ONAP
OPEN NETWORK AUTOMATION PLATFORM

A General Implementation with Intent-based network in ONAP

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denglingli@chinamobile.com
hekeguang@chinamobile.com
chenchuanyu@huawei.com

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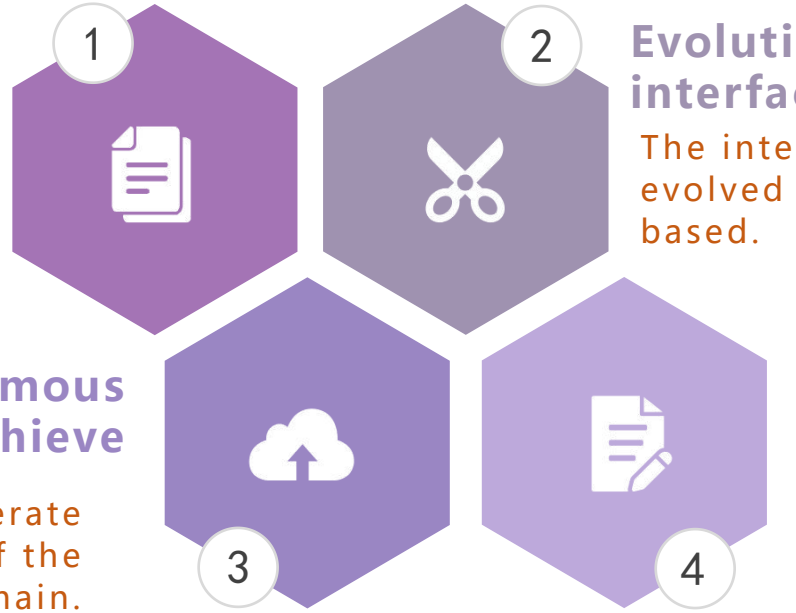
Relationship between intent and autonomous network

Intent is a must for autonomous Networks

Based on the user specified intent goal, combined with AI technology to achieve automatic closed-loop, and independent evolution, finally achieve autonomous operation.

Intent defines what an autonomous domain is expected to achieve

Leave details of how to design and operate network to the internal operation of the autonomous domain.



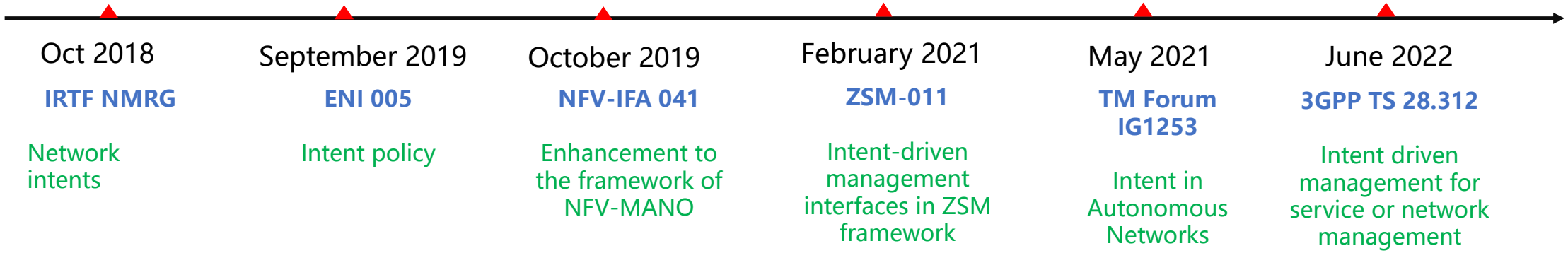
Evolution of autonomous domain interface

The interface between autonomous domains has evolved from rule based/policy based to intent based.

Key technologies of closed-loop management automation

Closed loop realizes and maintains explicitly intent goals through perception, analysis, decision-making and execution.

Requirements introduction



Consensus

Above SDOs agree that the intent is used to describe "what", not "how". It is easy to get the consensus of all SDOs that the "goal" is included in "what".

Objective

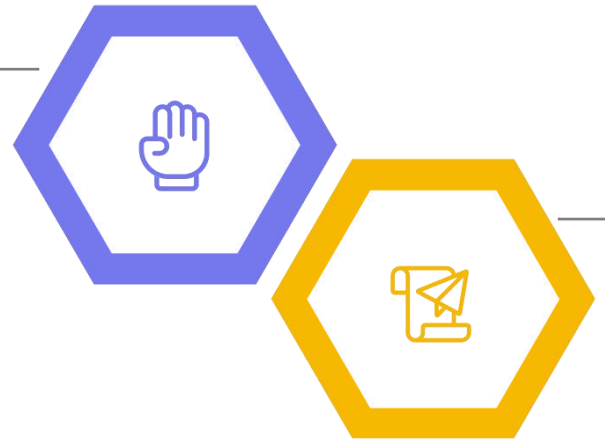
Try to implement a general intent solutions by studying key technologies, reference implementations, and industry standards for intent network management. In the future, will continue to conduct in-depth research and lead implementation on intent standards and open source solutions to ensure the operation of the intent network meets the overall expectations of operators.

Overall plan

R&D of IBN

01

- Research the intent use case, intent model and intent management of **autonomous network**.
- Improve interoperability between components/systems via **standarded intent description.**
- Make all intents(especially machine-machine intents) in the system **operate in the same way**.
- Decompose the complex intent into **sub intents** of different dimensions.
- Support **use case** related to intents to demonstrate our requirements.



Cooperate with SDOs

02

- **ETSI ENI:** Reporter of ENI 013 and important contributor of ENI 015.
- **ETSI NFV:** Reporter of NFV-IFA 050.
- **3GPP:** Actively contribute to 3GPP R17 and R18.
- **TMF:** Actively contribute to autonomous network and intent project.
- **CCSA:** As the reporter, created five intent projects in the field of autonomous network and core network.

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Important concepts

- **Intent:**

Intent is the formal specification of all expectations including requirements, goals, and constraints given to a technical system. (TMF IG1253)

- **Intent Object:**

Intent object is an object described in the format after the two parties of the requirement negotiate the intent.

- **Intent Instance:**

Intent instance is the carrier of formatted intent and intent fullfillment status.

- **Intent Owner:**

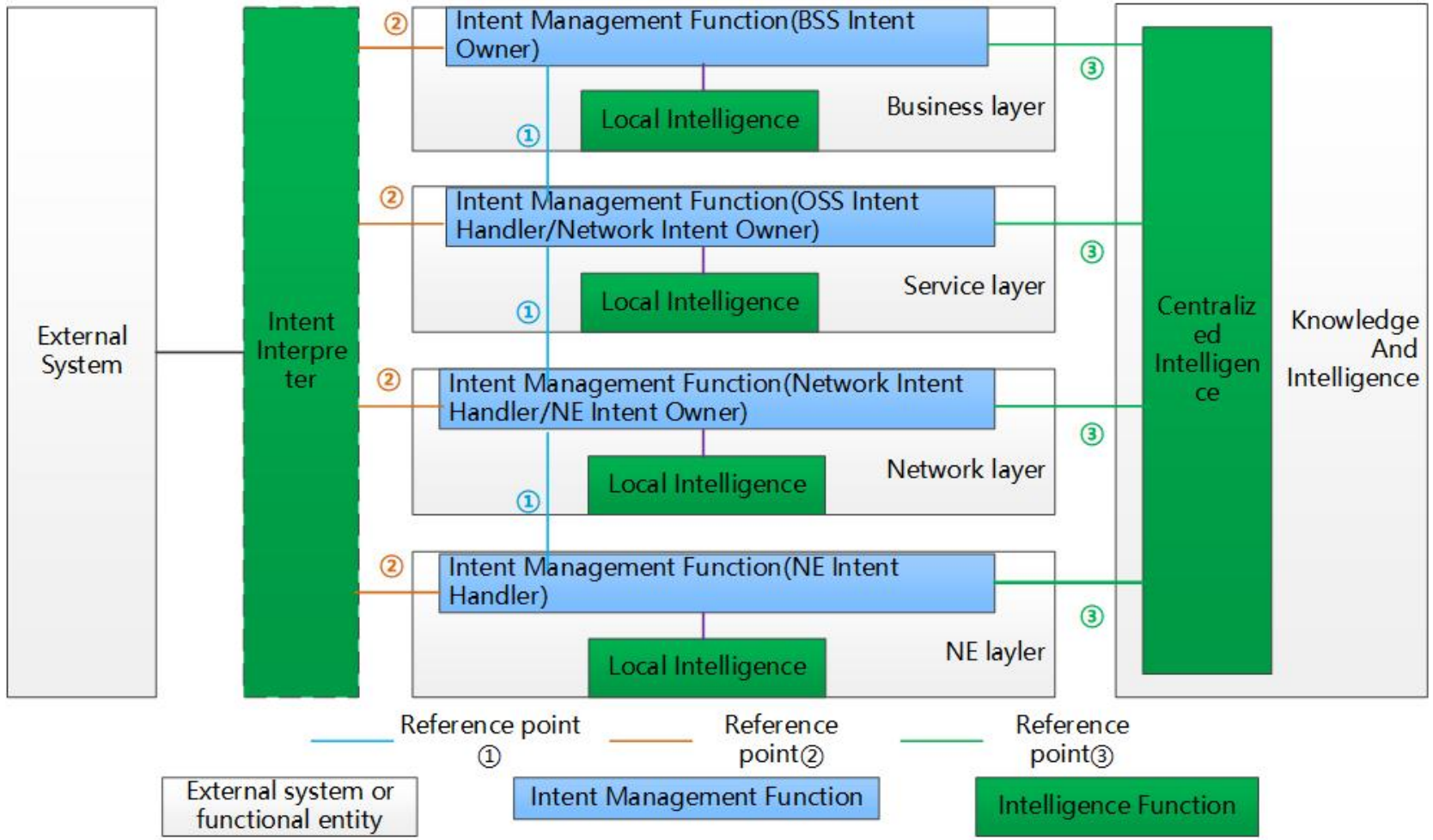
Intent owner is the creator of the intent object and is responsible for managing the life cycle of the intent object.

- **Intent Handler:**

Intent handler is the receiver of the intent object, responsible for the realization and satisfaction of the intent object, and managing the life cycle of the intent instance.

Autonomous network intent management framework

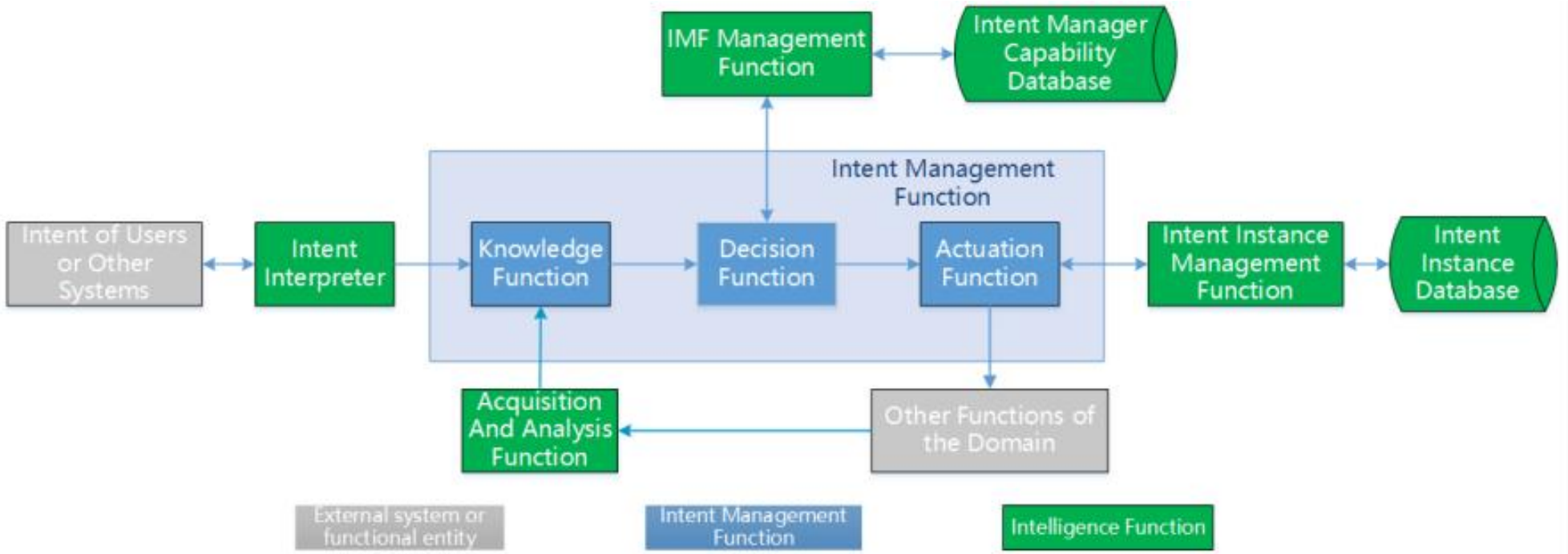
- The intent management function of the intent owner interacts with the intent management function of the intent handler.
- Format intent input interface provided by intent management function.
- Intent management functions interact with centralized intelligence functions.



Functional architecture related to intent management

IMF:

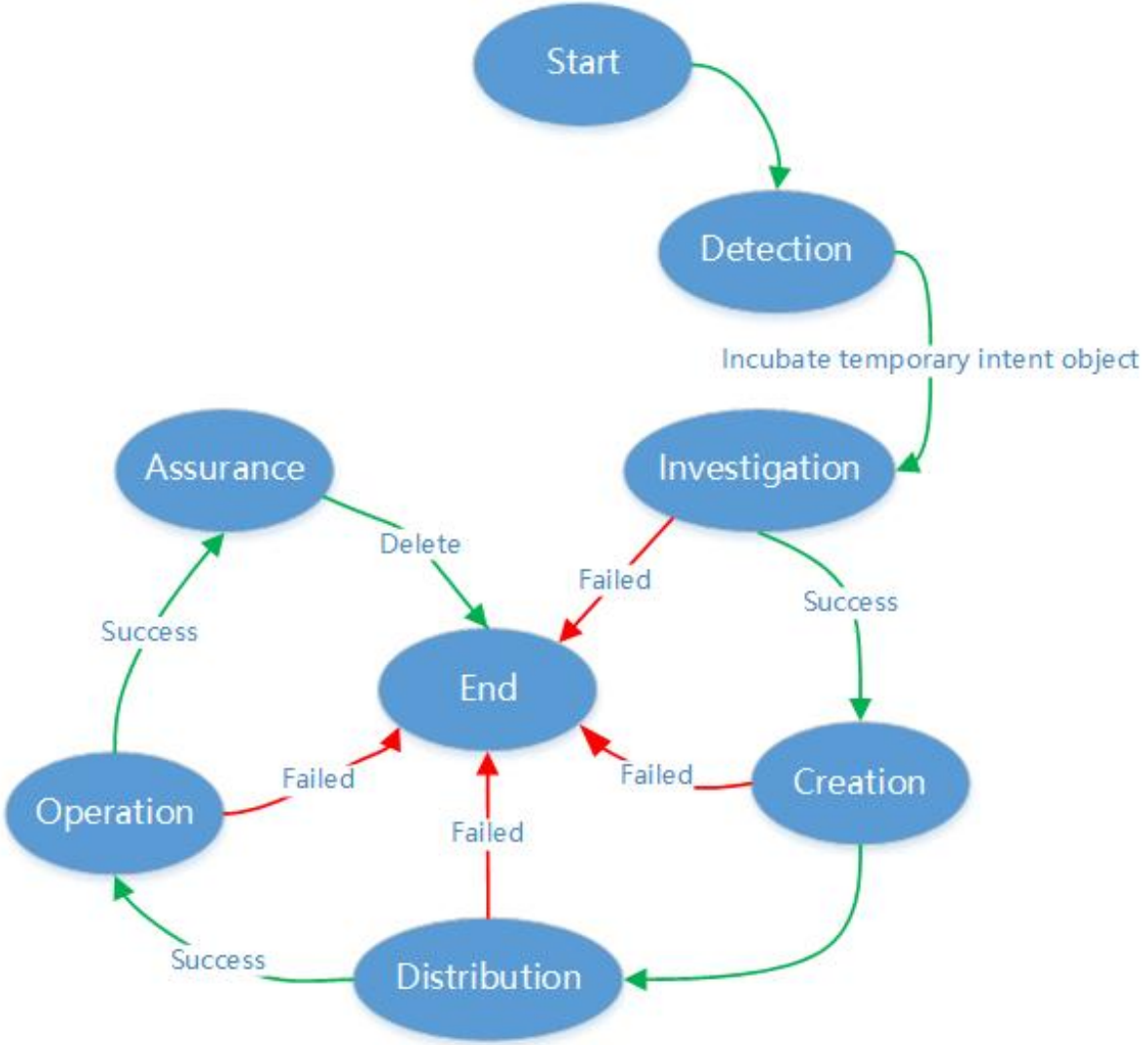
Intent Management Function



- **Intent Format Funciton:** Receive intent from external users or other systems, and format it into a general intent model definition form.
- **Acquisition And Analysis Funciton:** Collect and analyze the corresponding information of the system, and monitor the operation status.
- **Intent Function Management Funciton:** Provide intent management function registration mechanism, and support the query function .
- **Intent Instance Management Funciton:** Perform lifecycle management on intent instances.

General intent processing flow

- **Detection stage:** Intent owner determines whether to define new intent or change existing intent.
- **Investigation stage:** Intent owner and intent handler complete investigation and negotiation to check feasibility.
- **Creation stage:** Formal intent object is created.
- **Distribution stage:** Intent owner sends the intent object to the intent handler.
- **Operation stage:** Intent handler operates its responsibility domain according to the accepted intent object.
- **Assurance stage:** Intent handler continuously ensures that the expectations corresponding to the intent are met.



General intent inerface

A

Mandatory Interface

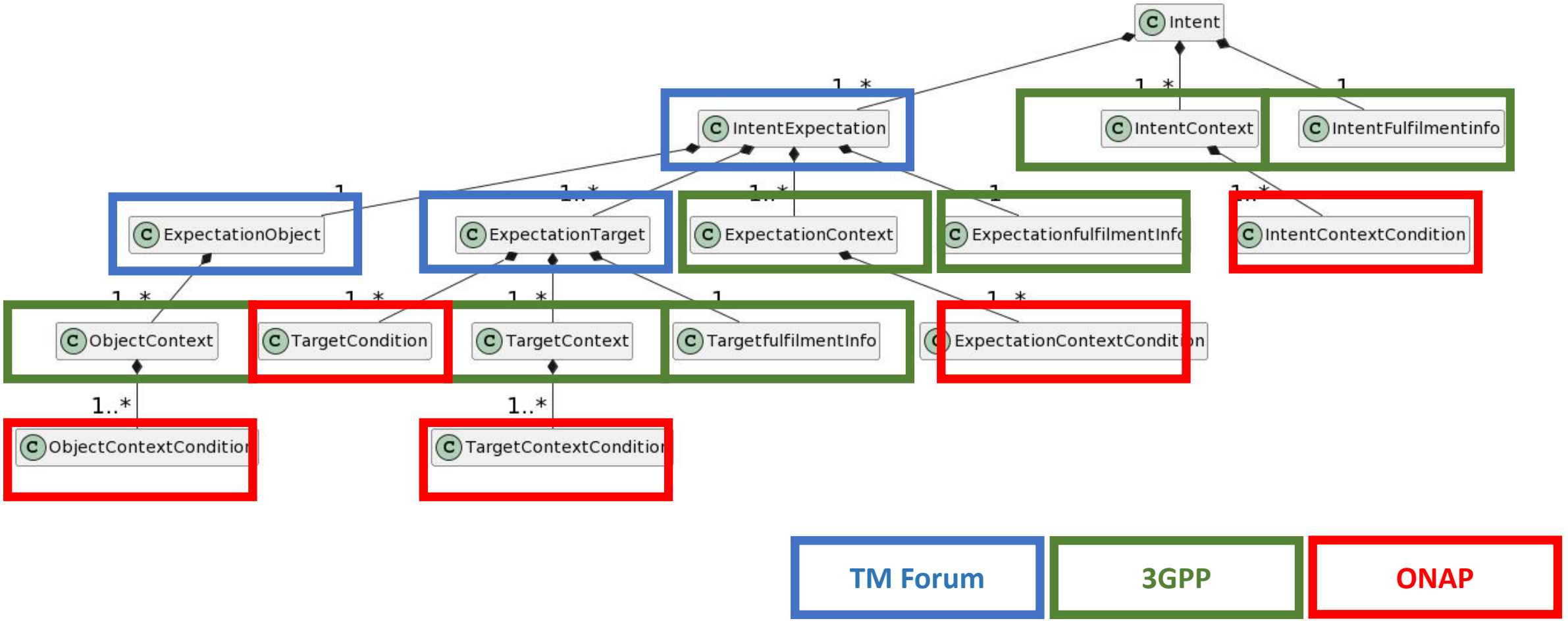
- **Create:** Intent owner requests intent handler to create a new intent instance.
- **Update:** Intent owner requests intent handler to update the intent instance.
- **Delete:** Intent owner requests intent handler to delete the intent instance.
- **Query:** Intent owner and intent handler query the existing intent instances information from the intent instance management function.
- **Report(TBD):** Used for intent handler to report intent execution status and reasons for dissatisfaction to intent owner.

B

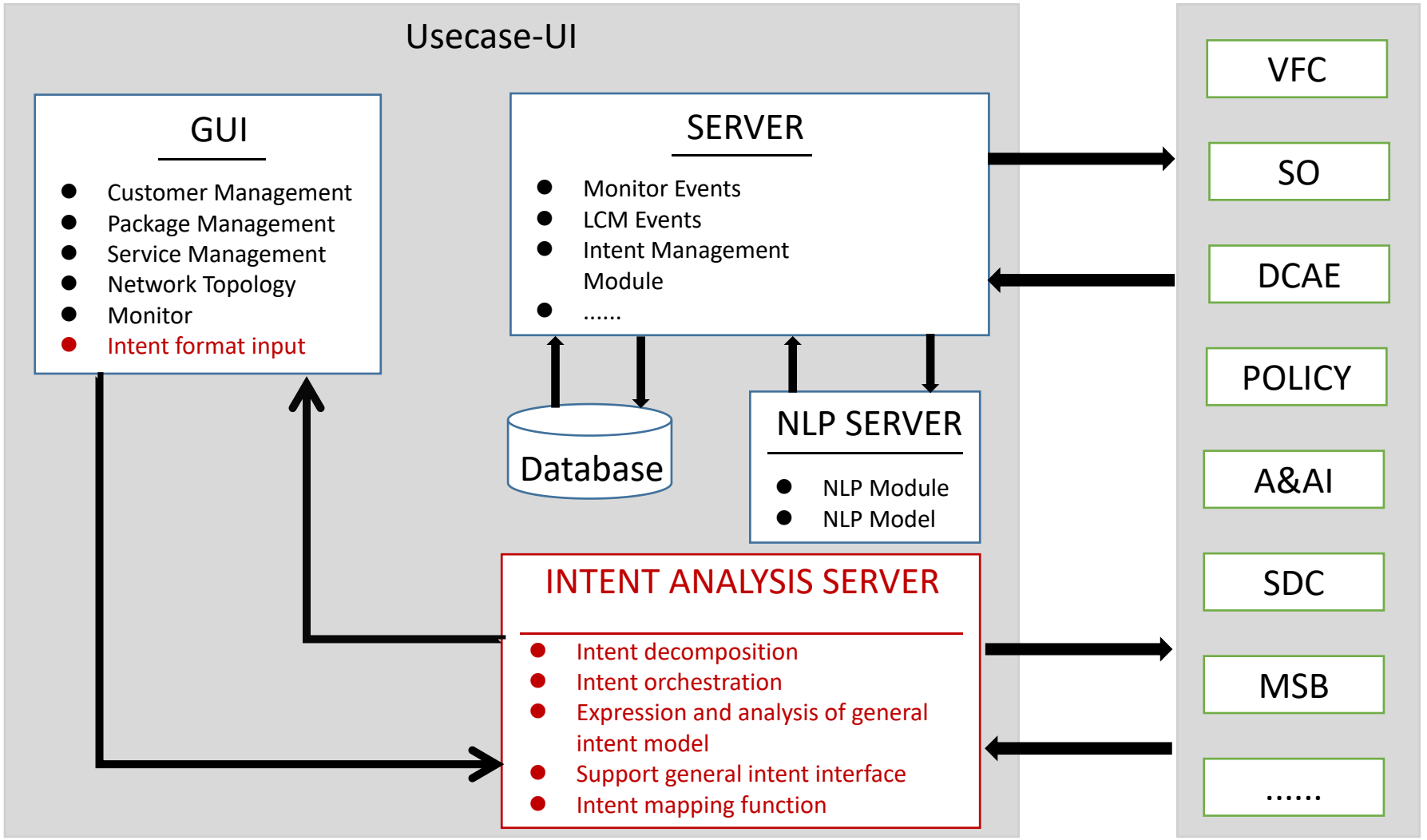
Optional Interface

- **Probe(TBD):** Explore whether intent handler can implement the specific intent, and verify the effect and possible impact of the intent in advance.
- **Negotiate(TBD):** Intent owner and intent handler negotiate necessary modifications to the content of the intent object to ensure the realization of the intent.

General intent model



Interaction with existing ONAP components



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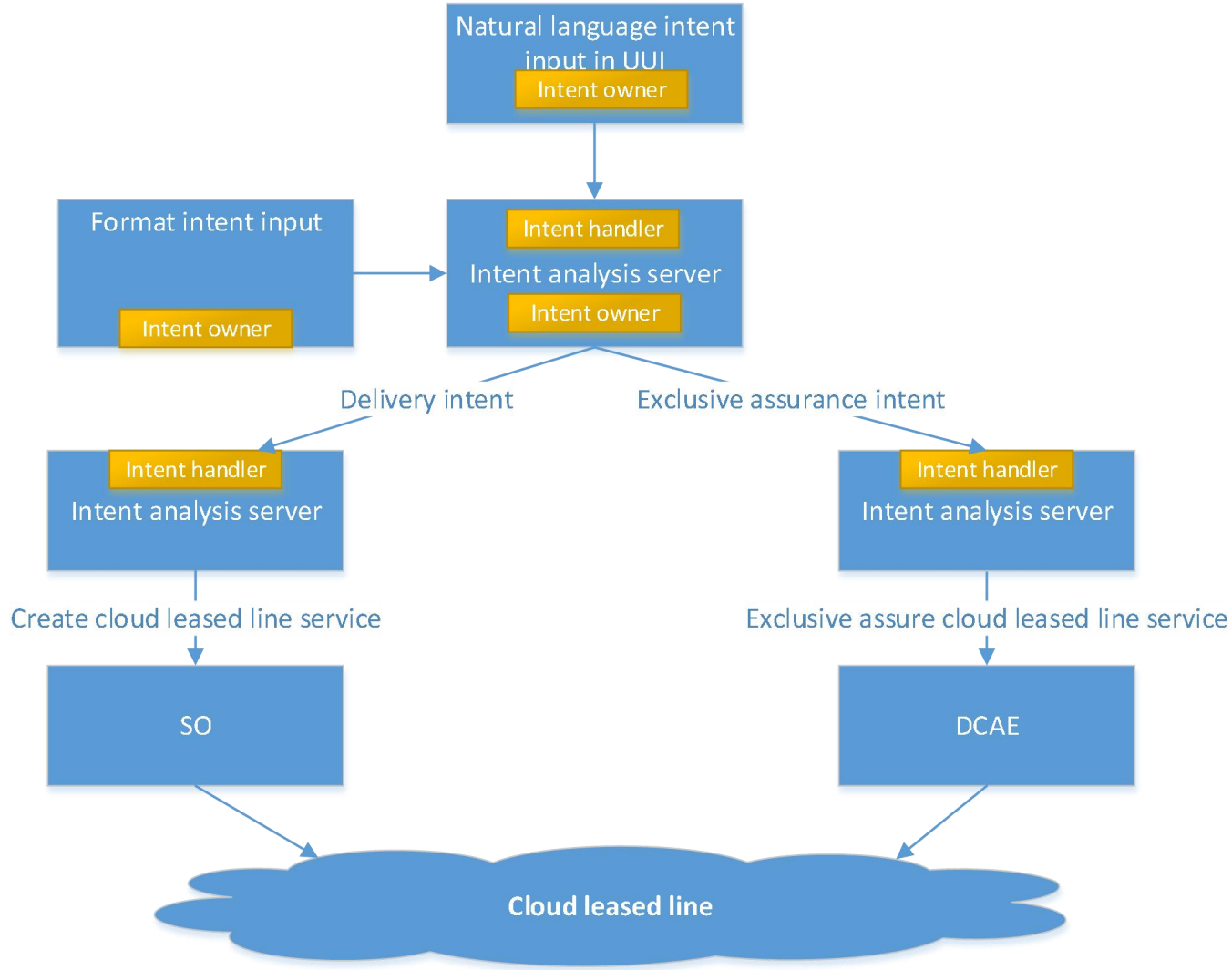
Use case description

User Requirement: Operators provide intent based cloud leased line services, and provide corresponding assurance measures based on user requirements.

Delivery Expectation: Configure the cloud leased line with a bandwidth of 1G.

Exclusive Assurance Expectation: When the bandwidth utilization rate exceeds 80%, the bandwidth will be expanded by 60% to ensure the user experience; when the traffic returns to normal (the utilization rate is 30%), the service bandwidth will be restored to 1G.



Use case demonstration

Create a new intent includes two expectations: one is delivery expectation, and the other is exclusive assurance expectation.

intent processing video.mp4

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Future Plans

Improve the R&D of IBN

Improve AI driven capabilities

01

Introduce more AI related technologies in intent analysis, translation, decomposition and other processes.

Implement more intent interfaces

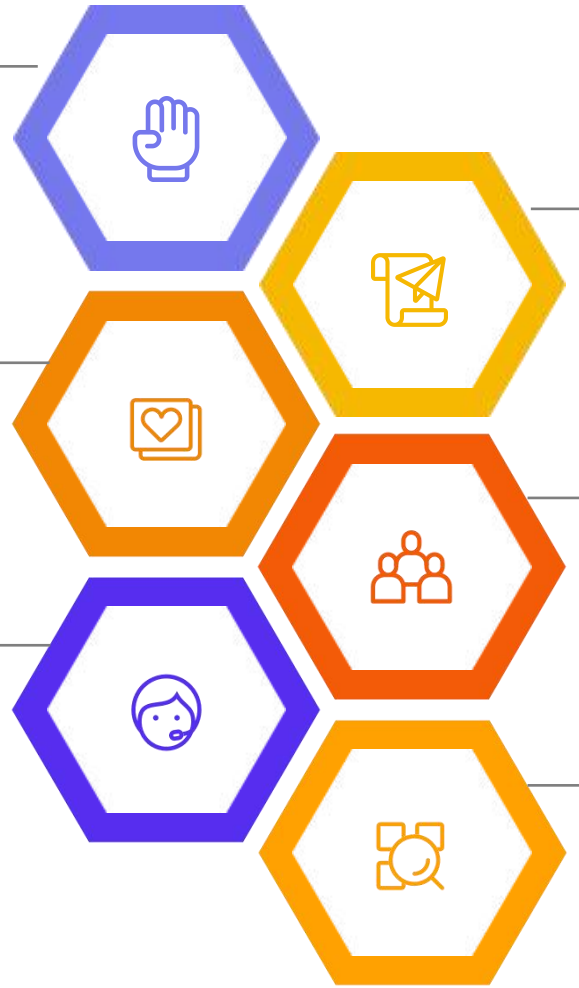
02

The interface of intent negotiation stage shall be formulated and relevant processing flow shall be realized.

Provide intent verification function

03

Verify the effect and possible impact of the intent in advance.



Cooperate with open source projects

Upstream to standards organizations

01

Analyze new technologies related to intent in SDO(TMF/3GPP/ETSI/CCSA) for improvements in the next release.

Cooperate with nephio

02

Try to cooperate with open source projects such as nephio to realize end-to-end intent.

Provide more use cases

03

Provide more usage scenarios and use case implementations to support our solutions.

REQ-1408 R12: Enhance general intent implementation solutions

In London release, we continue plan to do deep research about general intent implementation. Mainly includes those work as below:

A

Optimize the interaction between intent owner and intent hanler.

B

Introduce AI-related technologies, focusing on the introduction of AI technology in the processes of intent formatting, intent translation, and intent decomposition.

C

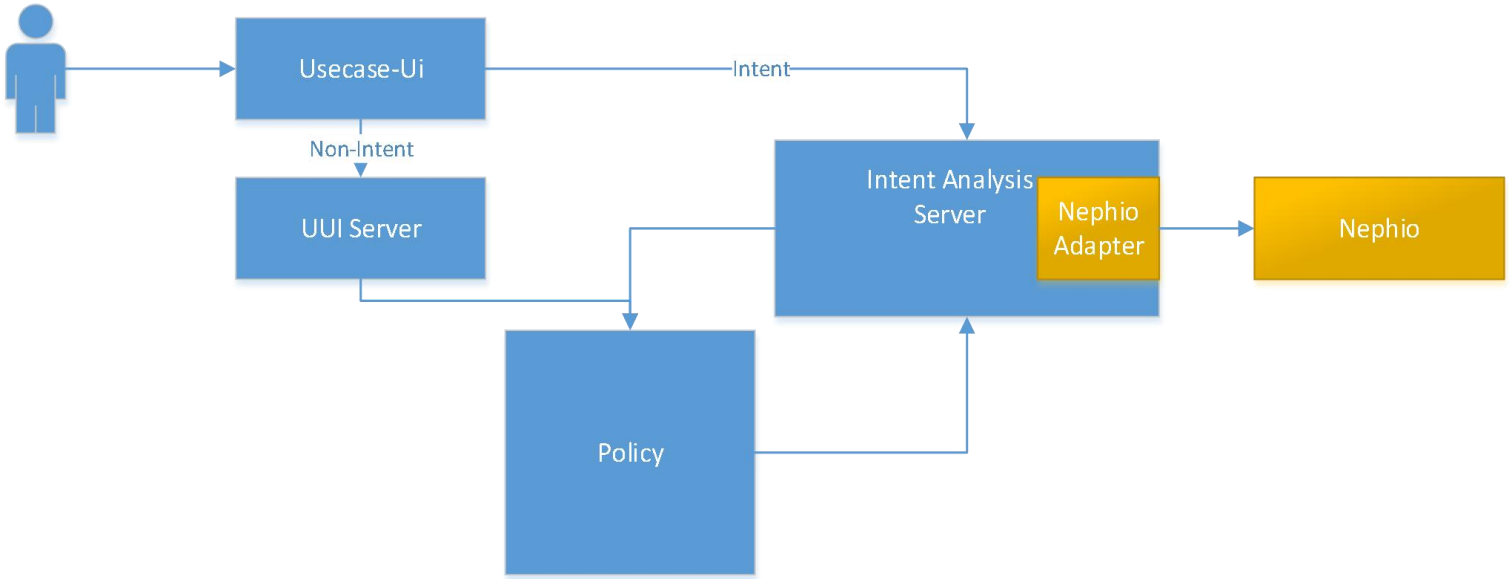
Implement more intent interfaces, such as intent negotiation, intent report, etc.

D

Cooperate with third party projects and open source projects such as nephio to realize end-to-end intent.

Integration with Nephio

- Intent analysis server is a general intent processing module under the ONAP Usecase UI module. The integration with Nephio can be realized by adding Nephio adapter to intent analysis server.
- Other modules of ONAP, such as policy, can interact with Nephio through Nephio adapter of Intent Analysis Server



Nephio Adapter can provide the following functions:

- Interact with Nephio based on general intent interface.
- Conversion of ONAP and Nephio intent Model.
- Registrate and analysis of Nephio environment information.
- Life cycle management for the intent to interact with Nephio.
- ……

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Thanks!