ETSI GS ENI 001 V3.1.1 (2020-12)

Experiential Networked Intelligence (ENI); ENI use cases

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Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group (ISG) Experiential Networked Intelligence (ENI).

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1 Scope

The present document specifies a collection of use cases from a variety of stakeholders, where the use of an Experiential Networked Intelligence (ENI) system can be applied to the fixed network, the mobile network, or both, to enhance the operator experience through the use of network intelligence. The present document is a revision of ETSI GR ENI 001 [i.1]. It identifies and describes additional use cases and scenarios and gives the baseline on how the studies in ENI can be applied as solutions of some identified use cases in accordance with the ENI Reference Architecture. It also provides guidelines in terms of how to use ENI system in the network and for third parties, including the use of ENI systems in intent based networks.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference.

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2.2 Informative references

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NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI GR ENI 001 (V1.1.1): "Experiential Networked Intelligence (ENI); ENI use cases".

[i.2] NGMN Alliance: "Description of Network Slicing Concept", Version 1.0, January 13, 2016.

NOTE: Available at https://www.ngmn.org/publications/description-of-network-slicing-concept.html.

[i.3] 3GPP TR 23.799 (V14.0.0): "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Study on Architecture for Next Generation System Release 14", December 2016.

[i.4] ETSI TS 132 101 (V11.4.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Telecommunication management; Principles and high level requirements (3GPP TS 32.101 version 11.4.0 Release 11)".

[i.5] ETSI TS 128 530 (V15.1.0): "5G; Management and orchestration; Concepts, use cases and requirements (3GPP TS 28.530 version 15.1.0 Release 15)".

[i.6] ETSI GR NFV-EVE 012 (V3.1.1): "Network Functions Virtualisation (NFV) Release 3; Evolution and Ecosystem; Report on Network Slicing Support with ETSI NFV Architecture Framework".

[i.7] ETSI GS ENI 002 (V1.1.1): "Experiential Networked Intelligence (ENI); ENI requirements".

[i.8] ETSI GS ENI 005: "Experiential Networked Intelligence (ENI); System Architecture".

[i.9] ETSI GR ENI 004: "Experiential Networked Intelligence (ENI); Terminology for Main Concepts in ENI".

[i.10] IETF RFC 6645: "IP Flow Information Accounting and Export Benchmarking Methodology".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GR ENI 004 [i.9] apply.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AI	Artificial Intelligence
AI/ML	Artificial Intelligence/Machine learning
AI-MC	AI-based Mobile Caching
AI-NTC	AI enabled Network Traffic classifier
AN	Access Network
AP	Access Point
API	Application Programming Interface
APIB	API Broker
APP	Application
AT	Antenna
BBU	Baseband Unit
BRAS	Broadband Remote Access Server
BSS	Business Support System
C-AM	Context-Aware Management (functional block)
CAPEX	Capital Expenditure
CCO	Capacity and Coverage Optimization
CGN	Carrier Grade Network address translation
CMS	Cloud Management System
CN	Core Network
CP	Cloud Provider
CPRI	Common Public Radio Interface
CPU	Computing Processing Unit
C-RAN	Centralized RAN
CSMF	Communication Service Management function
CSP	Cloud Sevice Provider
CT	Client/Tenant
DC	Data Centre
DDOS	Distributed Denial Of Service
DHCP	Dynamic Host Configuration Protocol
DIN	Data ingestion and Normalization
DL	Downlink
DNS	Domain Name System
DPI	Deep packet inspection
D-RAN	Distributed RAN
E2E	End-to-End

EMS	Element Management System
ENI	Experiential Networked Intelligence
FB	Functional Block
FCAPS	Fault, Configuration, Accounting, Performance and Security
FPS	Frames Per Second
FTP	File Transfer Protocol
GUI	Graphic User Interface
HTTP	Hypertext Transfer Protocol
IDC	Internet Data Centre
IDS	Intrusion Detection Systems
INFP	Intelligent Network Failure Prevention
IP	Internet Protocol
ISP	Internet Service Provider
IT	Information Techology
KM	Knowledge Management (functional block)
KPI	Key Performance Indicator
MANO	Management and Orchestration
MC	Mobile Caching
MCP	Multi-vendor Command Platform
MDE	Model Driven Engineering (functional block)
MEC	Multi-access Edge Computing
MIMO	Multiple Input Multiple Output
ML	Machine Learning
MOS	Mean Opinion Score
MPLS	Multi-Protocol Label Switching
MS	Monitoring System
NF	Network Function
NFV	Network Function Virtualisation
NFVI	NFV Infrastructure
NFVO	NFV Orchestrator
NGFI	Next Generation Fronthaul Interface
NGMN	Next Generation Mobile Networks
NPO	Network Planning and Optimization
NRM	Network Resource Management
NSI	Network Slice Instances
NSMF	Network Service Management Function
NSSMF	Network sub-slicing Management Function
OMC	Operation and Maintenance Centre
OPEX	OPerational EXpenditure
OS	Operating Systems
OSS	Operations Support System
OTN	Optical Transport Network
PHY	PHYsical layer
PM	Policy Management (functional block)
PTN	Packet Transport Network
PTP	Precision Time Protocol
QCI	Quality of service Class Identifiers
QoE	Quality of Experience
QoS	Quality of Service
RAM	Random Access Memory
RAN	Radio Access Network
RAU	Remote Aggregation Unit
RCA	Root Cause Analysis
RCC	Radio Cloud Centre
RF	Radio Frequency
RP	Reference Point
RRU	Remote Radio Units
RSRP	Reference Signal Received Power
SA	Service Assurance
SDN	Software Defined Networking
SD-WAN	Software-Defined Wide Area Network
SIA	Service Impact Analysis

SIP	Session Initiation Protocol
SLA	Service-Level Agreement
SM	Session Management
SON	Self-Organizing Network
SP	Service Provider
TCP	Transmission Control Protocol
TN	Transport Network
TT	Trouble Ticket
UE	User Equipment
UL	UpLink
VM	Virtual Machines
VNF	Virtualised Network Functions
WAN	Wireless Access Network
WLAN	Wireless Local Area Network
XDR	eXternal Data Representation
XML	eXtensible Markup Language
YAML	YAML Ain't Markup Language

4 Overview

4.1 Background

Operators see human-machine interaction as slow, error-prone, expensive, and cumbersome. For example, operators are worried about the increasing complexity of integration of different standardization platforms in their network and operational environment; this is due to the vast differences inherent in programming different devices as well as the difficulty in building agile, personalized services that can be easily created and torn down. These human-machine interaction challenges are considered by operators as barriers to reducing the time to market of innovative and advanced services. Moreover, there is no efficient and extensible standards-based mechanism to provide contextually-aware services (e.g. services that adapt to changes in user needs, business goals, or environmental conditions).

These and other factors contribute to a very high OPerational EXpenditure (OPEX) for network management. Operators need the ability to automate their network configuration and monitoring processes to reduce OPEX. More importantly, operators need to improve the use and maintenance of their networks. In particular, this requires the ability to visualize services and their underlying operations so that the proper changes can be applied to protect offered services and resources (e.g. ensure that their Quality of Service (QoS) and Quality of Experience (QoE) requirements are not violated). If such visualization could be provided, then operators would be better able to maintain their networks.

The associated challenges may be stated as:

a) automating complex human-dependent decision-making processes;

b) determining which services should be offered, and which services are in danger of not meeting their Service-Level Agreement (SLA)s, as a function of changing context;

c) defining how best to visualize how network services are provided and managed to improve network maintenance and operation; and

d) providing an experiential architecture (i.e. an architecture that uses various mechanisms to observe and learn from the experience an operator has in managing the network) to improve its understanding of the operator experience, over time.

The aforementioned challenges will require advances in network telemetry, big data mechanisms to gather appropriate data at speed and scale, machine learning for intelligent analysis and decision making, and applying innovative, policy-based, model-driven functionality to simplify and scale complex device configuration and monitoring.