

ISG ENI - Industry Specification Group on Experiential Networked Intelligence

The Experiential Networked Intelligence Industry Specification Group (ENI ISG) is defining a Cognitive Network Management architecture. This uses Artificial Intelligence (AI) techniques and context-aware policies to adjust offered services based on changes in user needs, environmental conditions and business goals. It therefore benefits all networks, including 5G networks, by providing automated service provisioning, operation, and assurance, as well as optimized slice management and resource orchestration. ENI also has launched PoCs aiming to demonstrate how AI techniques can be used to assist network operation including 5G.

ENI focuses on improving the operator experience, using closed-loop AI mechanisms based on context-aware, metadata-driven policies. This enables the ENI system recognize and incorporate new and changed knowledge, and hence make actionable decisions. This model gives recommendations to decision-making systems, such as network control, and will interact with management systems, to adjust services and resources offered based on changes in user needs, environmental conditions and business goals. The use of Artificial Intelligence techniques in the network will solve problems of future network deployment, optimization, and operation.

ENI has published the first version of the System Architecture with Context Aware Policy Management, Categorization on Networks using AI Intent aware network Architecture, Data mechanisms, Evaluation of Categorization, functional concepts, Prominent control loop Architectures & Artificial intelligent mechanisms. Two versions of the Proof of Concept (PoC) Framework and three versions of the Use Cases, Requirements and Terminology in Release 2. A second version of the System Architecture has been Published recently.

Recently published deliverables: nineteen published outputs,

1. [ETSI GS ENI 001 V3.1.1 \(2020-12\)](#) **Published** Use Cases
2. [ETSI GS ENI 002 V3.1.1 \(2020-12\)](#) **Published** Requirements
3. [ETSI GR ENI 003 V1.1.1 \(2018-05\)](#) **Published** Context-Aware Policy Man.
4. [ETSI GR ENI 004 V2.2.1 \(2021-12\)](#) **Published** General Terminology
5. [ETSI GS ENI 005 V2.1.1 \(2021-12\)](#) **Published** System Architecture
6. [ETSI GS ENI 006 V2.1.1 \(2020-05\)](#) **Published** PoC Framework
7. [ETSI GR ENI 007 V1.1.1 \(2019-11\)](#) **Published** Definition of Categories
8. [ETSI GR ENI 008 V2.1.1 \(2021-03\)](#) **Published** Intent Aware Network Autonomicity
9. [ETSI GR ENI 009 V1.1.1 \(2021-06\)](#) **Published** Data Mechanisms
10. [ETSI GR ENI 010 V1.1.1 \(2021-03\)](#) **Published** Evaluation of categories
11. [ETSI GR ENI 012 V1.1.1 \(2022-03\)](#) **Published** Reactive In-situ flow information Telemetry
12. [ETSI GR ENI 016 V2.1.1 \(2021-07\)](#) **Published** Functional Concepts
13. [ETSI GR ENI 017 V2.1.1 \(2021-08\)](#) **Published** Control Loop Architectures.
14. [ETSI GR ENI 018 V2.1.1 \(2021-08\)](#) **Published** AI Mechanisms

The second version of the System Architecture further specified the function and operation of each of its functional blocks, along with internal and external reference points. ENI has work-items to develop version 4 terminology, version 3 system architecture, and a new work-items on Intent aware network architecture, data mechanisms, measurement of the evaluation of categorization for AI application to Networks, mapping of the ENI architecture to operational systems, Reactive In-situ flow information Telemetry and an ENI Intent Policy Model analysis across SDOs. Also included is a specification of ENI's information and data models, along with a transformer architecture for policy processing.

ENI is continuing its Proof of Concepts activity. A PoC review team was created and tasked with reviewing incoming proposals. Each PoC Team proposal shall address at least one goal relevant to ENI, related with an ENI

Use Case, an ENI Requirements or a demonstration of using the ENI System Architecture, including reference points. The output of each PoC project shall contribute to the completion of the current version specifications within ISG ENI. To improve the output of the Work-items, alignment with existing activities is required. Each PoC Proposal will provide proof of the technical feasibility of ENI within the Industry. Proof of Concept (PoC) Proposals are called for in line with the approved PoC framework. With the publication of the revised PoC Framework the proof of reference points between equipment is added.

ISG ENI has the following ongoing PoCs:

Title	PoC Team Members	Main Contact	Start Time	Current Status (Dec-2020)
PoC #1: Intelligent Network Slice Lifecycle Management	China Telecom Huawei, Intel, CATT, DAHO Networks, China Electric Power Research Institute	Haining Wang	Jun-2018	Completed
PoC #2: Elastic Network Slice Management	Universidad Carlos III de Madrid Telecom Italia S.p.A., CEA-Leti, Samsung R&D Institute UK, Huawei	Marco Gramaglia	Nov-2018	Completed
PoC #3: SHIELD, security through NFV	Telefonica Space Hellas, ORION, Demokritos (NCSR)	Diego R. Lopez Antonio Pastor	Jan-2019	Completed
PoC #4: Predictive Fault management of E2E Multi-domain Network Slices	Portugal Telecom/Altice Labs SliceNet Consortium	António Gamelas Rui Calé	Mar-2019	Completed
PoC #5: AI Enabled Network Traffic Classification	China Mobile Huawei, Intel, Tsinghua University	Weiyuan Li	Jun- 2019	Completed
PoC #6: Intelligent caching based on prediction of content popularity	China Unicom Beijing University of Posts and Telecommunications, Samsung, Cambricon, Huawei	Bingming Huang	August-2019	Completed
PoC #7: Intelligent time synchronization of network	China Unicom Beijing University of Posts and Telecommunications, Samsung, Cambricon, Huawei	Bingming Huang	August-2019	Completed

PoC #8: Intent-based user experience optimization	China Telecom/Huawei Technologies China Telecom, Huawei Technologies, AsiaInfo, Beijing University of Posts and Telecommunications	Dong Li	Jan-2020	Completed
PoC #9: Autonomous Network Slice Management for 5G Vertical Services	Nextworks TIM, Nextworks, Samsung, WINGS, UC3M	Gino Carrozzo	Jan-2020	Completed
PoC #10: Intelligent Telecom Network Energy Optimization	China Mobile China Mobile Research Institute, Intel, Quanta Cloud Technology, Hong Kong ASTRI (Applied Science and Technology Research Institute)	Yan Yang	Jan-2020	Completed
PoC#11: Intelligent Energy Management of DC	China Telecom China telecom, Intel, AsiaInfo, Samsung, Huawei	Yu Zeng	April-2020	Completed
PoC #12: Intelligent Transmission Network Optimization	China Mobile China Mobile Research Institute, China Mobile Group Zhejiang Co., Ltd., Huawei, Intel	Chen Shaofan	Sept-2020	Completed
PoC#13: Intelligent Coverage Optimization of 5G Massive MIMO BS	China Telecom China Telecom, Intel, Inspur	Xueqi Yuan	Oct.-2020	Extended Jun-2022
PoC #14: Intent-based Cloud Management	NTT Labs NTT labs, Intracom Telecom, NTT-AT, Intel	Chao Wu	June-2021	Final report in Review
PoC#15: PINet— Polymorphic Intelligent Network	China Telecom China Telecommunications, China Mobile Research Institute, AsiaInfo Technologies Inc., Maipu Communication Technology Co., Ltd.	Ziting Zhang	Nov.-2022	Ongoing

ISG ENI has presently 65 Members /Participants: 47 Members, 18 Participants and 0 Counsellors.