5G+AI Exploration and Standardization Suggestion

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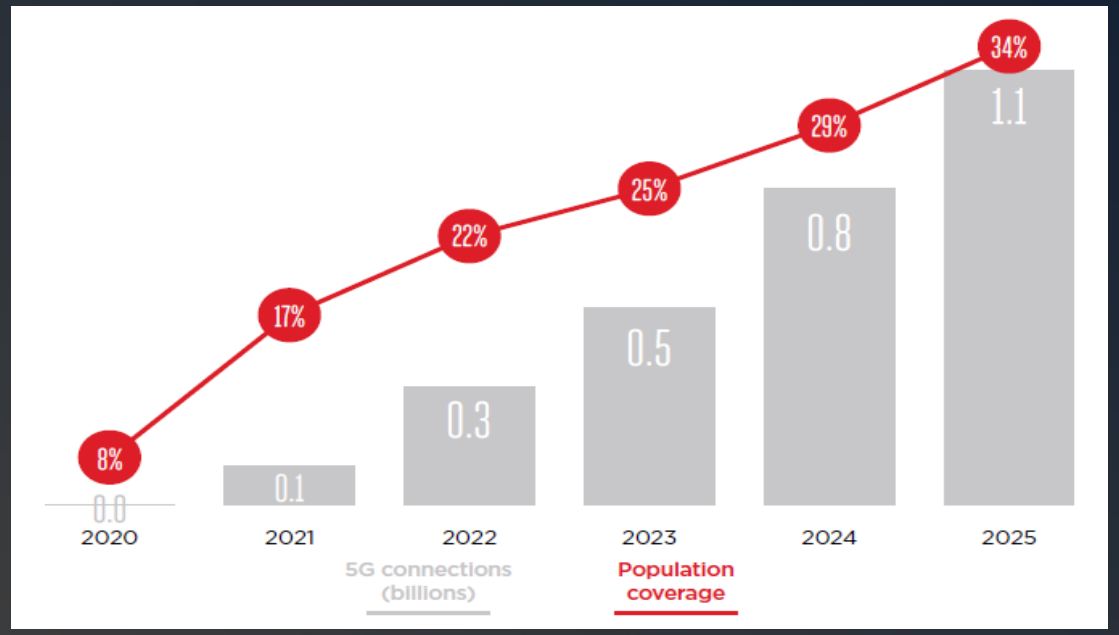
Two Strategic Areas: 5G and AI

"The 5G era: Age of boundless connectivity and intelligent automation"

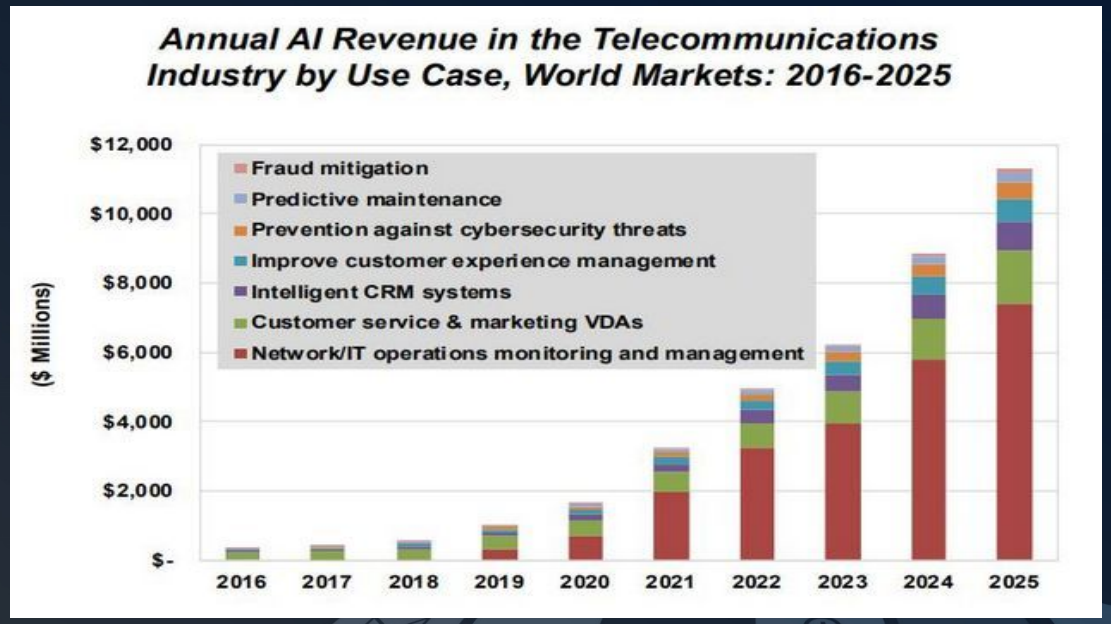
- By 2025, the number of 5G connections will reach 1.1 billion (about 12% of total mobile connections), covering 34% of the global population (2.6 billion people).
- 5G will help operators grow revenues globally at a CAGR of 2.5% to $1.3 trillion in 2025.



From GSMA

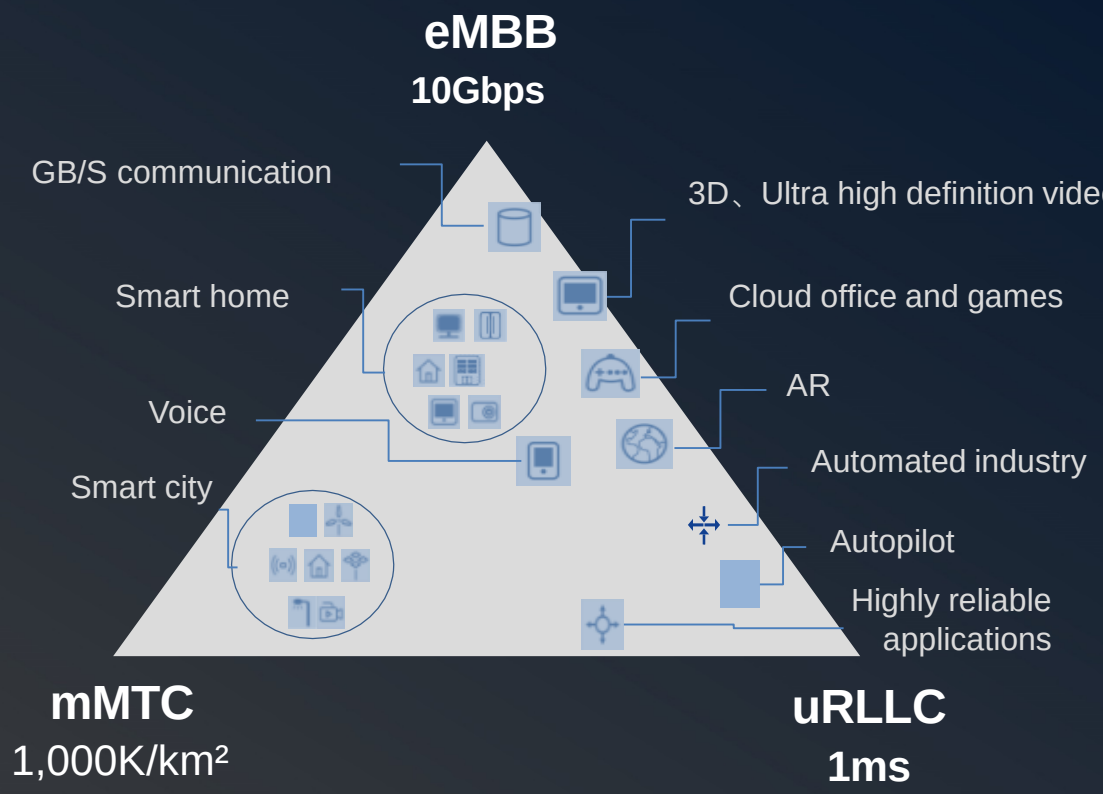
Telecom is currently the largest AI market segment

- By 2025, the global telecom industry is expected to invest $36.7 billion in AI software, hardware and services.
- The annual AI revenue in the telecommunications industry will grow at a CAGR of 48.8%, from $315.7 million to $11.3 billion in 2025.



From Tractica/Ovum

5G Promotes AI Applications



	4G		5G
User Throughput:	100Mbps	->	10Gbps
End-to-end Delay:	30-50ms	->	1ms
Connections /km²:	10K	->	1,000K

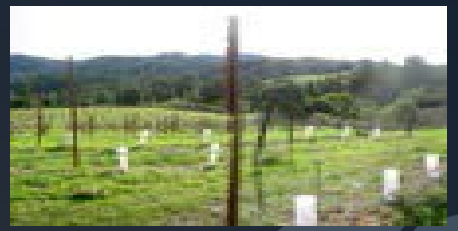
Smart medical treatment

Smart transportation

Smart home

Smart grid

Smart agriculture

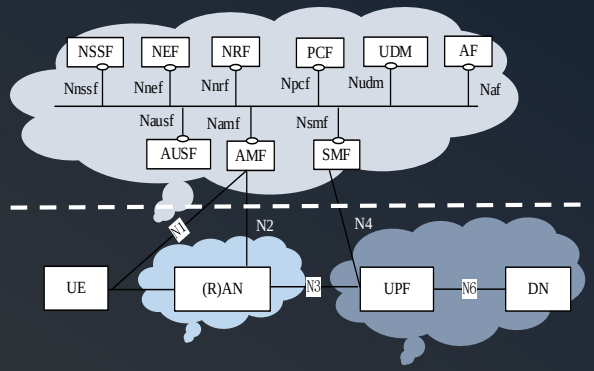


Automated industry

AI Promotes 5G Commercialization

New network architecture

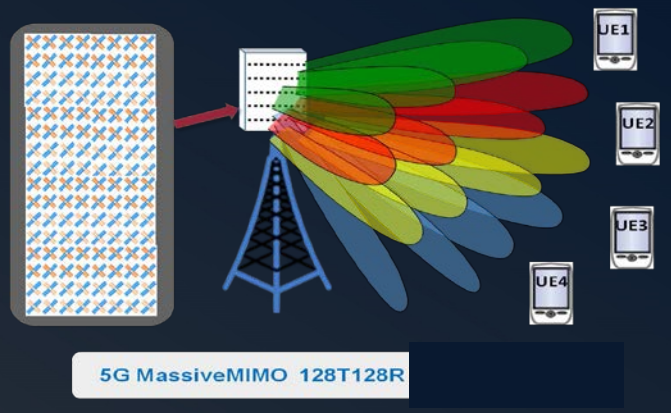
SBA + slicing



Network architecture and network resources change dynamically

New radio technologies

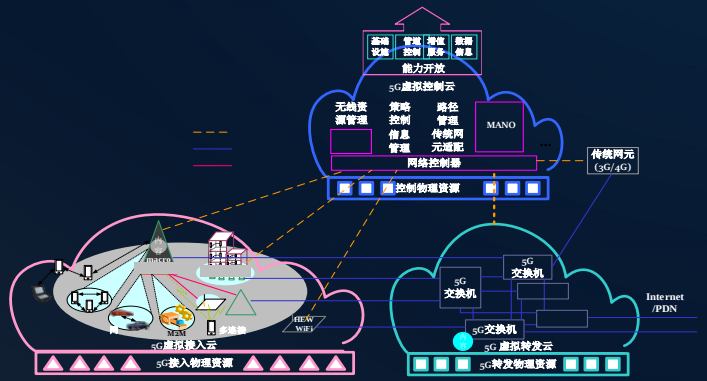
Massive MIMO +
High frequency communication



Network configuration becomes more complex

New deployment method

Cloud + NFV + MEC



Power consumption increases exponentially

Traditional operation and maintenance methods CANNOT meet the requirements of 5G operation. AI is mandatory for 5G commercialization.

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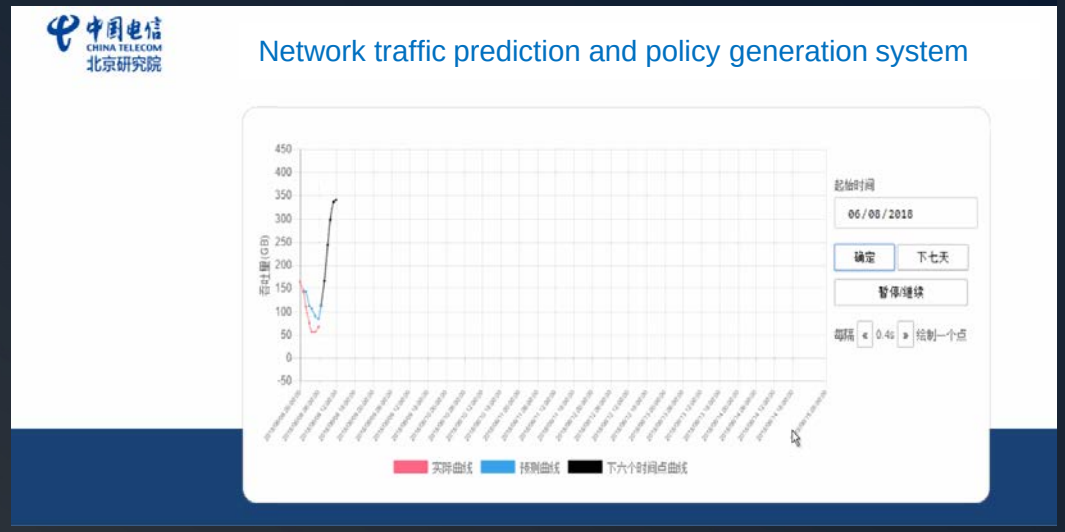
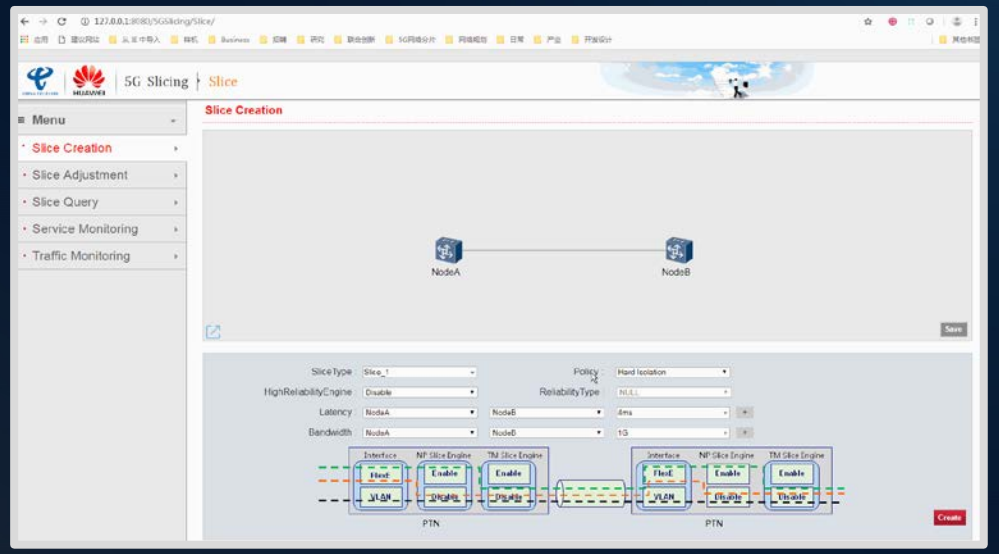
PoC: AI-based Network Slice LCM

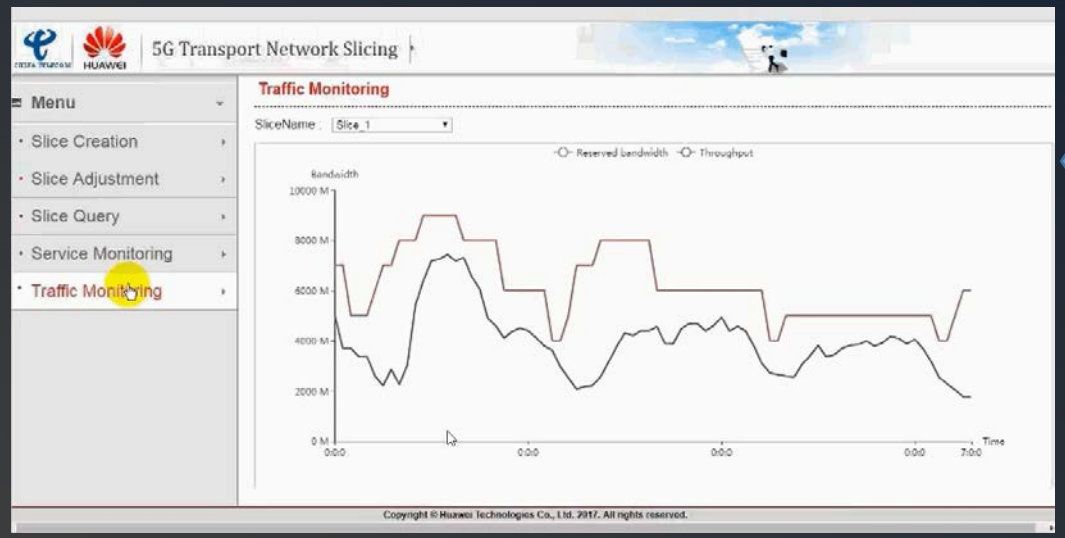


Traffic data

Intelligent policy



Policy execution

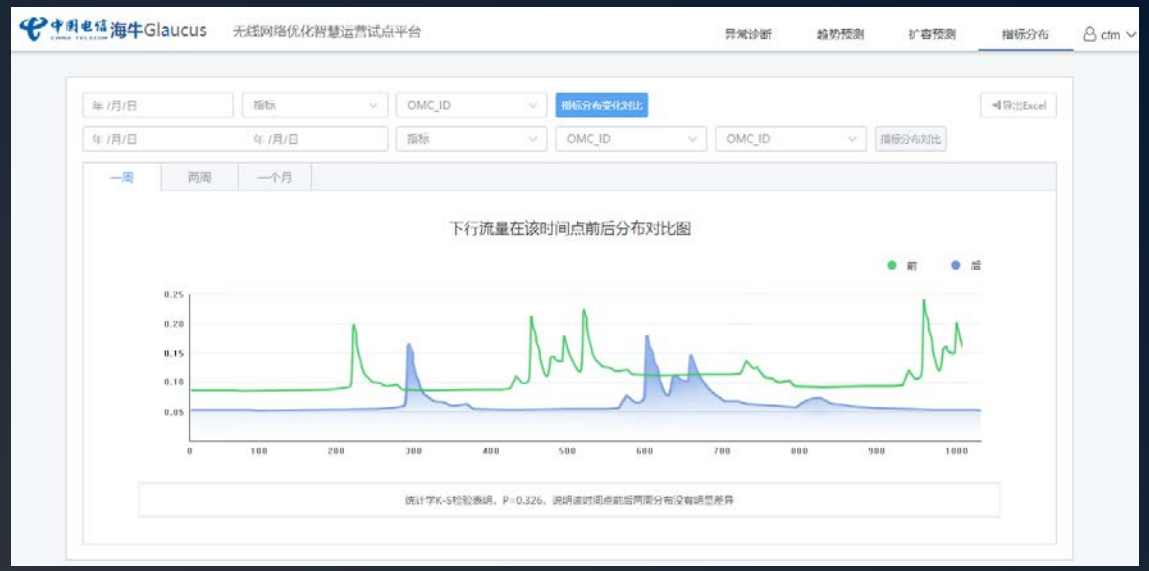


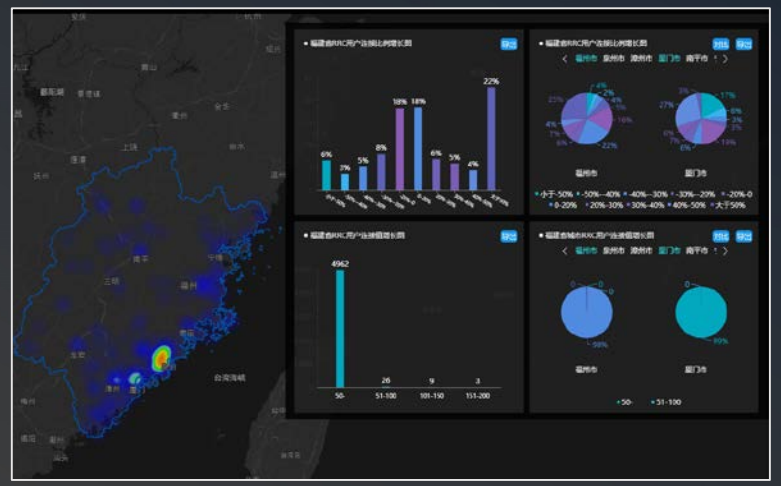
Predictive accuracy>90%
Resource utilization increases 30%

ETSI ENI PoC#1: Intelligent Network Slice Lifecycle Management

https://eniwiki.etsi.org/index.php?title=PoC#PoC.231:_Intelligent_Network_Slice_Lifecycle_Management

AI-based Wireless Network Operation





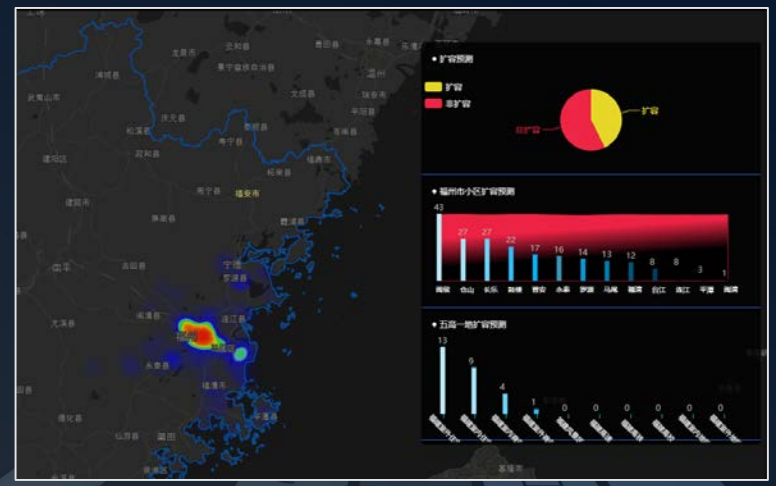
Features：

① KPI distribution visualization

② Abnormity diagnosis

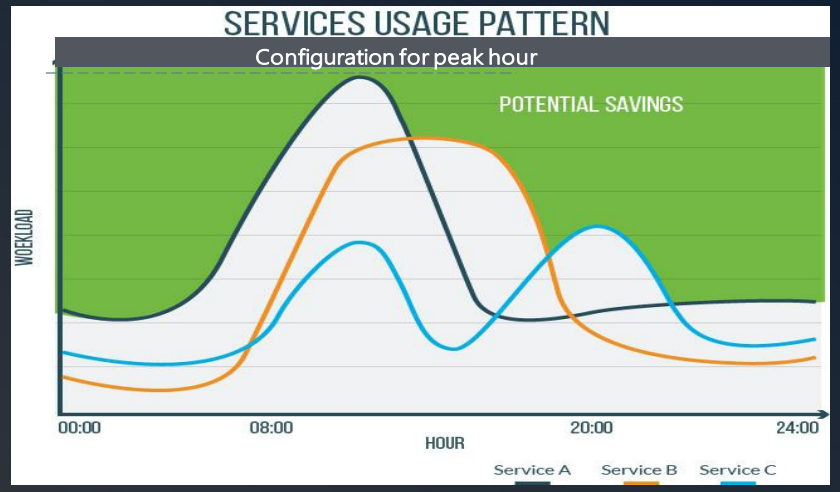
③ KPI trend prediction

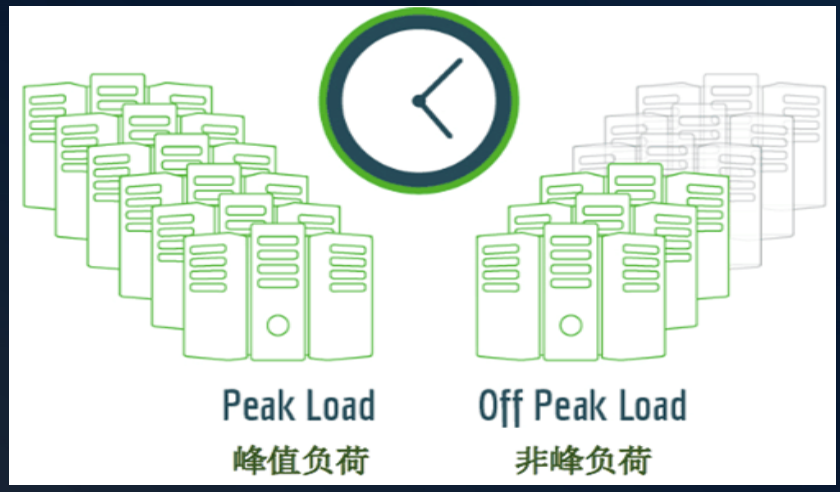
④ Capacity expansion requirement prediction



AI-based DC Energy Saving

Analyze the traffic pattern of different services based on deep learning model, and trigger service migration during off-peak periods to improve energy efficiency.





During off-peak periods, the service loads are migrated and spare servers are turned into idle mode:

- Power consumption of idle mode server is 20W
- Power consumption of working server is 200-500W

Power consumption reduces 30%.
￥ 357.4 is saved per server per year.

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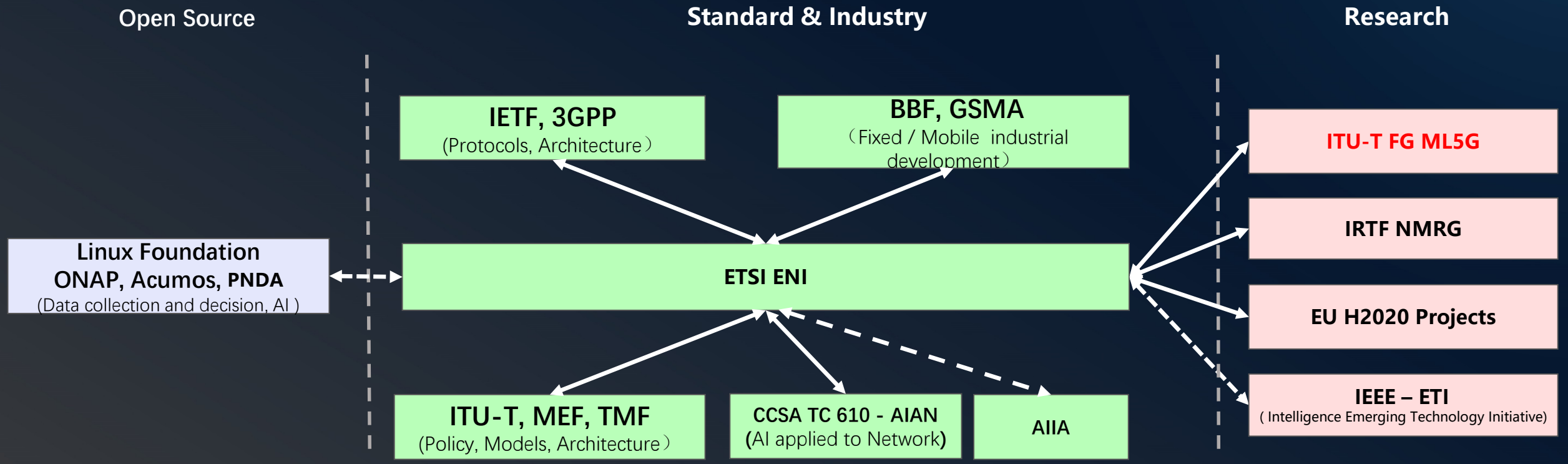
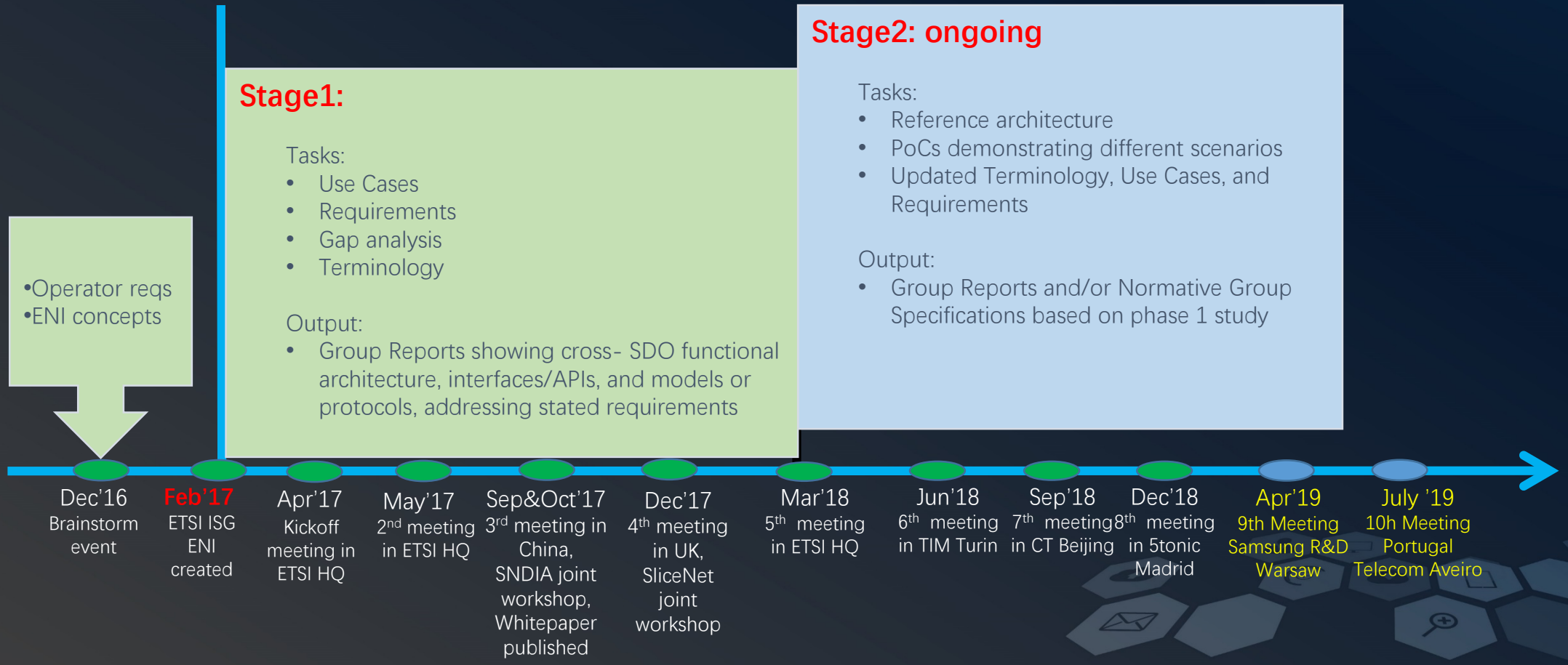
Overview of SDOs and Open Sources



ETSI ISG ENI(Experiential Networked Intelligence)

Founding member：China Telecom、HUAWEI、CAICT、University of Luxembourg、Samsung、Xilinx

ENI focuses on improving the operator experience by adding closed-loop AI mechanisms based on context-aware, metadata-driven policies to more quickly recognize and incorporate new and changed knowledge, and hence, make actionable decisions.



ENI Members and Participants

ENI Use Cases

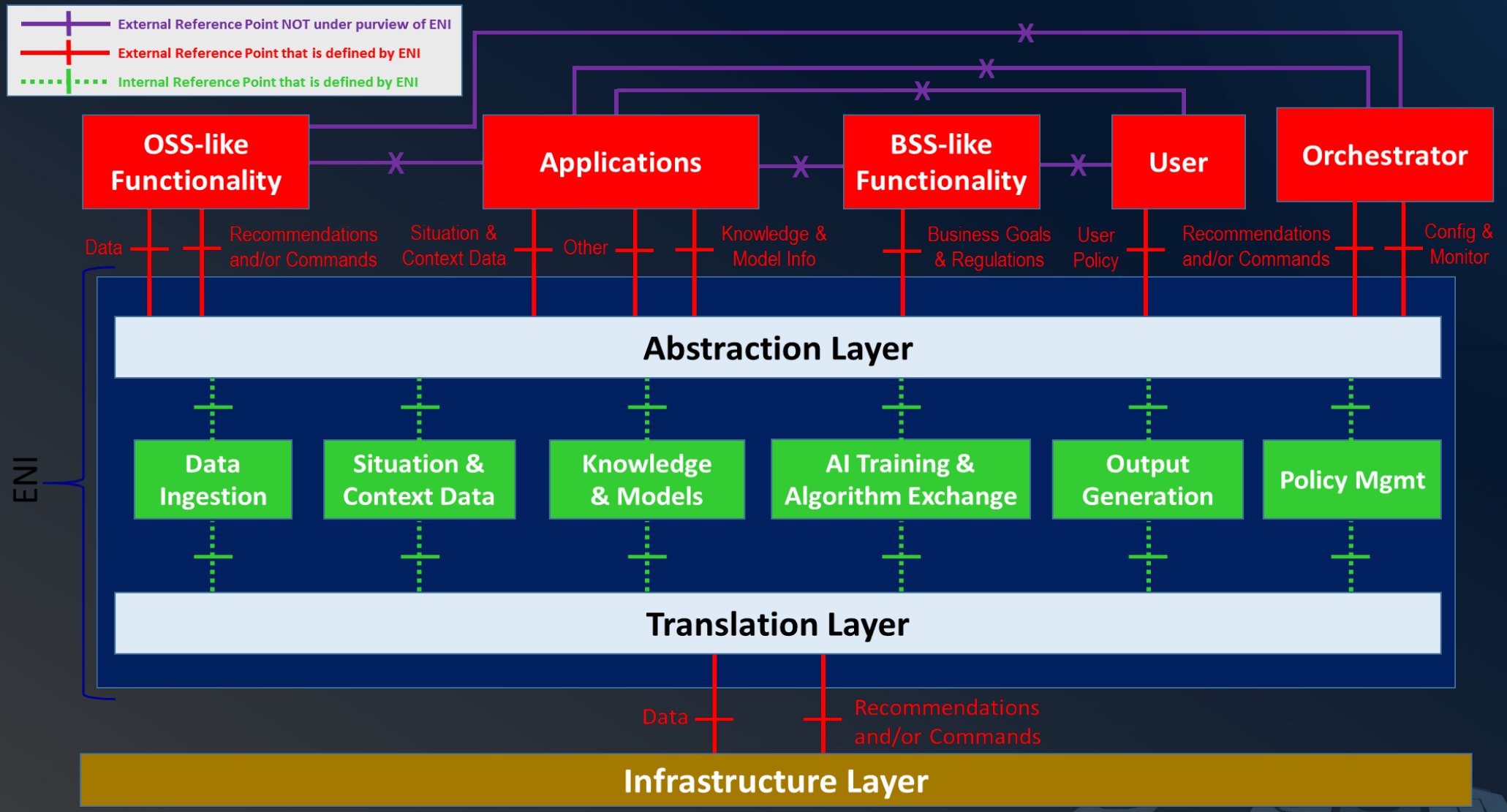
Network Operations
Policy-driven IP managed networks
Radio coverage and capacity optimization
Intelligent software rollouts
Policy-based network slicing for IoT security
Intelligent fronthaul management and orchestration
Elastic Resource Management and Orchestration
Application Characteristic based Network Operation
AI enabled Network Traffic Classification

Network Assurance
Network fault identification and prediction
Assurance of service requirements

Infrastructure Management
Policy-driven IDC traffic steering
Handling of peak planned occurrences
Energy optimization using AI

Service Orchestration and Management
Context aware VoLTE service experience optimization
Intelligent network slicing management
Intelligent carrier-managed SD-WAN

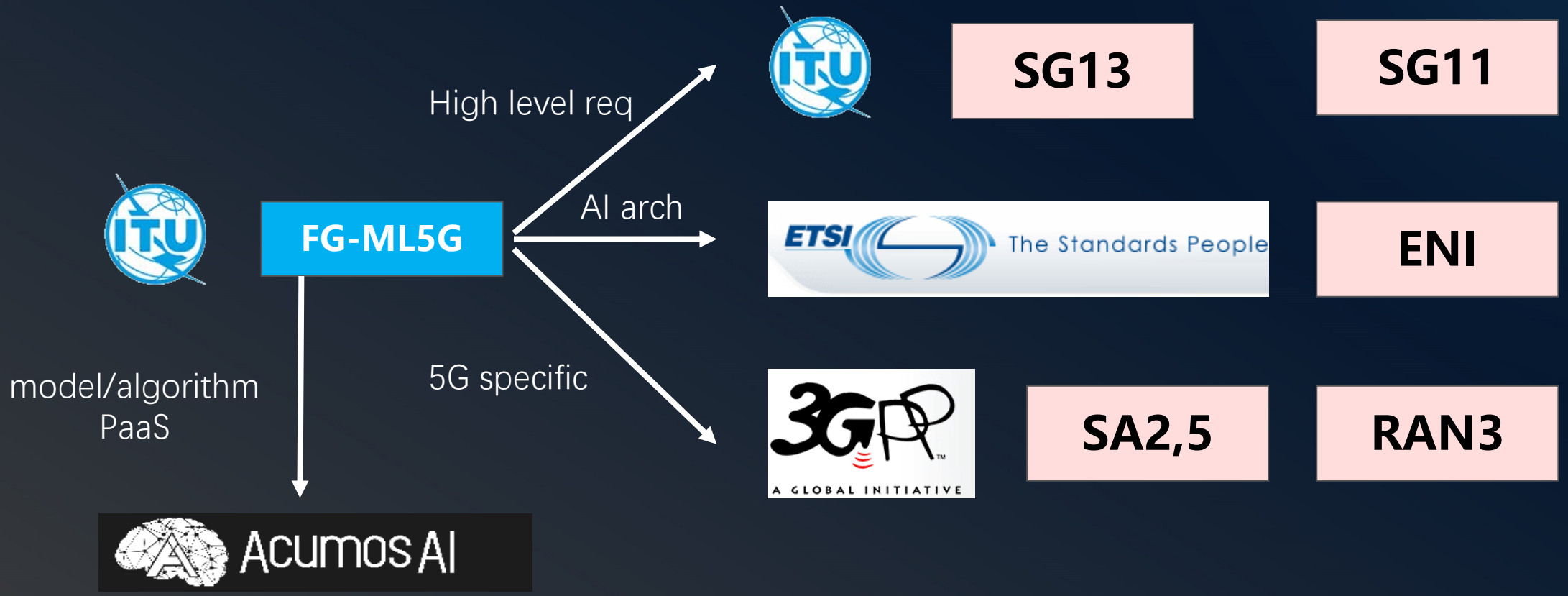
ENI Reference Architecture



ENI PoC Projects

Title	PoC Team Members	Main Contact	Start Time	Current Status
Intelligent Network Slice Lifecycle Management	China Telecom Huawei,CATT,DAHO Networks,Intel,China Electric Power Research Institute	Haining Wang	Jun-2018	Stage 1 finished
Elastic Network Slice Management	Telecom Italia S.p.A. Universidad Carlos III de Madrid, CEA-Leti, Samsung R&D Institute UK, Huawei	Marco GRAMAGLIA	Nov-2018	Started
Securing against Intruders and other threats through a NFV-enabled Environment (SHIELD)	Telefonica Space Hellas, ORION,Demokritos (NCSR)	Diego R. Lopez Antonio Pastor	Feb-2019	Started
Predictive Fault management of E2E Multi-domain Network Slices	Portugal Telecom/Altice Labs SliceNet Consortium (Eurescom,University of the West Scotland,Nextworks S.R.L,Ericsson Telecomunicazioni SpA,IBM,Eurecom,Universitat Politècnica de Catalunya ,RedZinc Service Ltd.,OTE – The Hellenic Telecommunications Organisation, SA,Orange Romania / Orange France,EFACEC,Dell EMC,Creative Systems Engineering,Cork Institute of Technology)	António Gamelas Rui Calé	NA	Proposed

Suggestion to ITU-T FG-ML5G



Thank you!

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