3 month free Secure Net
 - Sports, video, music



- Select two:
- Roaming
 - BT Sports
 - Music Pass
 - Netflix, YouTube
 - Amazon Prime

Considerations

5. Self service and Commerce integration with content providers
6. Charging scheme changes on Self-service driven entitlement changes
7. Application aware charging
8. Streaming add-on product; subscription and settlement

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Beyond connectivity and streaming

Trend 3 – Disruptive Innovation

Charging Impacts

- Single **wallet for all/subset of connected devices** of a customer
- Capacity and Service based **network slice** charging
- **Extensible** business logic

Network Impacts

- **Capacity** and scale to support growing number of devices
- Network **slicing** – capacity and service based, NS Management
- Network **optimization** for content/streaming network

Catalog Impacts

- **Onboard** payment/loyalty providers
- Include **payment methods** as part of product offer and specification
- **Product** overlay for OTT content on top of native AR/VR service
- **Integration with OTT** catalog/commerce

Billing Impacts

- **Accuracy of charges** consistent with real-time view of Bills
- **Split billing** of NaaS services – e.g. Consumer and Venue owner



Cloud Gaming over 5G

Private venue network
AR/VR content over private network
UHD content over mobile

Considerations

9. Private networks for venues – edge Charging
10. Network slice based charging to support VR/AR
11. Location and Time based charging
12. Real time display of all types of charges (usage, one time, recurring, subscription) to customers
13. Alternate payment options

Discussion and Q&A