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Title: Initial draft Recommendation ITU-T Y.ec-reqts: ″Overview and requirement of edge computing″

Purpose: Proposal

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Keywords: Edge computing; Distributed computing, New work item

Abstract: This document provides initial new draft Recommendation of Y.ec-reqts. ″Overview and requirements of edge computing.″

The following table shows discussion results for contributions.

Contribution No.	Source	Contribution title	Result and action
C890	Electronics and Telecommunications Research Institute (ETRI)	New: Y.ec-reqts “Overview and requirement of edge computing.”(merged with C104)	Accepted with modification

Major issues of initial draft Recommendation are summarized as follows:

- Update relations on other standards in A.1 justification.
  - Adding the relationship with ITU-T Recommendations, ETSI, and ISO/IEC JTC 1.
- Update notes in initial draft Recommendation.
  - Changing the contributor’s notes to editor’s notes.
  - Adding contents and figures based on C890 in clause 6.1.

Future contributions are invited for the following topics with high priority:

- Terms and definitions related edge computing (Not edge computing itself);
- Basic introduction and concept of edge computing in clause 6;
- Relationship with cloud computing and other technologies;

- Analysis of the key characteristics driving edge computing in current industries (see Appendix I).

Attachment:

Initial text of new Recommendation Y.ec-reqts

Attachment: <Text of Draft Recommendation Y.ec-reqts>

Initial draft Recommendation ITU-T Y.ec-reqts

Overview and requirements of edge computing

Summary

This Recommendation provides overview and requirements of edge computing. To provide requirements, this Recommendation defines terms and concept of edge computing, provides reference frameworks for edge computing based on fundamental characteristics and capabilities. Also, this Recommendation provides requirements through various use cases based on reference framework.

Keywords

Edge computing, Distributed computing, Cloud computing

Contents

<Text of Draft Recommendation>

Initial draft Recommendation ITU-T Y.ec-reqts

Overview and requirement of edge computing

1 Scope

This Recommendation provides overview and requirement of edge computing. It addresses the following subjects:

- Overview of edge computing;
- Fundamental characteristics and common capabilities driving edge computing;
- Reference frameworks for edge computing;
- The requirements of edge computing.

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.3501] Recommendation ITU-T Y.3501 (2016), Information technology – Cloud computing – Framework and high-level requirements.

[ITU-T Y.3508] Recommendation ITU-T Y.3501 (2019), Information technology – Cloud computing – Overview and high-level requirements of distributed cloud.

[Editor's Note] Other references can be added. Contributions are invited.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

[Editor's Note] These definitions need to be enhanced. Contributions are invited.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

[Editor's Note] These definitions need to be enhanced. Contributions are invited.

3.2.1 Edge computing

[Editor's Note] These definitions need to be enhanced and new definition can be added here. Contributions are invited.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CSC Cloud Service Customer

CSP Cloud Service Provider

[Editor's Note] These abbreviations and acronyms should be enhanced. Contributions are invited.

5 Convention

[Editor's Note] The texts in this clause are from other Recommendations. If necessary, they will be revised during the progress of 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 document is to be claimed.

The keywords "**is prohibited from**" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document 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 the specification.

In the body of this document and its annexes, the words shall, shall not, should, and may sometimes appear, in which case they are to be interpreted, respectively, as is required to, is prohibited from, is recommended, and can optionally. The appearance of such phrases or keywords in an appendix or in material explicitly marked as informative are to be interpreted as having no normative intent.

6 Overview of edge computing

6.1 Introduction to edge computing

[Editor's Note on 2020-07-27] This clause includes introduction and current status of edge computing before explaining edge computing. Contributions are invited.

Edge computing leverages computing resources at the edge to analyse and process data generated by people and devices faster. Edge computing is an alternative to solving the latency of cloud computing, but it was accompanied by urgent improvement in terms of resource limitation of edge computing. This concept is a fundamental requirement for edge computing to overcome the shortcomings of cloud computing and mobile computing.

For example, IoT or mobile devices generate large amounts of data and receive data from the edge side. If the collected data can be analysed at the edge or used for decisions, computing resources are needed at the edge. And if you need massive amounts of data analysis and analysis results for your

old data, you need to send or fetch data or related information from the edge to your data centre or cloud, which complements edge computing and centralized cloud computing.

However, the edge computing itself is not limited to this cloud domain. It must also accommodate existing monolithic environments, other than the cloud. Therefore, the edge computing platform provide capabilities that include these cloud and non-cloud domains (single environment or cloud native environment).

To provide such a platform, there are many technologies which are flexible and extensible architectures such as FaaS (Function as a service) that provide event-based functions, service mesh architecture or server-less architectures.

Based on these technologies, various requirements and technologies for fast and rapid service are making the transition from edge computing to a highly advanced distributed collaborative environment beyond a simple server-client environment.

6.2 Relationship with cloud computing

[Editor's Note on 2020-07-27] This clause explains relationship with cloud computing.

Edge computing connects to various types of cloud or monolithic data centres to address resource shortages as shown in Figure 1.

In Figure 1, edge computing works between devices, node, distributed cloud and non-cloud data centre, as you can see above, edge computing involves a variety of cloud resources and non-cloud resources, etc.

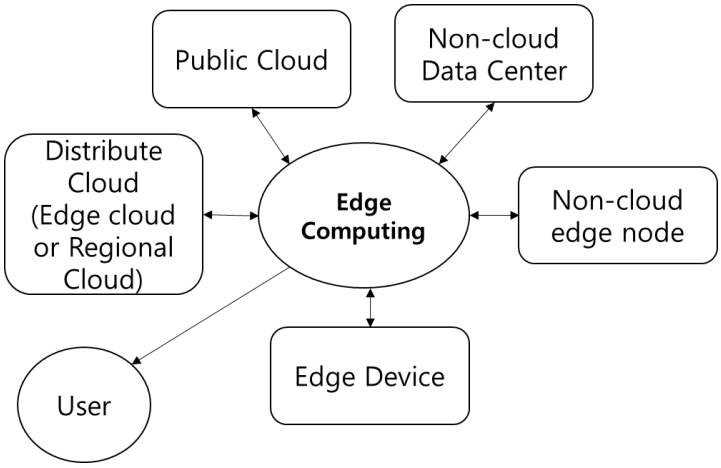

Figure 6-1. The concept diagram of edge computing

7 Fundamental characteristics and common capabilities of edge computing

7.1 Fundamental characteristics of edge computing

[Editor's Note on 2020-07-27] This clause suggests the key characteristic driving edge computing. This clause is related with the analysis for characteristics of edge computing in current industries and future edge computing. (See Appendix I). This clause seeks to derive key characteristics after analyzing various edge computing in the current and future state of industries. The current and future state can be derived from general use case (See Appendix II). Contributions are invited

7.2 Common capabilities of edge computing

[Editor's Note on 2020-07-27] In this clause, common capabilities from the key characteristic derived from 7.1. Example of capability can be related with various characteristics such as fast response, location, diversity, data and etc. Also, this clause can be finalized after analysis of characteristics. Contributions are invited.

8 Reference framework for edge computing

8.1 The domain of framework for edge computing

[Editor's Note on 2020-07-27] Edge computing is used in various domains (smart city, connected vehicle, Industrial IoT, AI, and etc.) This clause is related with the analysis for characteristics of edge computing in current industries and future edge computing. (See Appendix I). In this clause, technical domain of frameworks for edge computing are explained according to analysis based on 7.1. Contributions are invited

8.2 Reference framework for edge computing

[Editor's Note on 2020-07-27] This clause suggests reference framework of edge computing. This clause seeks the reference framework accommodating various domain of edge computing. It can be a layerd architecture or not. Contributions are invited

9 Requirement of edge computing

[Editor's Note on 2020-07-27] In this clause, first, high level requirement is derived from clause 7 and general user case (See Appendix II), and then functional requirement are described from various use cases (See Appendix III) related with every capability based on 8. Contributions are invited

9.1 High level requirement

9.2 Functional requirement for capability A

9.3 Functional requirement for capability B

10 Security Considerations

[Editor's Note on 2020-07-27] "Security considerations" is the recommended clause in ITU-T. General security consideration for edge computing will be described here.

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Appendix I. Analyzing edge computing in the current and future state of industries

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

Source	Domain	Purpose	Description	Derived characteristics
AWS		Fast response		Low latency

[Editor's Note] This is example to fill in the table. Source is the organization or enterprise. For purpose, it can be function, capability or field of industries such as smart city, connected car, AI, emergency and etc. Description can be described with brief content and finally contributor choose the derived characteristic for key characteristics. Contributions are invited.

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Appendix II. General use case for edge computing

II.1 XXX

Title	
Description	
Role/Sub-role	
Figure (optional)	
Pre-conditions (optional)	-
Post-conditions (optional)	
Derived requirements	

Appendix III. Use case for edge computing

III.1 Use case based on capability A

Title	
Related Capability	
Description	
Role/Sub-role	
Figure (optional)	
Pre-conditions (optional)	-
Post-conditions (optional)	
Derived requirements	

III.1 Use case based on capability A

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Bibliography

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