
ENI ISG - PoC Proposal Template

A.1 PoC Project Details

A.1.1 PoC Project

PoC Number (assigned by ETSI):

PoC Project Name: PINet— Polymorphic Intelligent Network

PoC Project Host: China Telecom

Short Description: The current network mainly faced several challenges, such as rigid network structure, simple IP bearing, and difficulty in dealing with unknown threats. Based on above challenges, the goal of this PoC project is to realize polymorphic presentation of addressing and routing, and provide feasible design strategy for operators to automatically deploy network according to different types of business and application scenarios. PINet fundamentally meets the business requirement of network intelligence, diversification, personalization, high robustness and high efficiency.

The proposed PoC intends to test and validate AI-based approaches like those proposed by the ENI working items. This PoC plan to achieve the coexistence and collaboration of polymorphic network and realize adaptive adjustment and configuration between network resources and diversified services. Related outputs can contribute to ENI 001 (Use cases), ENI 002 (Requirements) and ENI 004 (Terminology), making this PoC a general reference for similar scenarios.

A.1.2 PoC Team Members

Table A.1

	Organization name	ISG ENI participant (yes/no)	Contact (Email)	PoC Point of Contact (see note 1)	Role (see note 2)	PoC Components
1	China Telecom	Yes	Ziting Zhang (zhangzt9@chinatelecom.cn) Yu Zeng (zengyu@chinatelecom.cn) Hongdan Ren (renhd@chinatelecom.cn)	X	Service Provider	- Use Cases definition - PoC development - PoC documentation - PoC demos
2	China Mobile Research Institute	Yes	Jiachen Zhang (zhangjiachen@chinamobile.com)		Service Provider	-Help with architecture design
3	Asia Info	Yes	Da Wang (wangda3@asiainfo.com)		Manufacturer	-Help with test environment and tools
4	Maipu Communication Technology Co., Ltd.	No	lanlisha@mail.maipu.com		Manufacturer	-Help with the implementation of Polymorphic addressing and routing

All the PoC Team members listed above declare that the information in this proposal is conformant to their plans at this date and commit to inform ETSI timely in case of changes in the PoC Team, scope or timeline.

A.1.3 PoC Project Scope

A.1.3.1 PoC Goals

PoC Project Goal #1: Demonstrate the use of intent-based interface to translate the network application requirement to different network modal configuration and support the coexistence and collaboration of polymorphic network.

PoC Project Goal #2: Demonstrate the use of AI to realize adaptive adjustment and configuration between network resources and diversified services, optimize network structure, resource allocation, function management and service efficiency.

A.1.3.2 PoC Topics

PoC Topics identified in this clause need to be taken for the PoC Topic List identified by ISG ENI and publicly available, i.e. the three topics identified in clause 4.5 of the ENI PoC Framework. PoC Teams addressing these topics commit to submit the expected contributions in a timely manner.

Table A.2

PoC Topic Description (see note)	Related WI	Expected Contribution	Target Date
New use case for PINet (Polymorphic Intelligent Network)	Use Case: ENI 001 (WI RGS/ENI-014) Use Cases	Propose new use case on PINet(Polymorphic Intelligent Network).	09/2022
New requirements for PINet (Polymorphic Intelligent Network)	Requirements: ENI 002 (WI RGS/ENI-015) , Requirements	Propose new requirements on PINet(Polymorphic Intelligent Network).	08/2022
Update the Terminology WI on PINet (Polymorphic Intelligent Network)	Terminology: ENI 004 (RGR/ENI-0018), Terminology	Update definitions in Terminology WI.	07/2022

A.1.4 PoC Project Stages/Milestones

Table A.4

PoC Milestone	Stages/Milestone description	Target Date	Additional Info
P.S	PoC Project Start	12/2021	Presentation during #ENI 20
P.D1	PoC Demo 1	03/2022	Present demo at an ENI plenary meeting
P.D2	PoC Demo 2	05/2022	Demo at Beijing CTIDC conference 2022
P.C1	PoC Expected Contribution 1	07/2022	Contributions to ENI Terminology.
P.C2	PoC Expected Contribution 2	08/2022	Contributions to ENI requirement.
P.C3	PoC Expected Contribution 3	09/2022	Contributions to ENI use case.
P.R	PoC Report	10/2022	PoC-Project-End Feedback
P.E	PoC Project End	11/2022	Presented to ISG ENI for information

NOTE: Milestones are entered in chronological order.

A.1.5 Additional Details

This PoC acknowledges the IEEE Transactions on Network Science and Engineering, called "Polymorphic Smart Network: An Open, Flexible and Universal Architecture for Future Heterogeneous Networks."

A.2 PoC Technical Details

A.2.1 PoC Overview

In the face of the demand for professional service bearing brought by the deep integration of the Internet and the economic society, the development of the connotation of network technology does not fully support the expansion of network application extension. The existing network infrastructure and the technology system constructed have some basic problems, such as rigid network structure, simple IP bearing, vulnerability to unknown threat, and so on, which leaves it with a low support ability on quality, security, integration, scalability, manageability, controllability, efficiency and mobility. It is impossible to satisfy the requirement of all sorts of users dynamically and flexibly in a wide range of scenarios under limited resources for high-quality network experience such as intelligence, diversification, personalization, high robustness and high efficiency.

PINet (Polymorphic Smart Network) redefines the structure of the network and supports incremental updates to incorporate new network functions in the future. The advantages of PINet are summarized as follows:

- PINet supports the coexistence and collaboration of IP, content, identification, geospatial location and other user-defined identities in the same physical network, which can break through the bottleneck of traditional single IP carrier network and meet the diversified and professional demand for efficient services.
- PINet supports intelligent network management and control operating logic formulated as a circle of "perception-decision-adaptation" to optimize network structure, resource allocation, function management and service efficiency.

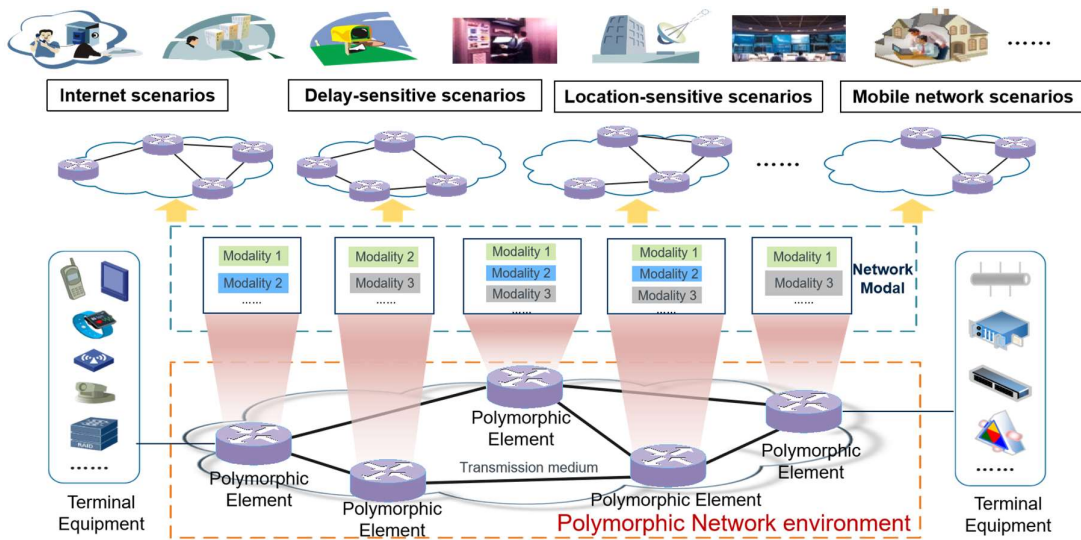


Fig. 1. System form and visual representation of PINet

This PoC provides how to employ Artificial intelligence and big data technologies (such as information fusion, cognitive computing, collaborative computing and so on) to construct a "perception-decision-adaptation" close-loop intelligent management and control system based on real-time perception of business and resource status, so as to realize efficient adaptive adaptation and fitting of network resources and upper services.

A.2.2 PoC Architecture

In order to achieve to PoC goals, the following procedures and methodologies can be used for reference:

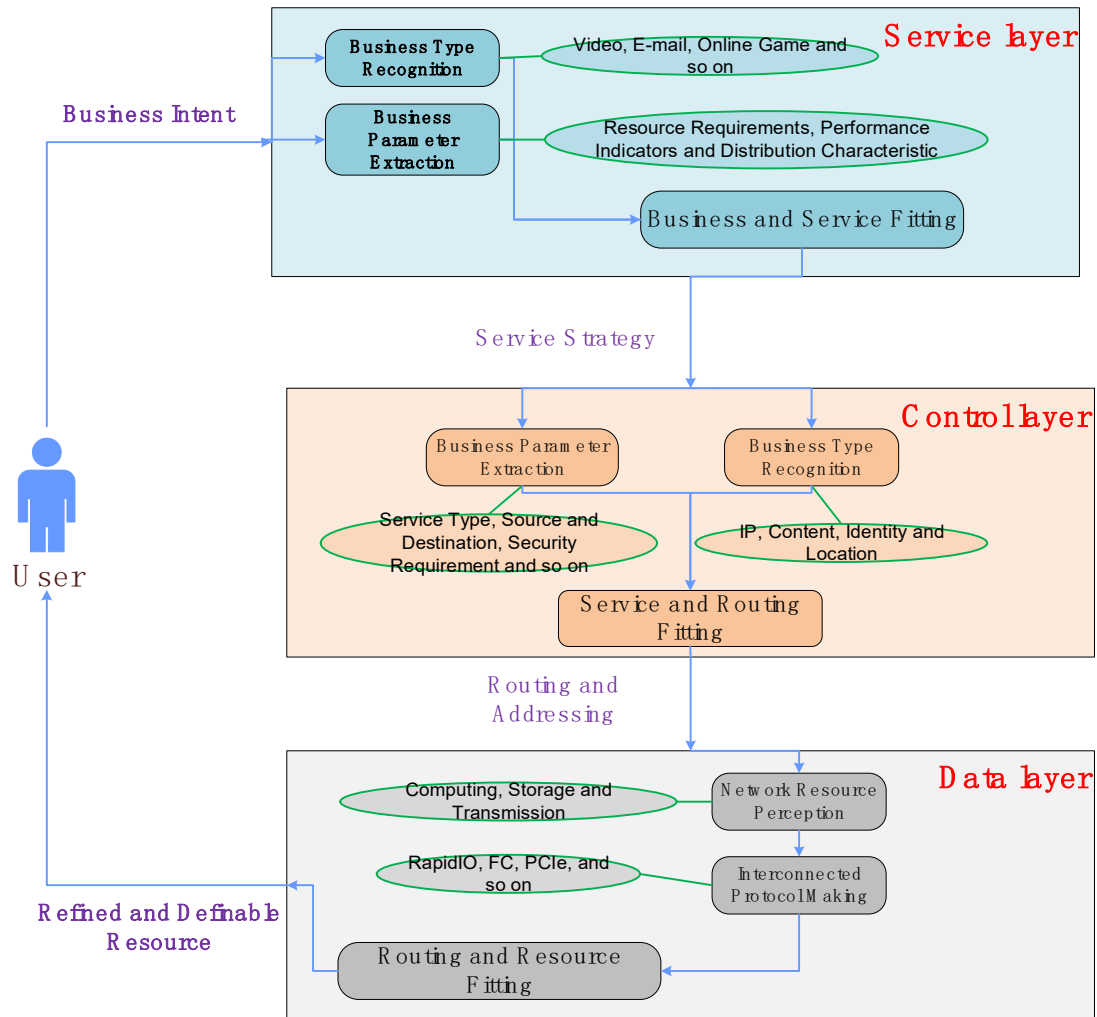


Fig. 2. PoC Architecture

•As shown in Fig. 2, the service layer of PINet mainly implements the fitting between users' business requirements/intents and network service capabilities, and realizes the self-adaptive bearing of the requirement for network operation and function arrangement.

• The control layer of PINet is mainly responsible for the realization of polymorphic addressing and routing and other functions. It provides support for the upper service layer and controls the lower data layer. The control layer of PINet establishes a polymorphic heterogeneous identification space addressing and routing model including IP, content, identity and location identification. It flexibly supports the service layer requirements according to the service characteristics of different routes, thus realizing autonomous and intelligent network mode switching method for different user requirements, service types and security requirement.

• The data layer of PINet defines the topology, protocol, software/hardware, interface, etc. of the basic network in a full dimension, thereby providing refined and definable network components and services for diversified and personalized applications.

With the help of ENI system and involved functional blocks, the response process and function for business requirements/intents in PINet can be realized and verified.

A.2.3 PoC Success Criteria

All goals are met when the described functionality is proved to be available.

A.2.4 Additional information

- [1] RGS/ENI-008 (GS ENI 001), "Experiential Networked Intelligence (ENI); ENI use cases", v3.1.1
- [2] RGS/ENI-007 (GS ENI 002), "Experiential Networked Intelligence (ENI); ENI requirements", v3.1.1
- [3] DGR/ENI-004 (GR ENI 004) "Experiential Networked Intelligence (ENI); Terminology", v2.2.1.
- [4] Y. Hu, D. Li, P. Sun, P. Yi and J. Wu, "Polymorphic Smart Network: An Open, Flexible and Universal Architecture for Future Heterogeneous Networks," in IEEE Transactions on Network Science and Engineering, vol. 7, no. 4, pp. 2515-2525, 1 Oct.-Dec. 2020, doi: 10.1109/TNSE.2020.3006249.