

Recommendation

ITU-T Y.2344 (01/2024)

SERIES Y: Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities

Next Generation Networks – Enhancements to NGN

Scenarios and requirements of intent-based network for network evolution

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Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities

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Recommendation ITU-T Y.2344

Scenarios and requirements of intent-based network for network evolution

Summary

Recommendation ITU-T Y.2344 aims to provide the scenarios and requirements of intent-based network for network evolution.

The scope of this Recommendation includes:

- Scenarios and workflow of intent-based network for network evolution.
- Capability requirements of intent-based network for network evolution.
- General framework of intent-based network for network evolution.

History *

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Recommendation ITU-T Y.2344

Scenarios and requirements of intent-based network for network evolution

1 Scope

This Recommendation aims to provide the scenarios and requirements of intent-based network (IBN) for network evolution.

The scope of this Recommendation includes:

- Scenarios and workflow of IBN for network evolution.
- Capability requirements of IBN for network evolution.
- General framework of IBN for network evolution.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T Y.2323] Recommendation ITU-T Y.2323 (2018), *Requirements and capabilities of orchestration in next generation network evolution*.

[ITU-T Y.2324] Recommendation ITU-T Y.2324 (2019), *Functional architecture of orchestration in next generation network evolution (NGNe)*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 application [b-ITU-T Y.101]: A structured set of capabilities, which provide value-added functionality supported by one or more services.

3.1.2 intent [b-IETF RFC 9315]: A set of operational goals (that a network should meet) and outcomes (that a network is supposed to deliver) defined in a declarative manner without specifying how to achieve or implement them.

3.1.3 media [b-ITU-T Y.2012]: One or more of audio, video, or data.

3.1.4 machine learning (ML) [ITU-T Y.3172]: Processes that enable computational systems to understand data and gain knowledge from it without necessarily being explicitly programmed.

NOTE 1 – This definition is from [b-ETSI GR ENI 004].

NOTE 2 – Supervised machine learning and unsupervised machine learning are two examples of machine learning types.

3.1.5 network intelligence capability enhancement (NICE) [b-ITU-T Y.2301]: An enhancement for NGNs supporting some intelligent capabilities for the provisioning of services according to requirements of users and application providers. These intelligent capabilities (termed as "NICE capabilities") enable operators to assign and dynamically adjust specific network resources based on

the requirements, as well as support interfaces for users and applications enabling on-demand resource and service provision.

3.1.6 NGN [b-ITU-T Y.2001]: A packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.

3.1.7 service [b-ITU-T Y.2091]: A set of functions and facilities offered to a user by a provider.

3.1.8 user [b-ITU-T Y.2201]: A user includes end user [b-ITU-T Y.2091], person, subscriber, system, equipment, terminal (e.g., FAX, PC), (functional) entity, process, application, provider, or corporate network.

3.1.9 intent-based network [b-IETF RFC 9315]: A network that can be managed using intent.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AI	Artificial Intelligence
API	Application Programming Interface
AR	Augmented Reality
CNF	Cloud native Network Function
E2E	End to End
IBN	Intent-Based Network
ID	Identity Document
IoT	Internet of Things
KPI	Key Performance Indicator
LAN	Local Area Network
MEC	Multiaccess Edge Compute
MR	Mixed Reality
NFV	Network Function Virtualization
NGNe	Next Generation Network evolution
NICE	Network Intelligence Capability Enhancement
QoS	Quality of Service
SDN	Software-Defined Networking
SLA	Service Level Agreement
VNF	Virtual Network Function
VR	Virtual Reality
WAN	Wide Area Network

5 Conventions

In this Recommendation:

The keywords "**is required to**" indicate a requirement which must be strictly followed and from which no deviation is permitted, if conformance to this Recommendation is to be claimed.

The keywords "**is recommended**" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.

6 Overview of intent-based network

At present, the evolution of emerging technologies represented by cloud computing, big data, Internet of Things, artificial intelligence, etc. is surging, which has set off a storm of change in various industries. At the same time, under the dual drive of 'technology and demand', the network field is also undergoing a huge change which leads to network evolution. The data show that the base of IoT devices is growing rapidly in these years, and millions of new devices will be connected to the network in every second. At the same time, the cost of network management and maintenance for enterprises will be many times that of building the network. Furthermore, in terms of network security, it takes days or even months to discover a vulnerability. However, the current business requirements and network requirements seem to be standing on two opposite sides: on one hand, various network requirements are continuously put forward for business needs, and on the other hand, the network operation and maintenance personnel are exhausted by various operations in response to the demand.

Under this circumstance, in order to support business agility and to save costs, the network needs to evolve from a static system to a dynamic system that can meet business goals. The IBN emerges at the historic moment with the continuous development and maturity of SDN technology and artificial intelligence technology. IBN is a network that can be managed to achieve desired operational goals and outcomes without specifying network details. It defines intent and how to translate it into corresponding network strategies or configurations and send them to the network, and continuously monitor network status information to observe whether the user's intent is fulfilled or not. If the IBN detects that the intents are not realized, the system will retranslate the user's intents through artificial intelligence and automation technology to satisfy the user's intents to the greatest extent.

The implementation steps of the IBN are as follows: intent acquisition, intent translation and verification, strategy delivery and execution, optimization and adjustment and real-time results feedback. Among those steps, the acquisition and the translation of intent involves technologies such as natural language analysis and recognition and artificial intelligent strategy selection. The intent verification involves format verification methods and automated network verification, and the delivery and execution of the intent can be realized through varied network protocol, data plane programming language or other related technologies. The following figure illustrates the basic implementation process of the IBN.