

Recommendation

ITU-T Y.3184 (05/2023)

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

Future networks

Mechanism for intelligent awareness of network status

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

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Recommendation ITU-T Y.3184

Mechanism for intelligent awareness of network status

Summary

Recommendation ITU-T Y.3184 specifies a mechanism for intelligent awareness of network status. The scope of this Recommendation includes: introduction of intelligent awareness of network status; overview of the mechanism for intelligent awareness of network status; mechanism for intelligent awareness of network fault; mechanism for intelligent awareness of network performance; mechanism for intelligent awareness of network resource; mechanism for intelligent awareness of network load; and mechanism for intelligent awareness of other aspects of network status and security consideration.

History *

Edition	Recommendation	Approval	Study Group	Unique ID
1.0	ITU-T Y.3184	2023-05-14	13	11.1002/1000/15534

Keywords

Intelligence awareness, mechanism, network status.

* To access the Recommendation, type the URL <https://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID.

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Recommendation ITU-T Y.3184

Mechanism for intelligent awareness of network status

1 Scope

This Recommendation specifies mechanism for intelligent awareness of network status. The scope of this Recommendation includes:

- a) Introduction of intelligent awareness of network status;
- b) Overview of a mechanism for intelligent awareness of network status;
- c) Mechanism for intelligent awareness of network fault;
- d) Mechanism for intelligent awareness of network performance;
- e) Mechanism for intelligent awareness of network resource;
- f) Mechanism for intelligent awareness of network load;
- g) Mechanism for intelligent awareness of other aspects of network status;
- h) Security consideration.

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 F.747.10] Recommendation ITU-T F.747.10 (2022), *Requirements of distributed ledger systems for secure human factor services*.
- [ITU-T Y.2704] Recommendation ITU-T Y.2704 (2010), *Security mechanisms and procedures for NGN*.
- [ITU-T Y.2770] Recommendation ITU-T Y.2770 (2012), *Requirements for deep packet inspection in next generation networks*
- [ITU-T Y.2771] Recommendation ITU-T Y.2771 (2014), *Framework for deep packet inspection*
- [ITU-T Y.3600] Recommendation ITU-T Y.3600 (2015), *Big data – Cloud computing based requirements and capabilities*.
- [ITU-T Y.3601] Recommendation ITU-T Y.3601 (2018), *Big data – Framework and requirements for data exchange*.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 network status awareness: The technologies and methods that make various network roles such as network builder, network operator, network service provider and network user aware of the network status, such as network resource, network performance, network fault status and other network status.

3.2.2 intelligent awareness of network status: Technologies and methods of network status awareness that are enhanced by artificial intelligence and machine learning.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

BSS	Business Support System
CPU	Central Processing Unit
DFI	Deep Flow Inspection
DPI	Deep Packet Inspection
EMS	Element Management System
ETL	Extracting Transformation Loading
NMS	Network Management System
OSS	Operation Support System
RF	Radio Frequency

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.

The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option, and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with this Recommendation.

6 Introduction of intelligent awareness of network status

Network status awareness is a kind of technology and method that makes various network roles such as network builder, network operator, network service provider and network user aware of the network status, which includes network fault status, network performance status, network resource status and other network status, in a timely manner. Higher and higher requirements about the awareness of the network status are being brought forward by future networks so that the network can be operated and managed more efficiently.

Artificial intelligence and machine learning related technologies can be used in various network areas including network planning, network re-structuring, network optimization and so on. It is likely that artificial intelligence and machine learning related technologies can also help to improve the function and performance of network status awareness.

While injecting network status awareness with artificial intelligence and machine learning related technologies, network status awareness will evolve to a new technology branch called intelligent awareness of network status.

Comparing the intelligent awareness of network status with traditional network status awareness, several main differences can be found, as follows:

- Traditional network status awareness collects network status data from the network directly, while intelligent awareness of network status not only collects direct network status data but also achieves new network status data from direct network status data.
- Traditional network status awareness only takes the network status data into account while intelligent awareness of network status will additionally take other factors such as time, environment and network history information into account.
- Traditional network status awareness only reports network status data to the network operator and network service provider, and intelligent awareness of network status will analyse network status data, dig internal law from the network status data and give some possible proposals to the network operator and network service provider in order that they can reconfigure and restructure the network based on received network status data.

7 Overview of mechanism for intelligent awareness of network status

7.1 General model for intelligent awareness of network status

Generally, intelligent awareness of network status is the capability that the network status is intelligently understood and grasped by the network owner or the network operator based on information collected from the network. Network status is the situation information when the network is running, and it can be described by some network status index. Generally, not direct network status data but intelligent network status information is the final output of the function for intelligent awareness of network status. For example, if the direct network status data is that data transport is interrupted, the final intelligent network status can be that the interface is out of order, the software system of the network device does not work or the optical fibre that connects the interfaces is cut off, etc.

Figure 7-1 describes a typical model for the intelligent awareness of network status. It shows four main parts of intelligent awareness of network status.

- Network: this represents the network data plane or infrastructure of the network.
- Network status sensing: this aims to collect basic status data from the network and transform basic status data to simple status information that can be easily understood and handled by succeeding functional entity.
- Network status analysing: this is to transform simple network status information to intelligent network status information.

NOTE – Basic network status data is the data that can be collected from the network directly; in other words, basic network status data can be also called network direct status data. Simple status information is some information transformed from basic status data. Intelligent status information is the information that can be achieved through analysis of the simple status information. It is not required but recommended to transform basic network status data to simple network status data in order that network status analysis function can process the data more easily. Under some circumstances, basic network status data can also be thought of as simple network status data if it can be easily understood by succeeding functional entity and transformation is not required.

- Network status reporting and displaying: this realizes the function to report intelligent network status information and take some action to fix possible network problems and improve the network status.