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MULTIMEDIA SIGNALS

Cloud-based converged media services for IP and
broadcast cable television

Specification of a cloud-based converged media service to support Internet protocol and broadcast cable television – System architecture

Recommendation ITU-T J.1302

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Summary

Recommendation ITU-T J.1302 defines the high-level system architecture of a cloud-based converged media service to support Internet protocol (IP) and broadcast cable television (TV). With the cloud-native technology development, cloud-based converged media services can be quickly deployed by cable television operators. This Recommendation is part 2 of a multi-part deliverable.

History

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Introduction

This Recommendation is part 2 of a multi-part deliverable covering the system architecture for cloud-based converged media service to support Internet protocol and broadcast cable television, as identified below:

Part 1: Requirements.

Part 2: System architecture.

Part 3: System specification on collaboration between production media cloud and cable service cloud.

Recommendation ITU-T J.1302

Specification of a cloud-based converged media service to support Internet protocol and broadcast cable television – System architecture

1 Scope

This Recommendation specifies the system architecture for cloud-based converged media services (CBCMSs) to support Internet protocol (IP) and broadcast cable television (TV). The CBCMS is intended to be deployed in the service cloud of cable television operators, which enables rapid innovation and deployment of new services, flexible expansion of online services, smart adaption of service origins or paths to meet the distribution needs for different terminal types and network status. This system architecture fulfils the requirements in [ITU-T J.1301].

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 J.1301] Recommendation ITU-T J.1301 (2021), *Specification of a cloud-based converged media service to support Internet protocol and broadcast cable television – Requirements*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 integrated broadcast and broadband (IBB) DTV service [b-ITU-T J.205]: A service that simultaneously provides an integrated experience of broadcasting and interactivity relating to media content, data and applications from multiple sources, where the interactivity is sometimes associated with broadcasting programmes.

3.1.2 cloud-based converged media service (CBCMS) [ITU-T J.1301]: The cloud-based converged media service is intended to be deployed by cable television operators and to support the requirements of rapid service innovation and deployment, which enables media services to be developed by separate vendors according to the standard application programming interfaces (API), where appropriate.

3.1.3 microservice [ITU-T J.1301]: An architectural and organizational approach to software development where software is composed of small independent microservices that communicate over well-defined APIs. Microservices architectures make applications easier to scale and faster to develop, enabling innovation and accelerating time-to-market for new features.

3.1.4 cloud digital video recorder (DVR) [ITU-T J.1301]: Cloud DVR saves TV shows in the service provider's cloud datacentre rather than in the DVR/set-top box by the TV. Cloud DVRs enable customers to store more content and record more shows that air at the same time.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 API gateway: In microservices architecture, applications and services are composed of smaller, exchangeable components, and these components need a way to find and communicate with one another. This is where API gateways come in. An API gateway sits between clients and services. It acts as a reverse proxy, routing requests from clients to services. It may also perform various cross-cutting tasks such as authentication, transport layer security (TLS) termination, and rate limiting.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AC	Access Criteria
Ad	Advertisement
AI	Artificial Intelligence
API	Application Programming Interface
CA	Conditional Access
CAS	Conditional Access System
CBCMS	Cloud-Based Converged Media Service
CDN	Content Distribution Network
CW	Control Word
DASH	Dynamic Adaptive Streaming over HTTP
DRM	Digital Rights Management
DVR	Digital Video Recorder
DVB	Digital Video Broadcasting
ECM	Entitlement Control Message
ECMG	Entitlement Control Message Generator
EMMG	Entitlement Management Message Generator
HDS	HTTP dynamic streaming
HLS	HTTP Live Streaming
HSS	HTTP Smooth Streaming
ID	Identification
SQL	Structured Query Language
TLS	Transport Layer Security
UI	User Interface
UX	User Experience
VOD	Video On Demand
VM	Virtual Machine

5 Conventions

In this Recommendation:

The keywords "**is required to**" indicate a requirement that 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 that is recommended but which is not required. Thus, this requirement need not be present to claim conformance.

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

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 Recommendation 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 a material explicitly marked as *informative* is to be interpreted as having no normative intent.

6 High-level system architecture

Cloud-based converged media service (CBCMS) is the cloud-based media service that provides various capabilities according to the practical development requirements [ITU-T J.1301]. CBCMS employs a hierarchical and modular software architecture and consists of four functional layers: the infrastructure layer, the ability layer, the abstraction layer, the application layer, as well as management tools that apply to every layer. Each consists of multiple software modules in a loose-coupling mode.

Figure 1 shows the high-level system architecture of CBCMS.