DAVIC(Digital Audio-Visual Council) 日本会議報告

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DAVICは，MPEG2の研究リーダであるDr. Leonardo Chiariglione(CSELT)の発案により1994年の1月より始まったディジタルAV情報の配送，利用に関する業界標準を1995年12月までの短期間で作り上げていこうとする活動である．

ここでは，去る12月4日から7日にかけて，早稲田大学国際会議場および理工学部キャンパスで開催されたDAVIC日本会議の模様を報告する．

Report of DAVIC(Digital Audio-Visual Council) held in Waseda Univ.

Hideyoshi Tominaga
(Dpt. of Electronics and Communication Eng. Waseda Univ.)

The DAVIC forum was conceived in January '94, at the initiative of Dr. Leonardo Chiariglione(CSELT), the convenor of MPEG2. All participants in DAVIC share a vision of a digital audio-visual world. DAVIC will produce and issue the planned specifications by 1st December 1995.

The following are reports from panelists who attended in DAVIC held in Waseda Univ., on 4th - 7th December.

報告 1

GCL's Proposal for DAVIC

Structured Video

Graphics Communication Laboratories

Intellectual property rights statement

To be provided.

Proposal Summary

This proposal responds to 3.2, 3.3, 3.4, 3.6, and 3.7 of the DAVIC's CFP. It concerns with an architecture of VOD systems. In this proposal, there are two major topics; the first, interchange data structures, and the second, system reference models.

We propose a structured audio visual data format as a basis of VOD services. This choice bring us a number of merits, such as ease of repackaging, reduction of redundant data storage, realisation of content indexing, and so on. Audio visual data structuring is achieved by separation of content data and scenario data.

Content data is a fragment of audio or video data, while scenario data describes presentation order of contents. Thus, an audio or video sequence is composed of number of contents and a scenario data. This structure is especially suitable for repackaging, because the operation is easily accomplished by editing scenario data. Content indexing/searching and book marking are also easy with this structure. Since different scenario data may refer to the same content, data storage space can be reduced through the reusability of contents.

For navigation, structured multimedia/hypermedia data enables downloadable menu, which gives attractive and flexible selection assistance to users without heavy traffic between a server and a user terminal. Thereby, user interaction time during navigation can be reduced. This approach also have superiority over executable software downloading, in terms of interoperability.

Interchange formats for presentation data (audio and video) and navigation data can be in the same structured multimedia/hypermedia format, such as MHEG.

A functional system reference model is introduced for protocol definition. The model is based on functional elements necessary for a VOD system. Since, there may be a variety of system implementations depending on social environment, network configuration, and so on, we cannot define a system participant's function as a concrete one. On the other hand, protocols defined as an interface between corresponding functional elements do not change as long as each element's function remains the same, even if a participant's function differs.

The other model, an operational model, serves as a aid for our understanding the relationship between the functional model and real world systems.

This proposal defines seven functional elements and eight protocols. Requirements for each protocol are described.

Last, some implementation examples based on the aforementioned architecture are illustrated.

報告 2

Proposal of Multimedia Scripting Language

Source: Y. Nishimura, Y. Kusumi, I. Minakata
Matsushita Electric Industrial Co., Ltd./Japan

Intellectual Property Rights Statement

Summary

This proposal is a response to DAVIC's First Call For Proposals (DAVIC/100) issued on 14 October '94.

This proposal is targeted to 3.4 `Set Top Unit'. It especially addresses the Potential API Interface described in Figure 3.5 `Layered Software Architecture view (Model 2)' by proposing a Multimedia Scripting Language. The specification of the Multimedia Scripting Language (MSL) is fully described in 3.4.3.5 `Software Model', since it realizes `Support for application poratbility'.

The platform independence capability which MSL provides, is an important service capability as listed in 3.3.1 `Video-on-Demand Service Attributes'.

報告 3

Proposal of DAVIC Layered Model

Source:

Tokumichi Murakami, Yoshiaki Kato and Hiroyuki Nakayama

Mitsubishi Electric Corporation/JAPAN

Summary

The purpose of this proposal is to provide a common basis for coordination of DAVIC standard development for the purpose of system interconnection, while allowing existing standards to be placed into perspective within the overall reference model. By using the common reference model, the reference points which provide the adequate extensibility and interoperability also may be clear.

In this document, the seven-layered model of *the Server*, *the Client* and *Access Node of Delivery System* depending on the connecting network (i.e. B-ISDN, CATV cable network, IP Internetwork), is proposed.

報告 4

Title: One page summary of "Basic command set for interactive broadcasting"

Source: NHK

This proposal addresses the DAVIC Core Services introduced in Section 3.1 of the "DAVIC's First Call for Proposal". We propose "Interactive broadcasting" be included in the DAVIC Core Service.

Interactive broadcasting is a type of broadcasting systems through which the viewer can enjoy interacting with TV programs from a broadcasting station using a bi-directional transmission channel. The target of the system is to provide programs where many people can participate at the same time and which have the following characteristics:

- Viewers can participate in the program.
- The program can change its presentation or the story sequence according to the viewer's command or response.
- Viewers can change viewing angles and image contents.

It can be thought of as a type of VOD systems through which a program can be viewed by many people at the same time. In addition to the functionality of program selection, a managing mechanism for more diversified response from viewers is needed. Further, aside from video and audio information itself, ancillary data is useful to control the presentation and progression of the video and audio signals.

To realize such services, some additional interface protocols between the Servers and the STU's are neded. For this purpose, we propose a basic command set for interactive broadcasting. This addresses the delivery system Interface (Section 3.4.3.1) and the Server interfaces(Section 3.6.3.2) of the CFP. In addition, we propose useful ancillary data for interactive programs. This addresses the Audio/Visual Interface (Section 3.4.3.2) and Server capabilities for Contents/Applications(Section 3.6.4) of the CFP.

It is expected that if a VOD system is constructed which includes such an interactive broadcasting system it will enlarge its range of applications and win more users. To achieve this objective the proposed set of basic commands for interactive broadcasting and other information will be useful.

報告 5

A Proposal of Download Model

Source: Hidenori Okuda, Tetsuo Tajiri, Tomohiko Arikawa, Hisashi Kasahara (NTT)

Software downloading is a key technique to make an STU versatile. First, it is proposed that application downloading should be standardized among three types of downloading; boot-up downloading, application downloading, and downloading in an application. Next, requirements of application downloading are discussed. Finally, a download control script, which makes applications interoperable with minimal standardization efforts, is proposed.

A Proposal for Equipment Extension Interface

Source: Hidenori Okuda, Tetsuo Tajiri, Tomohiko Arikawa, Hisashi Kasahara (NTT)

Hardware expandability is another key technique to make an STU versatile. First, requirements of equipment extension interface are discussed. Then, the applicants are surveyed. Finally, it is proposed that DAVIC should recommend PCMCIA as equipment extension interface.

報告 6

Proposal of Basic Delivery Systems for initial VOD services

Source: NTT (Masahisa Kawashima, Naotaka Morita, Shin-ichi Kuribayashi and Akira Miura)

Abstract

This contribution proposes to define and utilize basic delivery systems for initial VOD services. As items for discussion, this contribution also raises possible option functions of delivery systems for the ehnancement of VOD services.

We consider VOD services (including NVOD) can be realized even if delivery systems provide only single point-to-point connection control and data transport in the in-band channel (U-plane) without any functions particularly for VOD services. Therefore we propose only single point-to-point connection control and data transport in the in-band channel be defined as basic functions of delivery systems. We present how VOD services are realized using the basic functions of delivery systems, and state that only the interfaces between Service Provider and STU need to be specified for initial VOD services using only the basic functions. Therefore we propose that the interfaces between Service Provider and STU be specified firstly in the course of the work for specification.

As possible option functions, we raise call / connection control signalling capabilities such as point-to-multipoint connection establishment and destination party switching control, data transport capabilities such as user-user data transport with signalling message and connectionless data transport , and IN services such as premium rate and screening.

報告 7

A Proposal for Network-to-STU/Server Interfaces associated with SCM-PON based access system

Source: Nori Shibata, Yo-ichi Maeda(NTT)

(Summary)

Considering that

- the outcome of DAVIC is expected to specify the interfaces and protocols that enable system interoperability, and
- it is too early to limit the set of access systems in standardization because access systems have a lot of options,

it is proposed to standardize interfaces of access systems with STU and a server, prior to the access system itself.

However, those access systems may be classified into a few groups each of which has a common interface within the group with Customer Premises Equipment (CPE). Therefore, a small set of interface options could be standardized before access system standardization.

This document proposes options for the A1 and A9/A4 interfaces which are suitable for employment with an SCM-PON based fiber access systems for the DS access network.

SCM-PON based fiber access system can provide multiple services such as VOD, CATV video distribution, and telephony services. The prototype system configuration is introduced and the interfaces matched to the system are described. An example of carrier frequency allocation for the proposed access system is also shown.

Another NTT proposal, "A Proposal for Network-STU/Server Interfaces associated with ATM-PON based fiber access system", is on different options for A1 and A9 interfaces, and it fits to ATM-based digital VOD systems.

報告 8

A Summary of Security Protocol on VOD

Source: Youichi Takashima, Shinji Ishii, Masayuki Kanda and Kiyoshi Yamanaka(NTT)

In order to eliminate the anxiety for content providers and service providers about copyright, the following security requirements should be satisfied.

1) Protection against the disguise of end-users and service providers.
2) Protection against the denial of receipt and the refusal of payment.
3) Protection against the illegal digital copying and recording of content.
4) Protection against the unauthorized disclosure of content.

In order to satisfy the security requirements mentioned above, the VOD security communication sequences progress as follows.

1) Requests desired content to a server and authenticates user/server mutually using RSA public-key cryptosystem.
2) Securely delivers a decryption key to a security card and conceals the key which are isolated from the main body of content. Even the purchaser does not know the decryption key. It then certifies delivery and returns a digital signature of payment to the server.
3) Delivers encrypted content from a server to an authenticated end-user's STU.
4) Views and listens to content by decrypting, decoding and converting digital-to-analog within the STU tamper resistant unit .

In order to realize these functions, a security card is very effective. A security card (a PCMCIA or an IC card) stores secret personal parameters, that is private key of RSA public-key cryptosystem, a password, user identification code. Furthermore, it stores the decryption keys for each contents securely.

User authentication and digital signature is performed by RSA public-key cryptosystem. We propose a fast data encryption algorithm (FEAL) as an encryption and decryption method of content. FEAL which is categorized as a secret-key cryptosystem was developed by NTT in 1987 and the technology is already available.

No STU has any personal information regarding the end-user. So, any end-user with a security card can use any STU. In other words, if an end-user has a security card, any VOD services can be accessed anywhere and at anytime.

報告 9

Format for Real-Time Delivery of Video Contents between Servers and STUs over Constant Bit Rate Circuits†

Source: Hideki Sakamoto (NTT)

As stated in the article "Interactive Play Control" of DAVIC CFP, so-called "VCR functionality" and the ability to jump to arbitrary positions are essential functions of VOD services. To provide such functions, it is necessary to deliver MPEG-encoded video contents in a randomly accessible form in real time.

This document proposes a delivery format for the transfer of video contents between video servers and STUs. In the proposed delivery format, when the forward channels are fully CBR (constant bit rate) circuits, such as ISDN (integrated services digital network) and ADSL (asymmetric digital subscriber lines), it is possible to transmit video contents in real time with random-access capability even when the video contents have been encoded by a method that is not completely CBR, such as MPEG. By adopting this proposal in the DAVIC standard, the delivery format of video contents over CBR circuits will become unified, enabling compatibility between the "Server–Delivery System–STU Interfaces" of each company.

報告 10

On Demand Service Assistant on Video-on-Demand Service Attributes

Source: Kenichi Hosaka(NTT)

1. Introduction

There is a "Service Related Control (SRC)" in Delivery System architecture reference model (Fig 3.6 of CFP). According to CFP, Service Provider Selection is the first function of SRC. I have been considering "On Demand Service Assistant *(ODSA)*", Service Provider Selection is one of ODSA functions. So, I propose VOD system with *ODSA*.

報告 11

Sony's Response to DAVIC's CFP

Intellectual Property Rights Statement

Sony agrees with the Intellectual Property Rights Statement mentioned in the DAVIC's First Call For Proposals.

Executive Summary

Sony is a content creator, a server manufacturer, a terminal device manufacturer, and a software vendor. Sony's answer to DAVIC's First Call For Proposals is therefore targeted at the promotion of interfaces and protocols facilitating an open environment and a competitive marketplace.

As is often the case with documents that are pulled together from various different sources the structure and layout of this document can sometimes be confusing. As an aid to the reader we present below a synopsis of our document detailing what each section discusses and how the sections inter-relate.

Sections 1. and 2. are introduction.

Section 3. discusses the architectural framework of our proposal.

Sections 3.1. and 3.2. introduce our goal for complete system flexibility and a high degree of inter-operability. Specifically, only a solution to application-independent inter-operability, as the one proposed here, can guarantee a future-proof system.

Section 3.3. is designed to discuss the services that the architecture must support. We use section 3.3.2. to introduce our generic architecture that supports the goals outlined in section 3.2. We have added an extra section 3.3.2.1 that gives some background on the Object Management Group's (OMG) generic architecture that we have adopted to describe our software architecture. Section 3.3.2.2. discusses the Sony use of the OMG architecture and provides an overall description of the software framework we are proposing for the system in general, and the STU in particular.

Section 3.4. begins to discuss this STU and we outline in 3.4.1. our minimal requirements for the STU architecture. This section begins by discussing the minimum software architecture needed and the base level interfaces that must exist to support this minimum architecture. This section (3.4.1.) then goes on to describe the minimum capabilities of the resident objects including a fairly detailed description of the necessary telecommunication protocols, in terms of both formatting and signalling architecture. Completed by the specification of a minimal set of external interfaces, this section concludes by outlining of a minimum STU. Section 3.4.2. is used to describe in some detail the minimal set of system objects that will support a functional STU. This section should not be confused with 3.4.1. that simply discusses the minimal set of mechanisms and interfaces that will allow us to build a minimal STU. Section 3.4.2. continues by describing some of the details of the minimal system and driver objects needed for a working STU. Section 3.4.3. contains a lot of redundancy and is a legacy of the CFP. Where possible we have referred back to previous sections. However, this section can be viewed as a summary of the required functionality and has been kept as such.

Section 3.5. gives an overview of the delivery system, i.e. the network architecture and interfaces.

In section 3.6. we simply state our belief that the software architecture of the STU and the Server are similar, and that the generic proposal we have made in section 3.3.2. can be effectively used for both.

Section 3.7. finishes by giving some indication of what we feel are the critical interfaces.

In summary, section 3.3.2. can be viewed as the bulk of the proposal for inter-operability purposes: it is where we introduce a generic software architecture, how we use that architecture and how we apply that architecture to the system in general and the STU in particular. Section 3.4. is used to detail the important aspects of the minimal functionality of the STU, at inter-operability level, functional level, and interface level, with a particular emphasis on ATM protocols as the lower levels of the network architecture.

報告 12

An HDTV Still Picture Disc System for Video on Demand

Hiroshi Aoike, Hi-Vision Promotion Center
Nobuaki Takahashi, Victor Company of Japan, Ltd.
Hideo Kusaka, Dai Nippon Printing Co.,Ltd.

Intellectual Property Rights Statement
Similar condition to the IEC patent policy.

Possible improvements of this document
NA

Executive summary
The base-band high definition still picture presentation system has been marketed as HDTV-museum in Japan. The number of HDTV-museum system counts more than 100, many people have watched the HD display, most people feel "sensation of reality". Though the system is carried in closed circuit now, we feel the system will expand widely using network. The technical guidelines for the HDTV still picture disc system are specified by Hi-Vision Promotion Center. We would like to recommend to keep interoperability between the HD-still-picture system and the VOD system specified by DAVIC.

報告 13

Proposal of ATM Mini-Bar System and Its Information Access Model – Information Seal

N.Ito, K.Yawata, Y.Kosuge and H.Tominaga
Waseda University

Abstract

Many study issues are needed to be solved to realize an ATM Mini-Bar System, which is proposed as an infrastructure for future multimedia information providing system. In this paper, we would like to propose a new information access model for multimedia information providing service. In a traditional information access, both identity verification and access control techniques are used for security. To apply these techniques to accessing a packaged information, which DAVIC mainly treats, is not enough because getting information is not necessarily equal to using it in this type of application . Therefore, we think it is important to standardize an information security model which care for above type of information use. Proposed reference model utilize a concept of seal, which usually can be found on a letter or documents as a mark of authenticity.

報告 14 A Protocol Architecture for MOD Services

Source: Michi Iwasaki, Shin-ichiro Hayano, Kentaro Misawa, Shiroh Sakata
(NEC Corporation)

1 Introduction

This paper describes a protocol architecture and a framework of Application Programming Interface (API) --- Hyper DSM-CC. **Figure 1** shows the application model supposed in this paper.

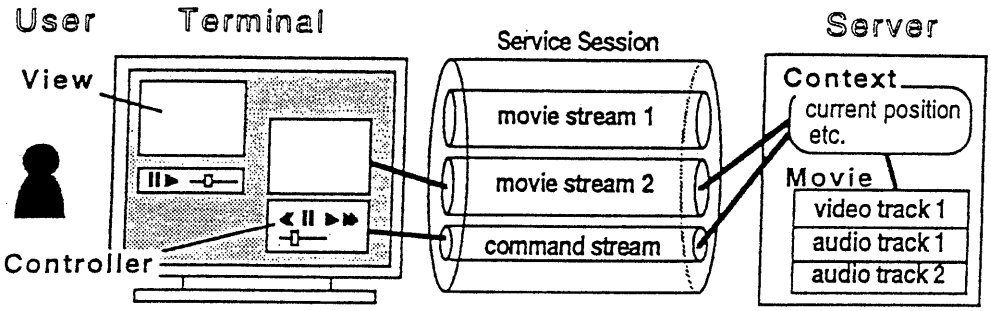

Figure 1. Application Model (Hyper DSM-CC Model)

When applications work, they allocate and utilize various system resources through the "Service Interface" and the "Delivery System Interface" in the Three-Layer-Model of the Call for Proposal. Some services can be provided by a node itself through Service Interface, namely API. However, to provide some other services, it is necessary for a node to communicate with other nodes. Therefor, both an API set and protocols should be standardized to obtain the interoperability between servers and terminals. An API framework and a protocol architecture we propose are described in the following sections.

報告 15 Regulation of VOD Service Quality

Sourse: Tatsuo Mori, Kenich Hosaka, Kazunori Shimamura (NTT)

1. Introduction

To guarantee the quality of VOD services provided to users, it is necessary to investigate the regulation of conditions that systems should support at two levels: the minimum level that all systems must attain, and conditions that they should meet at a higher level.

This document proposes concrete parameters, minimum specifications and high-level specifications for thesecurity of user profile management, the registration of connection times and charge details, the protection of intellectual property rights, delivery quality levels, and the quality of contents. And this document clarifies the conditions that STUs should satisfy when there is a fault in the VOD system.

報告 16 Proposal on Copyright Processing

applicable to,
3. Architectural Framework
3.3.1 Video-on-Demand Service Attributes
3.4 Set Top Unit

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What should be discussed on copyright is not only protection of it.

1 Copyright side, that is owner, server or distributor has to show the followings to user. Conditions for agreement of use of copyrighted work. Cost, payment, rejection or yes of copy are mandatory, conditions for copy, editing are recommended.

2 System should be thought reliable from IP's, then the followings must be introduced.
As system structure, contract of use of copyrighted work exclusively between 1 entity to 1.
As data structure, encapsulation of information of copyright conditions with AV contents.
As entity structure, copyright conditions are inherited by every entity from IP to user.
As STU structure, promise filter necessary build in for use under the agreed condition.

3 Interactive sequence of copyright processing as follows,
show condition from IP to user (I-U) , select or agree with the condition, agreement from user to IP(U-I), agree to user with mask for promise filter (I-U), command from user under promise filter (U-I), deliver content to user (I-U).

DAVIC (Digital Audio-Visual Council) 日本会議報告参考資料

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3 「Proposal of DAVIC Layered Model」
Tokumichi Murakami, Yoshiaki Kato and Hiroyuki Nakayama (Mitsubisi Electric Corporation)

4 「双方向型インタラクティブ放送の基本コマンドセット」
吉村 俊郎 (NHK)

5 「Security protocol on VOD」
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7 「On Demand Service Assistant on Video-on-Demand Service Attributes」
Kenichi Hosaka(NTT Human Interface Laboratories)

8 「連続メディアを扱うためのオープンソフトウェアアーキテクチャ」
横手 靖彦 ((株) ソニーコンピュータサイエンス研究所)

9 「VOD 系における HDTV 静止画像システムの相互運用性について」
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10 「情報冷蔵庫システムとその情報アクセスモデル (情報の封印モデル) の提案」
伊藤 典男, 八幡 賢, 小菅 康晴, 富永 英義 (早稲田大学)

11 「A Protocol Architecture for MOD Services」
Michi Iwasaki, Shin-ichiro Hayano, Kentaro Misawa, Shiroh Sakata (NEC Corporation)

12 「VOD Service Quality」
Tatsuo Mori, Kenichi Hosaka, Kazunori Shimamura (NTT Human Interface Laboratories)

13 「著作権処理のためのシステム構造の提案」
喜多村 政贊 (For more conveient AV life)

構造化ビデオに基づくＶＯＤシステム

滝川　啓、綿谷　由純、山田　恭裕
(株) グラフィックス・コミュニケーション・ラボラトリーズ

あらまし

本報告は（株）グラフィックス・コミュニケーション・ラボラトリーズがＤＡＶＩＣに提案したプロポーザルの要旨を述べたものである。プロポーザルの要点は、１）ＶＯＤシステムにおける交換データフォーマットとして標準化されたマルチメディアデータフォーマットの採用、２）１）を前提としたシステムリファレンスモデル、からなる。前者においては、論理的に区分された複数のＡＶデータ素片によるＡＶシーケンスの構造化、後者においては機能要素を単位とするシステムのモデリングが主な主張になっている。

A VOD system based on structured video

Kei TAKIKAWA, Yoshizumi WATATANI, Yasuhiro YAMADA
Graphics Communication Laboratories

Abstract

This report is the excerpt from Graphics Communication Laboratories' proposal to DAVIC. The main proposal issues include 1) Introduction of a standardised multimedia data format as the interchange data format for VOD systems, and 2) A system reference model based on 1). The former is characterised with the audio visual sequence structuring technique which employs audio visual data fragments clipped regarding to context. The latter claims the system reference model based on functional elements.

まえがき

ＶＯＤサービスはムービ・オン・デマンド、テレショッピング、マルチメディアデータベース検索、など幅広い応用が考えられている。また、適用する伝送路もＣＡＴＶ網、光ファイバ網、電話網など各種の可能性がある。したがって、ＶＯＤに関するインタフェース規定は柔軟性に富んだものである必要がある。

一方、個別情報提供サービスにおいては放送等のマスコミに比べるとユーザ当たりの情報作成コストが高くなるため、とりわけ情報作成・編集を容易にする工夫が必要である。

本提案はこれらの課題に対する一つの解決策を示している。

1　交換データ形式

1.1 プレゼンテーションデータ

プレゼンテーションデータはユーザに呈示される主要データであり、多くの応用ではＡＶデータシーケンスである。ＡＶデータシーケンスは、直列に接続された複数の素片により構成する。各素片はシーンやカットに対応させ、標準的には５秒～１０秒程度の長さである。また、各素片の再生順序を指定するデータをシナリオデータと呼ぶことにする。図１にシナリオデータと素片データの関係を示す。

このような構成はノンリニア編集システムや、マルチメディアシステムでは従来から用いられており、ＶＯＤシステムにおいても同様なメリットが期待できる。メリットは以下の通りである。

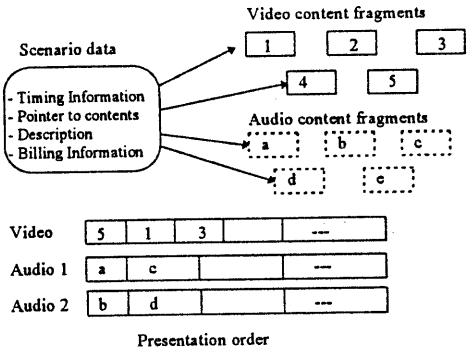

図１　シナリオデータと素片データの関係

- ＡＤ挿入、地域別編集、ユーザ層別編集などの編集（リパッケージング）を容易にする
- 編集の際、復号・符号化を繰り返さないので品質劣化がない
- 複数のバージョンを作っても素片データは共通に利用できるので、データ蓄積量を極端に増やさない
- 情報制作者の意図しない編集を行い難くできる（素片の分割など）
- 内容検索、ブックマーキング、などを容易にする

シナリオデータは再生順序の指定以外に、書誌情報や課金情報も持たせることができる。これにより、番組表の作成などにも用いることが可能である。

プレゼンテーションデータの具体的フォーマットとしては、MHEG(1)、HyTime(2)などの標準化されたマルチメディアデータフォーマットを適用することができる。

1.2 ナビゲーションデータ

ナビゲーションデータは、サービスプロ

バイダならびにあるサービスプロバイダが提供する番組の選択などの際に用いるユーザインタフェースのための情報を表現するデータである。表示内容としては文字の他、静止画、図形、さらにはビデオなども使われる可能性がある。また、ユーザの選択に応じた階層的なメニュー呈示のためのシナリオも必要である。図2にナビゲーションデータの構造を示す。ここで、Action は表示その他の動作の規定、Link は Action の起動条件の規定、を記述したオブジェクトである。

図に示されたようにナビゲーションデータはプレゼンテーションデータと同様の

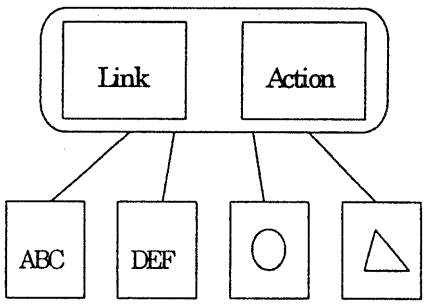

図 2　ナビゲーションデータの構造

構造をしているので、同一のフォーマットが適用可能である。

一方、メニュー処理等についてＳＴＵへ呈示データを含むソフトウェアをダウンロードする方式も提案されている。しかし、この方法では以下の問題が想定される。

- 処理系を含んだソフトウェアはハードウェア依存性が大きいので、同じ内容についてハードウェア別に対応するソフトウェアを用意しなければならない
- サーバもＳＴＵの種別を意識しなければならない
- 通信のたびに同じソフトウェアをダウンロードするのは経済的でなく、応答時間も遅くなる

2　システムリファレンスモデル

2.1 オペレーショナルモデル

オペレーショナルモデルはＶＯＤサービスの運用イメージをベースにしたモデルであり、サービスに関わるメンバを単位としている。図3にＶＯＤサービスのオペレーショナルモデルを示す。ここで各メンバの働きは以下の通りである。

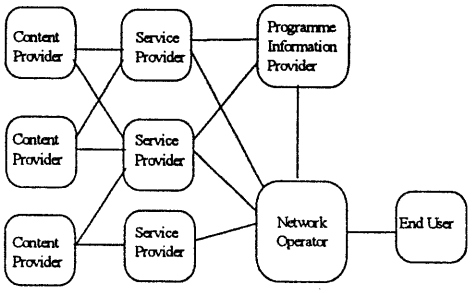

図 3　オペレーショナルモデル

2.1.1 Content provider

Content provider はＡＶデータ素片と原シナリオデータの提供者である。

2.1.2 Service provider

Service provider は Content provider が提供する情報を元に、ＡＤを挿入したり、地域別、ユーザクラス別に編集を行って、ＳＴＵにデータを供給する。

2.1.3 Programme information provider

Programme information provider は Service provider やプログラムを選択するための情報を提供する。

2.1.4 Network operator

Network operator はプレゼンテーションデータ、ナビゲーションデータ等をメンバ間で転送する。また、Network operator は他のメンバを代行してユーザから料金を徴収することがある。

2.1.5 End user

End user は上記の各メンバによって提供されるサービスを享受する。

このモデルはＶＯＤサービスを直感的に理解するのに便利である。しかしながら、各メンバの役割は国の違いや実現の仕方により一通りではない。このため、この種のモデルをインタフェース設計のために用いることはできない。

2.2 ファンクショナルモデル

ファンクショナルモデルはシステムの実現方法にあまり依存しないインタフェース定義のために考えられた[3]ものである。少なくとも上位層プロトコルは実装に独立である。ここで、実装とは各メンバの持つ機能も含んでおり、このためオペレーショナルモデルとファンクショナルモデルの間のマッピングは一通りではない。

図４にＶＯＤサービスのファンクショナルモデルを示す。モデルはサービスを構成する機能要素を単位に構成されている。各要素の機能は以下の通りである。なお、単なる伝送システムはシステムの基本的な機能には関係しないので、ここでは End-to-End の通信のみを考慮している。

2.2.1 Authoring agent

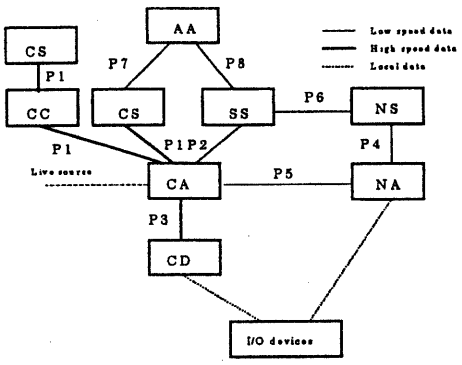

図 4　ファンクショナルモデル

Authoring agent は Content server からオリジナルのシナリオデータを取得し、修正を加える。そして、Scenario server に蓄積する。全く新たにシナリオデータを作成することもあり得る。

2.2.2 Content assembly agent

Content assembly agent は Scenario server からシナリオデータを取得し、それに従って Content server から素片データを逐次取得しつつ、連続したＡＶシーケンスを生成する。生成したＡＶシーケンスは、必要ならばオーディオとビデオを多重化して、Content decoder に送られる。ライブソースが用いられる場合は単にデータのルーティングを行う。

2.2.3 Content caching agent

このエージェントは素片データを一時的にキャッシングする。Content server が遠隔地にある場合、これによってデータ転送量を減少させることができる。

2.2.4 Content decoder

Content decoder は Content assembly agent からＡＶシーケンスデータを受信し、復号する。復号したデータは I/O devices によりユーザに呈示される。また、再生制御のためにユーザとの会話を行う。

2.2.5 Content server

Content server はＡＶコンテント（素片データ）を蓄積し、要求に応じて送出する。各素片は直接指定して取り出すことができる。

2.2.6 Navigation agent

このエージェントは Navigation server からナビゲーションデータを受信し、表示データを生成し、I/O devices を介してユーザと会話する。ユーザの指定に応じて次々にナビゲーションデータを取得し、最終的に所望の番組のシナリオデータへのポインタを取得して Content assembly agent に転送する。

2.2.7 Navigation server

Navigation server はナビゲーションデータを蓄積し、Navigation agent からの要求によりデータを送出する。ナビゲーションの開始時には初期データが送出され、ユーザの選択に応じてリンクをたどって次のナビゲーションデータを送出する。番組に関する情報は Scenario server から取得する。

2.2.8 Scenario server

このサーバはシナリオデータを蓄積し、Content assembly agent からの要求に従って所望のデータを送出する。

2.2.9 I/O devices

I/O devices は情報呈示のためのモニタ、スピーカや、情報入力のためのリモートコントロール等を指す。I/O devices はローカルな要素である。

ＶＯＤシステムの各プロトコルは上記の各機能要素間において以下のように規定される。

- P1: CS-CA, CS-CC, CC-CA
- P2: SS-CA
- P3: CA-CD
- P4: NS-NA
- P5: NA-CA
- P6: SS-NS
- P7: AA-CS
- P8: AA-SS

2.3 マッピング例

2.3.1 オペレーショナルモデルへのマッピング１　集約的な実現例

図５は各機能が集約配置された実現例である。Content server と Scenario server はいずれも Service provider が所有しており、Service provider からは連続したＡＶシーケンスデータが End user に送られる。ここで、各メンバの持つシステムの実際の内部構造、インタフェースは規定されない。

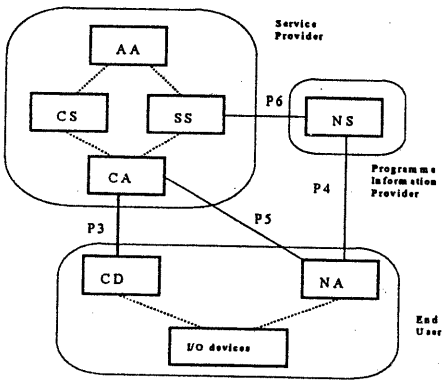

図 5　集約的な実現例

2.3.2 オペレーショナルモデルへのマッピング2　分散的な実現例

図6は各機能が分散配置された実現例である。Content server は Content provider が所有し、Service provider はシナリオデータのみを所有する。AVシーケンスの組立は End user が直接 Content provider と通信して行う。この実現例は FTTH を前提とするが、ひとつのシーケンスの中で複数の Content provider からの素片を混用するのが容易である、Content provider から Service provider へのコンテントの送信やコピーがなく原著作者の権利が保護しやすい、Service provider の持つシステムがシンプルである、などの利点がある。

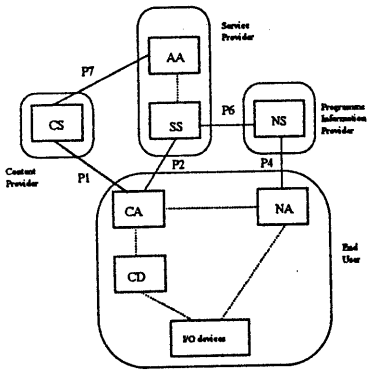

図 6　分散的な実現例

2.3.3 地域的モデルへのマッピング

図7は Content server が End user 群と離れた地域にある場合を想定している。このような場合、End user 群のある地域に Content caching agent を設置することにより、高速データ通信のトラフィックを減少させることができる利点がある。

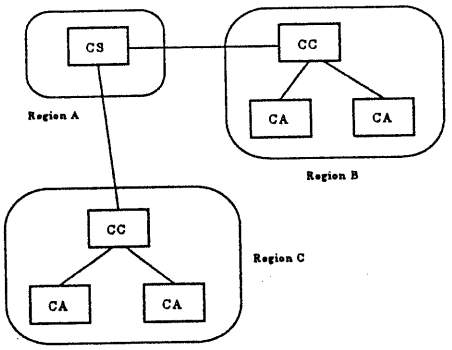

図7　地域的モデルへのマッピング例

むすび

VODシステムへの標準的なマルチメディアデータフォーマットの適用と、機能要素に基づいたシステムリファレンスモデルを提案した。VODシステムは単にムービ・オン・デマンドに止まらず、各種マルチメディアサービスのインフラになると考えられる。システムの実現方法も多様な可能性があり、将来の拡張性を十分に考慮した標準作りが望まれる。

(参考文献)

(1) ISO/IEC DIS 13522-1, 1994
(2) ISO/IEC 10744, 1992
(3) ISO/IEC 10021-1 MOTIS, 1990

マルチメディアスクリプト言語MSLの概要

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あらまし

本稿では，マルチメディアスクリプト言語（Multimedia Scripting Language, 以後MSL）の仕様を概説する。MSLは，ネットワークメディアならびにパッケージメディアを通して配布されるマルチメディアタイトルを記述するための言語である。MSLでは，システムで定義済みの，テキスト・グラフィックス・ビデオ・オーディオなどのマルチメディア情報を表現するオブジェクトに，簡単な言語を用いてユーザインタラクションを記述することができる。また，メディア再生の時間制御を行うためのタイムライン機構が提供されている。

1. Introduction

Generally, multimedia titles, which will be delivered via network or package media, consist of not only video/audio data (MPEG streams), but computer programs which mainly control the playback of the title(user-interface). Considering that there might be various platforms of settop terminal and package media player, the user-interface of a multimedia title needs to be described in a platform-independent language. In addition, from the author's point of view, the language needs to have enough capability to express rich user-interface using various colors, text font, visual/sound effect, and so on. Of course, the language needs to be simple enough to describe the user-interface effectively.

This document describes the specification of Multimedia Scripting Language or MSL, in short. The MSL enables title developers to develop multimedia title for both package media and network use with rich multimedia object such as text, raster image, vector graphics, audio and video, while giving great efficiency comparing to the traditional general purpose language, such as C or C++.

The important features of MSL are as follows:

Base Platform Independence: The most important feature of MSL is its independence from the player architecture. The MSL doesn't depend on any specific CPU nor operating system. A multimedia title written in the MSL runs on MSL runtimes which are prepared for the players. Furthermore, the architecture of MSL is object-oriented and it encapsulates the device dependent procedures.

Object-Oriented Language: MSL is an object-oriented language, which is based on event-driven concept. In other words, MSL script is the collection of handlers for messages, just like HyperTalk or OpenScript. In addition, the MSL provides the message passing mechanism through the pre-defined object hierarchy. These object-oriented features enables the title developers to describe desired user interface in an simple and plain manner.

Exact and High-functional Timeline: Multimedia Script Language runtimes provides timeline facilities for synchronous playback of various media. Timeline is the collection of schedules for audio/video playback, keyframe animation, and so on. An MSL runtimes' timeline architecture ensures as exact synchronisity as the resolution of system clock. Furthermore, one can specify the invocation of the script handler from a schedule

in the timeline. This means that internal state of script (i.e. value of variable) can be changed from timeline.

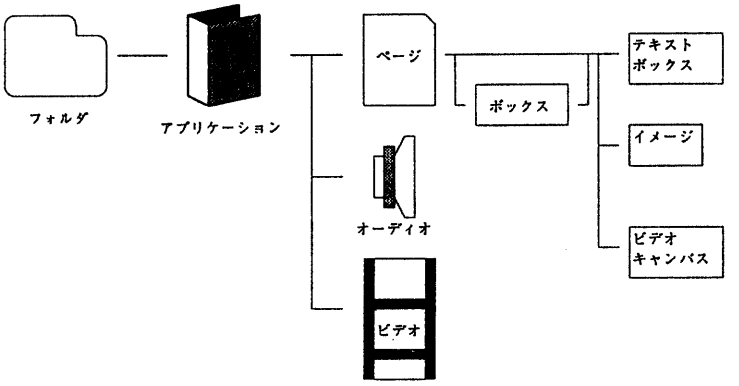
Wide Applicability: MSL covers wide range of multimedia titles, from Video-on-Demand, Video Home Shopping and Information Kiosk to Multimedia Presentation and CD-ROM interactive title.

Compactness: MSL is designed to fit into small terminal devices, such as settop terminals with limited computing and memory resources.

2 . Multimedia Title Definition

2.1 . Structure of Multimedia Titles

A multimedia title of MSL consists of collection of objects. Each object is an instance of MSL's predefined objects, where the relationship among the objects are structured by the object hierarchy shown in the figure below.



Any object may have a **script** and **properties.** A script is a program written in MSL to describe the behavior of the object, and is a collection of **handlers** and **user functions.** Properties are used for characterizing individual instance of object.

The collection of objects in a simple application is known as an **application** object. A title could be composed as a single application if that is short and simple. However, if the title is long and complex, it could be subdivided into series of applications, for example an application could correspond to a chapter of the title, or a collection of scenes. Application objects may be stored in a **folder** object, with which each of the application object can be retrieved using application name or ID. An application may have **audio** and **video** objects which contain MPEG stream data.

A scene of the title is expressed as **page** object. A page is contained in an application, and displays the **graphic** objects such as text and raster image contained in it. A page may also have timelines, each of which describes the transition of the graphics in the page, audio/video playback, and script invocation invocation as time goes.

2.2 . Object Types

MSL provides predefined objects, which are necessary for multimedia titles. This clause describes the brief overview of these objects.

Folder A folder is a container of application objects, which provides the capability to retrieve an application by its name or its ID. Folders can be nested, i.e. a folder may have another folder in it.

The folder object is optional. Some implementation in network environment may resolve application objects at server side, in this case list of available application objecs may retrieved using external process functions or SQL functions.

Application An application object is a collection of pages, video and audio.

Page A page object is a unit to be displayed on a screen. Any graphic objects (i.e. text, image, box, and video canvas) needs to be placed on a page, in order to display them on the screen. These graphic objects will be rendered according to Z-order in the page. Pages in an application are ordered by their page numbers, so that the author may identify the page by number, as well as in "next" or "previous" manner.

Textbox, EntryWidget A textbox object provides container functions to the text. MSL provides some sort of typesetting functionality for text.

An entry widget is a variant of textbox, which allows single-line text for its content.

Image An image object consists of color raster image data, on which such operation as rotation, scaling, and translation can be made.

Box A box object is a rectangle region in the page, which can have several graphic objects as its children. The child graphics of the box is clipped by the box rectangle.

Video Canvas A video canvas object is a rectangle region where a video object is played back.

Viewer A viewer is optional graphic object, which allows the display of other pages.

Video A video can be controlled by both timeline and script. MSL's video can be interleaved with audio data.

Audio An application may have audio objects as its child. An audio can be controlled by both timeline and script.

Some implementation in the network environment may allow retrieving MPEG stream for video and audio object, using name or ID of the stream in the server's storage system.

2.3 . Syntax Overview

2.3.1 . Message Handler

`on` *<messagename>* `...` `end` *<messagename>*
Handler definition.

`exit` *<messsagename>*
Exits from the handler.

`send` *<messagename>* `to` *<object>*
Handler invocation.

2.3.2 . Property Management

`set` *<propname>* `of` *<object>* `to` *<value>*

Sets the value of the property *propname* of the object.

`get` *<propname>* `of` *<object>*

Obtains the value of the property of the object.

2.3.3 . Conditional Statements

`if` *<condition>* `then` *<statementes>* `else` *<statementes>* `end if`

2.3.4 . Iterative Statements

`repeat for n times` *<statementes>* `end repeat`

2.4 . Primitives Overview

2.4.1 . System Messages

`openApplication`

`openPage`

`keyDown` *<btnname>*

`mouseDown` *<btnname>*

2.4.2 . System Properties

`name`	the name of the objects
`size`	size of page/graphic objects
`position`	position of the graphic objects
`visible`	visibility of graphic objects
`timeline`	the timeline description of the page object.

2.4.3 . System Functions

`goto(`*page, effectname, effecttime*`)`

`gotoNextPage(`*effectname, effecttime*`)`, `gotoPrevPage(effectname,effecttime)`

changes the page displayed on the screen with visual effect.

`lockInCore(`*page*`)`, `unlockInCore(`*page*`)`

locks/unlocks page object on main memory.

`startTimeline(`*page, timelineID*`)`, `stopTimeline()`

starts/stops the timeline.

`lockScreen(`*page*`)`, `unlockScreen(`*page*`)`

disables/enables the screen update.

`setVisualEffect(`*page, gfx, effectname, effecttime*`)`

registers the visual effect which will be executed when the screen update is enabled next time.

`moveTo(`*gfx, x, y*`)`

moves the graphics to the specified position.

`openVideo()`, `playVideo()`, `jumpVideo()`, `scanVideo()`,`closeVideo()`

provides VCR functions.

2.5. MSL Timeline

Timelines are collections of the schedules. They are defined in a property `timeline` of a page, which may have the following types of schedules:

- making keyframe animation
- sending message
- playing audio
- playing video

These schedules are described with the time to be performed in the timeline.

3. まとめ

MSLは，デジタルCATVの上で展開される様々なサービスをマルチメディアタイトルとして記述する際に必要となる，オーディオ・ビデオストリームの制御，それらとアニメーションやプログラム実行の時間同期，ユーザインタフェースの実現，通信機能などを備えている。MSLの文法自体は平易なものである上，MSLで記述されたタイトルは，様々なアーキテクチャのクライアント上で実行することが可能となる。このような特徴を持つMSLの標準化によって，様々なコンテントプロバイダが様々なサービスを展開する機会を得るものと期待される。

[参考文献]

[1] Y.Nishimura, Y.Kusumi and I.Minakata, "Proposal of Multimedia Scripting Language", DAVIC/CFP033, 25 November 1994.

Proposal of DAVIC Layered Model

Source:

Tokumichi Murakami, Yoshiaki Kato and Hiroyuki Nakayama
Mitsubishi Electric Corporation/JAPAN

This proposal is a response to DAVIC's First Call For Proposals.

Version : 1.0
Date : 4 December 1994

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Summary

This proposal is responding to

"Section 3.3.2 Layered service model" in the Services section,
"Section 3.4.2 STU Logical Architecture" in the Set Top Unit section,
"Section 3.5.3 Interfaces" in the Delivery systems section, and
"Section 3.6.3.2 Server Interfaces" in the Servers section.

The purpose of this proposal is to provide a common basis for coordination of DAVIC standard development for the purpose of system interconnection, while allowing existing standards to be placed into perspective within the overall reference model. By using the common reference model, the reference points which provide the adequate extensibility and interoperability also may be clear.

In this document, the seven-layered model of *the Server, the Client* and *Access Node of Delivery System* depending on the connecting network (i.e. B-ISDN, CATV cable network, IP Internetwork), is proposed.

1. Introduction

The purpose of this proposal is to provide a common basis for coordination of DAVIC standard development for the purpose of system interconnection, while allowing existing standards to be placed into perspective within the overall reference model. By using the common reference model, the reference points which provide the adequate extensibility and interoperability also may be clear.

In this document, we propose the layered model of the Server, the Client and Access Node of Delivery System depending on the connecting network (i.e. B-ISDN, CATV cable network, IP Internetwork).

2. Delivery System Reference Model

Figure 2.1 shows the delivery system reference model which provide interactive digital audio-visual services.

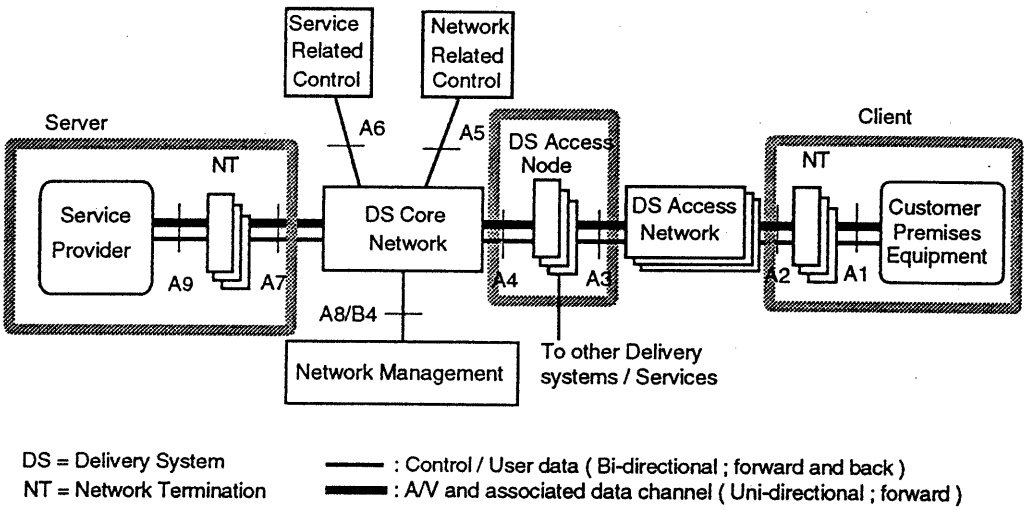


Figure 2.1 Delivery System architecture reference model

This model consists of *Server*, *Delivery System*, *Client* and *Control & Management*. The function of each element is as follows.

Server:

The function of the server is to store and deliver multimedia content. The server is owned and operated by a Value Added Service Provider (VASP), and is called simply Service Provider. It contains a mechanism which handles interaction with a client(s) to deliver a service.

Delivery System (Core Network and Access Network) :

The function of the delivery system is to transport information between a client and server. The delivery system consists of the core network and the access network, and has the adaptation functions between core network and access network.

Client:

The client makes the request to the server and receive the information service.

Control & Management:

The functions of the control are a call set-up of the data channel and bandwidth control, error control etc. The functions of the management are network management (fault, configuration, accounting, performance etc.) and subscriber management (accounting and billing).

To communicate between each element, there are three logical channels.

Signaling :

Set-up Network session

Control/User data Channel :

Bi-directional message channel with low-bandwidth

Audio/Video and associated data Channel :

Uni-directional (from Server to Client) multimedia data channel with high-bandwidth

3. Definition of each layer function

The data delivery functions are vertically partitioned into seven layers. Each layer performs a related subset of the functions required for delivery of services and communication with other systems. The functions of each layer are defined as follows.

Application	: Provides user-oriented application to the Sever and Clients
Presentation	: Conversion and presentation of information
Session	: Selection of or access to information
Transport	: Identification of group of data
Network	: Identification of logical channel
Data link	: Linkage with logical transmission
Physical	: Physical transmission

4. Interface signal between layers

In case of *Audio/Video and associated data channel*, it assumed the following signal formats. In this document, multimedia multiplexed stream is assumed the Transport Stream and Program Stream as defined in ISO/IEC 13818-1 (MPEG 2 Systems).

Application - Presentation	: Application specified analog / digital signals
Presentation - Session	: Elementary Stream
Session - Transport	: PES packet
Transport- Network	: Transport Stream / Program Stream
Network - Data link	: Network specified signal
Data link - Physical	: Network specified channel signal

5. Communication Layer model through the B-ISDN and CATV cable networks

5.1 Communication layer model of Server

Figure 5.1 shows Communication layer model of the Server which is connected with B-ISDN i.e. ATM.

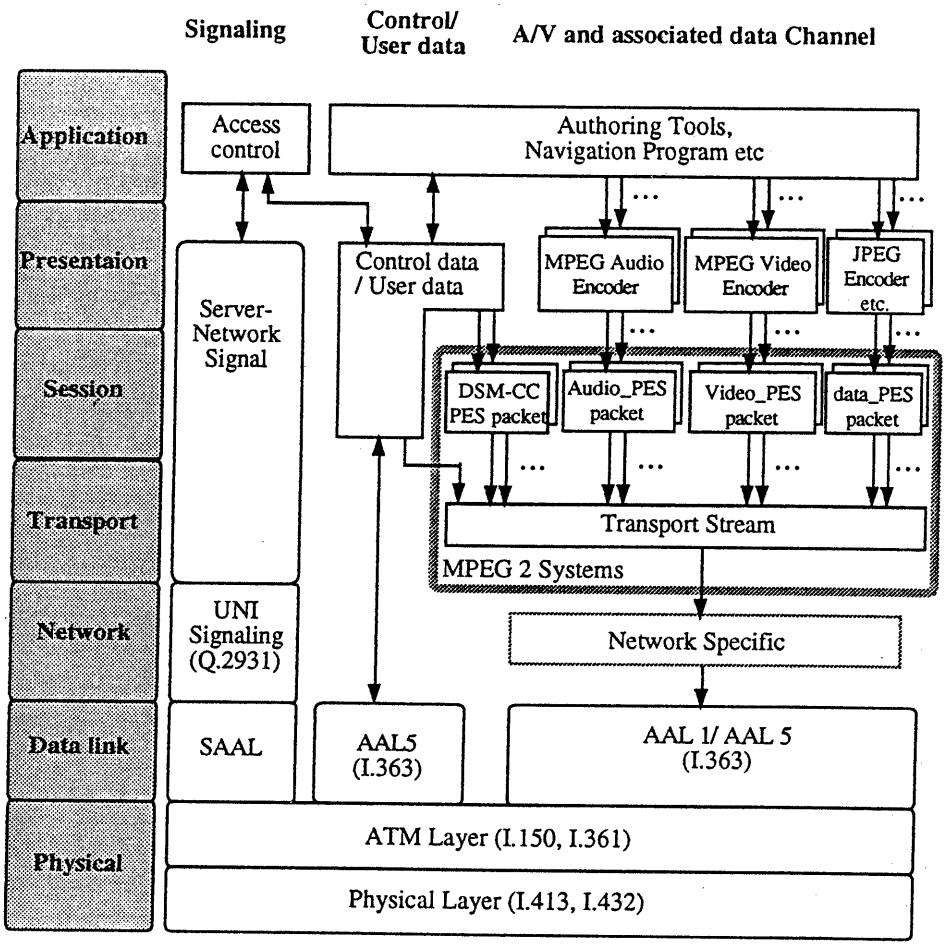


Figure 5.1 Communication Layer model of the Server (B-ISDN connected)

1) Application Layer

Signaling :

- Establishment / Disconnect of the connection between the Server and the STU over back and forward logical channels
- Allocation / Reallocation of the connection bandwidth

Control / User data channel:

- Handle the control and user data for application of registration and user-authentication

A/V and associated data channel :

- Provision of Server-side of application programs, e.g. authoring tools, navigation program etc.

2) **Presentation Layer :**

A/V and associated data channel :

- Conversion and compression of the audio, video, auxiliary data
- Audio signal will be encoded into the MPEG 1/ MPEG 2 audio stream.
- Video signal will be encoded into the MPEG 1/ MPEG 2 video stream.
- Still image data will be encoded by using the JPEG standard.

3) **Session Layer**

Control / User data (Forward):

- DSM-CC (ISO/IEC 13818-6) stream(Acknowledgment) or MHEG stream will be organized as PES packets.

Control / User data (Back):

- DSM-CC or MHEG stream from clients will be received.

A/V and associated data channel :

- Audio/video/auxiliary data streams will be organized as PES packets.

4) **Transport Layer**

A/V and associated data channel :

- PES packet will be organized as Transport Stream packet and multiplexed into the TS as defined in MPEG 2 Systems. TS packets are 188 bytes in length.

5) **Network Layer**

Signaling :

- UNI signaling as defined in ITU-T Rec. Q.2931

A/V and associated data channel :

- Network specific function e.g. forward error correction

6) **Data Link Layer**

Signaling :

- SAAL as defined in ITU-T Rec. Q.2110

Control / User data :

- AAL type 5 as defined in ITU-T Rec. I.363

A/V and associated data channel :

- AAL type 1 or AAL type 5 as defined in ITU-T Rec I.363

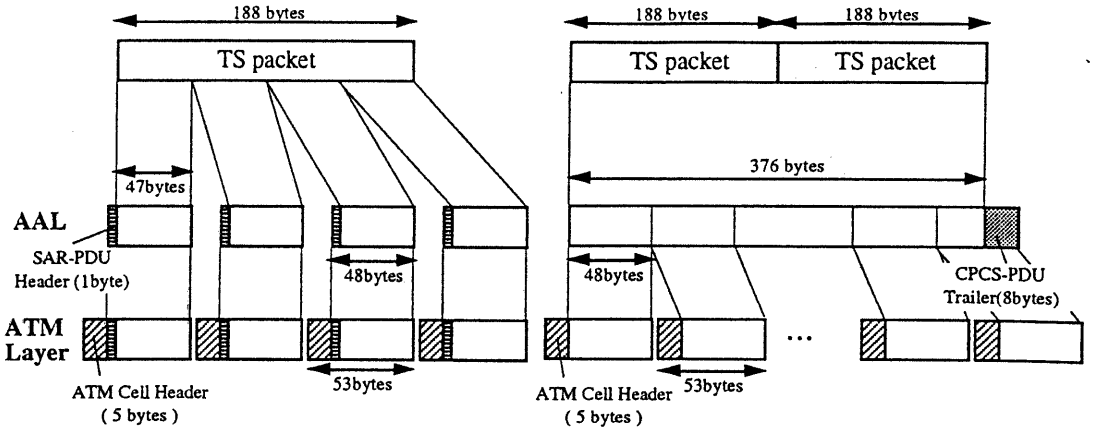
  In case of AAL 1, the forward error correction(FEC) which is described in 2.5.2.4.1/I.363 can be used for correction of bit errors and lost cells. In case of AAL 5, the FEC may be necessary to achieve a high quality communication.

7) **Physical Layer**

Signaling, Control / User data , A/V and associated data channel :

- ATM layer is described in ITU-T Rec. I.150 and I.361
- Physical layer is described in ITU-T Rec. I.413 and I.432

Examples of mapping methods of TS packet into the ATM cells are shown in Figure 5.2. (In these cases, FEC is not including.)



(a) AAL type 1 mapping
TS packet is mapped into 4 ATM cells

(b) AAL type 5 mapping
2 TS packets is mapped into 8 ATM cells

Figure 5.2 Mapping method of Transport Stream packet into ATM cells

5.2 Communication layer model of Delivery links

Figure 5.3 shows the layer model for Access Node point. The function of the Access Node are

-Adaptation between core network (B-ISDN) and access network

-Remultipexing(marging) of TS from other delivery systems

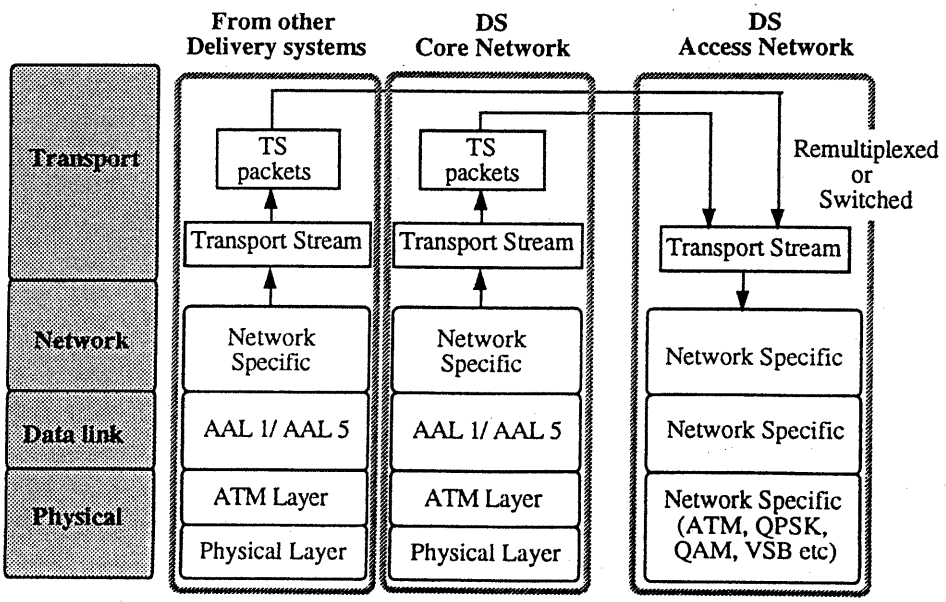


Figure 5.3 Communication layer model of DS Access Node

5.3 Communication Layer model of Client

Figure 5.4 shows the Communication layer model of the Client which is connected with B-ISDN, Coax cable, ADSL, etc.

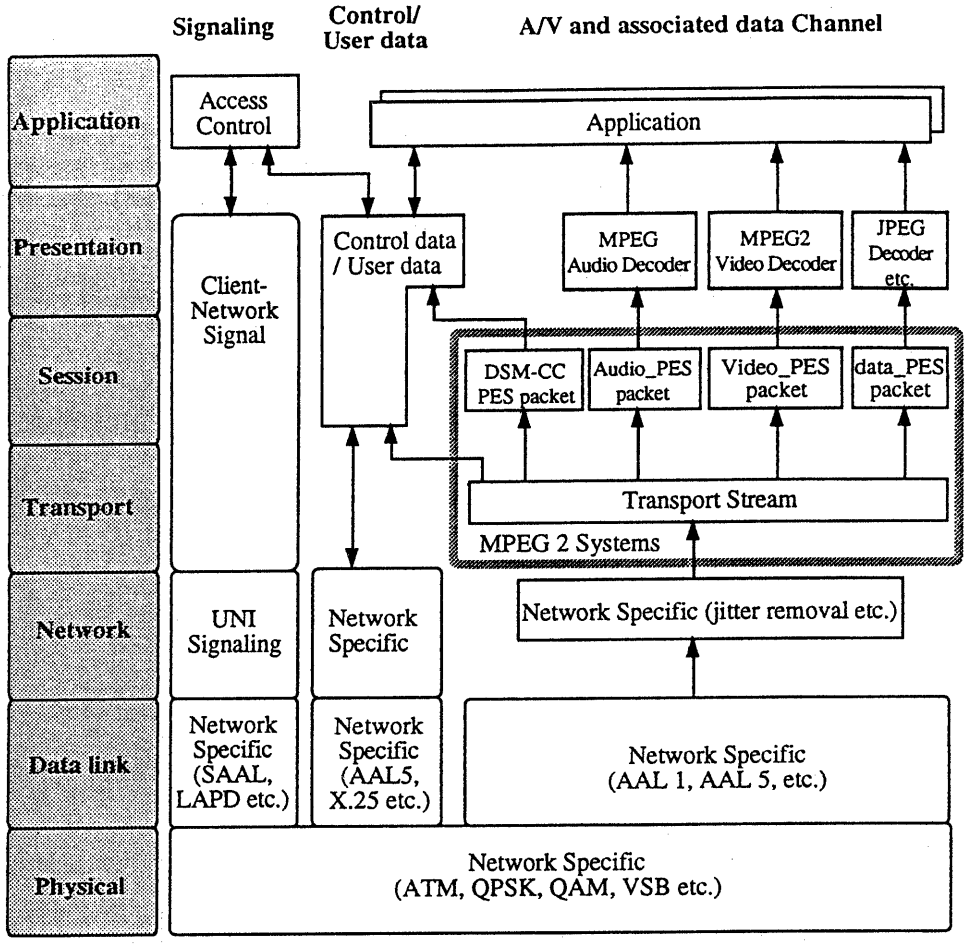


Figure 5.4 Communication layer model of client

1) Application Layer

Signaling :

- Establishment / Disconnect of the connection between the STU and the Server over back and forward logical channels

Control / User data :

- Handle the control and user data for application of booting, authentication, etc.

A/V and associated data channel :

- Provision of Client-side of application program, e.g. Video On Demand, Movies-on-demand, Home Shopping, Videophony, etc.

2) **Presentation Layer**

A/V and associated data channel :

- Re-conversion and de-compress the audio, video and auxiliary data
- MPEG 1/ MPEG 2 Audio stream will be decoded in audio signal
- MPEG 1/ MPEG 2 Video stream will be decoded in video signal

3) **Session Layer**

Control / User data (Forward):

- DSM-CC stream(Acknowledgment) or MHEG stream from server will be organized into PES packet.

Control / User data (Back):

- DSM-CC stream or MHEG stream will be sent to the server.

A/V and associated data channel :

- Each PES packet data (Audio, Video and auxiliary data) will be assembled into the elementary streams

4) **Transport Layer**

A/V and associated data channel :

- TS will be demultiplexed and assembled into PES packet (Program is selected by using PSI)
- System clock will be recovered by using Program Clock Reference (or Program Clock Reference)

5) **Network Layer**

Signaling :

- Network specified UNI signaling (In case of B-ISDN, it is based on ITU-T Rec. Q.2931.)

Control / User data :

- Network specified function ; e.g. Error control etc.

A/V and associated data channel :

Network specified function ; e.g. Jitter removal etc.

6) **Data Link Layer**

Signaling :

- Network specific ; e.g. SAAL, LAPD, etc.

Control / User data :

- Network specific ; e.g. AAL type 5, X.25, etc.

A/V and associated data channel :

Network specific ; AAL type 1/5 for B-ISDN, B8ZS code etc.

In case of AAL type 1, the FEC is optional used for correction of bit errors and lost cells.

7) **Physical Layer**

Signaling , Control / User data , A/V and associated data channel :

- Network specified signal ; ATM, SHD, PDH, QPSK, QAM, VSB etc.

6. Communication Layer model through the IP Internetwork

6.1 Communication layer model of Server

Figure 6.1 shows the Communication layer model of the Server which is connected with Internet Protocol Internetwork. In this model, multiplexed stream (Transport Stream and Program Stream) is stored in DSM system and then transmitted by using TCP/UDP. To achieve a real time delivery, Real Time Pump may be considered.

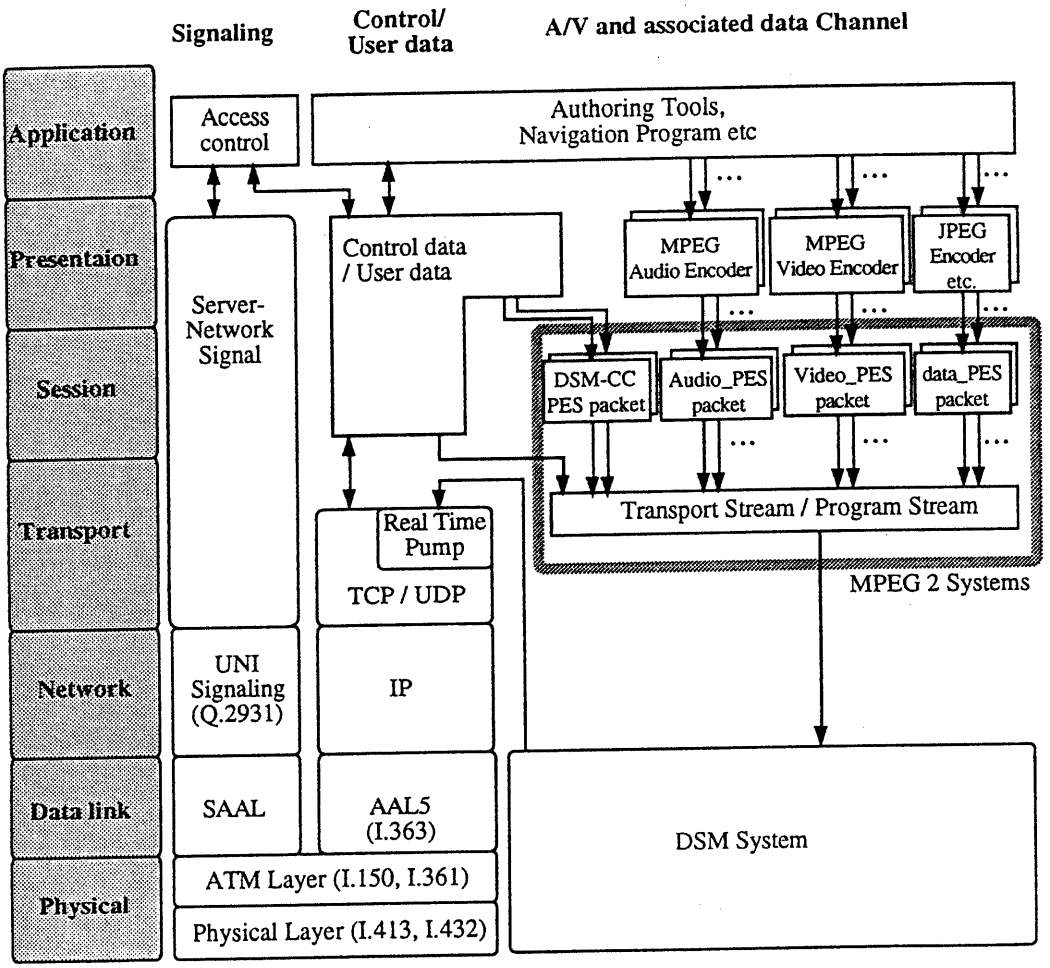


Figure 6.1 Communication layer model of the Server (IP network connected)

6.2 Communication layer model of Client

Figure 6.2 shows the Communication layer model of the Client which is connected with IP Internetwork. In this model, received multiplexed data stream is stored their DSM or is directly decoded.

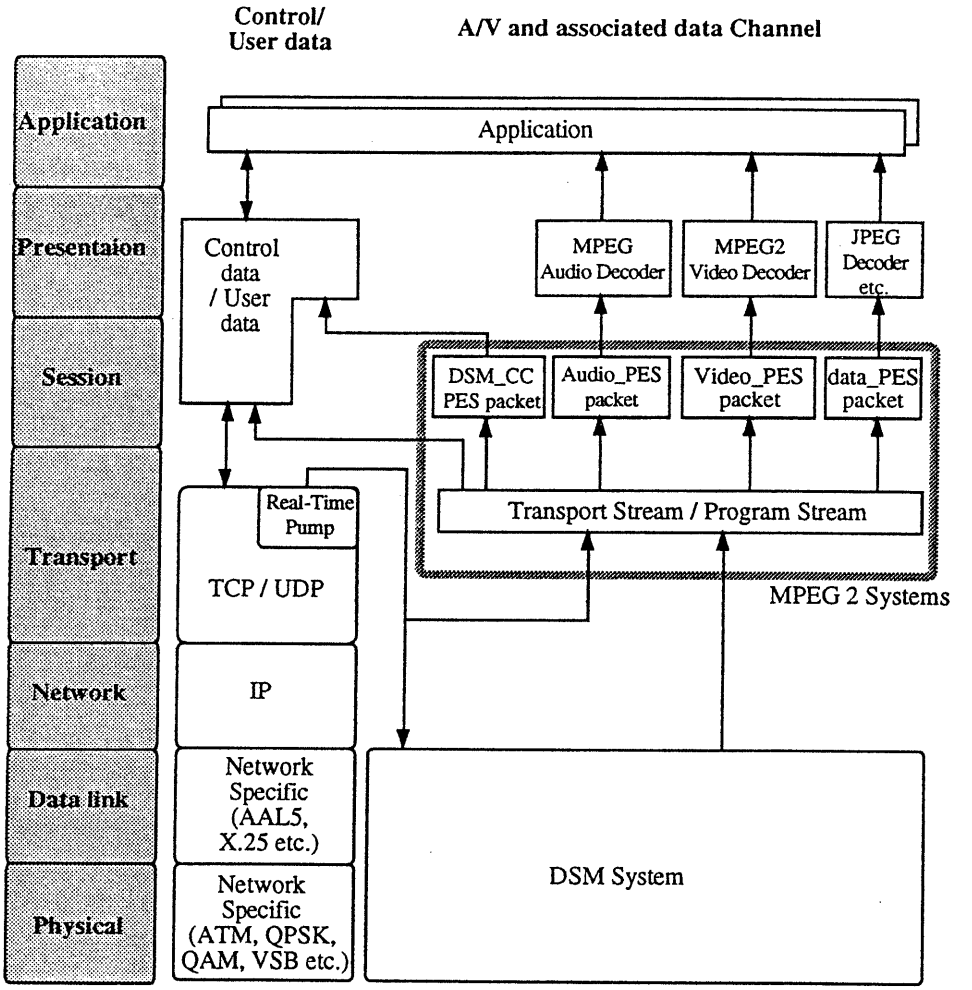


Figure 6.2 Communication layer model of the Client (IP Internetwork connected)

DAVIC 日本会議報告参考資料 4
(94-AVM-7-3)

双方向型インタラクティブ放送の基本コマンドセット
Basic Command Set for Interactive Broadcasting

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Summary

Interactive broadcasting is a type of broadcasting systems through which the viewer can enjoy interacting with TV programs from a broadcasting station using a bi-directional transmission channel. The target of the system is to provide programs where many people can participate at the same time and which have the following characteristics:

- Viewers can participate in the program.
- The program can change its presentation or the story sequence according to the viewer's command or response.
- Viewers can change viewing angles and image contents.

It can be thought of as a type of VOD systems through which a program can be viewed by many people at the same time. In addition to the functionality of program selection, a managing mechanism for more diversified response from viewers is needed. Further, aside from video and audio information itself, ancillary data is useful to control the presentation and progression of the video and audio signals. In this paper we propose a basic command set for interactive broadcasting and useful ancillary data for interactive programs.

1．はじめに

双方向型インタラクティブ放送は、放送局と視聴者が双方向のネットワークを介して結ばれ、放送局からのテレビサービスをインタラクティブに楽しむことができるシステムである。１つの番組を多数の人が同時に視聴する形態において、次のような特性を有する番組がこのシステムの対象である。

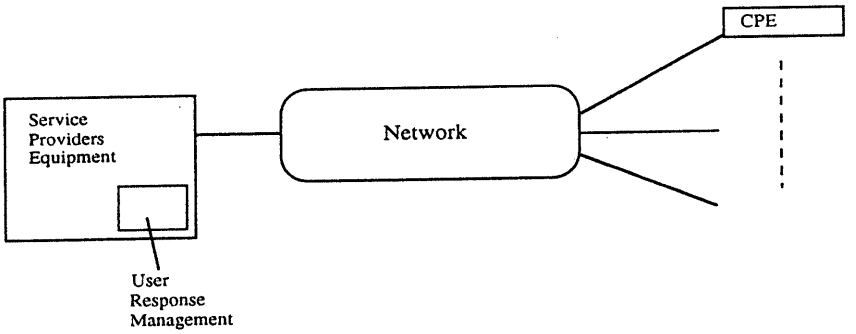
- 視聴者がその番組に参加できる
- 視聴者の反応によって番組の提示、進行が変わる
- 視聴者が画面の視点および表示内容を変更できる

一般的にインタラクティブ番組では、視聴者の番組への参加感が強まり、より番組を楽しむことができる。例えば、スポーツ競技の予想、討論番組におけるアンケート、クイズ番組の回答を、視聴者が放送局に送ると、その集計結果が番組に反映されると同時に、自分が送った情報との対比も示されるようなことが考えられる。また、複数のストーリーを有する番組を提供する場合、視聴者によって異なる番組進行で楽しむことも考えられる。視聴者の好みに応じてインタラクティブに映像、音声を加工設定（ズーミング、視点変更など）し、視聴者によって異なる番組の表現を楽しむことも考えられる。

このようなサービスは、１つの番組を多数の人が同時に視聴するタイプのＶＯＤサービスとみなすことができる。番組の選択に関する機能に加えて、ユーザーからのより多様な応答を管理する機構が必要とされる。また、受信側における映像音声の提示、進行のインタラクティブな制御には、映像、音声情報そのものだけでなく補助データが有効である。本文では、このような目的で使用される双方向型インタラクティブ放送の基本コマンドセットと補助データの活用について提案する。

２．システム構成

双方向型インタラクティブ放送のシステム構成を下図に示す。サービスプロバイダにおいて、ユーザーからのより多様な応答を管理する機構が必要とされる。



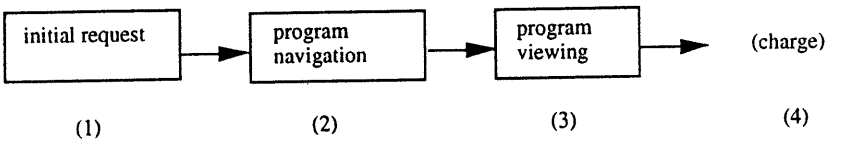
３．基本コマンドセット

３．１　視聴者から放送局へのコマンド

視聴者から放送局へ向かって発せられる基本的なコマンドの種類を以下に示す。

３．１．１　一般コマンド

一般的な視聴において、発せられるコマンドを、下図のフローに基づき列挙する。



（１）センターアクセス

(a)初期リクエスト

・番組メニュー画面を要求する。
・期待される応答信号は初期番組メニュー（映画／ﾆｭｰｽ／資料映像／･･･などのカテゴリー分けされた番組グループのメニュー）。

（２）番組ナビゲーション

(b)番組カテゴリー選択

・番組メニュー中の番組グループごとに分類された詳細な番組一覧を要求する。
・期待される応答信号は、詳細な番組一覧。
　例：カテゴリーが「映画」　→ジャンル別映画一覧ﾒﾆｭｰ
　　カテゴリーが「ﾆｭｰｽ」　→ﾆｭｰｽ項目一覧

(c)映像・音声品質のグレードの指定を含む番組選択

・映像・音声品質のグレードの指定を含めて番組一覧中から選択された番組のビットストリームを要求する。このために提供される番組の品質と料金のテーブルも示される。映像および音声の品質は、視聴しようとする番組に対する好みや料金によって選ぶことができる。画面のアスペクト比、立体視の情報、多チャンネル音声の表現などについての要求も含まれる。
・期待される応答信号は、指定された映像および音声品質のグレードによる番組信号。

（3）番組視聴

(d)ＶＣＲライクな番組操作
ノーマル再生、早送り、静止画、駒送り、リバース、スローフォワード、スローリバース

(e)高機能番組操作
ジャンプ再生、ハイライト再生、繰り返し再生、中断再生

(f)音声モード指定
日本語／原語

(g)強制終了

（4）課金照合

(h)課金照合リクエスト
・課金内容情報を要求する。
・期待される応答信号は、課金内容に関する情報。

3．1．2　視聴者応答コマンド（情報のアップロード）

番組へ参加する目的で発せられるコマンドを以下に列挙する。

（1）メニュー中にリストアップされている項目の選択

番組提供者が与えるメニューの中の項目を選択する。

例：アイテム番号、ポインタ位置

（2）マクロリクエスト

例えば、選択メニューや映像シーンに関するインデックス情報など予め登録された情報を視聴者の必要に応じて要求する。

例：選択メニューリクエスト、番組インデックスのリクエスト

（3）メッセージアップロード

ボタンやキーボードなどのＳＴＵの入力装置を使用して作成したメッセージをアップロードする。

（4）オーディオビジュアル作品のアップロード

視聴者が制作したオーディオビジュアル作品をアップロードする。

（5）ファイルアップロード

視聴者が作成したコンピュータのデータファイルをアップロードする。

3．2　放送局から受信端末へのコマンド

放送局からＳＴＵへ向かっては、サービスの種類、機能により様々なコマンドが発せられる。このようなコマンドは、サービス内容の拡大とともにさらに多様なコマンドをサポートする必要が生じると考えられる。従って、放送局側からこれらのコマンドを解釈可能とするソフトウェアをダウンロードする方法が望ましいと考えられる。以下に、放送局からＳＴＵに向かって発せられるコマンドセットの例を示す。

3．2．1　映像切り替え時の効果制御コマンド

（1）利用法

映像切り替え時の画面表示を効果制御し、番組の視覚的効果を高める。

（2）内容

(a)表示制御

画面切り替え時の表示を制御する。以下の項目を指定する。

・表示時刻

・表示切り替え種類

カット、ディゾルブ、ワイプ、ＤＶＥ (Digital Video Effect)、スーパー

・切り替え速度

・外周色

(b)準備制御

画面切り替え時の表示の準備を制御する。以下の項目を指定する。

・画面切り替えの準備開始時刻

・周囲色

3．2．2　映像音声品質のグレードの制御コマンド

（1）利用法

映像音声品質のグレードを制御可能とすることにより、番組料金に対する視聴者の様々な要求に応えることができる。

（2）内容

データの伝送ビットレートに関係する復号パラメータを選択する。例えば次のようなパラメータが指定される。

・符号化アルゴリズム

・アスペクト比

・立体視情報の存在

・多チャンネル音声のモード

4．インタラクティブ放送サービスへの補助データの活用

映像、音声のほか、次のような補助データを活用することにより、番組の表示能力、番組へのアクセス能力を高めることができる。

4．1　ビデオアトリビュート

（1）利用法

カメラワークデータを使用することにより、受信した映像と別の映像（例えば自分を映すカメラ）を連動して合成する。また、キー情報を利用して、映画の主役を自分に置き換えて好きな女優（あるいは男優）と共演などという楽しみかたが可能となる。さらに、カメラワークデータとキー情報を組み合わせて、ロールプレイングが楽しめるようになる。

一方、シーン記述は、番組ごとのインデックス情報より詳細な情報を与え、長い映像シーケンスの中から必要なカットを容易に選び出すことができる。

（2）内容

タイムコード、カメラワーク・パラメータ、キー情報、スーパーインポーズ情報、
シーン記述（撮影場所、撮影日時、撮影者、天気、登場人物、映っているもの、動作など）。

4．2　番組インデックス

（1）利用法

通常の番組選択はメニュー画面により行われるが、蓄積保存して再利用する場合の番組の検索に番組インデックス情報が利用される。

（2）内容

番組名、ジャンル、キーワード、出演者、演出者、著作権、再生時間の長さ、タイトル用静止画など。

5．結び

双方向型インタラクティブ放送における基本コマンドセットと補助データの活用について提案した。双方向型インタラクティブ放送を含む形でＶＯＤシステムが構成されることが、ＶＯＤサービスの提供するサービスの範囲を広げ、より多くのユーザーを獲得できると予想される。そのようなシステムを構築する上で、ここで提案した基本コマンドセットなどの情報が有効となるであろう。

アプリケーションダウンロード方式の検討

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Abstract
Software downloading is a key technique to make an STU versatile. First, it is proposed that application downloading should be standardized among three types of downloading; boot-up downloading, application downloading, and downloading in an application. Next, requirements of application downloading are discussed. Finally, a download control script, which makes applications interoperable with minimal standardization efforts, is proposed.

1. Introduction

Customer premise equipment is expected to serve for various digital audio/visual (DAV) applications. Downloading is a promising way to make an STU versatile. This paper describes a download model to achieve interoperability in the application layer. This model also makes an application interoperable on any STU platform with the minimal standardization efforts. Although any file transfer protocol is not specified here, it should also be defined in the DAVIC standard.

2. STU-Server Dialogue Model

An STU-server dialogue consists of three stages; boot-up, application downloading and application dialogue. The dialogue model is depicted in Figure 1.

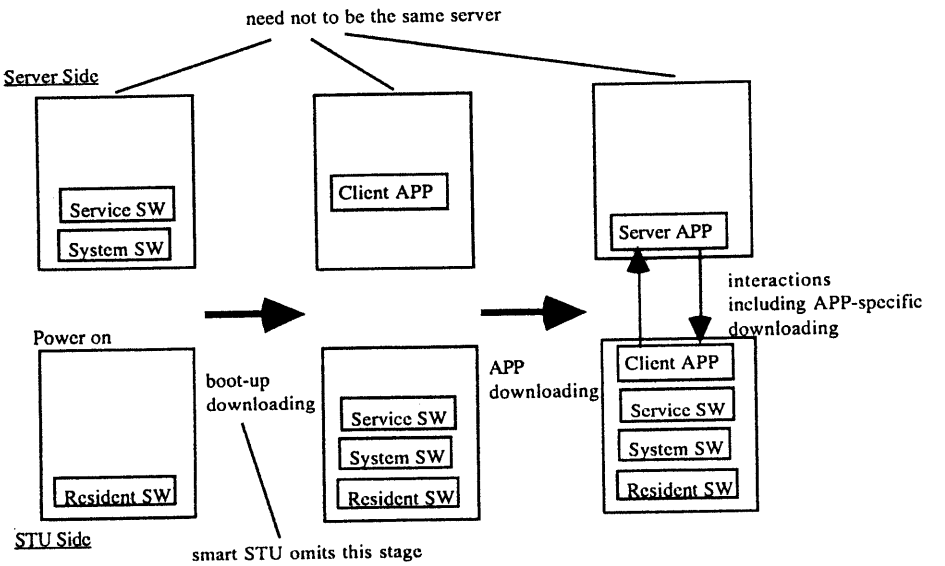

Figure 1. Dialogue Model

A boot-up stage begins with turning on an STU. A light STU, whose resident software is really minimum, downloads system and service software in this stage. It is called boot-up downloading. A smart STU, already having that software in its storage device, may omit

this downloading. The download protocol may be specific to each STU platform, although further discussion is necessary.

The next is the application downloading stage to obtain a client application program from a server. The download protocol in this stage should be strictly defined to make an application usable on any STU platform. It should not depend on a specific platform or an application. A navigation program to reach an application is also classified into an application.

The last is the application dialogue stage, where a client application on the STU interacts with a server-side application. While in this stage, the STU might download programs and/or data from a server. Since the required download performance greatly depends on each application, the protocol should be defined in each application individually. For example, downloading in a network game application will be much faster but consist of smaller chunks than in a news-on-demand application.

The above three types of downloading are summarized in Table 1.

	Boot-up downloading	Application downloading	Downloading in an application
Platform dependent?	Yes	No	No
Application dependent?	N/A	No	Yes
Needs a standard?	ffs	Yes	No

Table 1. Three Types of Downloading

3. Requirements of Application Downloading

The following features are essential for an application downloading architecture;

- independent of the physical file structure of an application
  The file structure of an application depends on implementation. For example, an application might be implemented in several binary executables, each of which corresponds to an STU platform. If so, the proper executable must be chosen for the target STU. On the other hand, if an application is implemented in a common API, the file selection is unnecessary. The application downloading mechanism must be able to cope with any file structure of an application.
- subsuming distributed applications
  An application might be distributed over multiple servers. For example, a news-on-demand application might need a terminal emulator from a server and a JPEG-viewer from another. Thus, all pointers to the relating files are necessary to be delivered to an STU. The security keys are also delivered so that the STU can access to the secured servers.
- avoid unnecessary downloading
  Some applications may be available only on particular platforms. In that case, availability should be checked before actual downloading processes. Otherwise, an STU will consume unnecessary downloading time. Also, the version of an application should be checked to avoid redundant downloading of the same version.
- fewer interactions
  The interactions between an STU and a server should be as fewer as possible to avoid overheads. Particularly, negotiation steps are to be excluded if possible,

because they takes long time typically.

4. Proposed Architecture for Application Downloading

In this section, we propose an application download architecture satisfying the requirements in Section 3.

4.1 Download Control Script

Every application is provided with a download control script, which prescribes information necessary for downloading the application. When an STU does not have enough information to download an application, e.g., does not know the exact file name of the application, the corresponding download control script is retrieved from the server. If the STU believes that it has sufficient information, the application files can be downloaded without getting a download control script. A download control script should be interpretable on any STU platform. The format is to be as simple as possible to make the interpreters simple.

A download control script describes the following information in ASCII texts;

- minimum free memory size required to launch the application
- file names, file sizes, file versions
- the server IDs that hold the above files
- the accounts and the security keys to access to the files on the servers
- the convention to launch the downloaded application.

These items are listed for each STU platform ID. If an STU cannot find its platform ID in the given script, the application is not available on that platform. An STU platform ID is a structure composed of an operating system ID and an extension field. An extension field is used, for example, to specify hardware attachments.

An example of a download control script for a news-on-demand application is shown in Figure 2. The syntax is just an example and may need further discussion.

```
os1:x::                                    /* OS ID:extension:: */
    5                                      /* minimum free memory size */
    0468592829:your_account:your_pwd:newskernel1.exe:356:1.0
    /* server ID:account:security key:filename:filesize:version */
    0468593123:anonymous::jpegview1.exe:512:1.1
    0468592829:shared_account:1ud73nj:news.dat:1224:2.0
    newskernel1 news.dat                   /* convention to launch an application */
os3:y::
    5
    0468592829:your_account:your_pwd:newskernel3:256:1.0
    0468593123:anonymous::jpegview3:456:1.2
    0468592829:shared_account:1ud73nj:news.dat:1224:2.0
    newskernel3 news.dat
```

Figure 2. An Example of a Download Control Script

4.2 Function of Resident Download Process on STU

The resident download process should have the following function;

- Interpret a download control script
- Establish connection and download a file from a server
- Launch an application using the downloaded files

5. Conclusion

A download model in the application layer was proposed to achieve interoperability. First, it was proposed that application downloading should be standardized among three types of downloading. Next, requirements of an application downloading architecture were discussed. Finally, a download control script, which is to be interpretable on any STU platform, was proposed to be provided with every DAV application to manage application downloading. This downloading architecture makes applications interoperable on any STU platform with minimal standardization efforts, comparing the standardization of API.

Security protocol on VOD

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Abstract

In order to eliminate the anxiety for content providers and service providers about copyright, some security requirements should be satisfied. We present a security protocol on VOD to satisfy the security requirements. The protocol progress as follows.

1. Requests desired content to a server and authenticates user/server mutually using RSA public-key cryptosystem.
2. Securely delivers a decryption key to a security card and conceals the key which are isolated from the main body of content. Even the purchaser does not know the decryption key. It then certifies delivery and returns a digital signature of payment to the server.
3. Delivers encrypted content from a server to an authenticated end-user's STU.
4. Views and listens to content by decrypting, decoding and converting digital-to-analog within the STU tamper resistant unit .

A security card (a PCMCIA or an IC card) is effective to realize these functions. It stores secret personal parameters, that is private key of RSA public-key cryptosystem, a password, user identification code. Furthermore, it stores the decryption keys for each contents securely.

No STU has any personal information regarding the end-user. So, any end-user with a security card can use any STU. In other words, if an end-user has a security card, any VOD services can be accessed anywhere and at anytime.

1 Introduction

Security functions (including "Encryption") are key issue for the field of VOD services. They are especially effective for ensuring the content-provider copyrights as well as billing schemes. We present a new protocol incorporating many security functions that will ensure VOD security.

2 Security Requirements

In order to eliminate the anxiety regarding copyrights for content providers and service providers and to facilitate access for end-users, the following security requirements should be satisfied.

1. Protection against the disguise of end-users and service providers.
2. Protection against the denial of receipt and the refusal of payment.

3. Protection against the illegal digital copying and recording of content.

4. Protection against the unauthorized disclosure of content.

The first requirement mentioned above is effective for charging the rightful end-users who received content. The second requirement is important for ensuring reliable delivery and accurate billing. The third and the last requirements listed above play a major role in copyright protection.

3 Security Functions

We show the following security functions to satisfy the security requirements mentioned earlier.

1. Mutual authentication between end-users and service providers.

2. Certification of content integrity and delivery.

3. Digital signature to ensure end-user payment .

4. Content encryption.

5. Concealing the decryption keys for each content which are isolated from the main body of content. Even the purchaser does not know the decryption key.

4 Achieving Those Functions

Some VOD system components used for the security functions are shown in Fig. 1.

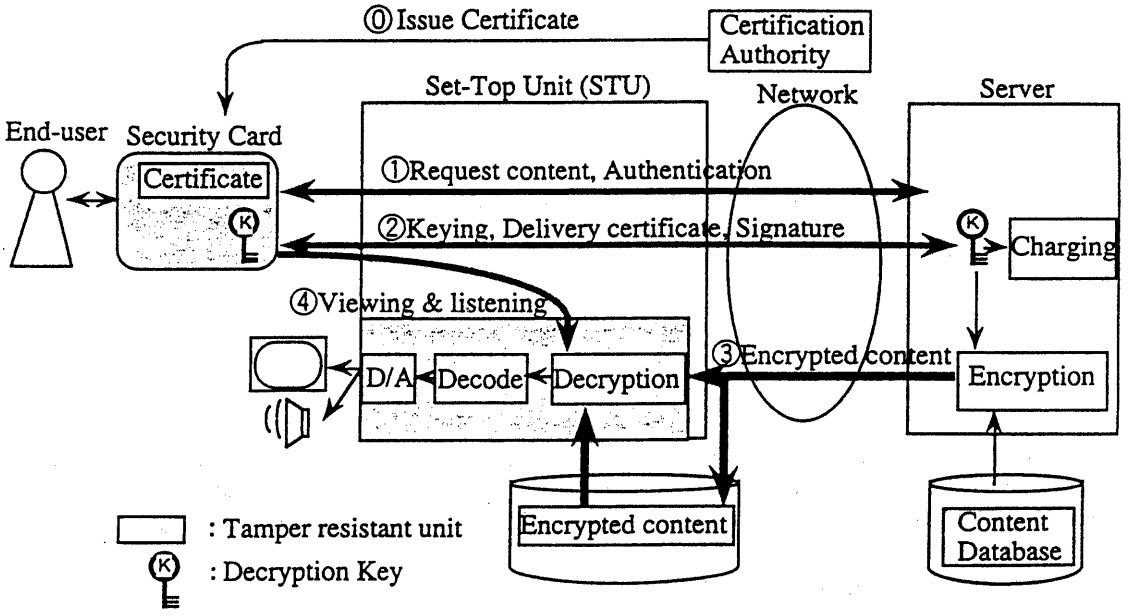

Figure 1 System Configuration Model for VOD Security

4.1 System Configuration Model

The main features of each component are described below.

1. Security Card

   - Securely stores the decryption keys for each content.
   - Encrypts and decrypts based on RSA public-key cryptosystem [1],[2] for authentication and digital signature.
   - Securely transfers the content decryption key to STU.
   - Stores secret personal parameters, such as a private key in RSA public-key cryptosystem, a password, and a user identification code.

   A security card is a portable computing unit that gives the owner access rights to a server. For example, a PCMCIA card or an IC card.

2. Set Top Unit (STU)

   - Secures communication between servers and security cards.
   - Ensures receipt of the content decryption key from the security card securely.
   - Decrypts, decodes and converts digital-to-analog of each content within the STU tamper resistant unit .
   - Stores encrypted content.

3. Server

   - Contains content database.
   - Encrypts each content.
   - Authenticates end-users.
   - Stores the digital signature of each end-user as evidence of payment.
   - Bills end-users.

4. Certification Authority (CA)

   - Issues "Certificate [3]" based on the RSA public-key cryptosystem.

4.2 Security Protocol

After acquiring a certificate form CA (Fig. 1, No. 0), VOD security communication sequences progress as follows. Security requirements for each step are also described.

1. Requests desired content to a server and authenticates user/server mutually using RSA public-key cryptosystem (Fig. 1, No.1).
   - Protects against the disguise of end-users and service providers.

2. Securely delivers a decryption key to a security card. It then certifies delivery andreturns a digital signature of payment to the server (Fig. 1, No. 2).
   - Protects against the denial of receipt and refusal of payment.

3. Delivers encrypted content from a server to an authenticated end-user's STU (Fig. 1, No. 3).
   - Protects against the unauthorized disclosure of content.
   - Protects against altering content.

4. Views and listens to content by decrypting, decoding and converting digital-to-analog within the STU tamper resistant unit (Fig. 1, No. 4).
   - Protects against the illegal digital copying and recording of content.

We propose a fast data encryption algorithm (FEAL)[4] as a method of content encryption and decryption. FEAL which is categorized as a secret-key cryptosystem was developed by NTT in 1987. The FEAL technology is already available. It has been applied to many kinds of application software and customer equipment (ex. facsimiles, ISDN terminal adapters and digital telephones). Furthermore, NTT has developed a single-chip FEAL processor which can encrypt/decrypt 10 Mbytes of text per second [5]. As shown in Fig. 1, this security protocol can be applied to two types of delivery services. One service type is for a server that does not permit an end-user to store delivered content in the STU. Another service type is for a server that permits storing delivered content in a STU storage memory (ex. hard disk).

In addition, this security protocol can be applied to any kind of access network.

4.3 Ease of Use

As stated above, no STU has any personal information regarding the end-user. So, any end-user with a security card can use any STU. In other words, if an end-user has a security card, any VOD services can be accessed anywhere and at anytime. This feature is a great advantage for the end-users.

5 Conclusion

We present security functions and communication protocols for many kinds of VOD services. According to our proposals, we believe that the content-provider copyrights and the correct billing for service providers are ensured. Furthermore, this system model allows the end-user easy and convenient access.

Acknowledgements

The authors would like to thank Mr. Ikuro Oyaizu, who is our project team leader at NTT, for his promotion and helpful discussion of implementing the security protocol.

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固定ビットレート回線のための Video Server — Set-Top Unit 間のビデオコンテンツのリアルタイム配送フォーマット

Format for Real-Time Delivery of Video Contents between Servers and STUs over Constant Bit Rate Circuits

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あらまし

VOD(Video-on-Demand) サービスにおいては、ビデオコンテンツ内の任意箇所へのジャンプやビデオコンテンツ内へのコマーシャル挿入等が必須機能となる。本提案では、Video Server と Set-Top Unit が ISDN (Integrated Services Digital Network) や ADSL (Asymmetric Digital Subscriber Lines) のような完全な固定ビットレート回線で接続されている環境において、MPEG で符号化された一つのビデオコンテンツ内でランダムジャンプを行った場合、あるいは、MPEG で符号化された複数のビデオコンテンツから必要な部分を取り出して編集を行う場合の、ジャンプ点および編集点におけるビデオ表示の完全な連続性を保証するためのビデオコンテンツ配送フォーマットについて提案する。

1 Introduction

As stated in the article "Interactive Play Control" of DAVIC CFP, so-called "VCR functionality" and the ability to jump to arbitrary positions are essential functions of VOD services. To provide such functions, it is necessary to deliver MPEG-encoded video contents in a randomly accessible form in real time. However, this approach encounters technical difficulties when the forward channel links between the video servers and STUs are fully CBR (Constant Bit Rate) circuits, such as ISDN (integrated services digital network) and ADSL (asymmetric digital subscriber lines), because the encoded video rate generally varies depending on the picture content, even when based on a CBR-MPEG mode. For this purpose, we propose a video contents delivery format for CBR circuits between servers and STUs.

2 The Problems of Delivering Video Contents over CBR Circuits

The MPEG (MPEG1, MPEG2-PS, MPEG2-TS) encoding method uses a configuration where frames of video data are handled in groups called GOPs (groups of pictures), and in principle any portion of the video stream date can be accessed by these blocks. For example, this feature can be used in content searching by "Skip Search Replay', where it is possible to skip during Replay from one fixed-length GOP (i.e., one containing a fixed number of frames) to another. In practical VOD services, this feature is also useful for making links at GOP boundaries between scenes extracted from multiple video contents and for inserting commercials inside a single sequence of video contents.

However, in MPEG (CBR mode) encoding, it is difficult to convert GOPs to rigidly fixed amounts of data, no matter how much the bit rate is controlled. This is because MPEG encoding uses prescribed VLCs (variable length codes) in the quantization of each component. Furthermore, practical coding methods in which each GOP is constrained to a fixed length suffer from impaired image quality; most encoders slightly adjust the GOP length according to each scene. Figure 1 (1) shows the configuration of an MPEG bit stream encoded in this way.

Video contents encoded as shown in Fig. 1 (1) are assumed to be stored in a server and read back sequentially from the beginning by an STU. If the average MPEG bit rate corresponds exactly with the bit rate of the CBR circuit, these changes in bit rate can be taken into account by incorporating a fixed-size buffer (e.g., VBV buffer size) at the STU side for use during encoding and performing a fixed-period delay (e.g., VBV delay) during decoding. However, when performing random access at arbitrary GOP boundaries, continuity will inevitably be lost during video contents replay in situations, as shown in Fig. 1 (2), where large-size GOPs are occasionally read consecutively.

In this case, as shown in Fig. 1 (3), the bit rate of the largest possible GOP is made to correspond to the bit rate of the circuit by reducing the average bit rate of the video contents when encoding. This approach allows continuity to be maintained during random access replay of video contents, but it reduces image quality. Also, since the average bit rate of the video contents differs from the bit rate of the CBR circuit, it is necessary to compensate for this difference in bit rates by using techniques such as flow control.

3 Proposed Delivery Format

3.1 Delivery Format

Figure 2 (1) shows the proposed video contents delivery format. First, we define the VAU (video access unit) as the smallest unit of randomly accessible video contents, which consists

of a fixed number of GOPs in sequential order, and we define a video transport segment (VTS) as the amount of data carried over the CBR circuit in the decode time of one VAU. The basic delivery format is that a VAU is encapsulated by each VTS, and the remaining space in the VTS is taken up with padding or stuffing. In this delivery scheme, depending on the coding parameters (e.g., frame rate) and the circuit bit rate, the VTS may not correspond to byte or bit boundaries.

In this delivery format, the bit rate of the video contents in each VTS corresponds exactly with the bit rate of the circuit. As a result, bit rate discrepancies do not arise, not only when playing back sequentially from the start, but also when accessing randomly at VTS boundaries. Therefore, continuity is always guaranteed when replaying video contents.

This delivery method basically works by adjusting the bit rate of the video contents to that of the CBR by means of padding, and therefore the average encoded bit rate of the video contents is always reduced. However, this format does not directly limit the size of each GOP to below a fixed size, but incorporates VAUs comprising multiple GOPs into fixed-length VTSs. Variations of VAU length depend strongly on the implementation of bit rate control in the encoder. However, as the number of GOPs included in each VAU is increased, the ratio (Max. VAU length / Average VAU length) can generally be made to approach unity. Consequently, in this format, by setting a suitable value for the number of GOPs in each VAU, it is possible to adjust the relationship between the freedom of random access and the margin by which the average bit rate is reduced during video contents encoding.

3.2 VTS Management by VTS Headers (optional)

The proposed format realizes the transmission of video contents over a circuit from a video server, and at the STU side it is not necessary to be aware of the VTS contents. The proposed transmission format is based entirely upon MPEG syntax and can be decoded by an STU (decoder system) that is unaware of the VTS construction. However, if the STU is aware of the VTS construction, more effective access control can be achieved. Figure 2 (2) shows a delivery format in which a VTS Header (VTSH) is inserted at the head of each VTS in order to make the STU aware of the VTS configuration. The VTSH is incorporated as an MPEG private packet.

(1) Since VTSs are the boundaries of random access, it is possible to clearly specify VAU IDs instead of ordinary pointers like time codes as random access pointers from the STU to the server by, for example, incorporating "Direct access VAU ID" statements in the VTSHs.

(2) Since VTSs are the boundaries of editing, when scenes extracted from multiple video contents are inserted in the video contents being provided, the edited contents are described to the STU by a statement in the VTSH. As a result, by relaying information such as "a

commercial has been inserted after this point", it is also possible to prohibit users to skip commercials while the STU is replaying them.

(3) If the VTSHs include statements of the VTS size and the size of the VAUs inside it, they become useful when eliminating padding from inside the VTS.

4 Conclusion

This document has proposed a delivery format for the transfer of video contents between video servers and STUs. In the proposed delivery format, when the forward channels are fully CBR circuits, such as ISDN and ADSL, it is possible to transmit video contents in real time with random-access capability, even when the video contents have been encoded by a method that is not completely CBR, such as MPEG. By adopting this proposal in the DAVIC standard, the delivery format of video contents over CBR circuits will become unified, enabling compatibility between the "Server–Delivery System–STU Interfaces" of each company.

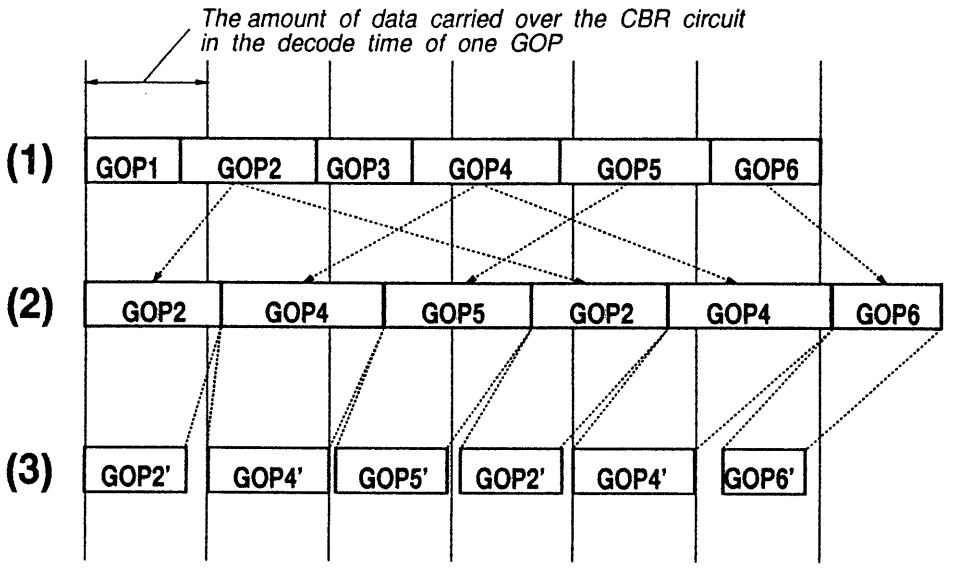

Fig. 1 Conventional delivery format of video contents.

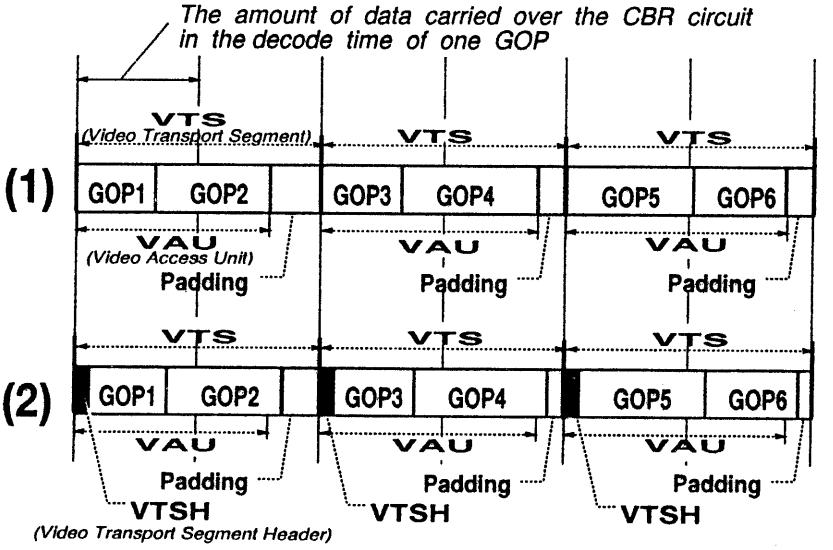

Fig. 2 Proposed delivery format of video contents.

On Demand Service Assistant on Video-on-Demand Service Attributes

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This proposal responds to the following items in CFP.
Video-on-Demand Service Attributes (Section 3.3.1 - Page 13 to Page 17)
Delivery System architecture reference model (Fig 3.6 - Page 26)
Service Related Selection and Control (Section 3.5.2.4 - Page 27)

1. Introduction

There is a "Service Related Control (SRC)" in Delivery System architecture reference model (Fig 3.6 of CFP). According to CFP, Service Provider Selection is the first function of SRC. I have been considering "On Demand Service Assistant *(ODSA)*", Service Provider Selection is one of ODSA functions. So, I propose VOD system with *ODSA*.

2. VOD system with *ODSA*

Fig.1-1 shows an example of VOD system with *ODSA*. Delivery System includes DS Core Network, Access Node, DS Access Network, Network Termination, Network Management, and Network Related Control (See Fig.1-2). *ODSA* is a kind of Value Added Service Provider, so it exists outside the Delivery System. But it differs from VOD Service Provider. It assists End users and VOD Service Providers.

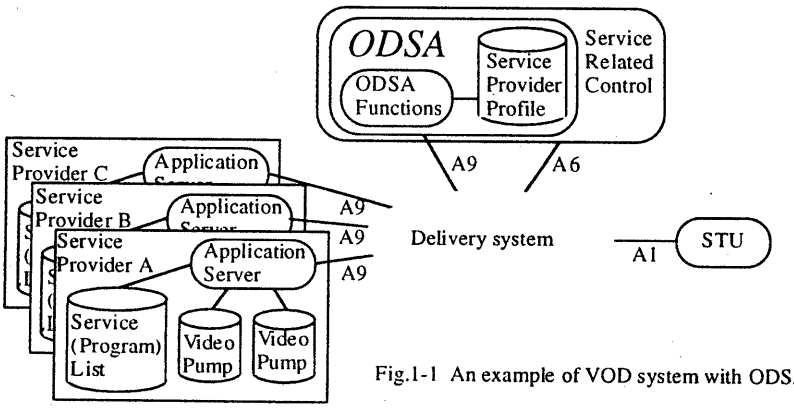

Fig.1-1 An example of VOD system with ODSA

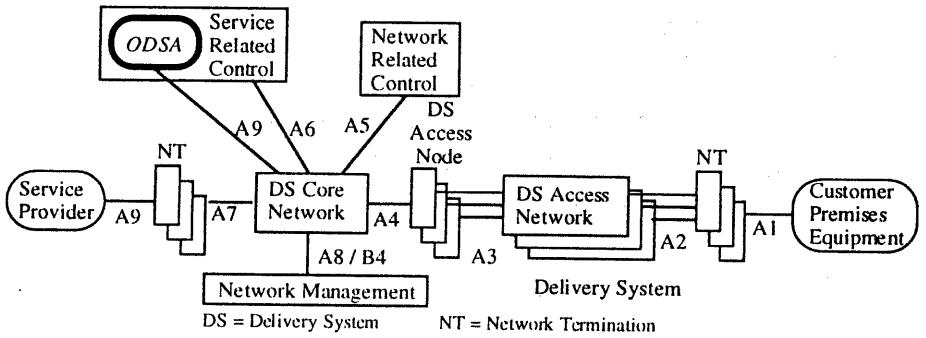

Fig.1-2 Delivery System architecture reference model with ODSA

3. *ODSA* functions

Fig.2-1 through Fig.2-3 show an example of VOD service sequence with *ODSA*. *ODSA* is responsible for the following functions in this example.

User Authentication (Fig.2-1)
Service Providers List Customization (Fig.2-1)
Service Provider Selection (Fig.2-1)
Public Service Warning (Fig.2-1)
Billing Information Collection (from Service Providers)(Fig.2-3)
Service Provider Authentication (Fig.2-3)
Billing Notification (to End users) (Fig.2-3)

User Authentication is mandatory. It is important for Navigation, Billing, etc. After this, *ODSA* customizes Service Providers List for End user. It should be required, because there will be a considerable number of Service Providers in the future.

ODSA is responsible to End user for Service Provider Selection. It is a little different from Service Selection and Program(Video) Selection. Because, VOD Service Providers are responsible to End user for their own service and program (video) selection after they are selected. But they don't have other VOD Service Providers information for Service Provider Selection, and they are not responsible to end user for Service Provider Selection.

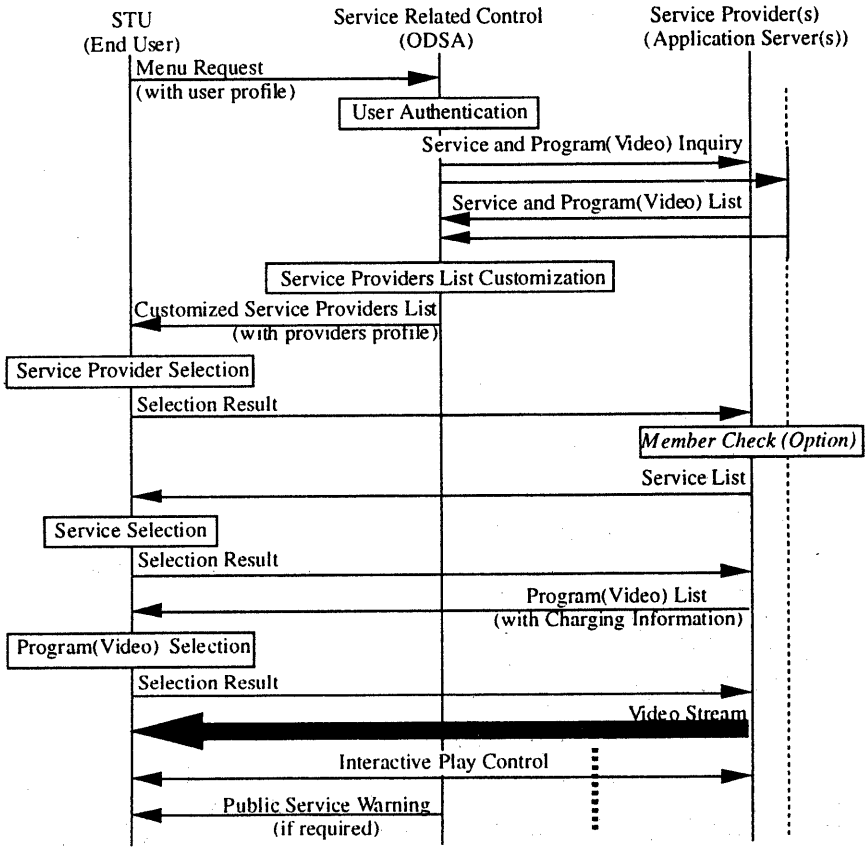

Fig.2-1 An example of VOD service sequence(1)

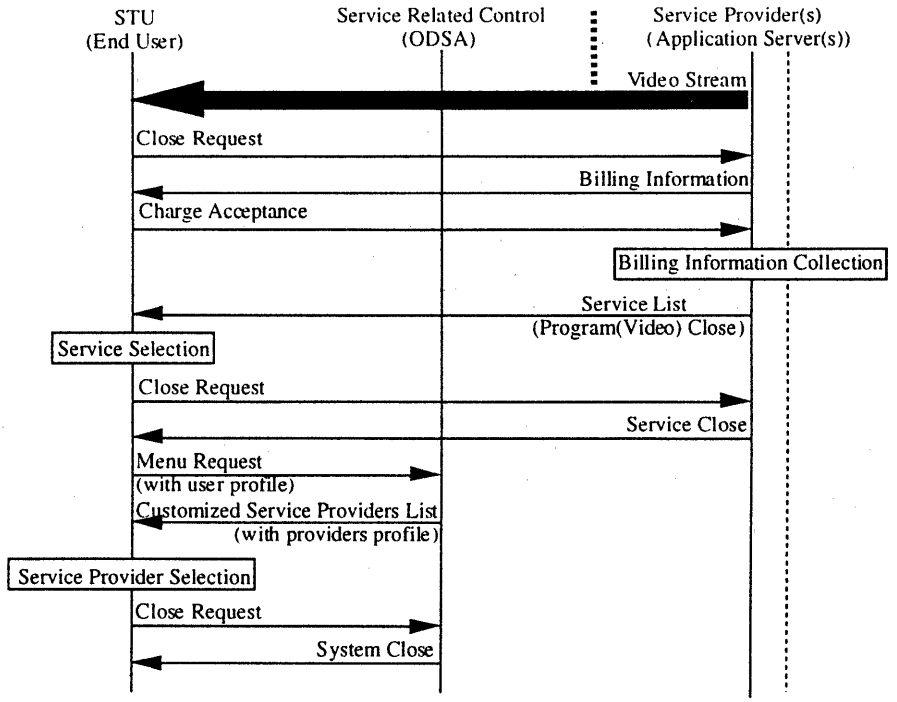

Fig.2-2 An example of VOD service sequence(2)

ODSA has VOD Service Providers List with their profile, but *ODSA* doesn't have their detail information (ex. Service List, Program(Video) List, etc.). So, *ODSA* has to get such information from VOD Service Providers for customization. Furthermore, if End user has a particular program(video) in mind, but he doesn't know the Service Provider of that program(video), *ODSA* manages to find the Service Provider in sophisticated navigation. In this case, *ODSA* should also get such information from Service Providers on demand. *ODSA* shouldn't have VOD Service Providers detail information, even if in sophisticated navigation.

VOD Service Providers may change their own services and programs(videos) at any time. If *ODSA* has such information, *ODSA* have to follow their changes and maintain such information. There may be problems in their inconsistency. But, if *ODSA* doesn't have such information and *ODSA* gets such information from them on demand, *ODSA* can always get the latest and the right information, and doesn't have to maintain such information.

Member Check is option. Service Provider is responsible for it. After a certain Service Provider is selected, it is required if the Service Provider wants to restrict the service provision.

ODSA should be responsible for "Public Service Warning". It is independent of the services that are provided by VOD Service Providers.

ODSA should collects Billing Information from Service Providers to notify such information to End users. It prevents End users from receiving a lot of Bill from different Service providers. Furthermore, *ODSA* may collect charges from End users on behalf of Service Providers, if it is allowed.

Service Providers Authentication is important as well as User Authentication. End users should know Service Providers are authentic, before they pay the charge.

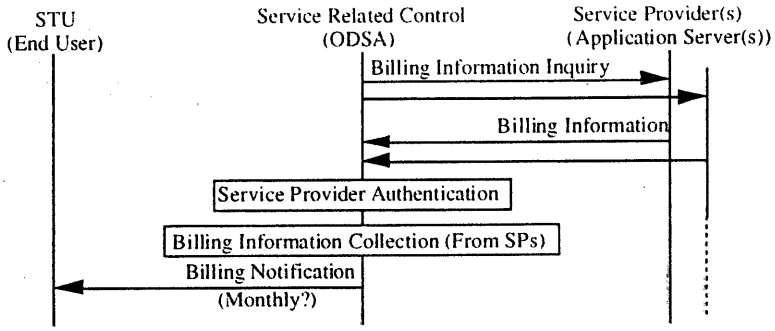

Fig.2-3 An example of VOD service sequence(3)

4. Conclusion

ODSA is a kind of Value Added Service Provider. It exists outside the Delivery System. So it is easier to customize *ODSA* functions for End users and Service Providers. This is one of the advantages of *ODSA*, because required *ODSA* functions may change depend on End users and Service Providers. *ODSA* is independent of End users and Service Providers. It is good for User Authentication and Service Provider Authentication. This is the other advantage of *ODSA*.

ODSA will be useful for VOD system in which a considerable number of Service Providers exist.

連続メディアを扱うためのオープンソフトウェアアーキテクチャ

Sony's Response to DAVIC CFP

連続メディアを扱うための オープンソフトウェア アーキテクチャ

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Sony's Response to DAVIC CFP

Outline

- √ What is Sony's Proposal?
- √ What Are the User's Requirements?
- √ Object-Oriented Framework
- √ Evolution Mechanisms
- √ STU, Minimum Requirements
- √ Communication Protocols (1/2)
- √ Communication Protocols (2/2)
- √ Summary

2

What is Sony's Proposal?

√ Sony is proposing an open system architecture, which must be sufficiently flexible to support application independent interoperability.

√ Our goals
- any vender equipment can be interconnected with other vender equipment.
- any vendor can implement application software that can be downloaded and run in any other vendor equipment.

√ This is achieved by...
- object-oriented software architecture (OMG based).
- evolution mechanisms to handle requirement changes.
- communication and signalling protocols based on ATM (OSI conformance).

√ NOTE! our proposal does not detail the interfaces of all of the required system modules, rather, it concentrates on describing the architecture that those software modules must fit into, and explains how those modules can be written and extended.

What Are the User's Requirements?

√ Attractive services at an attractive price
- one STU supports the largest number of existing services and future services.
- an STU should continue to evolve without having to shut down (or temporarily stop) the system.
- more than one service should be accessible at the same time in a transparent manner to users.
- when an STU evolves, enabling it to interact with new services requiring new kinds of capabilities, users should not notice.
- a cheap STU which can be purchased from different venders without fear of being limited to a reduced a set of services.
- an STU has an ability to connect to existing and future home equipment.

Object-Oriented Framework

√ OMG/CORBA
- our proposal uses the OMG/CORBA model as a means to describe our software architecture.
- CORBA consists simply of a set of software modules (called objects) that interact through a generic communication subtrate (the ORB).
- the ORB is responsible for ensuring that an object that conforms to the CORBA model can access and make a request on any other objects that conforms to the architecture.

√ Sony's object model
- each object implements some functions and makes these available via well defined interface.
- each object interact with others via a simple generic communication mechanism.
- each object relies on a set of other objects known as its environment.

Evolution Mechanisms

√ Assumption
- any attempt to fix software boundaries without a means to evolve them as hardware and requirements change is doomed to failure, thus our system architecture stresses how system interfaces can be defined and evolved in a clean and controlled manner.

√ Three mechanisms
- implementation evolution
  - change how an interface is implemented
  - uses dynamic loading and dynamic dispatch
- interface evolution
  - change object's typed interface
  - uses dynamic interface association and dynamic binding
- environment evolution
  - change behavior of the support environment
  - uses object migration between environments

√ What we have to standardize is these evolution mechanisms.

STU, Minimum Requirements

√ Software modules are downloadable from the the service providers to the STU.
√ Message communication format between objects
- M(longword selector, void* message)
- R(ID object, longword selector, void* message)
- Bind(longword vector, ID object, HardMessage* message, Boolean)
- Unbind(longword vector)

√ Download object API
- Migrate(ID object, ID environment)

√ Two-phase download process, object migration protocol
- Phase 1: a negotiation phase between two environments where an object moves, to ensure that the receiving environment supports the operations this object needs.
- Phase 2: a transfer phase which moves a representation of the object from one environment to the target environment, and installs it in that environment.

√ Access control and user profile
- We use access control lists (ACL's) managed by a protected environment; all cross environment invocation must use an ACL.

Communication Protocols (1/2)

√ Use international standards (official or de facto) wherever possible
√ ATM-based, down to the STU: why re-invent protocols for the access network when ATM is basically physical medium independent?
√ Use of a single AAL (AAL5): for signalling (mandatory in ATM) and for MPEG transport; implies cheaper implementation (no use of 2 AALs)
√ MPEG Transport Stream: 2 MPEG Transport Packets in 1 AAL5 SDU, which advantages:
- quality is preserved even if an AAL5 SDU is lost (i.e. more MPEG 2 Transport Packets in one AAL5 SDU risks hampering quality if one AAL5 SDU is lost),
- simplicity (good functional separation of layers),
- AAL5 is available from many vendors,
- solution to MPEG-2 source clock recovery (due to Cell Delay Variation) is possible using mechanisms in the MPEG-2 Transport Layer: it is a STU implementation-dependent issue (not a protocol issue).

Communication Protocols (2/2)

√ Can accommodate both MPEG-2 Constant Bit Rate and MPEG-2 Variable Bit Rate, in a simple and compatible way.
√ Choice of the physical layer (SDH/Sonet [STM1/OC-3]) at the STU Reference Point guarantees smooth evolution to fully-symmetric broadband services.
√ For Software Files transfer, the choice of the transport part of XTP over AAL5 guarantees:
- full "useful" bandwidth available,
- possible silicon implementation,
- versatile addressing capabilities.

√ STU "capabilities identification message" enables to optimize:
- the use of the full capabilities of STUs by Servers,
- the re-use of software previously downloaded to the STU by other Servers, if needed,
- the "future-proofness" of STUs.

Summary

√ We propose an open software architecture which is flexible and will evolve to meet future requirements.
√ We outline the minimal set of system functionality but do not define the interfaces to that functionality.
√ Our intention is to work with other vendors to define these interfaces within the framework of our software architecture.
√ Any STU based on the Sony open architecture will be able to evolve and to work with many vendors applications
√ We have defined a truly open, vendor neutral architecture which fully supports the DAVIC first CFP.

VOD系におけるHDTV静止画像システムの相互運用性について

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概要

CD-ROMもしくはMOディスクに記録された高精細度静止画像をベースバンド信号の状態で再生して、アスペクト比16:9、有効画素数1920×1080（又は1035）の形で表示するHDTV静止画像システムは高精細度静止画の表示装置として有用性を増している。

このHDTV静止画像システムは、日本ではすでに100個所を超える美術館をはじめ公共施設の静止画再生システムとして普及しており、多くの人々が大画面に表示された画面から臨場感あふれる映像を楽しんでいる。

閉回路テレビシステムの一つである本システムは、VODを含むネットワーク系に応用することにより、より広範囲にわたるサービスが期待できる。

本HDTV静止画像のためのディスクシステムは、日本国内ではHVC（ハイビジョン普及支援センター）によって定められた技術ガイドラインによって、ディスク上のフォーマットが定められている。また、すでにこのフォーマットはCCIR（現ITU-R）にも報告されている。

そこで、我々は、本HDTV静止画像システムと、DAVICによって仕様の詳細が定められるVODネットワークシステムとの間で、相互の運用性が保たれるよう提案したい。即ち、静止画ディスク再生信号がサーバーから家庭の端末（STU:Set Top Unit）にデコーダ用　コマンドと共に配信され、同時にSTUからは、任意の静止画及びその再生ソフトの検索が可能なコマンドがサーバーに向けて伝送できるような運用形態を整えた将来のVODシステムを提案するものである。

An HDTV Still Picture Disc System for Video on Demand

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Hideo Kusaka, Dai Nippon Printing Co.,Ltd.

Intellectual Property Rights Statement
Similar condition to the IEC patent policy.

Possible improvements of this document
NA

Executive summary

The base-band high definition still picture presentation system has been marketed as HDTV-museum in Japan. The number of HDTV-museum system counts more than 100, many people have watched the HD display, most people feel "sensation of reality". Though the system is carried in closed circuit now, we feel the system will expand widely using network. The technical guidelines for the HDTV still picture disc system are specified by Hi-Vision Promotion Center. We would like to recommend to keep interoperability between the HD-still-picture system and the VOD system specified by DAVIC.

1.Introduction

The high definition base-band still picture signal are stored in the optical disc, played according to the display control command recorded in the disc. The signal format of the still images, recording media are specified as technical guidelines by Hi-Vision Promotion Center (HVC). The guidelines specify the player control command, display sequence and effect control command, respectively. More than 100 of HDTV still picture systems are introduced, 1000 of playback software has been made. The disc system are applicable to VOD system, retrieve the picture and audio signal using control commands from the client system. The still picture data-base should be helpful to carry the VOD system at the still picture field.

2.Description of the process

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3.Architectural Framework

3.1 Introduction

The HDTV still picture disc systems are employed by art galleries as presentation system of fine arts (Application of HDTV system in museums; CCIR IWP 11/9-009 Sept 1990). It is important to keep disc interchange among these systems, HVC made technical guidelines for the exhibition type HDTV still picture disc system. HVC made the next technical guidelines for the retrieval type of HD-still picture disc system on May 1994, it is under investment by making the test disc of it.

The exhibition type guidelines specify the recording media and it's signal format. As to the recording media, MO, CD-ROM, CD-DA and FD are specified. The HDTV digital still picture data are compressed by JPEG coding scheme, and formatted according to the guidelines. The guidelines also specify the file formats such as volume, directory, information data and compression parameter, respectively. The guidelines specify the screen effects and playback control commands, too.

The image data file could be used for the VOD system as the part of still picture at the server. The file formats are also applicable at delivery system, display and playback control commands are useful for control & management and client.

3.2 System Reference Model

3.2.1 Generic Reference Model

The HD-still picture disc system are employed at the HD-museum, the disc has interchangeability between the system. These system could connect by transmission lines, it will operate as VOD system as following. The system construction is same as illustrated in figure 3.1 of DAVIC/100.

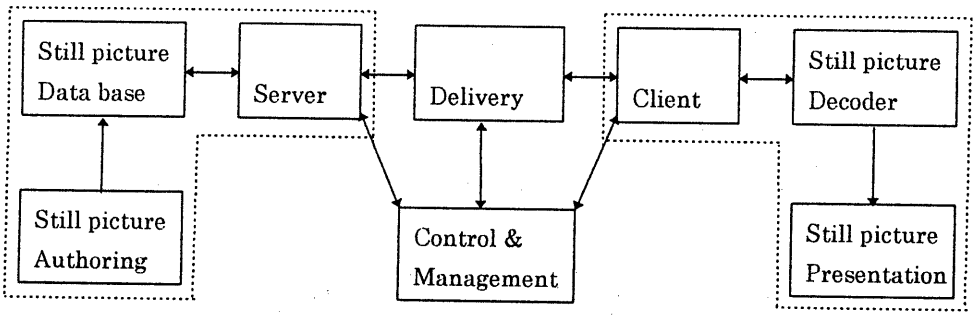

Figure 3.1 Generic Reference Model

Server:
The still picture disc system could use as a part of server to produce digital baseband high definition still picture images.

Delivery:

The delivery system should carry the still picture data and control command file.

Client:
To display the high quality images using the display commands, the reproducing system could be used as a part of VOD client system.

3.2.2 System Reference Model

Figure 3.2 shows a typical example of the composition of an HDTV still picture disc system. The HDTV still picture disc system employs three kinds of disc media, which record still picture data, sound data and control data, respectively. These discs are played back by each disc drive.

The HDTV still picture data is compressed by JPEG algorithm, recorded on the disc. It gives shorter playback time, two seconds per still frame. The compressed picture data is fed to JPEG decoding circuit, output HDTV still frame. The playback system employs three frames memories, three different HDTV still pictures are stored in the memory circuits.

The display effects circuit read the still picture from each frame memory according to the display commands from the control data file. The HDTV still picture signal with display effect, is fed to display.

The sound data file disc reproduces audio signal synchronizing to display effect of still picture presentation. The control data file includes the system playback sequence control using time-code.

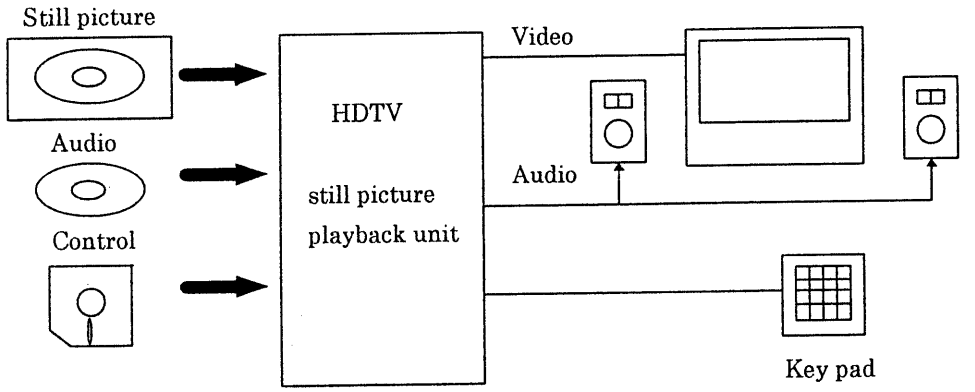

Figure 3.2 Typical examples of an HDTV still picture disc system.

3.3 Services

As one of the HDTV applications, there is a system called "HDTV Gallery System" which employs a disc of still pictures. First market appearance was in April 1989 as the "Hi-Vision Gallery of Fine Arts at GIFU". This proved utility of HDTV still picture systems and led further development and extension of the system applications.

As a standard specification for HDTV still picture system, the Hi-Vision Promotion Center (HVC) has drafted a document titled "Technical Guidelines for Exhibition Type HDTV Still Picture Disc System" in July 1991.

Various kinds of still picture software have been produced according to the Guidelines, which include "19th Century French Arts Appreciable in Japan" produced by the Association for Promotion of Hi-Vision Museum, and a program which introduces an artifact collection of the Hermitage Art Gallery produced by the NHK Enterprises as a part of the World Art Museum Series. Still picture software have been produced by local governments as well, which have amounted to more than 1,000 titles. (playing time of each

is approximately 10 minutes)

3.4 Set Top Unit

Figure 3.3 shows a typical example of an HDTV still picture decoding unit. The unit receives three kinds of signals which are still picture data, sound data and control data, respectively.

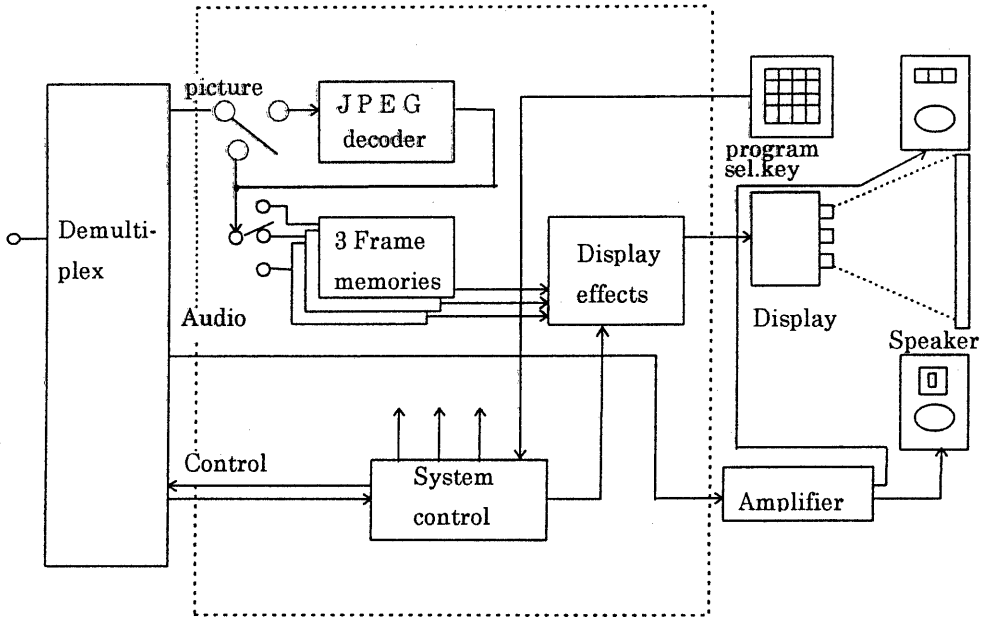

Figure 3.3 Typical examples of an HDTV still picture decoder.

3.4.1 Minimum Requirements

To be decided.

3.4.2 STU Logical Architecture

The HDTV still picture data is compressed by JPEG algorithm. It gives shorter playback time, less than two seconds per still frame by transmission rate of 1.4 Mbps. The compressed picture data is fed to JPEG decoder, generate HDTV still frame. The system employs three frames of picture memories, three different HDTV still pictures are stored in the memory circuits.

The display effects circuit read the still picture from each frame memory according to the display commands from the control data file. The HDTV still picture signal with display effect, is feeds to display.

Table 3.1 shows the basic image effect commands. There are more commands to control such as half-way-roll, open window, rolling in the window, etc.

The sound data file disc reproduces audio signal. The control data file includes the system playback sequence control using time-code.

Table 3.1 Basic Image effect commands

1	Simple cut	
2	Dissolve	
3	Wipe	Vertical wipe from top to bottom
4		Vertical wipe from bottom to top
5		Horizontal wipe from left to right
6		Horizontal wipe from right to left
7		Double opening from the center towards the top and bottom
8		Double opening from the top and bottom towards the center
9		Double opening from the center towards the left and right
10		Double opening from the left and right towards the center
11		Square opening
12		Square closing
13	Segmented wipe	Vertical segmented wipe from top to bottom
14		Vertical segmented wipe from bottom to top
15		Vertical segmented wipe from left to right
16		Vertical segmented wipe from right to left
17	Slide	Slide-out from top to bottom
18		Slide-out from bottom to top
19		Slide-out from left to right
20		Slide-out from right to left
21		Slide-in from top to bottom
22		Slide-in from bottom to top
23		Slide-in from left to right
24		Slide-in from right to left
25	Roll	Roll from top to bottom
26		Roll from bottom to top
27		Roll from left to right
28		Roll from right to left

3.4.3 Suggested Issues to be addressed by proposals

The system interface conditions should be decided.

3.5 Delivery system

3.5.1 Introduction

The still picture data file and control data file should be delivered using the VOD system discussed here.

3.5.2 Architecture reference mode

To be decided.

3.5.3 Interfaces

To be decided.

3.5.4 Service Delivery Across Networks

The system should have the capability to access software from client (home). The access unit includes the name of the disc, title of software, specific picture, etc.

To be decided.

3.6 Servers

3.6.1 Introduction

The still picture data files and control data file should be treated using the VOD system discussed here.

The servers should generate the logical file for picture, sound, and control signals. Figure 3.4 shows the outline of file map. The file is made up the four sections, such as volume section, compression parameter section, directory section and data section. The volume section has the management flags which identify the picture data is original or not, and the condition for the copying.

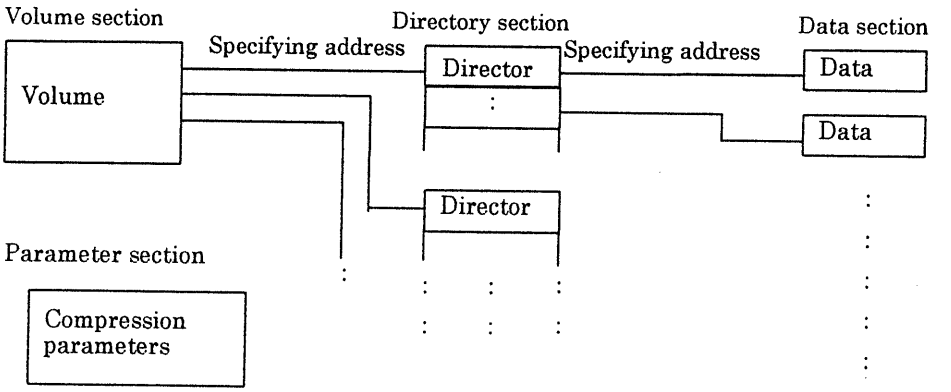

Figure 3.4 Outline of file map.

3.6.2 Assumptions

The system is assumed to be composed of the following major entities.

Server:

Refer to this section.

Access Network:

Refer to section 3.5.

Set Top Unit(STU):

Refer to Set top unit section.

3.6.3 Server Reference Model

To be decided.

3.6.4 Server Capabilities for Contents/Applications

NA

3.7 Critical Interfaces

NA

3.8 Interoperability Events

NA

4. Guidelines for submission and evaluation
NA

4.1 Submission format
NA

4.2 Evaluation criteria
NA

Appendix 1 Workplan and meeting schedule
NA

Appendix 2 Example Table of Contents of proposals
NA

Appendix 3 Other issues
NA

END

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Executive summary

The base-band high definition still picture presentation system has been marketed as HDTV-museum in Japan. The number of HDTV-museum system counts more than 100, many people have watched the HD display, most people feel "sensation of reality". Though the system is carried in closed circuit now, we feel the system will expand widely using network. The technical guidelines for the HDTV still picture disc system are specified by Hi-Vision Promotion Center. We would like to recommend to keep interoperability between the HD-still-picture system and the VOD system specified by DAVIC.

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Client: To display the high quality images using the display commands, the reproducing system could be used as a part of VOD client system.

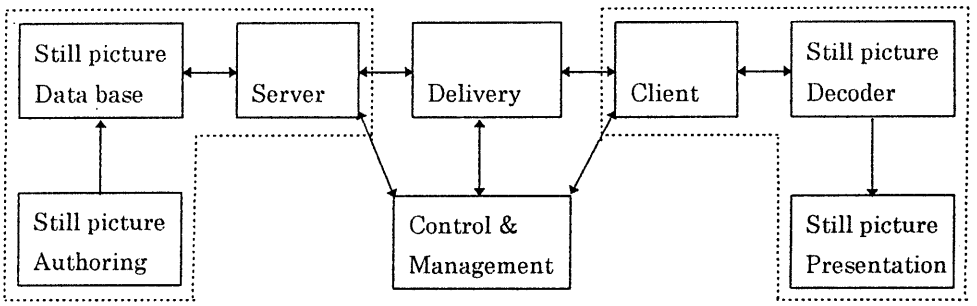

Figure 1 Generic Reference Model

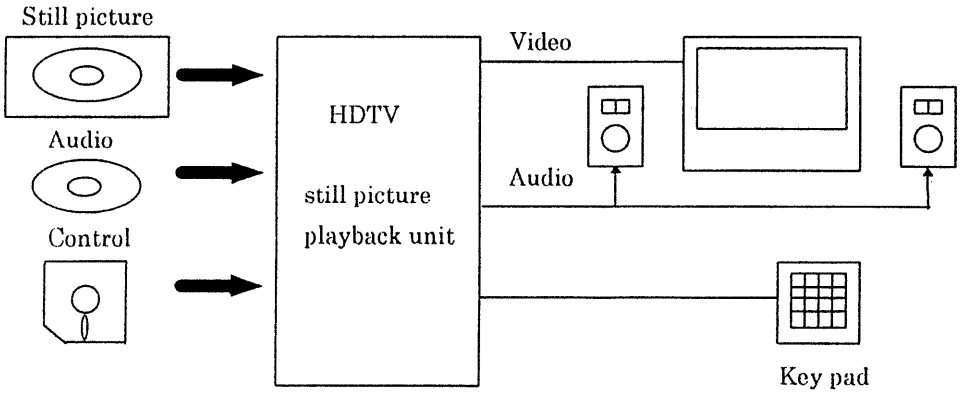

Figure 2 Typical examples of an HDTV still picture disc system

DAVIC 日本会議報告参考資料10
(94-AVM-7-3)

情報冷蔵庫システムとその情報アクセスモデル (情報の封印モデル) の提案

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あらまし

将来のマルチメディア提供システムとして提案されている情報冷蔵庫システムを実現するためには多くの研究課題が残されている．本論文では，情報冷蔵庫のみならず，他のマルチメディア情報提供システムのためのセキュリティモデルを提案する．これまでの情報アクセスでは個人識別とアクセス制御がセキュリティ技術として利用されているが，パッケージ情報のアクセスのセキュリティのためにこれらの技術を利用するだけでは十分ではない．なぜなら情報利用者の立場から見ると，パッケージ情報の取り扱いにおいて情報の獲得と利用は必ずしも一致しないからである．そのため，こうした情報利用の形態を考慮したセキュリティ機能を導入することは重要だと思われる．提案モデルは手紙や文書の信頼性を示すマークである封印の概念を利用するもので，これにより目的の機能を実現することが可能になる．

Proposal of ATM Mini-Bar System and Its Information Access Model – Information Seal

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Abstract

Many study issues are needed to be solved to realize an ATM Mini-Bar System, which is proposed as an infrastructure for future multimedia information providing system. In this paper, we would like to propose a new information access model for multimedia information providing service. In a traditional information access, both identity verification and access control techniques are used for security. To apply these techniques to accessing a packaged information, which DAVIC mainly treats, is not enough because getting information is not necessarily equal to using it in this type of application . Therefore, we think it is important to introduce an information security model which care for above type of information use. Proposed reference model utilize a concept of seal, which usually can be found on a letter or documents as a mark of authenticity, and a desirable function is incorporated by using this model.

1 Introduction

In this paper, we would like to propose a new reference model for information access. In a traditional information access, both identity verification and access control techniques are used for security. We think that these techniques are not enough to incorporate a packaged information distributing service, because it this type of application a getting information is not always equall to using it and these should be distinguished. Therefore, we think it is important to standardize an information access model which care for above type of information use. Proposed reference model utilize a concept of seal, which usually can be found on a letter or documents as a mark of authenticity.

2 Access Model - Information Seal

In this section, we would like to clarify what the information seal is and what functions are needed for incorporating the information seal.

2.1 Background

In a current information providing systems, a traditional charging is usually done when a communication channel is established even if the information isn't useful for the user. This fact not only prevent a fair development of information providing system which mainly treat a digital packaged information, but also cause high transmission cost for real time play, because information delivery between center and user terminal is needed every time. One idea to solve this drawback is that information is pre-delivered with a cheap channel and its charge is done when the information is used. Unfortunately the use of both user authentication and access control techniques are not good enough to satisfy an above application, because these techniques cannot distinguish between getting and using information. Therefore a concept of information seal is proposed as a reference model to generalize this type of access. By using the information seal, the above distinction become possible.

2.2 What are elements of information seal?

The information seal is understood as a technique lying between an access control and raw information shown in Figure 1. This figure shows that these three steps are maximally needed to access a raw information.

Figure 2 shows a comparison of a concept of the information seal and real seal. A real seal is found on a letter or documents. In order to see a letter, breaking the seal is first thing to do and it is difficult to see the letter without breaking the seal. The situation of using packaged information is same. It is natural way to think that the information access is breaking a pseudo-seal and that's why we call the access model as information seal. Two primary elements consist of the information seal. First element is 'seal' itself and next one is 'header'. Table 1 shows a requirement of each components.

2.3 Basic function of information seal

By means of information seal, it can be basically distinguish whether the information is used or not. Because it is impossible to use the information without breaking the information seal.

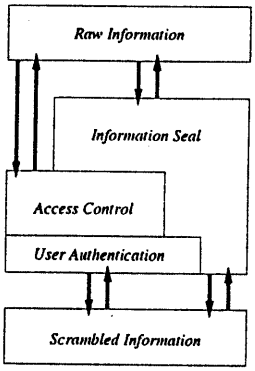

Figure 1: Relation between the information seal and other security techniques.

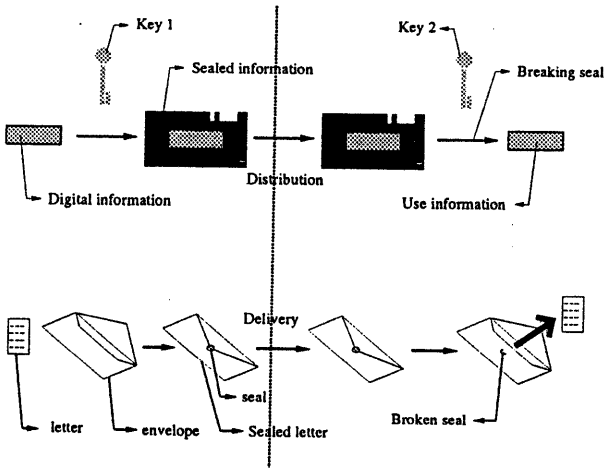

Figure 2: Basic concept of the information seal.

Table 2 shows two primary functions which information seal have.

3 Example - ATM Minibar System

In this section, a brief review of ATM Minibar System - our assumed system is introduced. As an example the above information seal is applied to this AMBS.

ATM Minibar System (AMBS) is an infrastructure of future multimedia information services[1, 2]. A purpose of the system is to provide for multimedia in which user can (1)select and get quickly any needed information, in low cost, at anytime, among very large amount of different media information provided by a variety of providers, (2)be charged on for the information which

Table 1: Requirement of each element of information seal

Element	Requirements	Examples
Seal	• The content of information is difficult to be disclosed without breaking a seal.	• Arbitrary encription method.
	• The broken seal is difficult to be restored.	• Encryption with an one-way function. (public key cipher)
	• The entity putting a seal is authenticated.	• Entity authentication.
Header	• The header indicates an overview of the content. • The header includes a part of information or a demo version of content.	• Addition of unencrypted information.

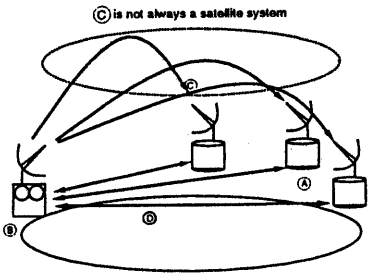

Figure 3: Basic configuration of ATM Mini-Bar System

is selected and used, and (3)edit or process information into his or her individually requested style before using them.

Figure 3 shows an example of basic configuration of the system. In this figure, Ⓐ represents user equipments with large internal storage, Ⓑ is information providing centers, Ⓒ represents information delivery media with a broadcasting/multicasting feature connecting information providing centers and user equipments, and Ⓓ is information networks providing 1 to 1 communication between user equipments and information providing center(s) for selective user equipment control and charging. Figure 4 shows a basic operating sequence of the system. AMBS has typfical four operations described as follows:

1. Information pre-delivery
   Different from traditional systems, AMBS pre-delivers information from a center to user equipments via a delivery media. This pre-delivery is based on an average user request forecast. All user equipments receive the same information at same time. The forecast of average user request will be done in centers by analyzing on accumulated history of information access key request from users. Each user equipments stores information from center in its local storage except that they are non-subscribed or non-permitted to store.

Table 2: Functions and its description for information seal

Function	Description	Examples
Sealing information	• Encrypting information not to be able to access it.	• Encryption
	• Adding a public information.	• Adding a part of content or a demo version of content.
	• Putting some mark on a seal.	• Entity authentication.
Breaking the seal	• Decrypting information to be able to access it.	• Requiring a decrypt key to the information center and decrypting information with it. • Decrypting information with an attached decrypt key. • Decrypting information with key stored inside a terminal.
	• Authenticating an entity to break the seal.	• Utilizing a user ID or a terminal ID.
Function when detecting an invalid access	• Self deleting • Reducing the value of the information	• System call • Computer virus

2. Information search and access key request
   When a user of user equipments want to user some information, he or she will search it in the internal storage. If the requested information is in it, the user equipment request an access key of the information to the center via managed network because all information stored in a user equipment are sealed except for publically open part. If it does not exist it, a request for the information itself will be sent to an appropriate information center via managed network, and the user will get them from center in a similar way to a traditional system in case the center recognizes the request is valid.

3. Validity check and charging
   The center will identify and check validity of the request from user equipment via managed network. If the request if valid, center will send the access key to the user equipment via managed network, and charge for the requested information. If the request is not valid, the center will send an unacceptable notice to the user equipment via managed network and clear the communication between them.

4. Breaking seal and using information
   With the key sent form the center, user can break a seal on the information and can use it. If invalid access is detected, the system try to delete the information or add a kind of virus which decrease a value of information.

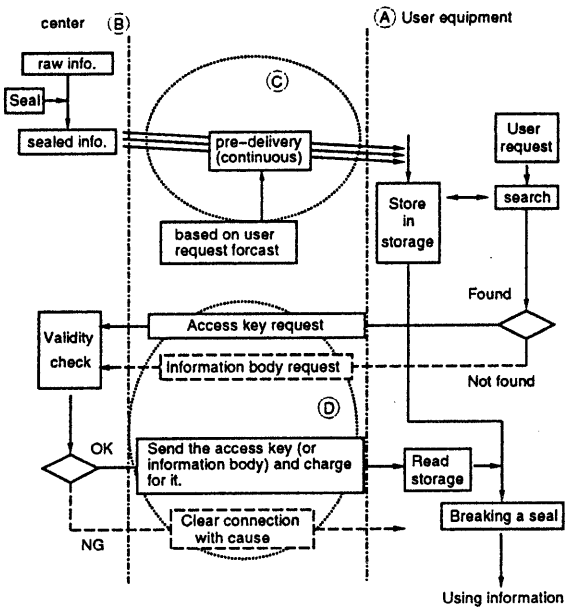

Figure 4: Basic operating sequence of ATM Mini-Bar System

In AMBS, a stored information is charged when using it. Therefore the information seal plays an important role to incorporate this function as specified above.

4 Conclusion

In this paper, a security model for accessing packaged information is proposed. The proposed reference model is based on a concept of seal found on a letter or documents. By means of this model, it is possible to charge a use of information, not retrieval. This is an important point because user don't want to pay a useless information which is difficult to know without trial. If an invalid access is detected, the system don't try to protect the information but delete it. A needed elements and its requirements are shown to incorporate the information seal. And also, basic functions, which information seal have, are described. As a technical example, the information seal for ATM Mini-Bar System is shown.

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[1] 小菅 康晴, 富永 英義: "情報冷蔵庫システム", 情報処理学会研究会報告, 93-AVM-2-1 (1993).

[2] 富永 英義, 小菅 康晴: "巨大論理アドレス空間を用いた情報提供システム", 情報処理学会研究会報告, 94-AVM-4-9 (1994).

Source: Michi Iwasaki, Shin-ichiro Hayano, Kentaro Misawa, Shiroh Sakata
(NEC Corporation)

A Protocol Architecture for MOD Services

This proposal responds to Layered Service Model, mainly Section 3.3.2.2 Three-Layer-Model in CFP.

1 Introduction

This paper describes a protocol architecture and a framework of Application Programming Interface (API) --- Hyper DSM-CC. **Figure 1 shows the application model supposed in this paper.**

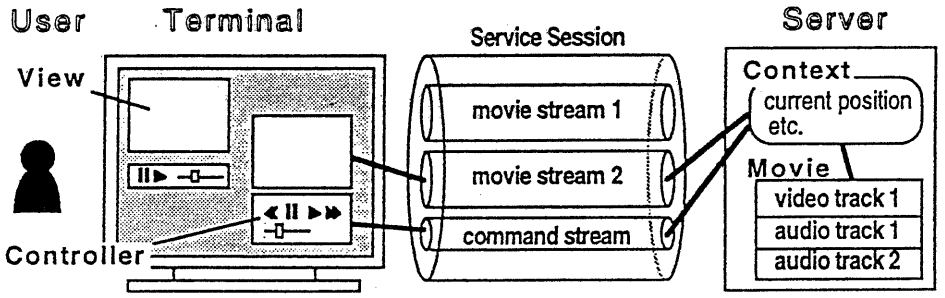

Figure 1. Application Model (Hyper DSM-CC Model)

When applications work, they allocate and utilize various system resources through the "Service Interface" and the "Delivery System Interface" in the Three-Layer-Model of the Call for Proposal. Some services can be provided by a node itself through Service Interface, namely API. However, to provide some other services, it is necessary for a node to communicate with other nodes. Therefor, both an API set and protocols should be standardized to obtain the interoperability between servers and terminals. An API framework and a protocol architecture we propose are described in the following sections.

2 Application Programming Interface Categories

Functionalities which API should provide are categorized as follows in the Hyper DSM-CC API framework.

1. Hypermedia Management
   (a) Node Management --- Hypertext Node Creation / Deletion, Node Contents Editing
   (b) Link Management --- Link Nodes / Unlink Nodes.
2. Remote DB Access Management
3. Content Management

(a) Movie Management (VCR Control)
   i. Movie-Media --- Select Movie, Select Tracks (ex. A movie may contain multiple audio tracks.)
   ii. Movie-Context --- Playing back, Trick-play, Change Current Point, Suspend (some resources are deallocated while the context being kept) / Resume, etc.
   iii. Movie-View --- Manage View-Port rectangle on screen, Video Imposing, etc.
   iv. Movie-Controller --- Video Controller Management to interpret user input, etc.
(b) Object Control --- Object Create / Delete, Get / Put.

4. Interaction Object Management --- GUI Object Creation / Deletion / Manipulation on local or remote nodes (ex. Button, TextField, Menu, etc.)
5. Communication Management
   (a) Service Session Management --- Connect / Disconnect, Terminal Capability, Security, Recording User Operations
   (b) Stream (Connection) Management (Video, Multimedia, Command) --- Allocate / Deallocate, Band-Width Control, Buffer Control, Select CODEC type of stream
6. Miscellaneous Service Management
   (a) CODEC Module Management --- Select CODEC Type (coding form) on Servers and Terminals (MPEG1, MPEG2, JPEG, etc.), Select CODEC Module (Multiple implementations for the same CODEC type may be available on a terminal)
   (b) Dimension Management --- Time Line (unit: time, frame number), Movie and Screen Geometry Management (layout and clipping), etc.

Movie Management functions correspond to a DSM-CC Extension --- *ISO/IEC JTC1/SC29/WG11 N0806, MPEG94/ November 1994, MPEG-2 DSM-CC Subgroup, "Working Draft of ISO/IEC 13818-6: MPEG-2 Digital Storage Media Command and Control Extension".*

3 Protocol Architecture

This section describes a networking protocol architecture. It is necessary to offer services that need cooperation between nodes.

3.1 Overview

As for video playing back control, a protocol like DSM-CC extension is supposed. To provide generic services to build MOD applications, some more protocols as follows are needed.

1. Connection Management
2. Hypermedia Control --- It may be implemented over the Object Management Protocol.
3. Remote Database Access

Figure 2 shows Hyper DSM-CC protocol architecture. Layers below the Session Layer are not described. Each of these protocols is described in following sections.

3.2 Application Layer

Application layer is placed on top of this protocol structure. This layer consists of four logical sub-layers as shown in the **Figure 2**. This layer includes many protocols, and provide corresponding functionalities to applications.

3.2.1 Application Specific Protocols

There may be some protocols that are specialized for each application program.

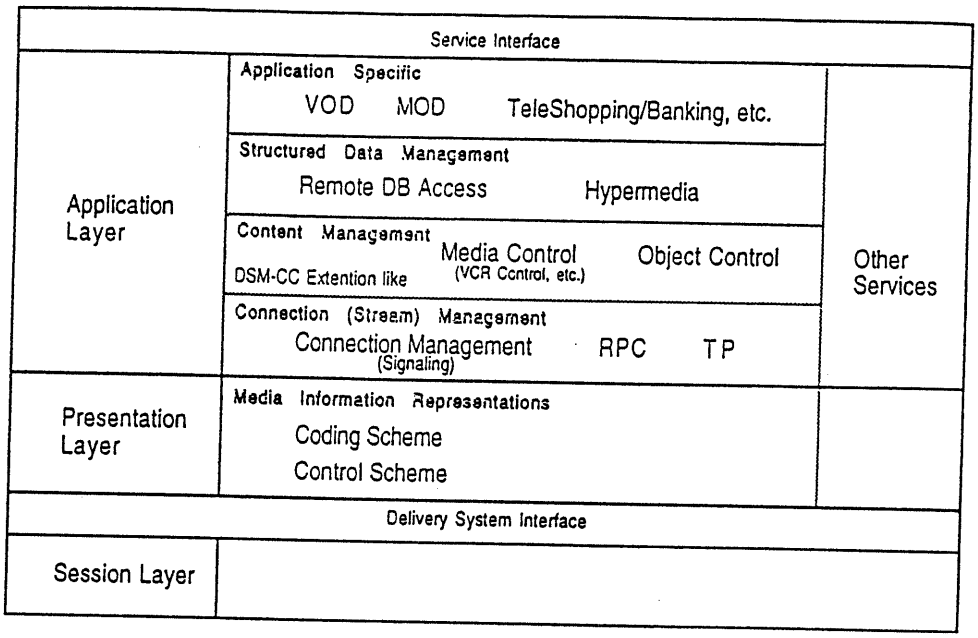

Figure 2. Protocol Architecture

3.2.2 Structured Data Management — Hypermedia / Remote DB Access

Some applications present multimedia information to the users, and they need means to access data located on the remote nodes. Hypermedia Access and Remote Database Access protocols are supported for this purpose in this layer. These protocols are used to build applications such as VOD, NOD, Tele-shopping and Banking service. They also aid building navigation programs. Navigation for MOD consists of following two functionalities. 1. Inter-Program Navigation (ex. Video Program Selection), 2. Intra-Program Navigation (ex. Playback Control in a Video Program). Hypermedia is a very useful framework to implement various forms of navigation.

3.2.3 Content Management --- VCR Control / Object Control

In the middle of the application layer, there is a layer that controls and manages the contents itself. This layer could include functions such as video control and object handling. The video control function is to play, pause, set speed, jump, etc. The object handling function is an object creation, deletion, instance get and put, etc. This layer is covered by the DSM-CC extension standard.

3.2.4 Communication Management --- Connection Management, RPC, TP

This sub-layer supports some forms of network communications and network resource management facilities.

Connection (Stream) Management

In order to provide a VOD service, the relationship between service control and network control is important. The service control supports service request and response to manage resources for the service. The service control allocates server and client resources for the requested service. On the other hand, the network control supports network connection setup to manage network resources. The network control allocates transmission facilities to transport information.

When a VOD service is requested, both the service control and network control should work simultaneously to allocate appropriate resources from a server, client, and network. Connection management function provides the association among the server, client, and network resource in order that the service and network control work properly.

Remote Procedure Call (RPC)

There is the situation that an application server program running on a server node calls a program in another node. In this case, the inter process communication method between server nodes is indispensable. When programs work cooperatively in distributed processing environment, Remote Procedure Call (RPC) mechanism should be equipped. In this protocol structure, RPC layer is necessary for upper layer function modules to communicate corresponding modules on other nodes. RPC also provides transparent communication by hiding heterogeneity of the network environment. It enables programs communicate one another without knowing information about network address of the other nodes. In some cases, it uses name service facilities equipped by network gateways. With this RPC layer, a request between servers is processed as a subroutine call in one machine.

Transaction Processing (TP)

Multimedia services, such as Tele-shopping, are based on the interaction between STUs and servers. Requests to organize such an interaction should be processed as transactions. Therefore Transaction Processing (TP) protocol layer needs to be equipped in the protocol structure.

When a system includes many transaction clients, it is important to control requests to utilize the system resources efficiently. Otherwise, the system performance falls down easily. TP layer manages queued messages from clients properly and controls the load balance of the system to keep performance being good.

3.3 Presentation Layer

Presentation layer supports some representation schemes for multimedia data --- Coding scheme and Control scheme. Coding scheme handles static coding format (ex. JPEG, MPEG, etc.). Control scheme handles dynamically controlled signal standard (ex. NTSC, PAL, etc.). In this layer, interfaces to select appropriate schemes are also provided to applications.

4 Conclusion

Both APIs set and a protocol architecture should be standardized to achieve the interoperability between STUs and servers. A protocol architecture was proposed for this purpose. It includes Structured Data Management Layer and Communication Management Functionalities other than Content Management (ex. VCR Control). An API framework for MOD applications is also proposed.

VOD Service Quality

Tatsuo Mori, Kenich Hosaka, Kazunori Shimamura
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Summary

This proposal responds to *3.3.1 Video-on-Demand service attributes* in CFP. (mainly Access contorol and user profile, Billing/charging, Cotent management) We propose the minimum conditions that should be supported by systems in order to guarantee the quality of VOD services provided to users. It is necessary to specify quality from a wide range of viewpoints. Quality aspects should be treated on a second level with a higher-level set of specifications. Concrete parameters for the minimum specifications and thehigh-level viewpoint specifications are proposed in the following. Specifically,

(1) Considering the privacy of users, we have proposed a protection level for user profiles (user ID, terminal class, password, age, sex, name, address, phone number). We propose that connection times and charge details are recorded with privacy protection.

(2) We define the quality of contents and intellectual property protection to make it easier for CPs (contents providers) to provide contents. We have also proposed a definition for the delivery quality of contents to allow safe usage by users.

- We propose limiting the bit rate of the MPEG1 video component in VOD signals up to 4 Mbit/s.

(3) To clarify the conditions that the STUs should satisfy when there is a fault in the server, we propose definitions for the on-demand quality (response time, picture quality) and the system-down influence level (time to recovery, recovery level).

- Considering the interface with the STU, the Time-Out of the response from the Server is taken to be 60 seconds.

1. Introduction

To guarantee the quality of VOD services provided to users, it is necessary to investigate the regulation of conditions that systems should support at two levels: the minimum level that all systems must attain, and conditions that they should meet at a higher level.

This document proposes concrete parameters, minimum specifications and high-level specifications for thesecurity of user profile management, the registration of connection times and charge details, the protection of intellectual property rights, delivery quality levels, and the quality of contents. And this document clarifies the conditions that STUs should satisfy when there is a fault in the VOD system.

2. Proposals for DAVIC

This section specifies the minimum conditions that should be supported by systems in order to guarantee the quality of VOD services provided to users.

- User notification: The way in which users are alerted when loss of quality occurs

- Recovery of user degradation: Reimbursement of charges
- System recovery in the event of obstructions: Execution of possible fallback procedures within the system inside the shortest time interval

And it is necessary to specify quality from a wide range of viewpoints. For example, the qualityof contents delivery and intellectual property protection must be considered. Quality aspects such as these should be treated on a second level with a higher-level set of specifications. Concrete parameters for the minimum specifications and the high-level viewpoint specificationsare proposed in the following.

(1) User profile protection level

(i) User profiles are regarded as comprising information such as the user's name, address and telephone number. In terms of privacy levels, this information can be broadly classified into three groups: (a) primary data used to specify users, (b) secondary information related to the service, and (c) tertiary information related to the individual users. The privacy levels of these groups are assumed to increase in the order (a) < (b) < (c) and to be used according to agreement between users.

(ii) The profile classification is as follows:
  (a) User ID
  (b) Terminal class
  (c) Password, age, sex, name, address, telephone number

(2) Registry level of communication records and charge details

(i) Considering the privacy of users, the communication records are classified according to whether they are used for complaints, for specifying system resources or for CP notification.
  - Those used for complaints can be accessed using the user ID as a keyword
  - Those used for system resources and CP notification can only be used as statistical data without specifying individual users.

(ii) Considering the privacy of users, the registry level of charge details is broadly divided into two types of information: (a) basic primary registry data, and (b) detailed secondary registry data. The contents of these two types of information are as follows:
  (a) User ID, indx number (charge count)
  (b) Connection times, program IDs

(3) Definition of intellectual property rights to contents (including author's rights, publishing rights, artist's rights, copy protection, etc.)

(i) Author's rights, publishing rights, artist's rights, copy protection, etc. of contents

(ii) Author's rights, publishing rights, artist's rights, copy protection, etc. of management table [= minimum specification]

(4) Definition of contents delivery quality level (e.g. bit rate, image class)

Register the delivery quality level of the contents.
  (a) Bit rate
  (b) Image class (e.g., coding method: MPEG1, MPEG2, etc.)

We propose limiting the bit rate of the MPEG1 video component in VOD signals up to 4 Mbit/s. This is because, in the upper bounds for bit rate stipulated in the MPEG2 international standard, Main Profile at Low Level are 4 Mbit/s.

(5) Definition of multimedia class (Media quality, degree of composition, level of synchronization, level of conversion support)

(i) Media quality (display and guarantee the quality of video, audio, text etc.)

(a) Video: clarity, resolution

(b) Audio: stereo, hi-fi, audio quality

(c) Text: character classification

(ii) Degree of composition

Level 0: Main media only **[= minimum specification]**

Level 1: Support supplementary media

(iii) Degree of synchronization

(a) Synchronization of moving pictures, still pictures and superimposed titles during ordinary playback

Level 0: Synchronization no better than the registered contents **[= minimum specification]**

Level 1: Better synchronization than recorded contents (compensation data included)

(b) Synchronization of moving pictures, still pictures and superimposed titles during special playback (fast forward, rewind)

Level 0: No special playback **[= minimum specification]**

Level 1: Rank A/B

Rank A : Special playback of pictures only

Rank B : Special playback synchronized with the media in the recorded contents

(iv) Degree of conversion support

(a) Conversion support

Level 0: No support **[= minimum specification]**

Level 1: Supported

(b) Support classification

Text <-> Speech

Speech <-> Translated speech

(6) On-demand quality (Response time, Support level of menus)

(i) Considering the interface with the STU, the Time-Out of the response from the Server is taken to be 60 seconds.

(ii) VOD menu information

Level 0: Off-line menu **[= minimum specification]**

Level 1: Rank A/B

Rank A: Basic menu (Titles listed according to genre, with replay time of contents)

Rank B: Detailed menu (Titles listed according to genre, with replay times and summaries of contents)

(iii) VOD menu retrieval support

Level 0: No menu retrieval support **[= minimum specification]**

Level 1: Rank A/B

Rank A: Menu retrieval support (help function)
Rank B: Menu retrieval support (active search functions)

(7) Allowable extent of system downs (time to recovery, user quality at recovery time)

(i) When a system goes down during program replay, the time to recovery is taken as a parameter. (No charges must be incurred when a system goes down during retrieval) minimum specification)

(ii) The time to recovery is taken as a parameter of the restart level in system-downs.
Phase 1: Restart within the specified period of time.
Phase 2: Restart after the specified time.

(iii) After system downs, the user notification of user quality and the recovery level are defined as follows:

(a) User notification
Level 0: Notify in initial screen after recovery **(= minimum specification)**
Level 1: Rank A/B
Rank A: Notify in menu retrieval after recovery intermittent notification thereafter
Rank B: Notify when a program is requested after recovery intermittent notification thereafter

(b) Priority level of those affected by system downs
Level 0: Restart regardless of the status before breakdown **(= minimum specification)**
Level 1: Rank B: Restored within a fixed period of time, with priority given to the users before the breakdown

3. Conclusion

This document has proposed minimum specifications that all VOD systems should satisfy and higher-level specifications for the purpose of guaranteeing the quality of services provided to users. Specifically,

(1) Considering the privacy of users, we have proposed a protection level for user profiles (user ID, terminal class, password, age, sex, name, address, phone number). We have also proposed that connection times and charge details are recorded with privacy protection.

(2) We have defined the quality of contents and intellectual property protection to make it easier for CPs (contents providers) to provide contents.
We have also proposed a definition for the delivery quality of contents to allow safe usage by users. And we have proposed limiting the bit rate of the MPEG1 video component in VOD signals up to 4 Mbit/s.

(3) To clarify the conditions that the STUs should satisfy when there is a fault in the server, we have proposed definitions for the on-demand quality (response time, picture quality) and the system-down influence level (time to recovery, recovery level). And we have proposed the Time-Out of the response from the Server is taken to be 60 seconds.

By adopting these proposals as the DAVIC standard, they will form guidelines for VOD systems and services in the servers of all companies.

著作権処理のためのシステム構造の提案

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〒247 横浜市栄区野七里 1-17-24

要 旨

劣化のないﾃﾞｼﾞﾀﾙｺﾋﾟｰの時代には、著作者や隣接権者が安心して著作物を託せる仕組みを提供して、はじめてﾕｰｻﾞｰはﾃﾞｼﾞﾀﾙ技術の恩恵を受けた高品質で便利な利用環境を得ることができる。本報告は問題の姿、どうあれば良いか、どうすれば良いかを論じ、DAVICへの提言内容を紹介する。

Proposal on Copyright Processing
- System Structure -

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ABSTRACT

In the age of Digital Copy of no degradation, a relyable system is needed for copyright and neighboring right owners to serve their properties. And user can get the Digital high quality and easy to use tools only when such system is really produced. This report discusses point of the copyright issue, what it should be and how to do with it, and introduces Proposal for DAVIC on Copyright Processing.

問題の姿

文献複写やﾎｰﾑﾃｰﾋﾟﾝｸﾞの普及は著作者や出版社、ﾚｺｰﾄﾞ会社の収入に影響するとして問題視されてきた。劣化の殆どないﾃﾞｼﾞﾀﾙｺﾋﾟｰ技術は権利者のさらに大きな悩みのﾀﾈであり、高品質のｺﾋﾟｰ機能を危惧する声が高い。一方、一般の利用者は高品質で便利な道具を求めており、同じくﾃﾞｼﾞﾀﾙ技術による自在なｺﾋﾟｰ、さらには編集や検索の機能、利用ｺｽﾄも安価であることを期待している。著作権問題ではﾃﾞｼﾞﾀﾙ技術が社会の発展より利害の対立を深めるやに見える。

問題の原因

技術は複製の機能そのものは追求してきたが、複製利用に伴う権利処理つまり支払いの手段は併行して手掛けては来なかった。そのため、やむなき無断複製が横行する。

どうあるべきか

手軽にｺﾋﾟｰが出来るが、この利便性を全うするためには同時に手軽に支払いが出来る必要がある。ｺﾋﾟｰ機能だけが進歩する一方で、支払いは人と人との個々のやりとりでは無理があり、義務履行も電子化が不可欠である。著作者や隣接権者は 高度なﾕｰｻﾞｰ機器に対し著作物の利用状況を把握し、権利の安全と適切な報酬を得たい。ﾕｰｻﾞｰも 利用条件を知って安心して使いたい。そのためには需、流、給、三者の情報交換の場が必要である。

どうすれば良いか

著作物が裸のﾃﾞｰﾀのままでは元からの権利もﾒﾃﾞｨｱの権利も不安定であり、ﾕｰｻﾞｰの地位も不明確である。　まず、著作物個々に識別ｺｰﾄﾞをはじめ、契約条件などの著作権情報が付記され保護されること。そしてﾒﾃﾞｨｱ全体はこの情報を保護し継承した上で付加価値を求めること。ﾕｰｻﾞｰは義務履行のためのﾌｨﾙﾀ機能を装備すること。ｲﾝﾌﾗとなるﾒﾃﾞｨｱは契約の記録をとり証人となること。以上の条件を満たす仕組みを提供する。

提案の骨子

VODを幕開けとする新しいﾒﾃﾞｨｱの時代に、当初から構造化すべき点を抽出し提案する。すなわち、著作物が何処でどの様に売買されても、その権利保全がされ、課金が自動的に行われる仕組みを実現する。

全体の構造は Fig.A に示す通り著作物のﾃﾞｰﾀ、それらを扱う機能ｴﾝﾃｨﾃｨ、それらを支えるﾈｯﾄﾜｰｸからなり、それぞれが商品、店や権利者、ﾕｰｻﾞｰ、市場に相当する。著作物は符号化された作品内容と著作権情報特に契約条件の記述がﾃﾞｰﾀｶﾌﾟｾﾙとして一体化される。著作物のﾃﾞｰﾀｶﾌﾟｾﾙを扱うｴﾝﾃｨﾃｨは著作権情報の内容に従ってこれを利用し、またこの情報を継承して著作物を仲介する。

ﾕｰｻﾞｰは著作物を利用する装置に契約順守のため機能を限定するﾌﾟﾛﾐｽﾌｨﾙﾀを装備し、契約条件の合意を表明する。各ｴﾝﾃｨﾃｨをつなぐﾈｯﾄﾜｰｸは著作物を扱うｴﾝﾃｨﾃｨの契約内容を記録し、証人役を果たす。

まとめ

劣化のないｺﾋﾟｰの時代には、新しいﾒﾃﾞｨｱの成否は著作権の扱いに掛っている。著作物を安心して託せるﾒﾃﾞｨｱとするにはｼｽﾃﾑの市場導入の当初から標準方式としてﾃﾞｰﾀの中に著作権情報が仕込める構造とする必要がある。

REFERENCES

[1] M.Kitamura."Copyrights and Convenience in Multimedia Communication" JW-MMC'94 Oct.13'94

[2] M.Kitamura."Copyright and Convenient utilizing of Multimedia Software" The IEICE Telecom, Quality Study Group Sept.9 '94(JP)

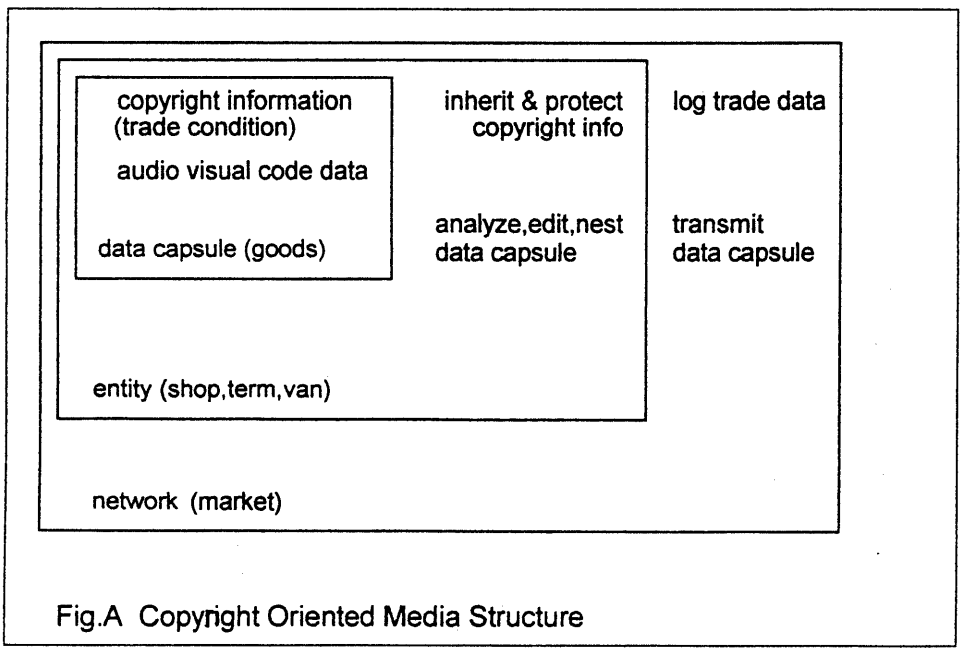


Fig.A Copyright Oriented Media Structure

The Digital Audio-Visual Council DAVIC/CFP/072—b

Title: # Proposal on Copyright Processing

Subject: Response to DAVIC's First Call For Proposals

Author: Masatsugu Kitamura TEL/FAX +81-45-893-9217
Date: December 1994

Summary:

The followings should be introduced electronically.

IP	show trade condition
Data	content in capsule with trade information
Entity	inherit trade information
STU	equip promise filter
User	contract (with promise)
Net	record contract log

Copyright owners and their lawyers don't have any ideas of technological way to solve the copyright issue. They cannot propose to technical committees or hardware manufacturers. Then we, technology side should first offer idea of solution for their claims. That is, the new system should have a room for scripting copyright trade conditions. That means all the copyrighted works wear their own copyright information instead the naked data style.

System structures:

Media are changing from only majority kind, such as B.C. and disc or tape package, to fully selectable or personal kind, applying network and server. And copyright processing is changing accordingly, from lawyer's job as blanket style of big trade among big companies, to automatic electronics task, as individual ,a large number of and each tiny sized trades. (see Fig.1)

Then, the System structures as above summary is required.

IP has to show his own trade condition to each copyrighted work.

First, from user side, for their doing duty that is payment, offering trade condition from IP is needed.

Data should have content in capsule with trade information.

Copyright trade must be processed electronicaly and the content is protected with the information of copyright trade conditions instead of being carried naked by mediator, server or distributor. Spreading market in Network causes copyright side needs their own trade information throughout in the network.

Entity should inherit the trade information in data capsule which it carrying.

In Digital network media, many mediators can be and produce a varieties of value added services.

Fig.2 shows a network introducing the data capsule. Original information is the most important for protecting the property then inherited throuout from IP to user carried by many mediators, and IP's are easy to produce their own properties into the network and can get reasonable payback. There, everyone can be a VASP.

Fig.3 ,4 show sequence for trading and promise filter.

STU must equip the promise filter.

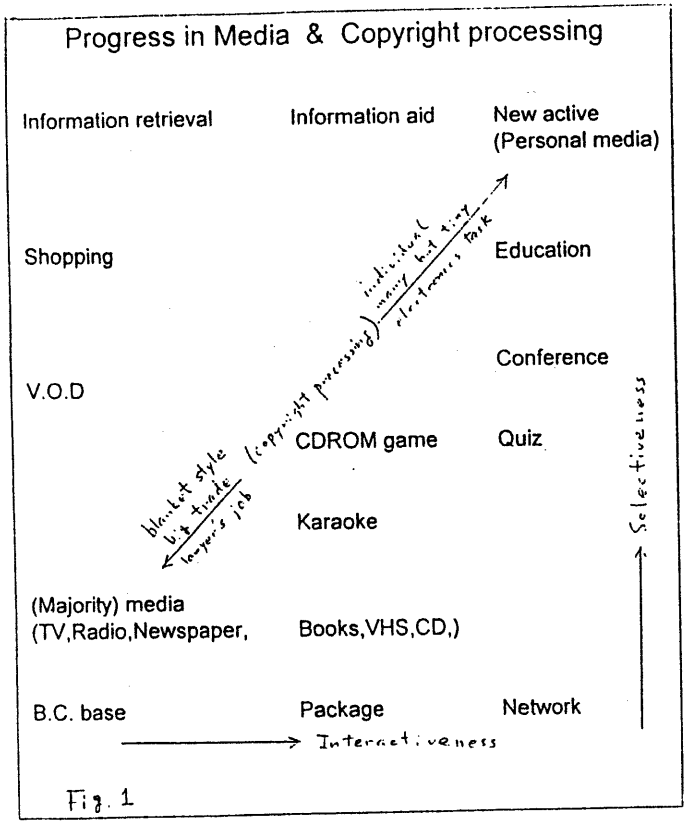
User has to make contract with promise .

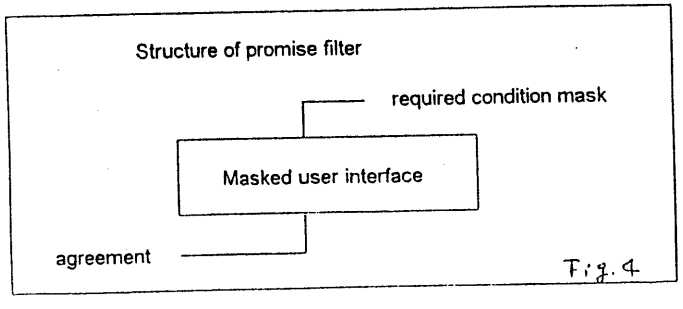
Copyright side requires encription and keys for protecting his properties. But it will not be complete. By the way, people fear to be excluded from network like credit card owners. Then simply the record of their contract is effective to protect copyright from violations. User's contract sequence is recorded in network, and promise filter masks a certain function control under the agreement.

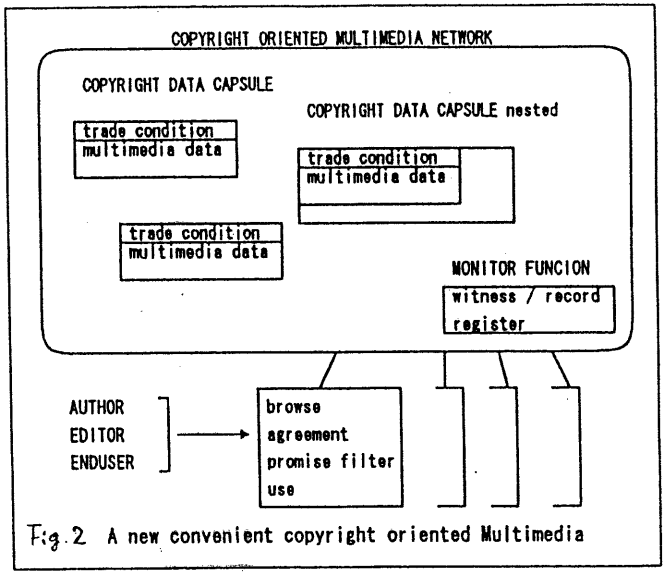
Net plays a role of witness by recording contract log.

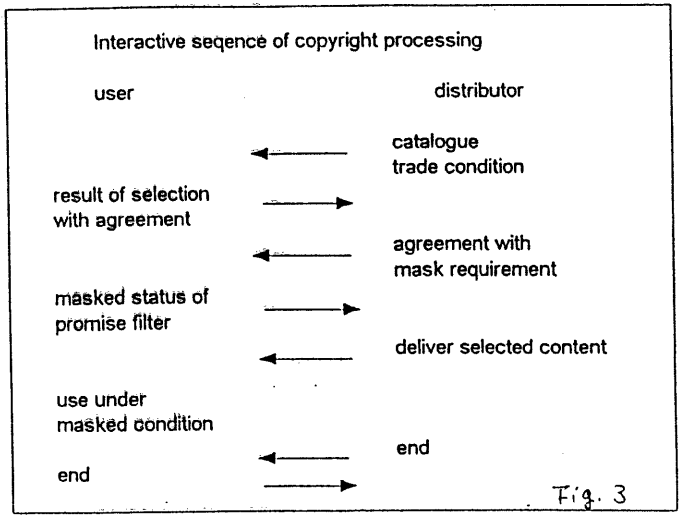
So, when a problem arises the record is opend and the concerned persons read and derive reasonable judgement.

We cannot have the complete system but can get properly working system. IP wants to have the information of his profit and the status of his property in the network.


Progress in Media & Copyright processing
Information retrieval
Information aid
New active
(Personal media)
Shopping
Education
Conference
V.O.D
CDROM game
Quiz
Karaoke
(Majority) media
(TV,Radio,Newspaper,
Books,VHS,CD,)
B.C. base
Package
Network
Interactiveness
Selectiveness
(copyright processing)
blanket style
Fig. 1


Structure of promise filter
required condition mask
Masked user interface
agreement
Fig. 4


COPYRIGHT ORIENTED MULTIMEDIA NETWORK
COPYRIGHT DATA CAPSULE
trade condition
multimedia data
COPYRIGHT DATA CAPSULE nested
trade condition
multimedia data
trade condition
multimedia data
MONITOR FUNCION
witness / record
register
AUTHOR
EDITOR
ENDUSER
browse
agreement
promise filter
use
Fig. 2 A new convenient copyright oriented Multimedia


Interactive seqence of copyright processing
user
distributor
catalogue
trade condition
result of selection
with agreement
agreement with
mask requirement
masked status of
promise filter
deliver selected content
use under
masked condition
end
end
Fig. 3

アプリケーションダウンロード方式の検討
Category: STU-VASP IF

1

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Goal

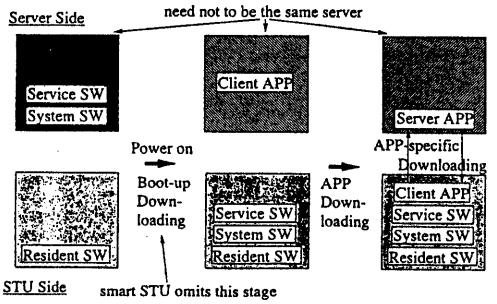
Interoperability with *MAX* flexibility of products.

Conclusion

- APP downloading is the most important issue for interoperability.
- Download Control Script is promising to manage APP downloading.

STU-Server Dialogue

2



Needs the Standard (in the APP layer)?

3

Boot-up Downloading - to get system & service SW

? (for further discussion)

APP Downloading - to get the core program of an APP

Yes !

To reach any APP from any STU-platform.

Downloading in an APP - to get the miscellaneous stuff

Not necessarily.

The protocol can be specified in the core APP program downloaded in the previous stage.

Also, required download performance may depend on APP.

Requirements of APP Downloading

4

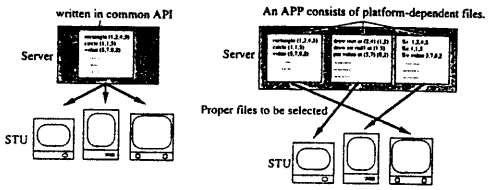
- Independent of the file structure of APP.
- Subsumes an APP distributed over multi-servers.
- Avoids unnecessary downloading;
  - by executability checking,
    - e.g.
      - code type
      - amount of free memory
      - amount of free storage area
  - by version checking
- Scarce interactions.

File Structure of APP

5

Shared file by all STU platforms

Platform-dependent files



Both cases should be subsumed.

Selection of Proper Files

6

- Server Originated
  1) STU's capability is notified to the server.
  2) The server selects proper files.

  → Load is concentrated on the server.

- STU Originated
  1) A selection procedure is downloaded from the server to the STU.
  2) The STU selects proper files.

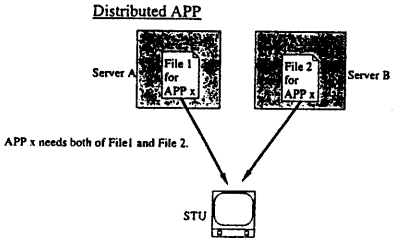
  → Load is distributed over STU's.
  Good for efficient sharing of server's CPU power.

STU originated approach is better.

Distributed APP over multi-servers

7

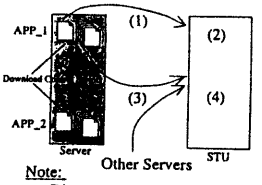
Distributed APP



Download Control Script

8

- Accompanies each APP.
- Shared by all STU platforms. - Simple language in ASCII text.
- Specifies;
  - the proper files to be downloaded for each STU platform.
  - the servers storing those files.
  - the convention to launch the APP.



Example: Downloading APP_1.
(1) Download a script for APP_1.
(2) Interpret it.
(3) Download necessary files.
(4) Launch APP_1.

Note:
Direct downloading without using a script is still *allowed*.

Sample of Download Control Script

```
os1:x::                          /* OS ID:extension:: */
    5                            /* minimum free memory size */
    0468592829:your_account:your_pwd:newskernel1.exe:356:1.0
    /* server ID:account:security key:filename:filesize:version */
    0468593123:anonymous::jpegview1.exe:512:1.1
    0468592829:shared_account:1ud7Jnj:news.dat:1224:2.0
    newskernel1 news.dat     /* convention to launch the APP */
os3:y::
    5
    0468592829:your_account:your_pwd:newskernel3:256:1.0
    0468593123:anonymous::jpegview3:456:1.2
    0468592829:shared_account:1ud7Jnj:news.dat:1224:2.0
    newskernel3 news.dat
```

Note: We don't stick to this syntax. It's just for an explanation.