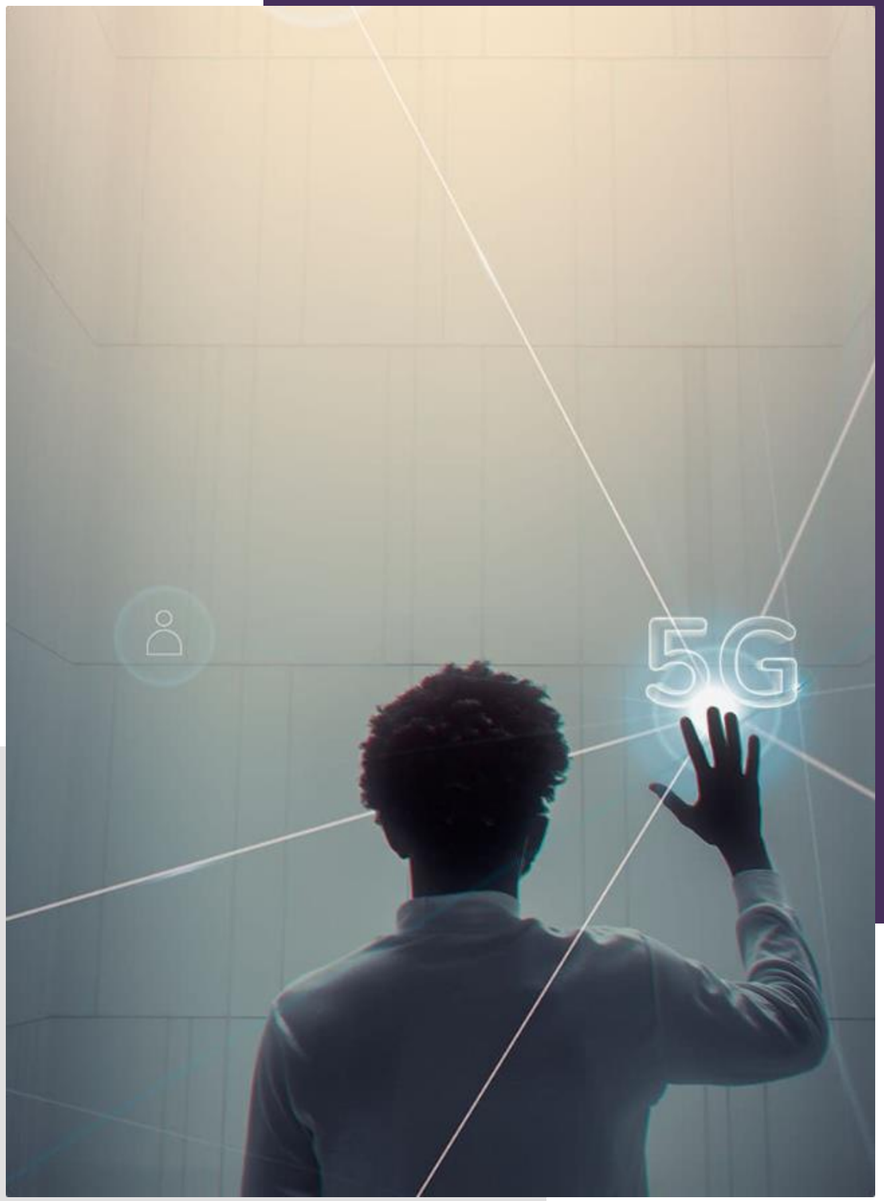

RAN Developments Towards 6G

Amit Mannan
Vice President – Samsung R&D Institute India Bangalore

Technology Trends towards 6G

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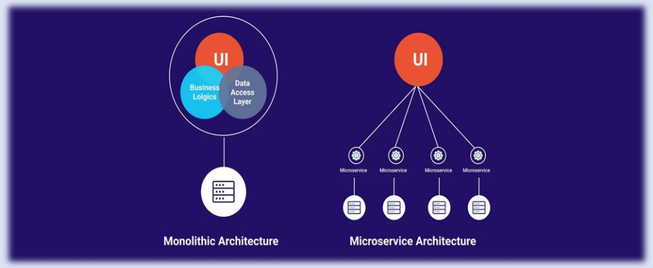
Softwarization & Virtualization

Flexible, Scalable network functions based on cloud technologies and open interfaces.



AI-Native Architecture

AI capabilities integrated into its core architecture to improve efficiency and reduce costs.

Ubiquitous Coverage

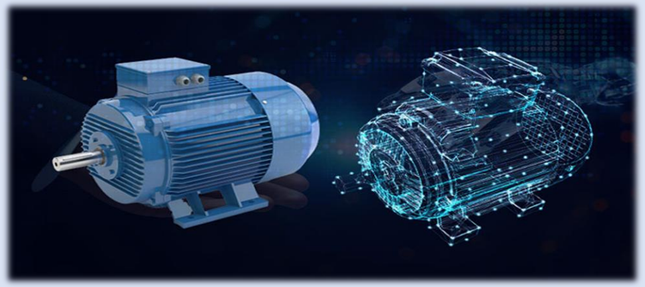
Integration of terrestrial and non-terrestrial networks to serve underserved areas

Immersive Extended Reality

The VR/AR market is expected to exceed $1 trillion by 2030.

Digital Twins

Creating virtual replicas to allow remote monitoring and interaction without spatial constraints.



Massive Communication

Enabling the management of millions of devices simultaneously for smart homes, factories, and cities.

Future Networks – Software based & Open Interfaces

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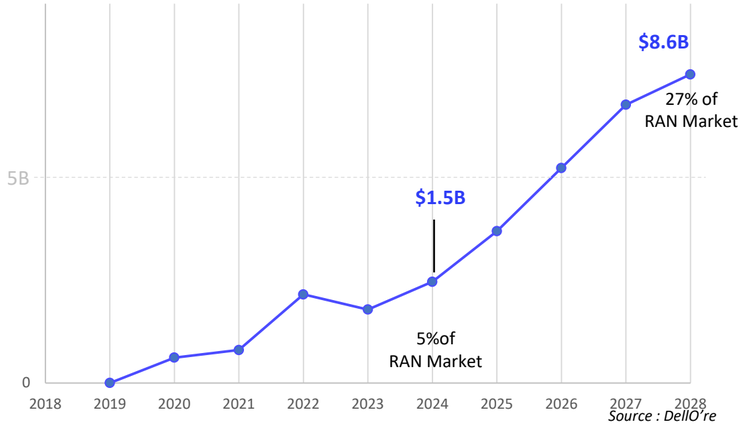
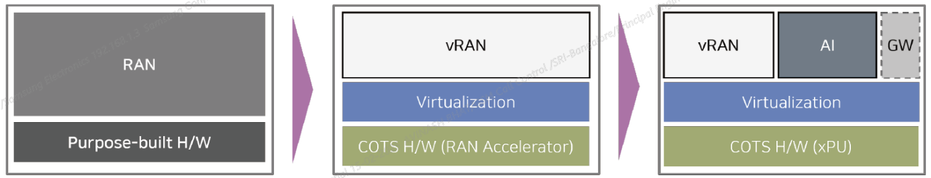
vRAN Evolution driven by AI RAN

vRAN as a % of RAN Deployment



Source : DellO're

vRAN Evolution driven by AI RAN



Legacy RAN

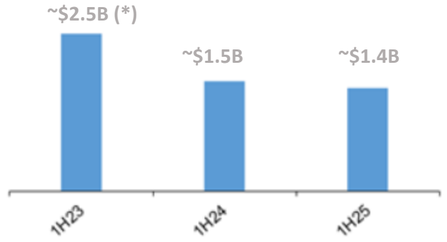
Virtualized RAN
(Specific Accelerator based)

Virtualized RAN
(xPU Based)

Source : SKT Whitepaper

Open RAN Interfaces for Flexibility

O-RAN Market Stabilization



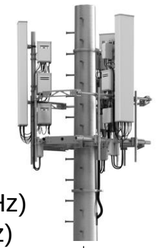
(*)Approximate values

The five-year forecast (2025–2029) remains positive (> 25% of RAN Market by 2029)

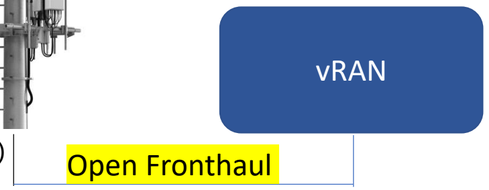
Source : DellO're

O-RAN Deployment are ongoing (led by US & Japan)

Rakuten Mobile



O-RAN Compliant:
- Low-band (700MHz)
- Mid-band (1.7GHz)
- Massive MIMO (3.8GHz)



Samsung's advanced, energy-efficient Massive MIMO solutions will accelerate Rakuten Mobile's network capacity

Open RAN, vRAN, and AI-driven RAN are central to Operators Next-Generation Deployment Strategies

Source : SK Telecom

Future Networks – AI Friendly and Data Driven

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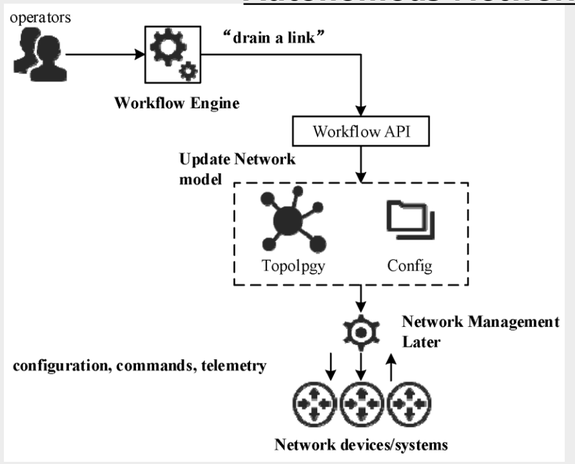
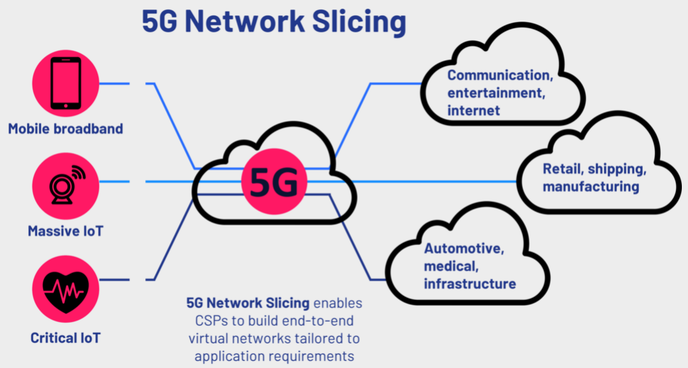
Data centre-like Architecture - Optimal to add AI capabilities & Networks that are easy to maintain

Autonomous Networks (Zero-Touch)



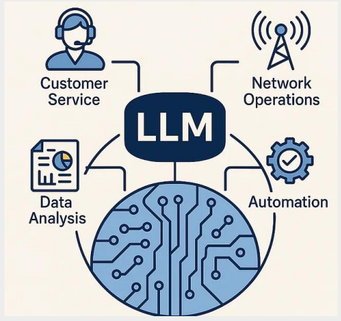
Transitioning from Manual Network Operations Centers (NOCs) to "Agentic AI." Networks that can self-configure, self-optimize, and self-heal without human intervention.

Dynamic Network Slicing



AI engines instantly analyzing traffic demands to carve out dedicated, secure slices of the network for specific use cases (e.g., reserving low-latency bandwidth for remote surgery).

Telco-Specific LLMs



Operators aren't just using ChatGPT; they are training their own large language models on proprietary telecom data (network operation, customer service etc) enabling network automations

Predictive Maintenance

AI analyzing telemetry data to predict equipment failure (e.g., cell tower outages) days before they happen, reducing Mean Time to Repair (MTTR) by 30-50%.

6G : Key Attributes

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For success of 6G, it would be of the utmost importance to pursue future-proof and sustainable user experience

- **AI Native :** Leveraging AI from the start for channel state information (CSI) prediction, TX/RX algorithms, and network operations
- **Sustainable Network :** Focuses on reducing operational costs and terminal power consumption through energy-efficient hardware and coding.
- **Secure and Resilient :** Ensures privacy and network robustness against cyber-attacks in an era of advanced computing power and open architectures
- **Ubiquitous Coverage** Expands services to mid/high bands (7–24 GHz) and integrates non-terrestrial networks to eliminate coverage gaps.
- **Spectrum Utilization**: Utilizing all available low, mid, and high bands, including new candidate bands like 7–15 GHz.

Conclusion : Key Take Away

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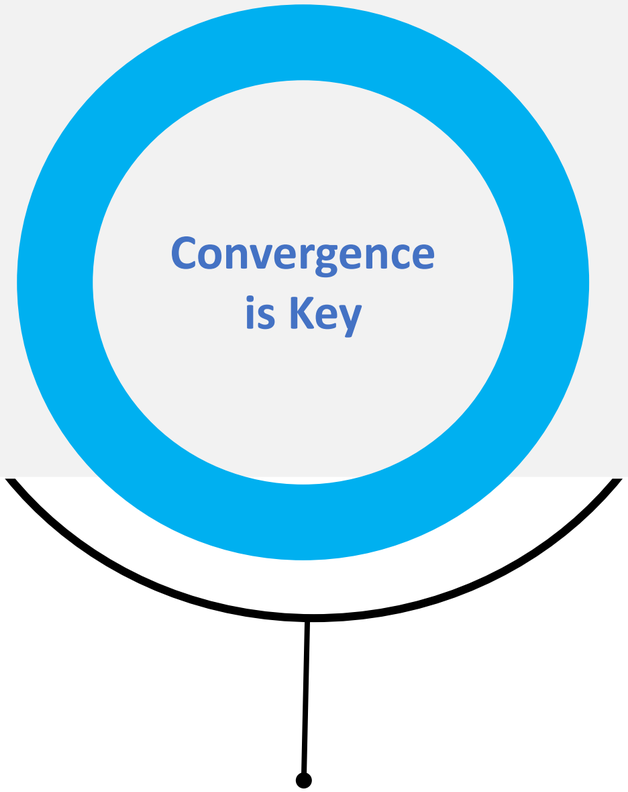
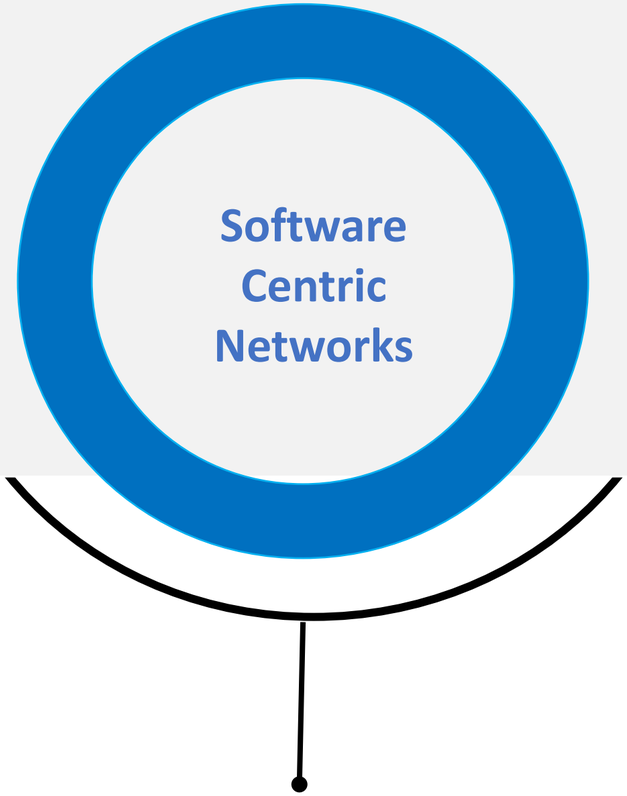
Evolving towards a fully software and AI-powered Autonomous Network



The lines between Telecommunications, Cloud Computing, and Artificial Intelligence have permanently blurred



Future telecom breakthroughs will rely on software engineering, data science, and AI models as much as hardware physics.

Building 6G isn't just about making things faster, it is also about making network intelligent and highly energy efficient.