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AND NEXT-GENERATION NETWORKS

Future networks

Service universalization in future networks

Recommendation ITU-T Y.3035

ITU-T



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Service universalization in future networks

Summary

Recommendation ITU-T Y.3035 addresses the social and economic awareness objective of future networks (FNs), in particular the related design goal of service universalization, identified in Recommendation ITU-T Y.3001. In order to help fulfil this purpose, this Recommendation identifies requirements and technical considerations regarding service universalization that FNs design should consider.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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Recommendation ITU-T Y.3035

Service universalization in future networks

1 Scope

This Recommendation addresses social and economic awareness objectives of future networks (FNs), in particular the related design goal of service universalization, identified in [ITU-T Y.3001].

This Recommendation covers the following:

- The objective of stimulating service universalization through FNs;
- Requirements regarding service universalization in FNs;
- Technical considerations for FNs design in order to facilitate service universalization.

It is important to bear in mind that this Recommendation does not have the purpose of creating new technologies or standards that should be implemented in FNs. However, it aims to identify which technical considerations should be useful to enhance service universalization and how they could contribute to achieve this goal.

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.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1*.

[ITU-T Y.3001] Recommendation ITU-T Y.3001 (2011), *Future Networks: Objectives and Design Goals*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 future network [ITU-T Y.3001]: A network able to provide services, capabilities, and facilities difficult to provide using existing network technologies. A future network is either:

- a) A new component network or an enhanced version of an existing one, or;
- b) A heterogeneous collection of new component networks or of new and existing component networks that is operated as a single network.

NOTE 1 – The plural form "Future Networks" (FNs) is used to show that there may be more than one network that fits the definition of a future network.

NOTE 2 – A network of type b may also include networks of type a.

NOTE 3 – The label assigned to the final federation may, or may not, include the word "future", depending on its nature relative to any preceding network and similarities thereto.

NOTE 4 – The word "difficult" does not preclude some current technologies from being used in future networks.

NOTE 5 – In the context of this Recommendation, the word "new" applied to a component network means that the component network is able to provide services, capabilities, and facilities that are difficult or impossible to provide using existing network technologies.

3.1.2 service universalization [ITU-T Y.3001]: A process to provide telecommunication services to every individual or group of people irrespective of social, geographical, and economical status.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CAPEX	Capital Expenditure
FN	Future Network
IP	Internet Protocol
NaaS	Network as a Service
OPEX	Operational Expenditure
VPN	Virtual Private Network

5 Conventions

This Recommendation uses "is recommended" to indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.

6 Introduction

Increasing the access to information provided through telecommunications infrastructure is important to enhance social and digital inclusion, especially in developing countries. Aiming to bridge the digital gap, it is highly recommended for FNs to promote service universalization by enhancing awareness of the importance of developing technologies that facilitate the deployment of networks and provision of services everywhere to every individual.

Social and economic awareness is one out of four design objectives for FNs defined in [ITU-T Y.3001]. This objective aims to reduce entry barriers for the various actors involved in the network ecosystem, by reducing life cycle costs, and by allowing appropriate competition and an appropriate return for all actors.

Accordingly, [ITU-T Y.3001] identifies the design goal of service universalization. Through it the FNs are recommended to facilitate and accelerate provision of telecommunication services in differing areas, such as towns or countryside, in developed or developing countries, by minimizing the costs of network deployment and by adopting collaborative design of new technologies.

Thus, the Recommendation at hand identifies the objective, requirements, and technical considerations important to promote service universalization.

7 Stimulating service universalization through FNs deployment

In order to better analyse the conditions and actions needed to enhance service universalization, it is possible to identify four areas of service provision, as shown in Figure 1.

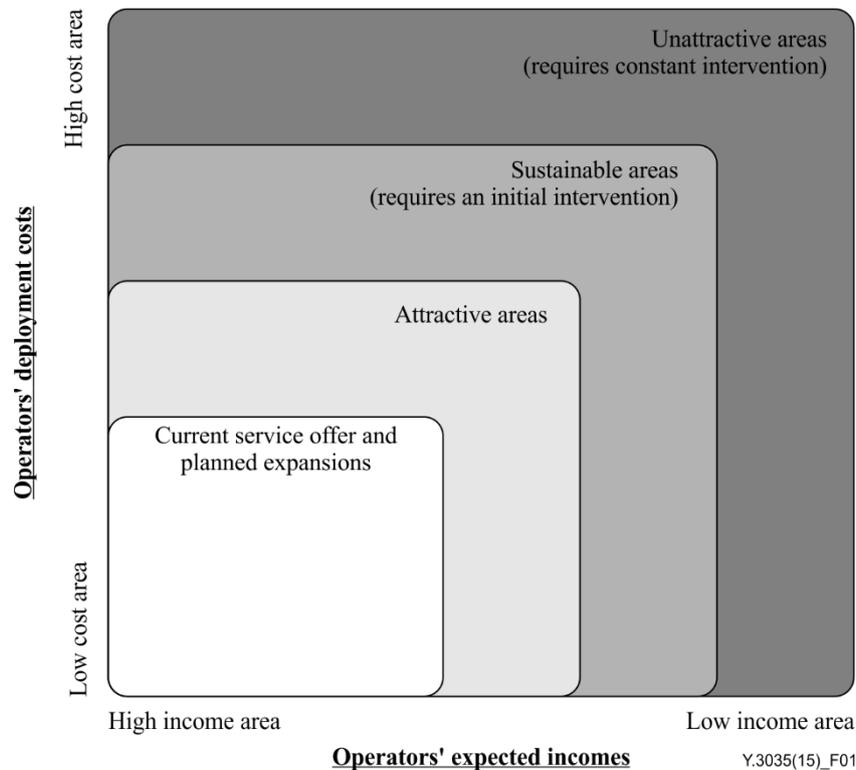


Figure 1 – Four different geographic areas of service provision

- **Current served area and planned expansions:** geographic region where telecommunication services are already provided or are planned to be provided in a short timeframe, due to its high-income potential and affordable capital expenditure (CAPEX) and operational expenditure (OPEX) requirements for operators;
- **Attractive area:** geographic region where the telecommunication services are not provided yet despite of its high-income potential and moderated level of CAPEX and OPEX requested;
- **Sustainable area:** geographic region with CAPEX and OPEX requirements and relatively high and low incomes expectations, which becomes economically attractive only after an initial incentive by the government in the infrastructure deployment;
- **Unattractive area:** geographic region with high CAPEX and OPEX requirements and low incomes expected in a way that the provision of telecommunication services is only viable with continuous regulatory intervention.

In this approach, the geographic regions are classified by economic attractiveness from the operator's perspective, which is related to how sustainable the financial return is to provide service to an area based on the CAPEX and OPEX required and the incomes expected by the operators.

Given that, the main objective of stimulating service universalization through FNs deployment is to make possible expanding current served and attractive areas by reducing sustainable and unattractive areas through more efficient regulatory interventions. The requirements and technical considerations that should be taken into account to achieve this objective will be described in the next clauses.

8 Requirements for service universalization

Aiming to achieve the objective described in the previous clause, this clause specifies requirements for service universalization.

8.1 Measurement of network resources by service

Measurement of network resources by service is to analyse the network resources allocation by each service provided. In packet-based networks, where the same infrastructure can provide various services, this possibility allows efficient regulatory interventions directed to service universalization into sustainable and unattractive areas.

Therefore, the measurement of network resources by service is recommended to facilitate service universalization.

8.2 Flexible network deployment

Flexible network deployment is to dynamically allocate only the resources required to address a specific demand of a telecommunication service, in order to reduce CAPEX and OPEX and to promote network infrastructure deployment into sustainable and unattractive areas.

Therefore, flexible network deployment is recommended to promote service universalization.

8.3 Collaborative development

Collaborative development is a joint effort to develop new technologies based on open standards, in order to promote innovation and facilitate the deployment of low CAPEX and OPEX telecommunication services into sustainable and unattractive areas.

Therefore, collaborative development is recommended to promote service universalization.

8.4 Use of green technologies

Use of green technologies is the adoption of technologies with small levels of heat and CO₂ emissions and lower energy consumption, allowing a lower level of OPEX requested for operators to maintain service provision in sustainable and unattractive areas.

Therefore, use of green technologies is recommended to promote service universalization.

9 Technical considerations to facilitate service universalization

In order to comply with the requirements for service universalization identified in the previous clause, some technical considerations should be taken into account.

9.1 Network resources measurement

Aiming to allow the measurement of the network resources allocated by each service provided, it is important to measure at least the following parameters:

- **Throughput by service:** allows better planning of network improvements to support the expected increase in the demand of users of a specific service;
- **Storage capacity by service:** allows better planning of storage capacity to avoid losing data due to out of memory issues;
- **Processing time by service:** allows better allocation of network resources in order to process packets from services with more strict delay and jitter requirements;
- **Energy consumption by service:** allows better management of power resources to reduce OPEX.

9.2 Adoption of technologies with flexibility

Aiming to allow a flexible network deployment, the adoption of the following technologies should be considered in order to give flexibility for the network deployment:

- **Network virtualization, including virtualization of network entities:** allows dynamical changing in the number of network entities and the resources allocated to a specific service.
- **Network as a Service (NaaS):** allows the provision of transport connectivity services and/or inter-cloud network connectivity services, including flexible and extended virtual private network (VPN) and bandwidth on demand.
- **Content and context awareness:** allows more efficiency in the network resources allocation by considering the users' content and context.

9.3 Green network equipment

Aiming to use green technologies, equipment should be considered with:

- **Lower heat and CO₂ emissions:** allows network deployment in regions where the gas or heat emission can be an issue;
- **Lower energy consumption:** allows network deployment in regions where electrical power available is low or irregular;
- **Renewable energy powering:** allows self-sustainability in terms of power supply in regions where weather conditions can make the access to electric power unfeasible;
- **Optimized enclosure¹:** allows network deployment in regions where the physical space or the access to the site is limited.

10 Security considerations

This Recommendation provides requirements and technical considerations FNs designs should consider in order to facilitate service universalization. It is therefore assumed, firstly, that security considerations should take into account the design goals of FNs, as described in [ITU-T Y.3001].

Given that this Recommendation is also applicable for IP-based networks, it is assumed that security considerations, in general, should take into account the security of IP-based networks, as described in [ITU-T Y.2701].

¹ Smaller size and lower infrastructure requirements.

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