ENI ISG PoC Report Template

1   General

The following normative disclaimer shall be included on the front page of a PoC report:

Submission of this ENI ISG PoC Report as a contribution to the ENI ISG does not imply any endorsement by the ENI ISG of the contents of this report, or of any aspect of the PoC activity to which it refers.

2   ENI ISG PoC Report

2.1   PoC Project Completion Status

Indicate the PoC Project Status. Can the PoC be considered completed? If this is a multi-stage PoC project, indicate the Reported Stage status and plans for future Project Stages/Milestones:

- Overall PoC Project Completion Status: _____Completed_____

2.2   ENI PoC Project Participants

Specify PoC Team; indicate any changes from the ENI ISG PoC Proposal:

- PoC Project Name: Intent-driven Operating for User-Centric Cloud-Network Convergence Services

- Network Operator/Service Provider: China Telecom

  Contact: Zhen Li (liz779@chinatelecom.cn)

- Manufacturer A: Huawei

  Contact: Henry Yu (henry.yu1@huawei.com)

- Manufacturer B: AsiaInfo

  Contact: Lei Shi (shilei8@asiainfo.com)

- University：Beijing University of Posts and Telecommunications

  Contact: Xiqing Liu (liuxiqing@bupt.edu.cn)

- University：Xidian University

  Contact: Chungang Yang (cgyang@xidian.edu.cn)

2.3   Confirmation of PoC Event Occurrence

To be considered as complete, the PoC should have been physically demonstrated with evidences extracted from the demonstration, i.e. the following information should be provided:

- **ETSI ENI #26 plenary meeting, online, June 6, 2023**

The new PoC proposal was led and presented by China Telecom on ENI #26 plenary meeting. The concept of intent-driven operating for user-centric cloud-network convergence services was introduced. More details such as project goals, team members, project stages/milestones, and PoC framework, were also provided.

Fig.1 New PoC proposal presented by China Telecom

- **ETSI ENI #27 plenary meeting, Beijing, September 4, 2023**

China Telecom hosted ENI #27 plenary meeting, where speakers from project participated and presented on the progress of key technologies research and platform construction. The project demo was also shown in this meeting.

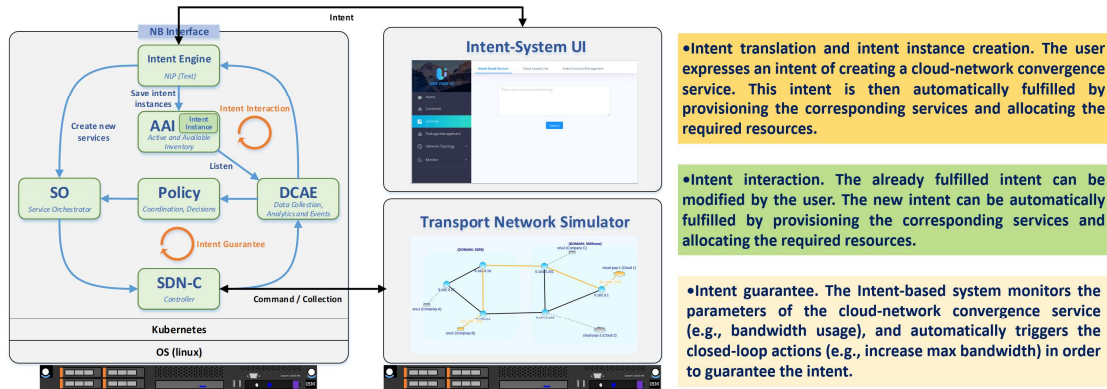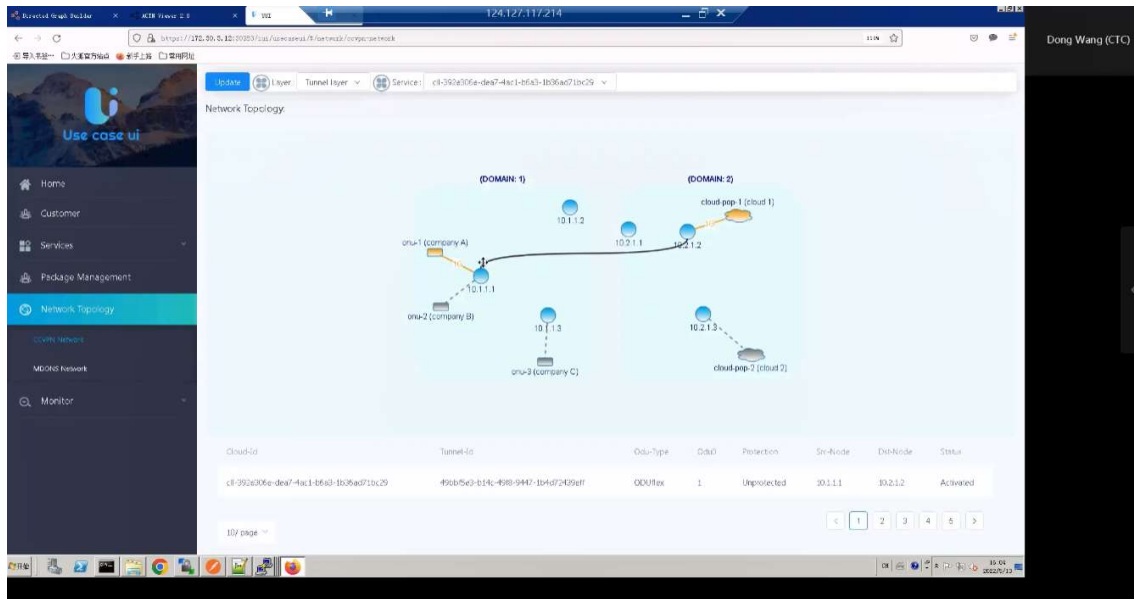Fig.2 PoC #18 Progress report on ENI #27 plenary meeting

Fig.3 Demo at ENI #27 plenary meeting

- **TM Forum, Copenhagen, September 11, 2023**

The demo of this PoC was shown in TM Forum. Project members introduced relevant research technologies to experts at the meeting.

Fig.4 TM Forum

- **LFN Developer & Testing Forum, Budapest, November 15, 2023**

The PoC was introduced in LFN meeting, which was also recorded and available at https://lf-networking.atlassian.net/wiki/spaces/LN/pages/15693488/2023-11+-+ONAP+AI-powered+Closed-loop+Autonomous+Networks
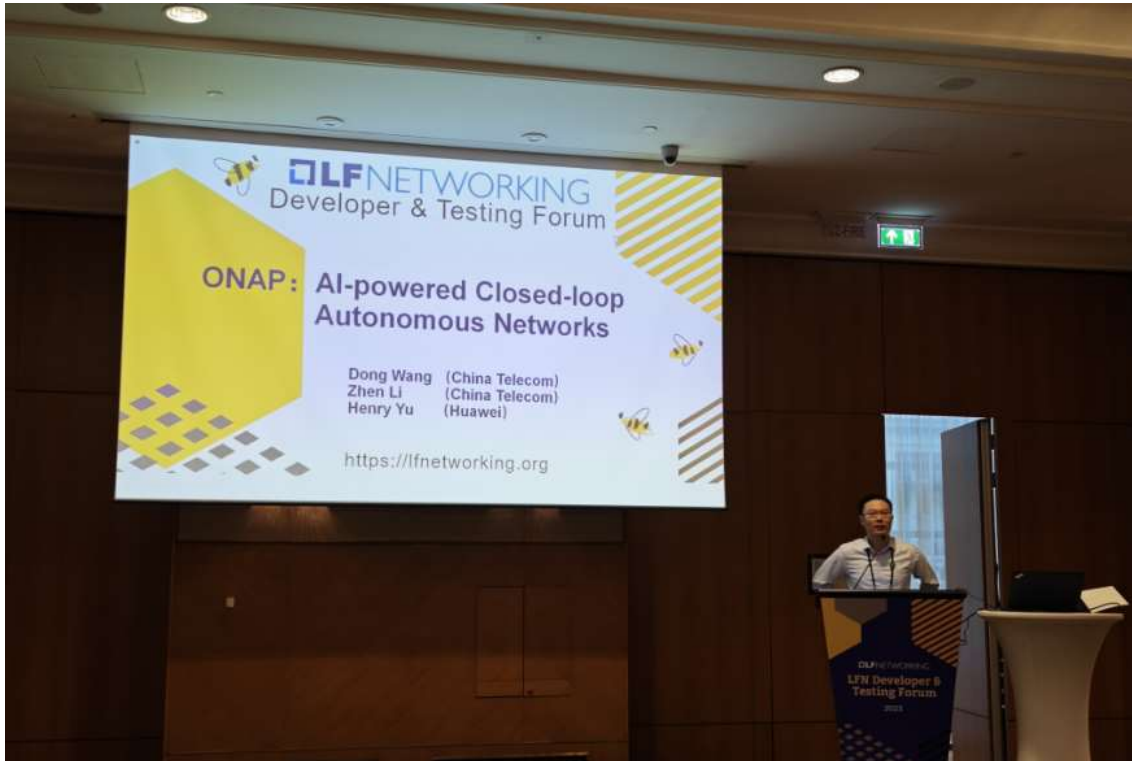
Fig.5 LFN Developer & Testing Forum

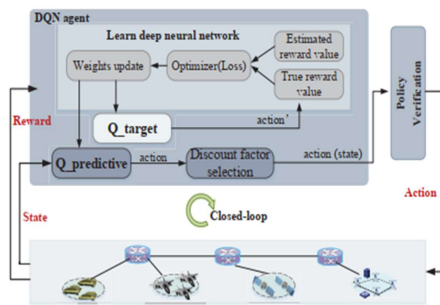- **ETSI ENI #28 plenary meeting, online, December 11, 2023**

The PoC progress was presented on ENI #28 plenary meeting. In this meeting, PoC #18 also contributes to ENI 015.

Fig.6 PoC #18 Progress report on ENI #28 plenary meeting

- **ETSI ENI #29 plenary meeting, online, March 4, 2024**

The PoC progress was presented on ENI #29 plenary meeting. Intent instance creation and management are reported in this meeting
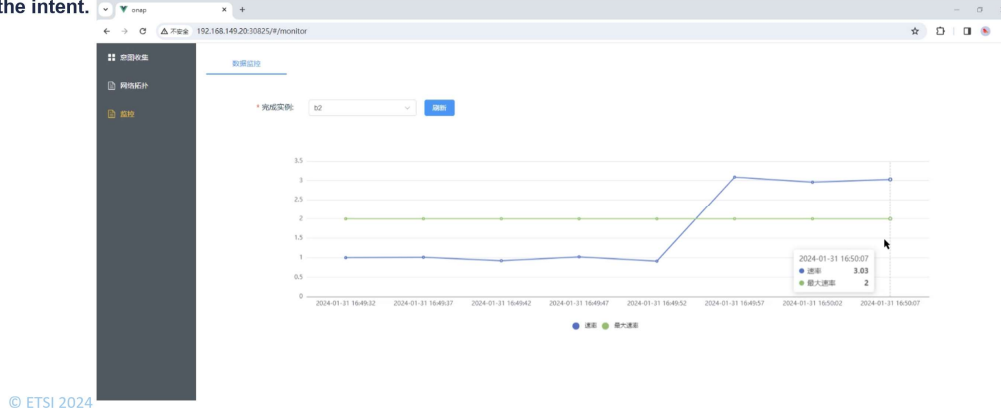
Fig.7 PoC #18 Progress report on ENI #29 plenary meeting

- **ETSI ENI #30 plenary meeting, online, June 3, 2024**

The PoC progress was presented on ENI #30 plenary meeting. We contribute to 002 requirement and 004 terminology in this meeting.

Fig.8 PoC #18 Progress report on ENI #30 plenary meeting

2.4 PoC Goals Status Report

Specify PoC Goals from ENI ISG PoC Proposal (clause A.1.2). Identify any changes from the original ENI ISG PoC Proposal with an explanation as to why the changes were made. Indicate the extent that each goal was met. Provide sufficient information for those not familiar with the PoC goals to understand what has been achieved and/or learned.

- PoC Project Goal #1: The PoC will demonstrate in a testbed environment how ENI system can be used to support intent policy in the cloud-network convergence services. The detailed goals include: demonstrate that the intent instance can be created to meet the intent requirements of the users; demonstrate 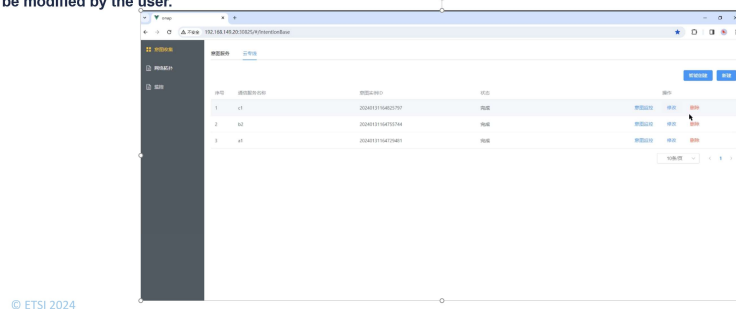that the ENI system can still meet the intent requirements of the user, when the network state changes or the users' intents changes.   Goal Status (Demonstrated/Met?) Demonstrated.

  The goal has been fully demonstrated. The proposed demo receives the users' network business intent, makes detailed policies according to the basic business parameters and performance expectations. We show the intent life-cycle management by creating, deleting, and modifying user's intent. We show the closed-loop feature by performing a real-time bandwidth monitoring of the traffic of one of the CLL services and show that a closed-loop action will be automatically triggered when the bandwidth usage of a service exceeds the originally provisioned bandwidth of that service.
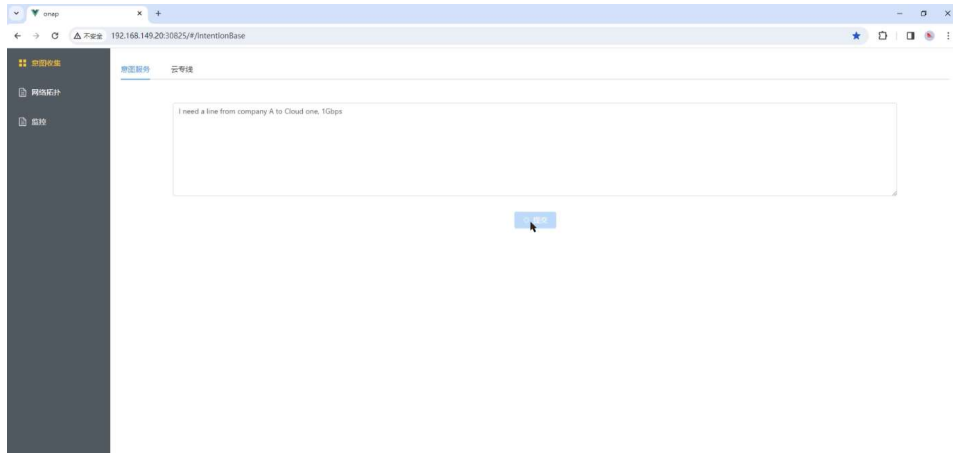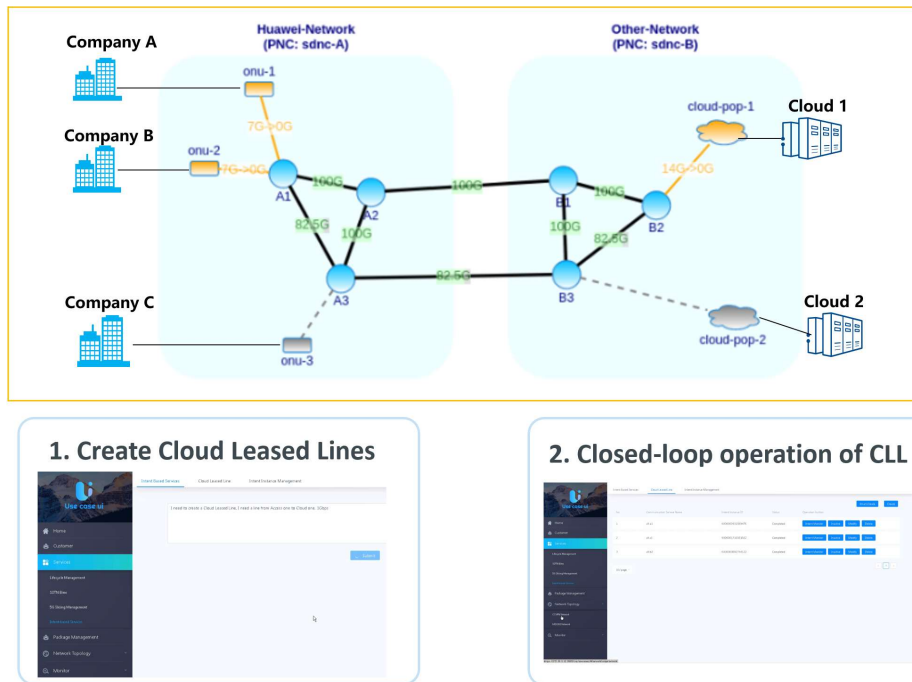

Fig.9 Intent instance creation

Fig.10 Intent instance management

- PoC Project Goal #2: This PoC will demonstrate the use of AI based data analysis to translate intents in the cloud-network convergence services. Goal Status (Demonstrated/Met?) Demonstrated.

The goal has been fully demonstrated. The transport network in this demo is a multi-domain (2-domain) optical network. Each network domain is managed by a network controller. The network controllers, as well as their managed network equipment, may be supplied by different vendors. We show in this PoC, customer's need (intent) can be receive and processed using natural language processing (NLP) techniques. For example, a simple user input describing customer's need in a natural language may be "I need a connection from company XYZ to Cloud ABC, with a bandwidth of 2Gbps". This intent gets translated into an intent records, and can be deployed onto the hardware. To be more specific, the BERT model is used in this PoC for intent translation.
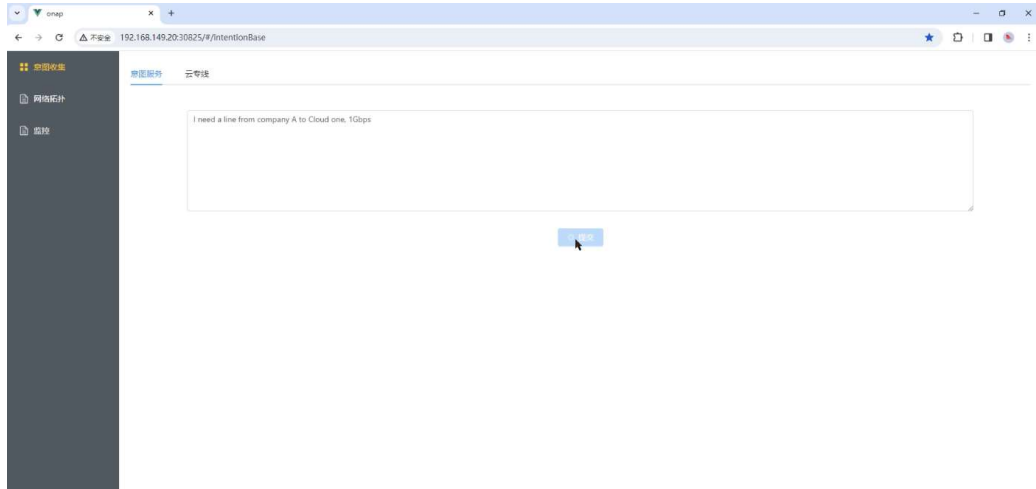

Fig.11 Intent translation

➢ **The intent translation is formulated as question answering(QA) problem.**

Text:
A cloud line is required from Company A to Cloud One, 10Gbps.

Questions:
["bandwidth", "access point", "cloud point"]

Answers:
{"bandwidth": "10Gbps", "access point": "Company A", "cloud point": "Cloud One"}

◆ **BERT (Bidirectional Encoder Representations from Transformers):developed by researchers at Google AI Language. BERT's key technical innovation is applying the bidirectional training of Transformer, a popular attention model, to language modelling.**

Fig.12 Bert model employed in this PoC

- PoC Project Goal #3: This PoC will demonstrate aspects of various requirements identified in GS ENI 002, including: General requirements, Data Collection and Analysis, Service orchestration and management, Data learning, Model training and iterative optimization, Policy Management, etc. Goal Status (Demonstrated/Met?) Demonstrated.

The goal has been fully demonstrated. Modules developed during the PoC implementation process include the aforementioned functions, such as Data Collection and Analysis, Service orchestration and management. Additionally, the PoC architecture can be mapped to the ENI reference architecture.
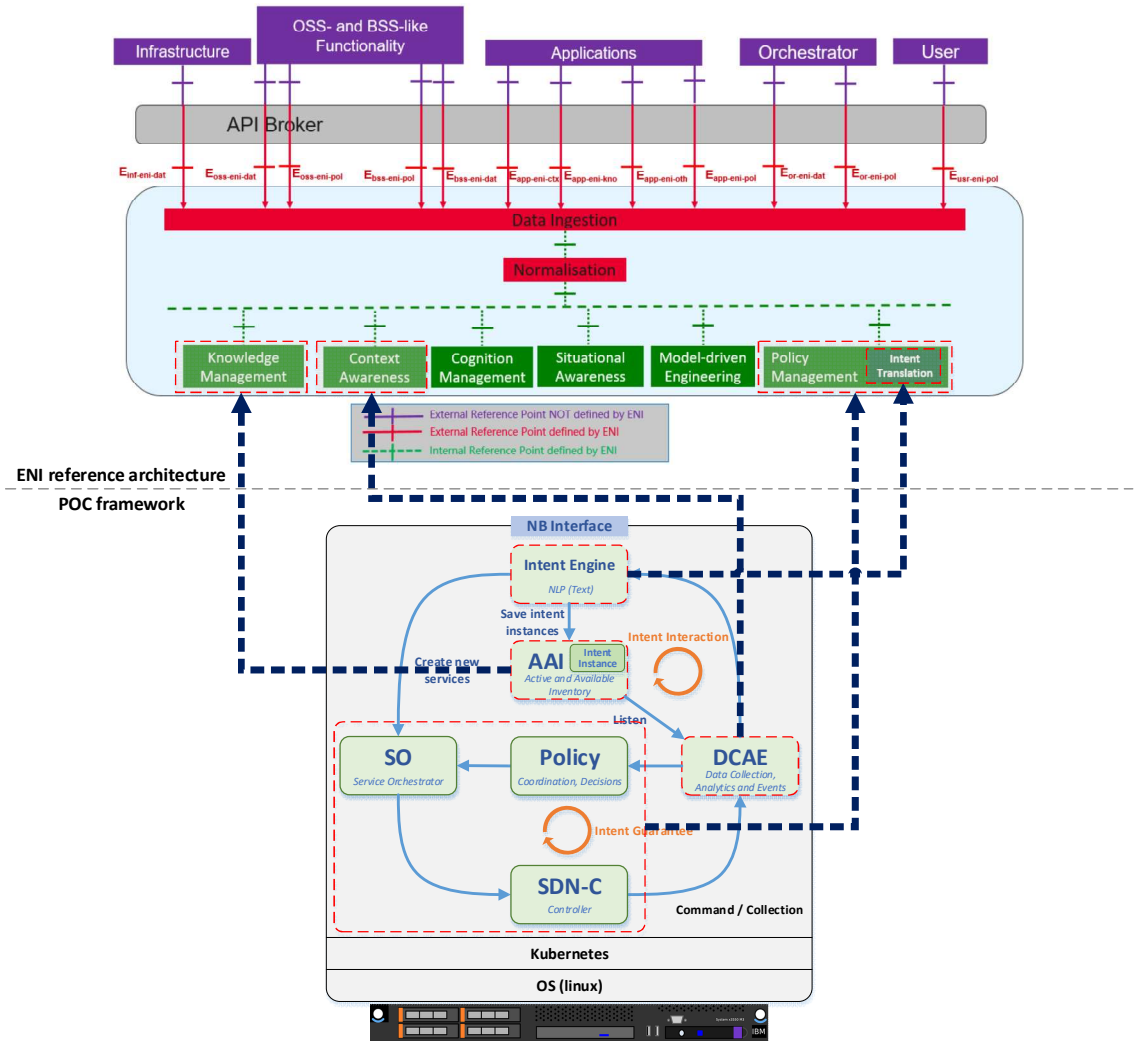
Fig.13 PoC architecture mapped to ENI reference architecture

2.5 PoC Feedback Received from Third Parties (Optional)

3 ENI PoC Technical Report (Optional)

3.1 General

3.2 PoC Contribution to ENI ISG

Use table B.1 to list any contributions to the ENI ISG resulting from this PoC Project.

Table B.1

Contribution	WG	WI/Document Ref	Comments
ENI(23)000_108 Update to Clause 7.1 Use cases for operators' business for ENI 015	ENI	ETSI GS ENI 015	Add a typical scenarios use case.
ENI(23)028_022r1 ENI(23)028_022_update_to_Clause_5_3_11_ENI-001v411_Use_Casesv401	ENI	ETSI GS ENI 001 Use cases	Add a typical scenarios use case.
ENI(24)030_032 Updates to GR ENI 004 Terminology from PoC 18	ENI	ETSI GR ENI 004 Terminology	Add cloud line services related terms.
ENI(24)030_033 Updates to GR ENI 002 Requirements from PoC 18	ENI	ETSI GS ENI 002 Requirements	Add some intent translate requirements.

3.3 Gaps identified in ENI standardization

3.4 PoC Suggested Action Items

3.5 Additional messages to ENI

None.

3.6 Additional messages to Network Operators and Service Providers

Intent-driven operating for user-centric cloud-network convergence services is a new diagram that reshapes social production and lifestyles. We encourage more network operators and service providers to participate in it. It requires more attention and industry collaboration to meet the needs of future network intelligence and personalization, and solve the problem of network configuration complexity and multi-vendor collaboration challenges.