

# Media Cloud Service with Optimized Video Processing and Platform

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Recently, video traffic on the Internet has been increasing dramatically as video services including video sharing sites (YouTube, Netflix etc.), Internet broadcasting and video on demand (VOD) services become popular. In addition, smartphones and tablet PCs are becoming more and more popular, and there is a fusion of broadcasting and the Internet, as in Google TV and Apple TV. These factors mean that consumers are likely to increasingly use video content. Under these circumstances, there has been an increasing need among enterprises for work styles that make use of video. Fujitsu has rich experience and know-how in fields such as IP codecs, which are used by 80% of broadcasting stations in Japan and the three major North American broadcasting stations (ABC, CBS and NBC), IP networking and ICT systems. We intend to support customers' businesses by taking advantage of these technologies we have cultivated. This paper describes media cloud services, which offer media processing around the trusted cloud services in a platform as a service (PaaS) environment.

## 1. Introduction

Recently, video traffic on the Internet has been increasing dramatically as video sharing sites including YouTube, Internet broadcasting and video on demand (VOD) services become popular. By 2014, video traffic is estimated to account for 91% or more of the global consumer IP traffic.<sup>1)</sup> In addition, smartphones and tablet PCs are becoming more and more popular and there is a fusion of broadcasting and the Internet, as in Google TV and Apple TV. These factors mean that consumers will use video more easily and in wider fields. Furthermore, enterprises are rapidly expanding their video use from specialized applications such as camera surveillance for preventing crimes and disasters, to product or corporate promotion, in-house education and information communication. Video content is becoming an essential element in improving the efficiency of corporate activities, and in turn generating new business

opportunities in the future.

Companies and users have an increasing need to easily handle video and sound and incorporate them into business applications in the same way as text information. At the same time, many challenges exist in terms of handling video. For one, it is necessary to have knowledge in various fields including videos as well as ICT knowledge. In addition, video requires much larger amounts of data as compared with the conventional text information, and this means vast amounts of capital investment are required.

To address these challenges and support customers' businesses, Fujitsu offers media cloud services, deployed in a platform as a service (PaaS) environment specialized in media processing.

This paper describes the strengths, advantages and applications of the media cloud services.

## 2. Current situation and challenges

Video offers an excellent power of expression, using amounts of information incomparable to those used by the conventional text or still images. If video can be appropriately incorporated into the existing business applications, a revolution in work flows can be expected. For example, video has the potential to transform the structures of conventional operations by changing maintenance manuals from documents to videos, using product information in video formats instead of paper, or recording conference proceedings in video rather than minutes for immediate sharing. At the same time, however, making full use of massive amounts of data poses many challenges. The list below shows the challenges expected when enterprises try to make use of video.

- 1) Need for specialized engineers well acquainted with video

Expertise in video in addition to ICT skills is required. For example, video files come in a number of formats including MPEG, WMV, FLV and MP4 and compatible formats may vary depending on the input/output devices such as cameras, PCs, mobile phones and IPTVs. The video expertise required ranges widely and should cover areas such as how to convert between file formats, which server software to use for delivery and how to edit video. Specialized engineers with a thorough knowledge of video are necessary.

- 2) Consideration for trouble of and risk in procurement of video processing software

There is a great variety of software applications for handling video, and technology is evolving rapidly. Many different vendors, ranging from major corporations to venture companies in Japan and overseas, offer their own software applications. This means license agreements and support are troublesome, and there is always a fear of uncertain software quality when using video for business.

- 3) Requirement of major investment and operational costs

Video requires massive amounts of data to be handled and loads on the servers that process or deliver the video can be extremely high. A large number of high-spec workstations, servers and storages are required, resulting in high investment costs and operational costs as well.

- 4) Increased development costs due to nonstandard APIs

Many software applications that process video are equipped with application programming interfaces (APIs) that are, however, not standardized. For that reason, integrating them with business applications requires the respective interfaces to be developed. Modifying interfaces when video processing software is changed also has the same problem.

Because of the conditions described above, many enterprises are reluctant to use video in their businesses on a full-scale basis. We found a development platform necessary to promote the use of video by addressing these challenges through black-boxing the video processing.

## 3. Solution approaches, technologies and products

Fujitsu offers media processing technologies (for images, videos and sound). These have been cultivated through the development of various products and most advanced media processing technologies. They have been packaged as media cloud services in a PaaS environment specialized in media processing.

Fujitsu has advanced video processing technologies and these advanced technologies have been studied in various fields. Fujitsu has made use of these various technologies to provide the benefits of cloud computing, and to offer an environment where high-speed processing is possible.

As shown in **Figure 1**, media cloud services (PaaS) consist of two elements called service plug-ins and media cloud platform, and they

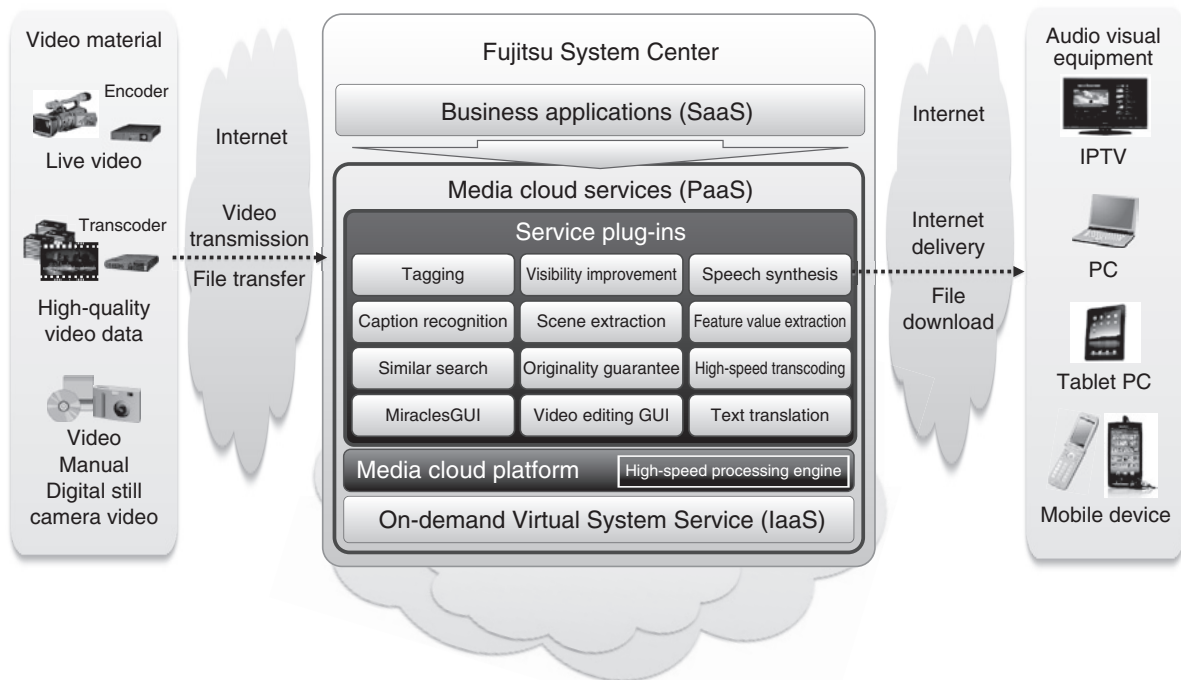


Figure 1  
Diagram of media cloud service.

have the strengths described below.

1) Service plug-ins

- Fujitsu has a variety of media processing technologies. One example is automatic tagging, in which feature information extracted by image or video analysis technologies (such as color recognition, shape recognition, scene analysis, character recognition and speech recognition) is tagged with keywords for sorting. When this is combined with high-speed transcoding technology (in a plug-in configuration) it can be easily integrated with business applications. This makes it possible for anybody to incorporate complicated media processing.
- Excellent media processing technologies of other companies can be made into service plug-ins and offered flexibly. This makes it possible to always use the latest media processing technologies.

2) Media cloud platform

- Standard interfaces are provided to enable

business applications to easily handle service plug-ins.

- Complicated video processing procedures and parameters can be abstracted in the form of scenarios. This reduces the amount of development needed for business applications. The scenarios are described in XML and can be extended on a script level.
- Load distribution and scale-out of the service plug-in execution environment are automatically implemented according to the resource usage to achieve high scalability.
- Operating conditions of service plug-ins can be easily viewed from the Web administration screen.

A conceptual image of processing with business applications linked with media cloud services is shown in **Figure 2**.

By taking advantage of these strengths, Fujitsu provides media processing technologies for a series of operations, from gathering, storage, editing and searching to delivery of videos, as media cloud services. In addition, linking with

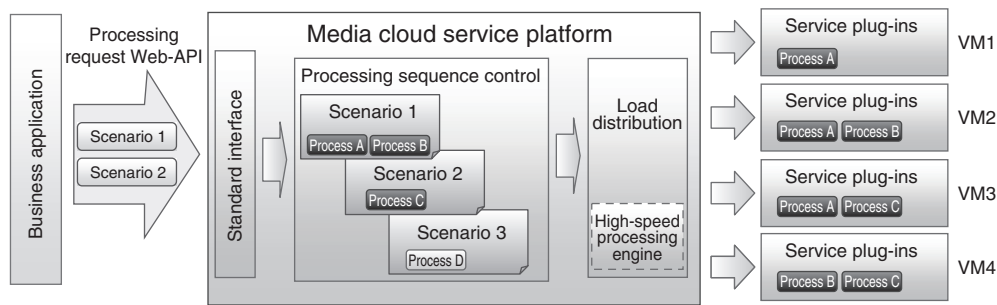


Figure 2  
Outline of media cloud components.

the trusted cloud service “On-demand Virtual System Service”<sup>2), note)</sup> offered by Fujitsu allows safe and reliable cloud services to be provided.

#### 4. Effect of media cloud services

Making use of media cloud services helps enterprises operate in a way that incorporates video at low cost and high quality within a short time. This section presents the effects that the introduced services have. They can be enjoyed by enterprises that take advantage of video content.

##### 1) Provision of value-added services by latest video technology

In various application systems, increased use of video content will lead to the situation where enterprises must meet video-related requests from customers, create additional functions, or develop new solutions.

In dealing with this situation, the time and money that enterprises spend on studying new technologies or developing new applications in relation to video are too great for them to fulfill such requests. When only video processing libraries are outsourced, performance verification, system design and optimization on a cloud platform still need to be carried out in-house, which again hinders the introduction.

By making use of media cloud services with

optimized video processing and platforms, value-added services that take advantage of the latest video technologies can be released with lower development costs and in a shorter time. In addition, use of the media cloud services allows enterprises to concentrate their investment on their core competence, which leads to a further improvement of corporate competitiveness.

##### 2) Absorption of operational peak by using cloud

The workload of processing operations is ever increasing due to the frequent need for high-load processing such as video conversion (transcoding) and CG rendering, in particular sophistication of processing for video quality improvement, H.264 compression, 3D content and such like. There is a set amount of operations that can be processed in-house and it is difficult to keep pace with changes in that amount. By using media cloud services, the necessary amount of ICT resources can be used when necessary.<sup>3)</sup> This allows enterprises to quickly respond to changes in the amount of operations and ensure flexible business strategy.

#### 5. Case examples of preceding trial

In the course of developing media cloud services, Fujitsu verified its use in actual operations and applications through trial uses in cooperation with partners in various business categories.

note) In June 2011, this was named as Fujitsu Global Cloud Platform “FGCP/S5” in Japan market and Global Cloud Platform (GCP) in overseas markets.

### 1) Trial in content production

Fujitsu's H.264 compression technology is capable of compressing video three to five times quicker than other companies' software. This technology has been made into a service plug-in and a media cloud service-based distributed processing platform has been used for parallel processing, thereby further reducing the processing time.

A demonstration experiment with a company engaged in commercial content production showed that the processing time for compression was one-thirtieth that of the conventional operations. This customer could significantly improve its operational efficiency, and secure more business deals.

### 2) Trial in application to content management system

One strength of media cloud services is its mechanism that allows business applications to be easily developed. We have asked partners in various business categories to incorporate these services into actual applications so that the functions and interfaces can be refined.

One example is the development of an additional function to deal with video content for a content management system intended for in-house office documents. In this development, based on analysis technology cultivated by Fujitsu in various fields, mechanisms for automatically adding meta information to video content and conducting high-speed searches for video content have been made into service plug-ins. They have then been given simple XML-based Web-APIs. Video search functions have been implemented virtually in only about two weeks, which has proved to the customer that it is possible to promptly launch new businesses.

## 6. Challenges and direction for the future

As described above, media cloud services have proved themselves useful for companies engaged in the video business and the

development of video applications. To make them adaptable to even more operations and applications in the future, the challenges listed below must be addressed.

### 1) Stream-based real-time processing

Some video applications handle not only stored content but also real-time video streams, such as interactive communication tools and live video delivery applications. For companies that develop these applications, we will realize an optimized cloud platform, take advantage of our latest video technologies (such as video quality improvement and high-speed encoding technologies) and build a media cloud service platform. In this way, we will meet market needs.

### 2) Support for scale-out and scale-up

To optimize cloud-based video processing, we intend to work out a mechanism that automatically scales out according to the load. In this way, we will achieve an even more flexible cloud environment. Equally important as the scale-out function is support for scale-up. This is because video applications cannot always be optimized by scale-out. Distributed processing by scale-out may not be sufficient for optimizing applications that need to be both real-time and responsive. Recently, video applications and libraries that make use of general-purpose computing on graphics processing units (GPGPUs) have been increasing. Sometimes they have ten times the performance in terms of cost than processing with common CPUs alone. We intend to keep up with these changes in technological trends and market needs to strengthen the media cloud service platform.

### 3) Business expansion by open innovation

To expand business in the future, we will strive to increase the number of application vendors that use our services and encourage partners to provide service plug-ins. Through such efforts, hopefully media cloud services will be used in various business situations. We also hope a virtuous circle will be created between

the evolution of our technologies and the greater competitiveness of our applications.

## 7. Conclusion

Video processing, which essentially requires expertise and a sophisticated environment, often poses a big challenge. With the focus on black-boxing video processing and its prompt and simple use in business operations, we have commercialized media cloud services. Our ICT products, cloud technology, solution know-how and elemental technology research capabilities have been brought together, which we regard as a common video platform applicable to diverse markets.

Use of video is still in the initial stages but it will spread rapidly from now and technological innovation is expected to progress at a global

level. Therefore, we will constantly seek technological evolution in media cloud services to ensure that they keep pace with the times and offer the latest video processing environment.

Through media cloud services, we at Fujitsu intend to help build a bright future together with our customers.

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