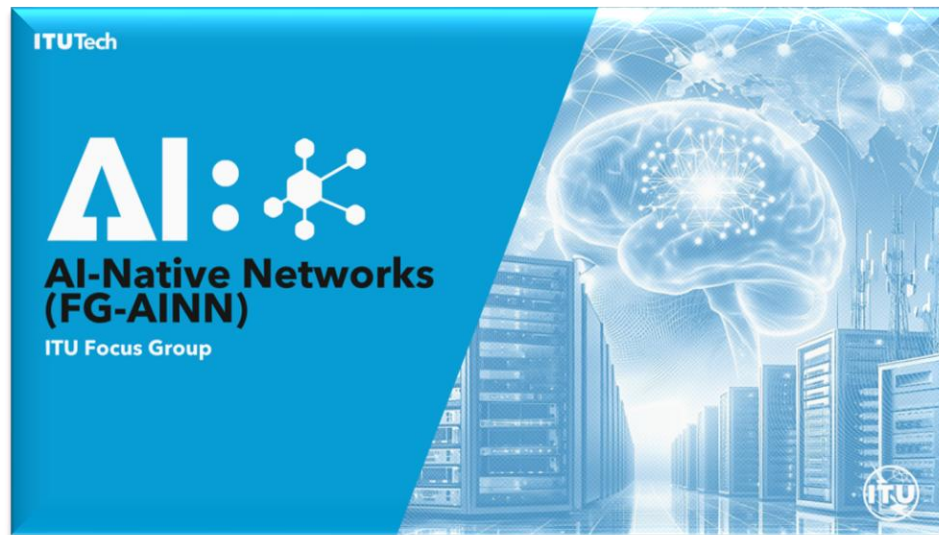


AI Agents for Network Management : Research Roadmap

FG-AINN Panel Contribution

Dr Houda CHIHI



Roadmap

- ❑ Context & Motivation : AI Agent for Network Management
- ❑ Difference between ML Traditional Operations & AI Agents
- ❑ AI Native Principle
- ❑ AI Agents For Network Management Types
- ❑ AI Agents For Network Management Initiatives
- ❑ Research in Progress : Actual Status
- ❑ Conclusion
- ❑ References

Context & Motivation

- ❑ Complexity of manual operation with multi-vendor, multi-generations and technology evolution takes so long time : different nodes , hardware & software operations, different steps towards troubleshooting operations.
- ❑ Limitation of traditional automation tools in the concern of network management : **Sustainability & Efficiency**.
- ❑ Fault management and troubleshooting operations are no longer based on manual or scripts.
- ❖ **AI Agents** driven Operations : A new definition of Network Management.

Shift from Manual Operation

- ❑ Next generation networks are expected to be more complicated.

Intersection between AI Native operation, standards & Governance

How Can we deploy (Architecture) Governed & Sustainable AI Agents For Network Management ?

Differenc between ML Traditional Operations & AI Agents

- ❑ Difference between **AI/ML & AI Agents** : **AI/ML** used for prediction or network investigation compared to AI Agents.
- ❑ Traditional AI/ML operations are based on datasets.
- ❑ Traditional AI/ML operations : reactivity following prompts.
- ❑ AI Agents : more complex problem solving tasks in autonomous way.
- ❑ AI Agents : intent based : anticipation.
- ❑ AI Agents decided about next steps following a learning process based on specific scenarios.

AI Native Principle

- ❑ AI Native Architecture : defined by AI Agents and Multi Agents Intervention.
- ❑ Zero Touch Operations & Self healing of networks.
- ❑ A transition from **IMT 2020** to **IMT 2030**.
- ❑ AI Agents Architecture efficiency checking : Digital TWIN.
- ❑ AI Agents learning process is based on previous problem solving outcomes : Experience.
- ❑ Zero Touch : Network Management without human intervention following specific policies and governance rules.

AI Agent for Network Management

- ❑ AI Agent intervention is based on a specific goals following required diagnostic and decisions to take.
- ❑ **Multi-Agents Systems** : autonomous troubleshooting in which once any incidents is detected orchestrator , analyzer and root causer are activated.

Question : **AI Agents Architecture?**

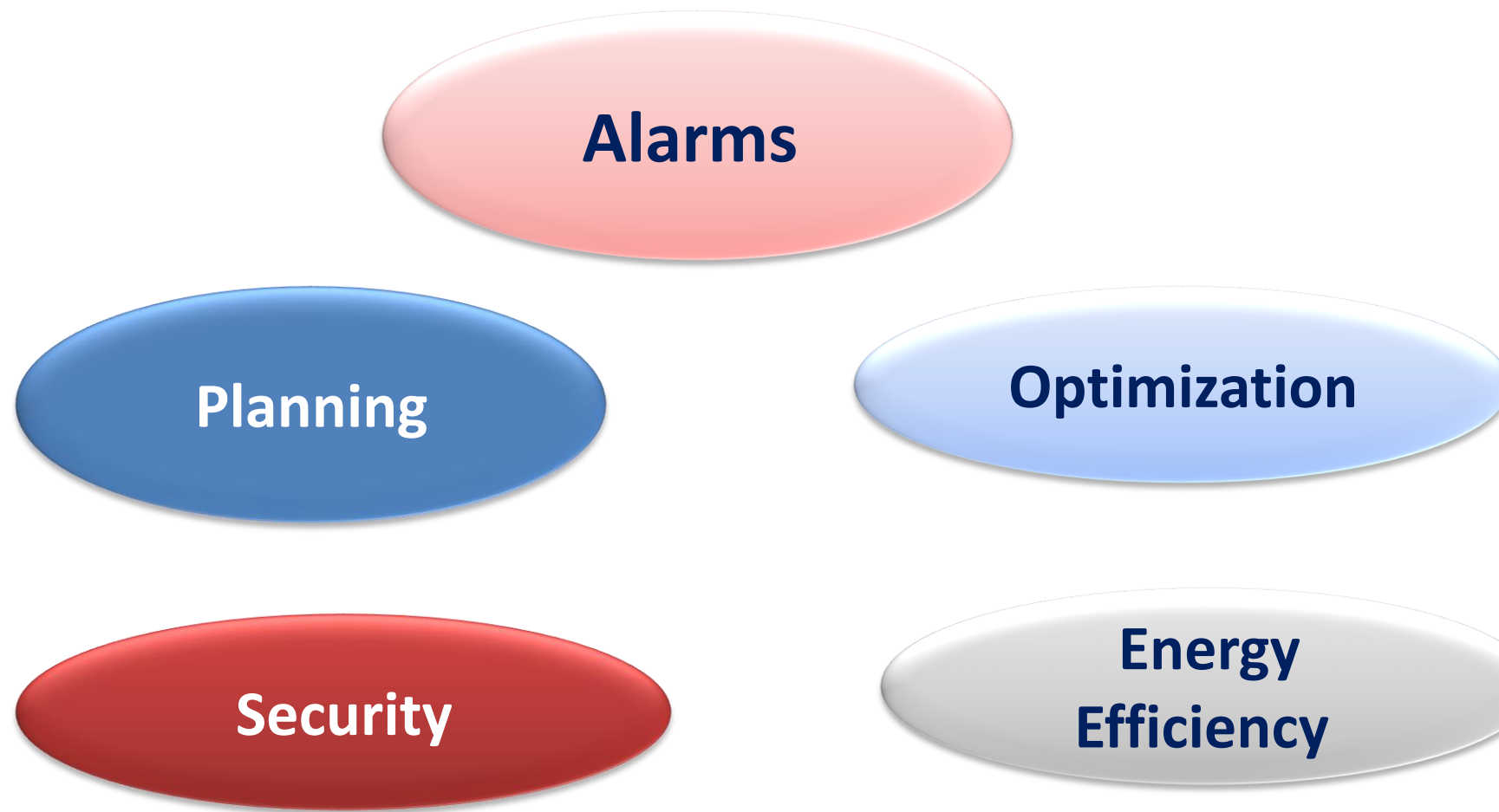
AI Agents For Network Management Initiatives

- ❑ **TM Forum** : network optimization based on Zero touch workflows , real time fault management operations
- ❑ **Telstra** : Telstra shared a Proof of Concept in which an AI Agent managed an outage in MWC 2026.
- ❑ **HPE** : deployed autonomous Agents for AIOps that diagnosis the network in autonomous way in real time.

AI Agents for Troubleshooting : Multi-Agent Orchestration

- ❑ Single **AI Agent** limitation following the continuous increase of network complexity.
- ❑ **Multi-Agent Orchestration** : Tasks coordination among agents : a central **orchestrator** decomposes tasks per **Agents** : each Agent deals with a specific task such as : data trigger, decision and execution, root cause analysis.
- ❑ **AI Agents** efficiency depends on network management experience and tasks exploitation.
- ❑ **AI Agents** able to manage RAN, CORE, Transport in multi-generation & multi-vendor context.

AI Agents For Network Management Types



Alarms

Planning

Optimization

Security

**Energy
Efficiency**

Challenges & Research In Progress

- ❑ **Security** and **Trigger** operations safety : Digital Twin a way for checking AI Agents efficiency.
- ❑ **Accountability** : responsibility in the concern of any taken decision.
- ❑ Layers & Interfaces definition among different AI Agents layers.
- ❖ Focus of **AI Agents** for Optical network
- ❖ **Energy efficiency & Sustainability**

Research In Progress : Actual Status

- ❑ **Mutli AI Agent Use Case** for orchestration, troubleshooting & Fault management in which measurement metrics are based on **MTTR**, energy efficiency (**power cost**) : Planned to be submitted at **W2 FG-AINN**.
- **In Progress** : anomalies management by a Multi AI Agents.
- **Governance** : Security & policy statement investigation.

Research & Standards Gaps

- ❑ Interaction between traditional network management tools and AI Native methods.
- ❑ Lack of accurate definition of AI Native architecture for network management.
- ❑ Lack of accountability concern investigation of AI Native for network management.
- ❑ Protocol design of AI Native architecture.

Research In Progress : Actual Status

Intent Layer : Policies & Intents / A2U

Orchestration : coordination Engine/A2A

Domain Layer : Different types of Agents/A2C

Testing Layer/A2N

Network Elements

❑ Step I : AI Agents contribution in network management state of the art & gaps identification.

❑ Step II : interaction among layers & Governance (Interfaces)

❑ Step III : Proof of Concept and contribution into FG-AINN (submission)

Overview about Standards

- ❑ **Rel-20 5GA** : focusing in AI/ML lifecycle, security and sustainability.
- ❑ **IETF** : A2A protocol investigation for Agents communication.
- ❑ **ITU-T FG-AINN** : AI Agents architecture , Gap analysis, use cases.
- ❑ **TM FORUM** : multi-agents different projects.

Conclusion

- ❑ **Gap Analysis** : policies, accountability , architecture
 - Energy exploitation at each AI lifecycle.
- ❑ Performance Metrics for AI Agents statements for network management : MTTR, KPIs , RCA.
- ❑ AI Agents architecture stack : requirement of human in the loop inclusion in the final decision.
- ❑ AI Agents for network management research redirection For governance, trustworthy, sustainability : New metrics for performance Evaluation.

References

- ❑ 3GPP SA5 TR 28.104
- ❑ TM Forum Catalyst C25.0.832
- ❑ Telstra Proof of Concept
- ❑ ITU-T Focus Group on AI Native for Telecommunication Networks (FG-AINN).

Thank you !

Call for contribution !

