

## **Draft new Recommendation ITU-T Y.EAIAA**

### **Enhanced AI-assisted analysis for network slicing in IMT-2020 networks and beyond**

#### **Summary**

With the development of IMT-2020 network and beyond, the network demand changes more dynamically in IMT-2020 networks to support diverse services, and need to be fulfilled as soon as possible to shorten the time to market for the new services while assuring the performance of the existing services. Therefore, it is necessary to enhance the network to perform to diagnose ongoing issues impacting the performance of the mobile network and predict any potential issues (e.g., potential failure and/or performance degradation) by using the AIML, performed by EAIAA, which can make the prediction of the network demand, and the consumer can take necessary actions to fulfil the network demand, beneficial for network optimization.

This Recommendation specifies the requirements, framework, procedures, security considerations of enhanced AI-assisted analysis for network slicing in IMT-2020 networks and beyond.

#### **Keywords**

Enhanced AI-assisted analysis, network slice management and orchestration, IMT-2020 networks and beyond

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## Draft new Recommendation ITU-T Y.EAIAA

### Enhanced AI-assisted analysis for network slicing in IMT-2020 networks and beyond

#### 1. Scope

This Recommendation specifies the Enhanced AI-assisted analysis for network slice management and orchestration in IMT-2020 networks and beyond.

This Recommendation addresses the following aspects of Enhanced AI-assisted analysis for network slice management and orchestration:

- Requirements;
- Framework;
- Procedures;
- Security considerations;

#### 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.3101] | Recommendation ITU-T Y.3101 (2018), <i>Requirements of the IMT-2020 network</i> .  |
| [ITU-T Y.3102] | Recommendation ITU-T Y.3102 (2018), <i>Framework of the IMT-2020 network</i> .   |
| [ITU-T Y.3104] | Recommendation ITU-T Y.3104 (2018), <i>Architecture of the IMT-2020 network</i> .  |
| [ITU-T Y.3150] | Recommendation ITU-T Y.3150 (2020), <i>High-level technical characteristics of network softwarization for IMT-2020</i> . |
| [ITU-T Y.3156] | Recommendation ITU-T Y.3156 (2020), <i>Framework of network slicing with AI-assisted analysis in IMT-2020 networks</i> . |

#### 3. Definitions

##### 3.1. Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

**3.1.1 control plane** [b-ITU-T Y.2011]: The set of functions that controls the operation of entities in the stratum or layer under consideration, plus the functions required to support this control.

**3.1.2 data plane** [b-ITU-T Y.2011]: The set of functions used to transfer data in the stratum or layer under consideration.

**3.1.3 IMT-2020** [b-ITU-T Y.3100]: Systems, system components, and related technologies that provide far more enhanced capabilities than those described in [b-ITU-R M.1645].

NOTE – [b-ITU-R M.1645] defines the framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000 for the radio access network.

**3.1.4 network function** [b-ITU-T Y.3100]: In the context of IMT-2020, a processing function in a network.

**3.1.5 service level agreement (SLA)** [b-ITU-T E.860]: A formal agreement between two or more entities reached after a negotiating activity with the scope to assess service characteristics, responsibilities and priorities of every part. A SLA may include statements about performance, billing, service delivery but also legal and economic issues.

**3.1.6 third party (3rd party)** [b-ITU-T Y.3100]: In the context of IMT-2020, with respect to a given network operator and network end-users, an entity which consumes network capabilities and/or provides applications and/or services.

**3.1.7 user plane** [b-ITU-T Y.2011]: A synonym for data plane.

## **3.2. Terms defined in this Recommendation**

This Recommendation defines the following terms:

TBD

## **4. Abbreviations and acronyms**

This Recommendation uses the following abbreviations and acronyms:

TBD

## **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. Overview on EAIAA**

With the development of IMT-2020 network and beyond, the network demand changes more dynamically in IMT 2020 networks to support diverse services, and need to be fulfilled as soon as possible to shorten the time to market for the new services while assuring the performance of the existing services. Therefore, it is necessary to enhance the network to perform to diagnose ongoing issues impacting the performance of the mobile network and predict any potential issues (e.g., potential failure and/or performance degradation) by using the AIML, performed by AI-assisted

analysis, which can make the prediction of the network demand, and the consumer can take necessary actions to fulfil the network demand, beneficial for network optimization.

An AI-assisted analysis functional entity is responsible to give data analysis results used for the optimization of network slice operation with AI technologies including machine learning (ML) [ITU-T Y.3156].

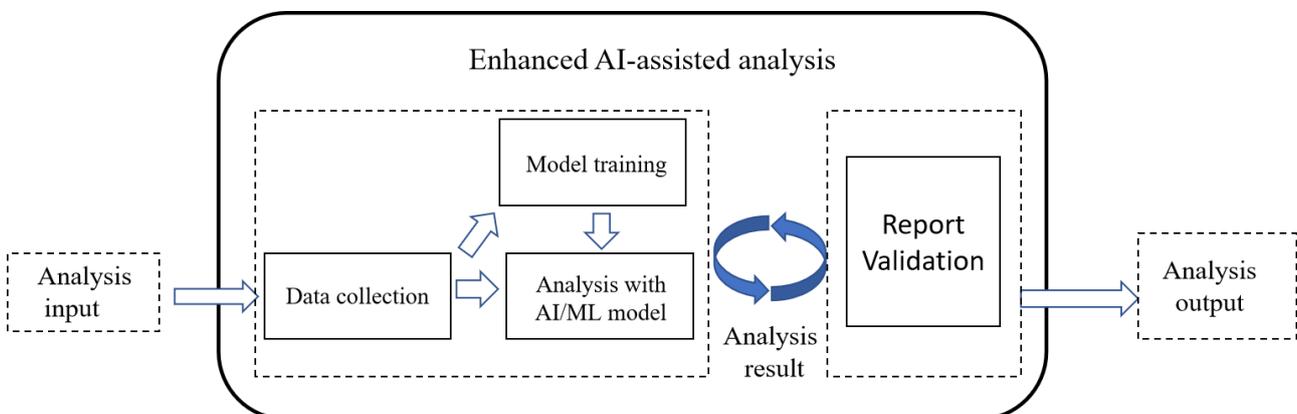
Enhanced AI-assisted analysis functional entity, hope to provide a capability of processing and analysing data related to network and service events and status including e.g. performance measurements, KPIs, Trace/MDT/RLF/RCEF reports, QoE reports, alarms, configuration data, network analytics data, and service experience data from AFs, etc. to provide analytics output, i.e. statistics or predictions,, root cause analysis issues, and may also include recommendations to enable necessary actions for network and service operations.

For diagnosis of network issues, the root cause(s) need to be figured out precisely. One network issue may result in multiple symptoms, such as alarms, performance degradation, user complaints, etc., and the enhanced AI-assisted analysis can analyse these symptoms and provide (or be part of process of providing) the precise root cause indication to the consumer.

For prevention of potential network issues (e.g., potential resource shortage), the enhanced AI-assisted analysis can analyse the network status (e.g., measurements related to load and resource usage) in connection with other related data from the past and provide indications of potential issues, so the consumer of analytics service may take preventative actions to avoid the issues from happening.

For the critical ongoing and potential network issues, the enhanced AI-assisted analysis output can be used to alert the consumer to take immediate actions.

The enhanced AI-assisted analysis can make the prediction of the network demand, and the consumer can take necessary actions to fulfil the network demand, for instance the action could be network capacity upgrade, deployment of new NF instances or re-deployment (e.g., relocation) of existing NF instances from demand decreasing location to the demand increasing location. The enhanced AI-assisted analysis may also provide recommendations on the actions besides the indications of the issues or predictions. In addition, the enhanced AI-assisted analysis can also support the optimization of networks, services and functionalities. Furthermore, the enhanced AI-assisted analysis can support the automation of network and service management.



**Figure 1 – Key processes of Enhanced AI-assisted analysis based on the figure in [ITU-T Y.3156]**

## **7. Requirements of Enhanced AI-assisted analysis**

*[Editor's Note] This clause specifies the requirements of enhanced AI-assisted analysis, in the context of IMT-2020 and beyond, which include general requirements, requirements on framework, requirements on network functions, and requirements on network performance.*

### **7.1. General requirements**

TBD

### **7.2. Requirements on framework**

TBD

### **7.3. Requirements on network functions**

TBD

### **7.4. Requirements on network performance**

TBD

## **8. Framework of Enhanced AI-assisted analysis**

*[Editor's Note] This clause specifies the framework of enhanced AI-assisted analysis, in the context of IMT-2020 and beyond.*

TBD

## **9. Network function enhancements for Enhanced AI-assisted analysis**

*[Editor's Note] This clause specifies the NF enhancements of enhanced AI-assisted analysis, in the context of IMT-2020 and beyond.*

TBD

## **10. Procedures of Enhanced AI-assisted analysis**

*[Editor's Note] This clause specifies the procedures of enhanced AI-assisted analysis, in the context of IMT-2020 and beyond.*

TBD

## **11. Security considerations**

*[Editor's Note] This clause presents the security considerations of enhanced AI-assisted analysis, in the context of IMT-2020 and beyond, which include network security, service security, and user privacy.*

TBD

## Appendix I

### Standardization landscape on enhanced AI-assisted analysis for network slicing

(This appendix does not form an integral part of this Recommendation.)

The Y.3156 “Framework of network slicing with AI-assisted analysis in IMT-2020 networks” has been studied in ITU-T SG13. And 3GPP TS 28.104 studied MDA in Rel-17 and Rel-18. The following table briefly shows the gap analysis for the proposed new work item.

**Table 1 – Standardization activities related to the proposed new work item**

GAP between current work and the new work item		
Organizations and projects	Description and applicability	Gap analysis
<p>ITU-T Y.3156</p> <p><i>Framework of network slicing with AI-assisted analysis in IMT-2020 networks</i></p>	<p>ITU-T Y.3156 the framework for the AI-assisted analysis of network slicing in IMT-2020 networks, which support the whole lifecycle management and orchestration of a network slice. This Recommendation includes:</p> <ul style="list-style-type: none"> <li>– Requirements of AI-assisted analysis;</li> <li>– General functional roles of AI-assisted analysis;</li> <li>– Relations with network slice management and orchestration.</li> </ul>	<p>This new recommendation extends the AI-assisted analysis, provides the analytics report to the consumer, helping for diagnose ongoing issues impacting the performance of the mobile network and predict any potential issues, and the consumer can take necessary actions to fulfil the network demand, beneficial for network optimization.</p> <p>The new Rec. provides a closed loop analysis based on the analytics report and the report validation feedback which didn't specify in Y.3156.</p>
<p>3GPP TS 28.104</p> <p><i>Management Data Analytics (MDA)</i></p>	<p>The MDA has been studied in TR 28.809 which led to the initiation of normative specification work which has already been documented in TS28.104 for Rel-17. While some aspects were prioritized and already addressed in Rel-17 normative work, the Rel-18 normative work is currently focusing on additional capabilities and enhancements. The MDA specification developed by the normative phase addresses a wide range of use cases (capabilities), along with corresponding requirements and solutions with analytics input (analytics enabling data) and analytics output (report), as well as the MDA Management Services (MnSs) to support the interactions between the service consumer and producer for MDA request and</p>	<p>This proposed new work item is based on the architecture of IMT-2020 network slice life cycle management defined in [ITU-T Y.3324], mainly focuses on the enhancement of AI-assisted analysis and provide the analysis report for customers who utilize the information to make some actions to optimize the network management, and we don't touch how to define information model.</p> <p>It won't overlap with the TS 28.104 scope, and will be aligned with the workitem by using it as a reference.</p>

	reporting. The specification also defines MDA functionality and service framework, MDA process, MDA role in management loop as well as other management aspects of MDA.	
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Therefore, there exists an urgent need to study enhanced AI-assisted analysis for network slicing.

## **Bibliography**

- [b-ITU-T Y.2011] Recommendation ITU-T Y.2011 (2004), *General principles and general reference model for Next Generation Networks*.
- [b-ITU-T Y.3100] Recommendation ITU-T Y.3100 (2017), *Terms and definitions for IMT-2020 network*.
- [b-ITU-T Y.3172] Recommendation ITU-T Y.3172 (2019), *Architectural framework for machine learning in future networks including IMT-2020*.
- [b-ITU-T E.860] Recommendation ITU-T E.860 (2002), *Framework of a service level agreement*.
- [b-ITU-T M.3010] Recommendation ITU-T M.3010 (2000), *Principles for a telecommunications management network*.
- [b-ITU-R M.1645] Recommendation ITU-R M.1645 (2003), *Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000*.
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**Annex A**

**A.1 justification for proposed draft new ITU-T Y.EAIAA “Enhanced AI-assisted analysis for network slicing in IMT-2020 networks and beyond”**

<b>Question:</b>	Q21/13	<b>Proposed new ITU-T Recommendation</b>	Geneva, 23 October - 3 November 2023	
<b>Reference and title:</b>	ITU-T Y.EAIAA “Enhanced AI-assisted analysis for network slicing in IMT-2020 networks and beyond”			
<b>Base text:</b>	SG13-TD533/WP1		<b>Timing:</b>	2025-11
<b>Editor(s):</b>	Yushuang Hu, China Mobile, e-mail: huyushuang@chinamobile.com Lu Lu, China Mobile, e-mail: lulu@chinamobile.com		<b>Approval process:</b>	AAP
<p><b>Scope</b> (defines the intent or object of the Recommendation and the aspects covered, thereby indicating the limits of its applicability):</p> <ul style="list-style-type: none"> <li>• This Recommendation specifies the Enhanced AI-assisted analysis for network slicing in IMT-2020 networks and beyond.</li> <li>• This Recommendation addresses the following aspects of Enhanced AI-assisted analysis for network slicing: <ul style="list-style-type: none"> <li>• <input type="checkbox"/> Requirements</li> <li>• <input type="checkbox"/> Framework</li> <li>• <input type="checkbox"/> Procedures</li> <li>• <input type="checkbox"/> Security considerations</li> </ul> </li> </ul>				
<p><b>Summary</b> (provides a brief overview of the purpose and contents of the Recommendation, thus permitting readers to judge its usefulness for their work):</p> <p>With the development of IMT-2020 network and beyond, the network demand changes more dynamically in IMT 2020 networks to support diverse services, and need to be fulfilled as soon as possible to shorten the time to market for the new services while assuring the performance of the existing services. Therefore, it is necessary to enhance the network to perform to diagnose ongoing issues impacting the performance of the mobile network and predict any potential issues (e.g., potential failure and/or performance degradation) by using the AIML, performed by EAIAA, which can make the prediction of the network demand, and the consumer can take necessary actions to fulfil the network demand, beneficial for network optimization.</p> <p>This Recommendation specifies the requirements, framework, procedures, security considerations of Enhanced AI-assisted analysis for network slicing in IMT-2020 networks and beyond.</p>				
<p><b>Relations to ITU-T Recommendations or to other standards</b> (approved or under development):</p> <p>ITU-T Y.3156, ITU-T Y.3110, ITU-T Y.3111</p>				
<p><b>Liaisons with other study groups or with other standards bodies:</b></p> <p>ITU-T SG2, SG11, 3GPP SA5, ETSI ZSM</p>				
<p><b>Supporting members that are committing to contributing actively to the work item:</b></p> <p>China Mobile, China Unicom, Huazhong University of Science and Technology, China Telecom</p>				