

Recommendation **ITU-T F.740.11 (03/2025)**

SERIES F: Non-telephone telecommunication services

Multimedia services

Requirements and framework of cloud-based augmented reality systems

ITU-T F-SERIES RECOMMENDATIONS
Non-telephone telecommunication services

TELEGRAPH SERVICE	F.1-F.109
Operating methods for the international public telegram service	F.1-F.19
The gentex network	F.20-F.29
Message switching	F.30-F.39
The international telemesssage service	F.40-F.58
The international telex service	F.59-F.89
Statistics and publications on international telegraph services	F.90-F.99
Scheduled and leased communication services	F.100-F.104
Phototelegraph service	F.105-F.109
MOBILE SERVICE	F.110-F.159
Mobile services and multideestination satellite services	F.110-F.159
TELEMATIC SERVICES	F.160-F.399
Public facsimile service	F.160-F.199
Teletex service	F.200-F.299
Videotex service	F.300-F.349
General provisions for telematic services	F.350-F.399
MESSAGE HANDLING SERVICES	F.400-F.499
DIRECTORY SERVICES	F.500-F.549
DOCUMENT COMMUNICATION	F.550-F.599
Document communication	F.550-F.579
Programming communication interfaces	F.580-F.599
DATA TRANSMISSION SERVICES	F.600-F.699
MULTIMEDIA SERVICES	F.700-F.799
ISDN SERVICES	F.800-F.849
UNIVERSAL PERSONAL TELECOMMUNICATION	F.850-F.899
ACCESSIBILITY AND HUMAN FACTORS	F.900-F.999

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T F.740.11

Requirements and framework of cloud-based augmented reality systems

Summary

Based on cloud computing capabilities and massive data collaborative processing, cloud-based augmented reality systems can effectively support large-scale physical scene recognition and digital processing, provide more flexible virtual-scene integration and support multiperson interactive scenarios. Recommendation ITU-T F.740.11 does not change cloud computing's functions, but rather presents a basic concept of cloud-based augmented reality and specifies requirements and a framework of cloud-based augmented reality systems.

History *

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FOREWORD

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The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Table of Contents

	Page
1 Scope	1
2 References.....	1
3 Definitions	1
3.1 Terms defined elsewhere	1
3.2 Terms defined in this Recommendation.....	1
4 Abbreviations and acronyms	1
5 Conventions	2
6 Overview	2
7 Modes of cloud-based AR systems.....	3
7.1 Cloud-based AR with the integration of cloud and terminal capabilities	3
7.2 Cloud-based AR relying on cloud processing capabilities.....	5
8 Framework of cloud-based augmented reality systems.....	5
9 Requirements of cloud-based augmented reality systems	6
9.1 General requirements.....	6
9.2 Content layer requirements.....	7
9.3 Control layer requirements	7
9.4 Resource layer requirements	10
9.5 Terminal layer requirements.....	10
9.6 Network layer requirements	11
9.7 OA&M requirements.....	11
9.8 Security requirements	12
Appendix I – Use cases.....	13
I.1 Cloud-based AR medical assistance.....	13
I.2 Cloud-based AR navigation	14
I.3 Cloud-based AR industrial maintenance	15
Bibliography.....	17

Recommendation ITU-T F.740.11

Requirements and framework of cloud-based augmented reality systems

1 Scope

This Recommendation specifies requirements and a framework of cloud-based augmented reality (AR) systems. The scope of this Recommendation includes:

- Overview;
- Modes of cloud-based augmented reality systems;
- Framework of cloud-based augmented reality systems;
- Requirements of cloud-based augmented reality systems.

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 G.1036] Recommendation ITU-T G.1036 (2022), *Quality of experience influencing factors for augmented reality services*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 augmented reality [b-ITU-T J.301]: A type of mixed reality where graphical elements are integrated into the real world in order to enhance user experience and enrich information.

3.1.2 augmented content [b-ITU-T J.301]: A binary object, such as 2D images, 3D animated models or audio/video streaming files, to be augmented into a predefined augmentation region.

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

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

2D	Two Dimensional
3D	Three Dimensional
AI	Artificial Intelligence
AR	Augmented Reality

AVI	Audio Video Interleaved
CDN	Content Delivery Network
CPU	Central Processing Unit
DoF	Degree of Freedom
E2E	End-to-End
FOV	Field of View
FTTH	Fibre To The Home
GPU	Graphic Processing Unit
NIC	Network Interface Card
OA&M	Operation, Administration and Management
SDK	Software Development Kit
SLAM	Simultaneous Localization And Mapping
WDM	Wavelength Division Multiplexing

5 Conventions

In this Recommendation:

- The keywords "**is required**" 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 needs not be present to claim conformance.
- The keywords "**can optionally**" indicate an optional requirement which is permissible, without implying any sense of being recommended. These terms are 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.

6 Overview

Cloud-based AR and terminal-based AR are two different operation modes of AR. Terminal-based AR is the AR operation mode which adopts local content data storage and locally available running resources of the terminal to provide AR services. Terminal-based AR does not involve the retrieval and scheduling of content data and running resources in the cloud. The operation of terminal-based AR could be severely restrained by local running resource limitations, such as terminal computing power, battery and data storage.

Cloud-based AR, based on the super computing power of the cloud, completes complex real-scene understanding, 3D modelling, multi-terminal data sharing, cloud-edge collaboration and other processing, builds a continuous combination of point cloud map and real-world coordinates, realizes real-time and updated 3D digital world model for real-world scanning, and provides the terminal with the ability to index and integrate virtual information.

Cloud-based AR requires the collaborative provision of services based on various systems, collectively referred to as cloud-based AR systems. The E2E service of the cloud-based AR system refers to the subsystems running on the cloud, which distributes cloud-based AR services to terminals by relying on network capabilities and obtains remote operation instructions from a terminal. The cloud-based AR subsystems running on the cloud include a content system, control system, resource system, operation, administration and management (OA&M) system and security system.