

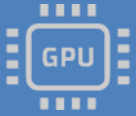
Intelligence in Future Networks

AI and ML Framework for 6G Networks:

Securing Technology Leadership Through Safe & Ethical AI, Data Sovereignty, Innovation, and Sustainable Infrastructure

RajaGopalan Rajappa
CTO, Communication Tech and Platforms
Tata Elxsi

6G - AI Native, AI Driven Networks (AIN-ADN)



AI Native
Autonomous
Safe



Data Driven
Digital Twin (DT)
Agile CI/CD

Technology reimagination
Build, **Test** (DT) & Operate



Open & Shared
Digital Infrastructure

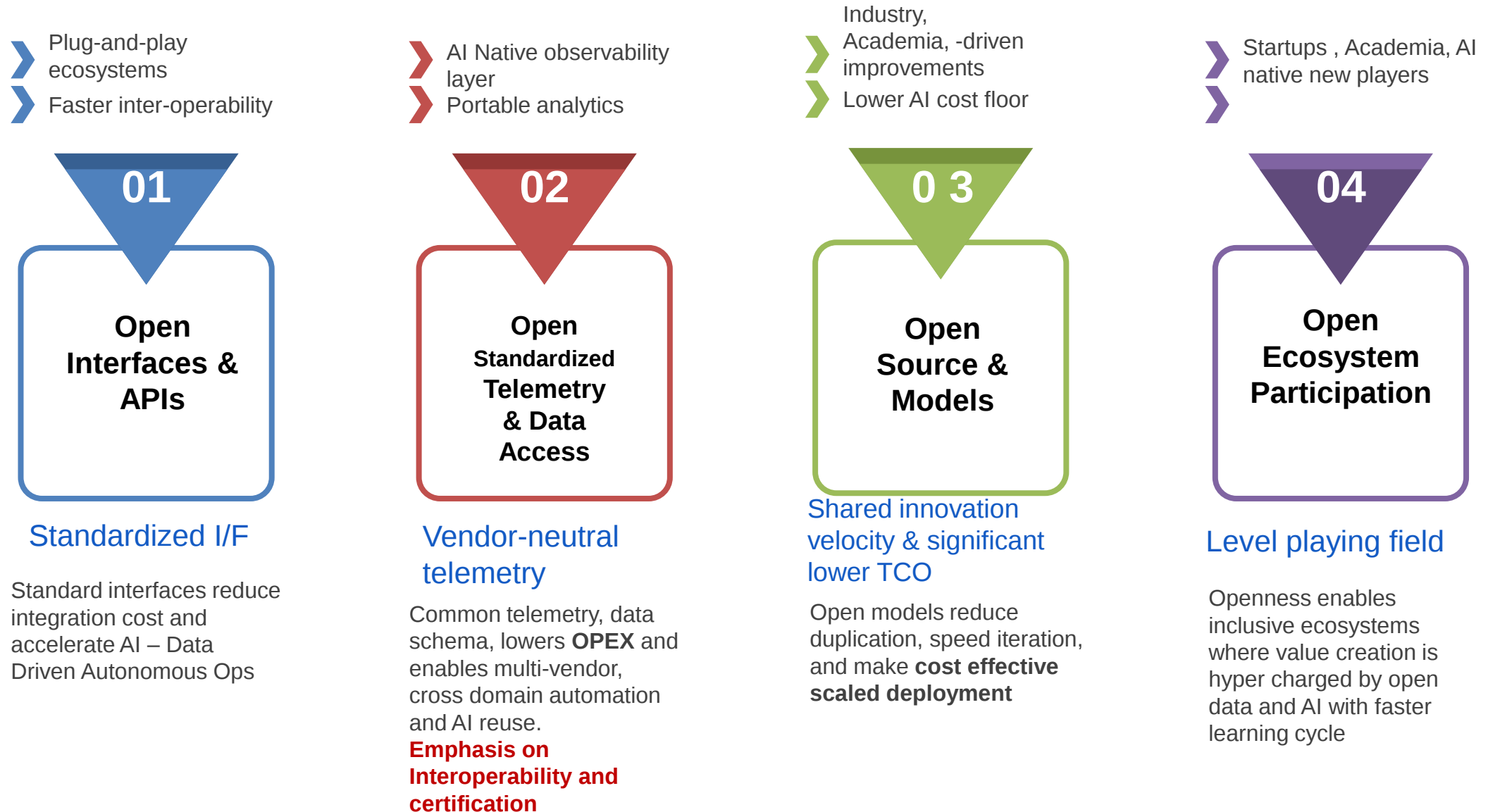


Sustainable
Low-Energy
Large Scale

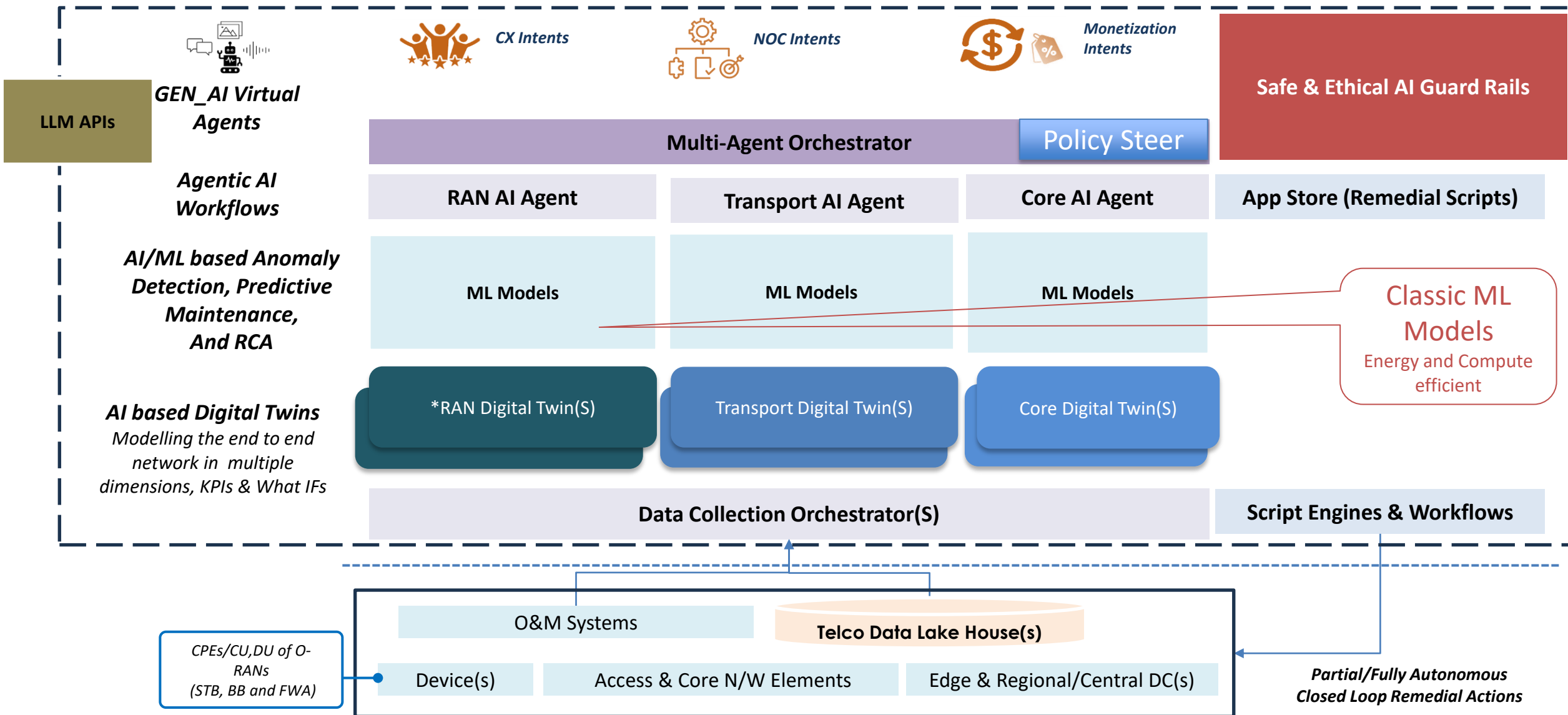
Business models Innovation

*AI in 6G has potential pathways for large scale, low cost and **GREEN** deployment*

6G Standardized Open AIN-ADN Platform - Foundations



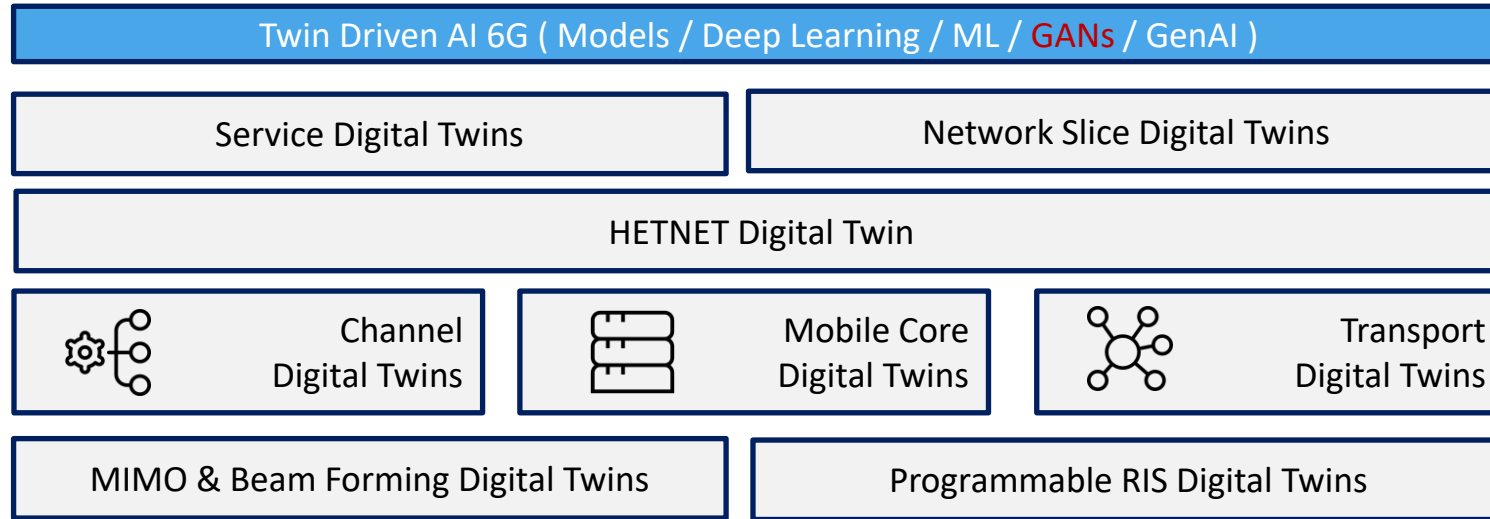
Multi-Domain-Multi Agent – Autonomous Ops of 6G Network



*Neighbor Cells/Full Topology for Channel interference, Power control, HO optimization

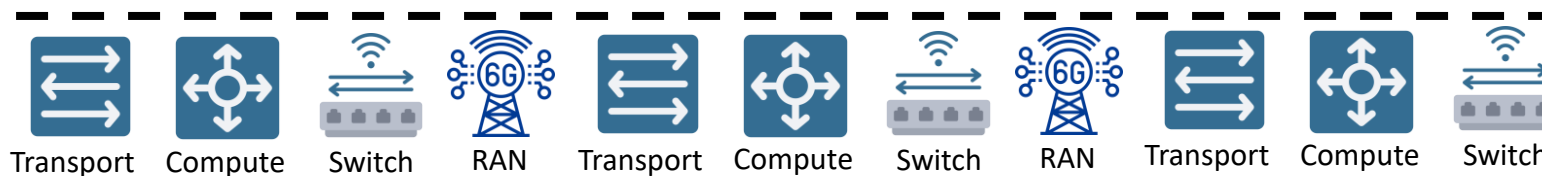
6G Digital Twin Universe

Digital Twin Layer



Secured Shared
Data Transport

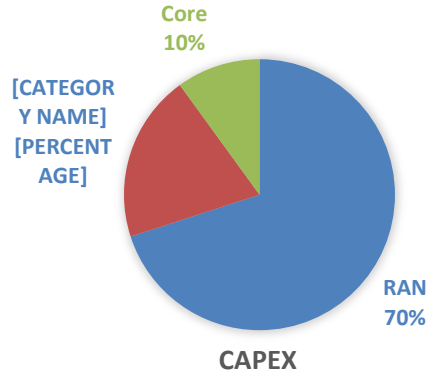
Network Layers



Security & Threat Model Digital twins

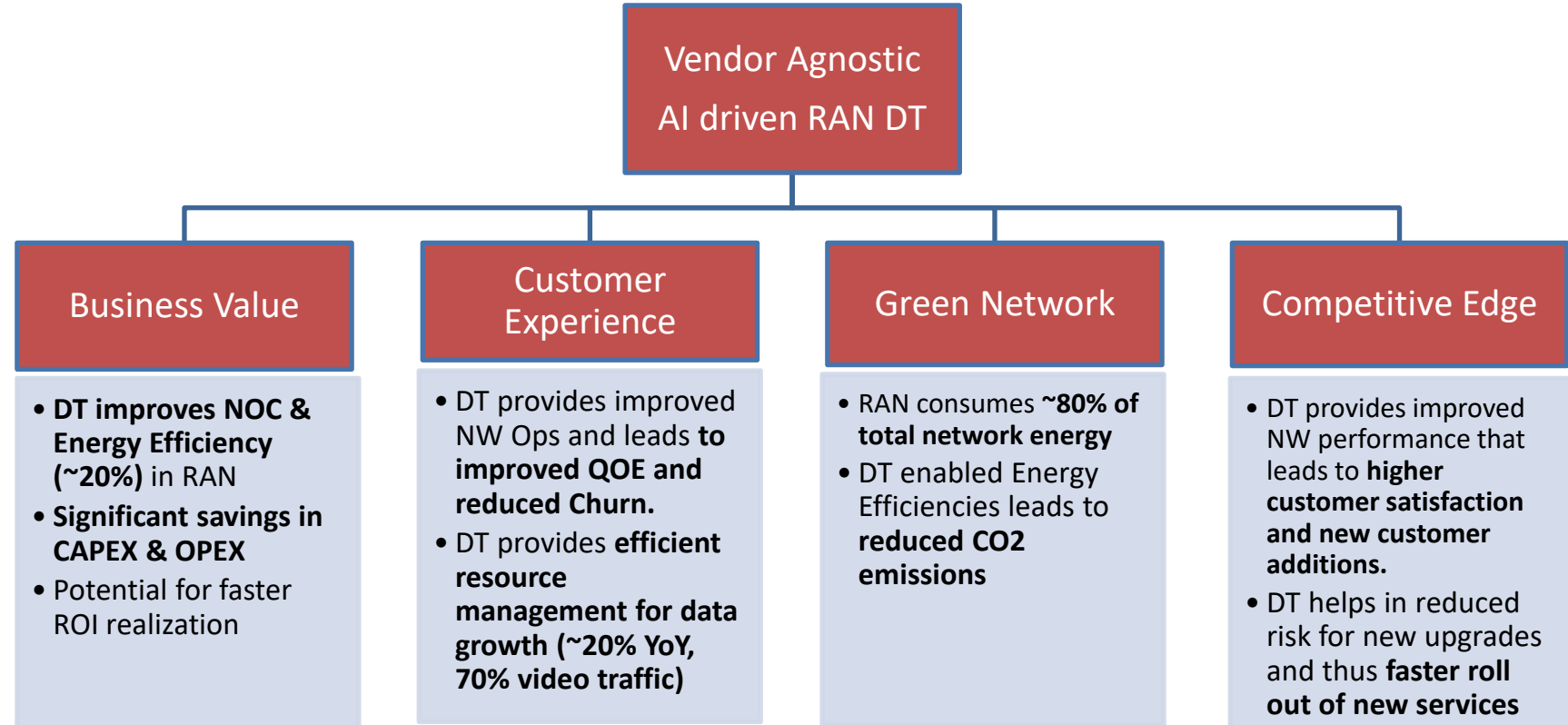
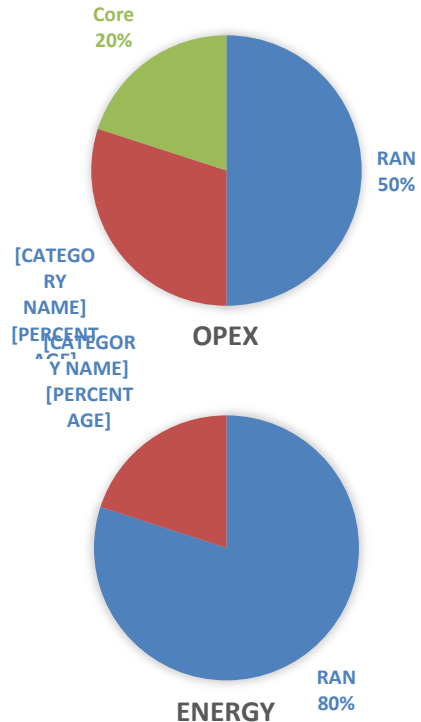
DISTRIBUTED | FEDERATED | CENTRALIZED

RAN: The Largest Cost & Energy Consumer – Why RAN Digital Twin is Critical?



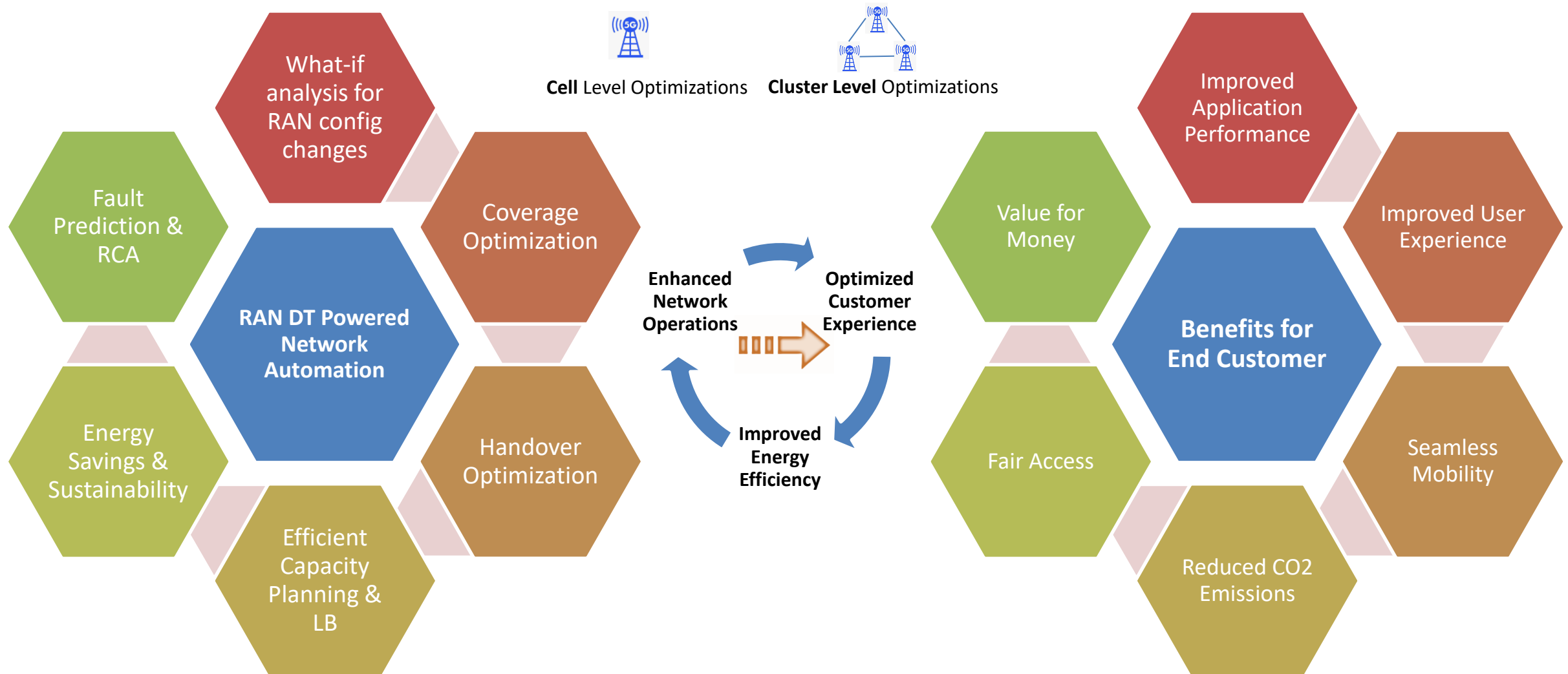
RAN accounts for ~70% of Telco CAPEX, ~50% of OPEX and 80% of network energy consumption

High RAN Costs + Operational Complexity + High RAN related customer complaints
 → Need for Efficient Operations & RAN Optimization
 → RAN Digital Twin & Improved Efficiency
 → Significant Cost Savings



Potential Use Cases that can leverage RAN DT

Towards Intent Driven & Agentic Autonomous 6G Networks
Improved Operational Efficiency, Reduced MTTR, Reduced OPEX and Improved User Experience



AI-Native 6G Network

Near/Non Realtime Intelligence

AI-native Observability & Autonomous Ops (AI Ops)

AI-native 6G Networks

Time Critical Intelligence

RAN Domain

Core Domain

Mobility optimization
QoE-aware decisions

Adaptive Framing
Scheduling
Load balancing
Energy efficiency

Beamforming
Channel estimation
Interference suppression
RIS control
ISAC

L3

AI-ML

AI-ML

L2

AI-ML

AI-ML

L1

AI-ML

Congestion prediction
Path optimization
Latency optimization
Fault localization

Transport Domain

AI-ML

Cross-domain
Intelligence &
Learning

Session management, policy,
slicing, QoS/QoE
optimization
Adaptive user plane
behavior

Cross-domain
Intelligence &
Learning

NF1

AI-ML

AI-ML

NF2

AI-ML

AI-ML

NFx

AI-ML

CI-CD

Security

AI Governance

AI native End to End 6G Network

6G Business Model Innovation – Cost effective Build, rollout & maintenance

- Incentives for sharing
- Federation Marketplace

01

**Data and
Model as
Credit**

**Trust-based data
exchange**

Various models of data
sharing and data models
Free to Freemium !

- On Demand Spectrum
- Flexible, Lower Cost

02

**Spectrum
as a
Service**

**Lower deployment
barriers**

Spectrum for Purpose
(Rural, Education, Skilling,
Mentoring, Agri, Health
care,..)

- Collaboration & Sharing
- Cost & Power reduction

04

**Shared
Infrastructure
& RAN As A
Service**

Economics of Scale

Shared infrastructure
reduces capex and
enables inclusive, scalable
network expansion.

- AI & ML Efficiency
- Lower Cost Solutions

03

**Open-
Source
Models**

**Tiny & Efficient
Models**

Open models xLM and
classical ML models cuts
down energy significantly,
enable reuse, and
accelerate affordable AI
adoption.

AI in 6G has potential pathways for large scale, low cost and **GREEN deployment by **Innovations** in AIN-ADN Open Platform AND Business models**

THANK YOU

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