

# 대화형 디지털 TV 방송

## 기술과 표준

1999. 11.12.

안치득, 김용석

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## Contents

1. Current Issues
2. Approaches
3. Implementation
4. Conclusion

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## Issues

- o No broadly agreeable specifications and trials
  - ATSC, DVB, ITU
  - DAVIC, AICi, ATVEF, etc.
  - FloraTV, NexTV, etc.
  
- o Need provisions for the whole broadcasting chain including contents creation, delivery, and client
- o Need contents IPMP(Intellectual Property Management and Protection) and CAS(Conditional Access System)
  
- o PC on TV v.s. TV on PC : Others vs WinTel

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## Methodology

- o Need to specify gradual APPLICATIONS/SERVICES scenario first
  - electronic commerce
  - education : sw download etc.
  - data services : EPG, data ticker, interactive ad., interactive entertainment, etc.
  
- o Define functions to be provided from client side first then delivery chain and service provider
  
- o Define business models and do field trials

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## International Standard Activities

- Transport and service protocol (draft standard)
  - ATSC T3/S13, S16
  - DVB (ETSI)
- Client API (draft standard)
  - ATSC-DASE (T3/S17), ATVEF
  - DVB-MHP
- Service Specification (in progress)
  - FloraTV : based on ATSC standard in USA
  - NexTV : based on DVB standard in Europe
- Interactive Contents Specification : AICi

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## Major Interactive Service Activities

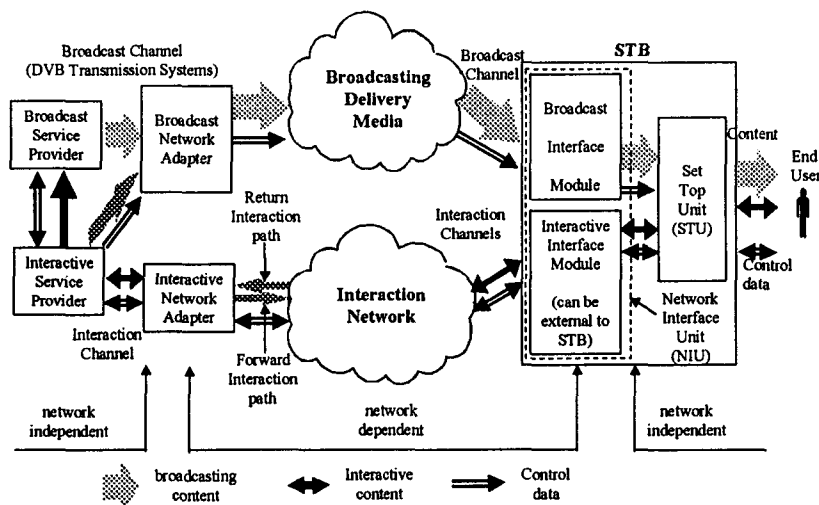
- WebTV, OpenTV : in business in USA, EU, etc.
- MS & AT&T : trial in USA
- AOL & DirecTV : trial in USA
- FloraTV : service research trial in USA
- NexTV(New media consumption on extended interactive broadcasting environment) : service research trial in EU

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## Interactive service system model



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## Interactive system model

### o Broadcast channel

- one-way from the broadcast provider to the user
- carry content and/or control data required by the interactive application and/or communication protocol to the user(receiver)
- may include the forward interaction path for interactive services

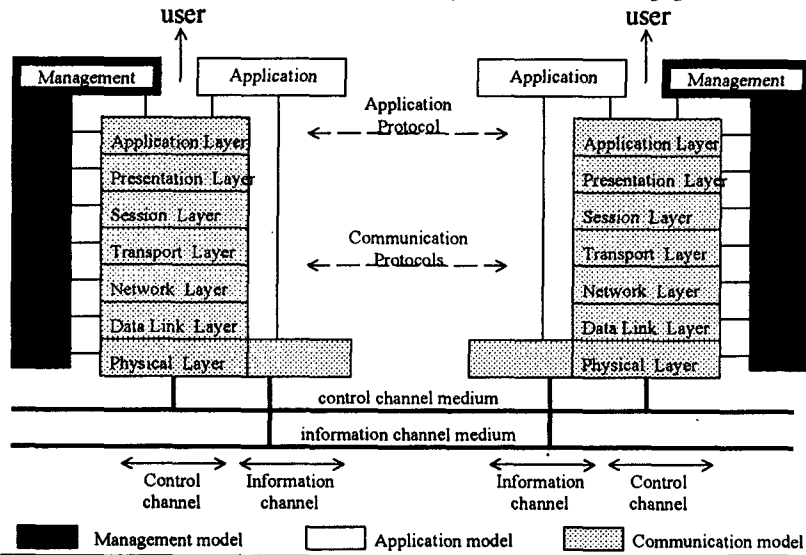
### o Interactive channel

- bi-directional between the receiver and the interactive service provider
- carry both content and control data required by the interactive application or communication protocol
- forward interaction path for data from the broadcast provider to the user, i.e., downstream
- return interaction path for data from the user to the broadcast provider, i.e., upstream

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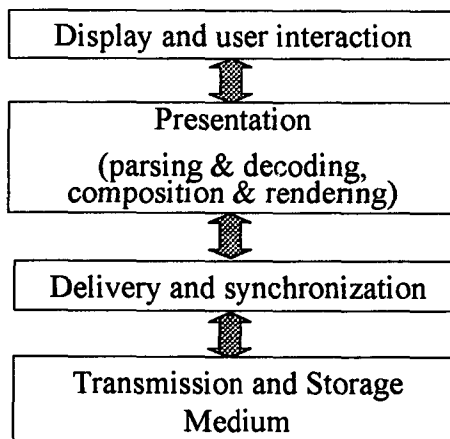
## Protocols for Interactive Service



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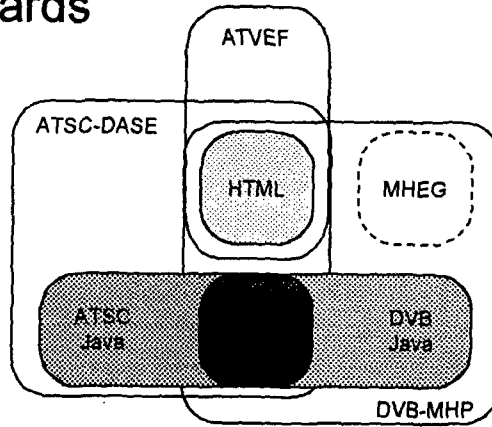
## Interactive Terminal - General Architecture



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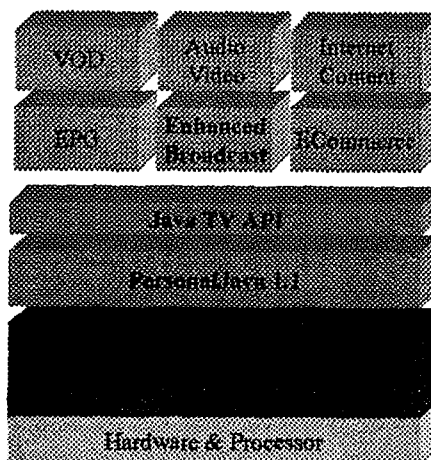
## Differences of Interactive DTV Standards



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## JavaTV

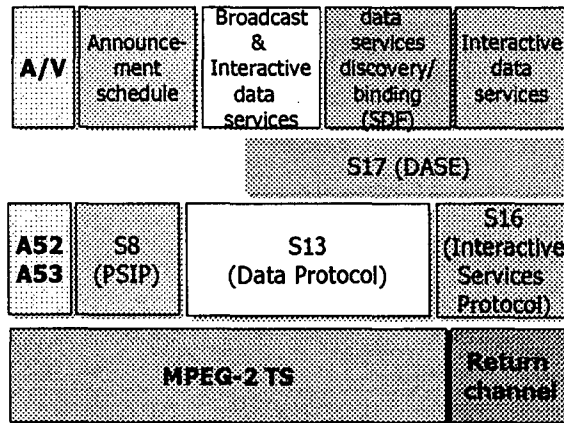


- Network Independent Application Environment for Broadcast Networks and Television Receivers
- An optional extension to PersonalJava™ providing standardized access to set-top box capabilities
- Provides JavaTV API

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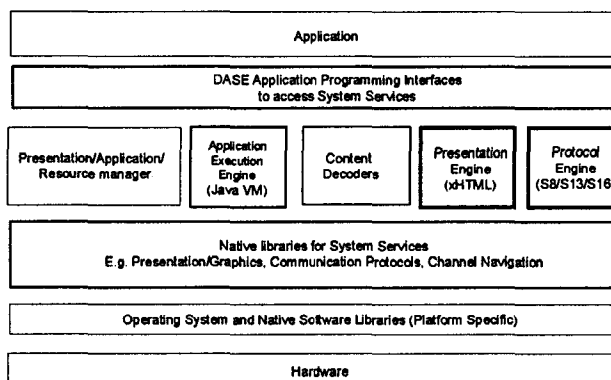
# ATSC Standards



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# ATSC- DASE : architecture



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## ATSC-DASE : components

- o Application execution engine(AEE) : Java VM
- o Presentation engine(PE) : xHTML with Cascading Style Sheets
  - ECMAScript for inline dynamic control of the declarative content (optional).
  - Document Object Model interfaces for control of the declarative content through ECMAScript or the application execution engine
- o Content decoders : Java Media Player API for MPEG-1, 2, QuickTime, AVI, WAV, AU, MIDI, and MPEG-4/VRML
- o System services : JavaTV API
  - access system services, presentation service

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## DVB-MHP

- DVB-TAM(Technical issues Associated with MHP)
- MHP encompasses the peripherals and interconnection of multimedia equipment via the in-home digital network
- MHP include protocols, common API Languages, interfaces and recommendations.

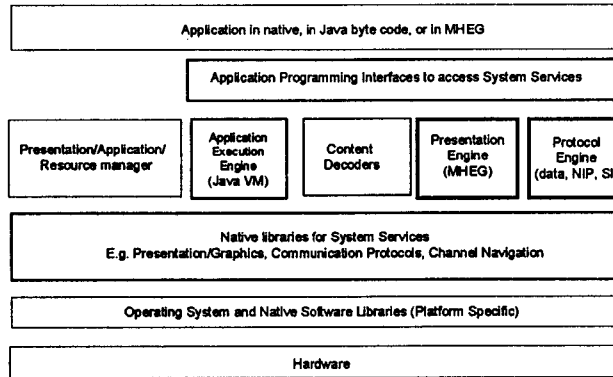
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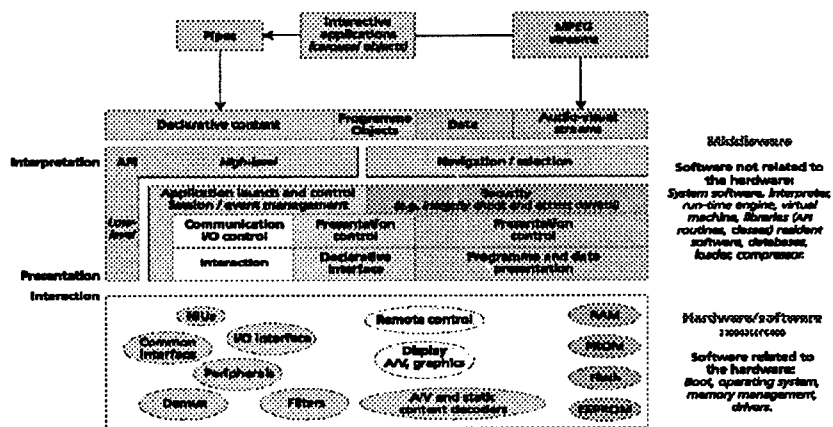
# DVB-MHP reference model



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# DVB reference model : API & middleware



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## Differences between DVB & ATSC

### : Interactive Application Specification

Broadcast Service	DVB	ATSC
<i>Application code</i>	Native/Java byte code, MHEG	Java
<i>API</i>	MHEG interpreter and Java TV API	Java TV API
<i>PE</i>	MHEG/XHTML	xHTML
<i>AEE</i>	Java VM	Java VM

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## Differences between DVB & ATSC Data Broadcast Protocol

Broadcast Service	DVB	ATSC
<i>Proprietary</i>	Data Piping	Data Piping
<i>Asynchronous</i>	PES DSM-CC Data Carousel	DSM-CC Data Carousel
<i>Synchronous</i>	PES	PES
<i>Synchronized</i>	PES	PES optional: DSM-CC Data Carousel
<i>Protocol Encapsulation</i>	Datagram section: LLC/SNAP Encapsulation IP Datagram	Datagram section via LLC/SNAP
<i>Asynchronous Data Carousel</i>	DSM-CC Data Carousel	DSM-CC Data Carousel

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## AIC - Purpose

o to integrate interactive content (creation) specifications for user devices to offer a range of basic through advanced interactive applications using 3D as well as 2D content, in stored and streamed form : missed in current ATSC and DVB standards

-->to integrate MPEG-4/X3D/JAVA, and xHTML in order to provide interactive broadcasting services over MPEG-2 TS, IP and DSM

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## AIC Principles

- Delivery in various transport environments
  - including MPEG-2 and IP environments
  - and combinations of broadcast/interactive delivery
- Presentation engine : XML
  - **integration** of MPEG-4, xHTML (XML-ized HTML 4.0), X3D (XML-ized VRML) content
  - focus on high level session description and — MPEG-4 BIFS commands and animation

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## AIC - Architecture

- o based on ATSC-DASE & MPEG-4 over MPEG-2 TS, IP and file format for DSM
- o delivery & streaming framework
- o presentation engine(parsing & decoding, object model integration, composition & rendering, ...)
- o application execution engine(session management, ...) by JAVA VM and API

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## FloraTV in U.S.A. - I

- o From 1999. 5.
- o Purpose :
  - o trials of interactive, on-line and e-commerce services over digital broadcasting media and the internet
- o Receiver interoperability thru terrestrial/cable/satellite TV
- o Services :
  - o E-Documentary, E-Classroom, Customized Commercial, Impulse Buy, Interactive Sports, E-Promotion(E-Coupons, E-Rewards), E-TV(Web portal), E-Neighborhood chat rooms, etc.

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## FloraTV in U.S.A. - II

- o Standards : ATSC, W3C, MPEG, OpenCable, etc.(DVB next)
- o DigitalTV technology : DASE, JavaTV, etc.
- o Web and Internet technology : xHTML, TCP/IP, RTP, etc. (AICi next)
- o 3D technology : Web3D

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## NexTV in Europe

- o From 1999. 5.
- o Purpose
  - trials of interactive, on-line and e-commerce services over digital broadcasting media and the internet
- o Standards
  - DVB, AICi(MPEG-4, Web3D, XML, Java, etc.)
- o Receiver interoperability thru
  - terrestrial/cable/satellite TV

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## NexTV : Applications

: Digital TV 광고 기능 향상을 고려한 정보서비스 위주

- o advanced EPG, program enhancement
- o buy-me button with ad
  
- o data ticker
- o interactive home shopping
  
- o interactive commercial
- o interactive entertainment
- o demographic programming, etc.

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## DAVIC : Applications

: 디지털 전송 환경에서 전통적인 TV 서비스 기능 향상

### 1. TV anytime

- o User initiated services
  - EPG, Internet connection, Embedded reference, Immediate recording
- o Agent initiated services
  - pre-defined user profile
  - PSIP(Program & System Information Protocol) 및 확장된 정보 이용
- o Video file transfer

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## DAVIC – Applications(cont.)

- o Content usage
  - Web link, segment jumping, content customization

### 2. TV anywhere : Digital TV on Internet or mobile networks

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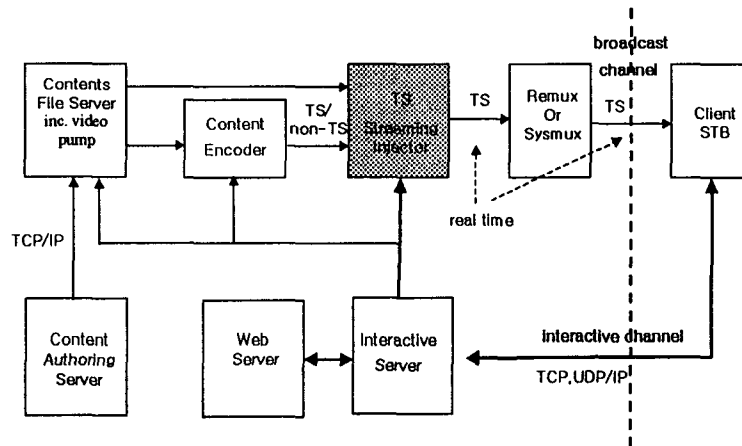
## Implementation example

Services	Protocol	비고
EPG	ATSC-PSIP	
Data broadcasting	ATSC t3/s13 data broadcasting	
Web data	ATSC t3/s13 data broadcasting	
부가정보	XML	다양한 방법 존재
Interactivity	MPEG-4 systems	
local storage	TV anytime	
Object description	MPEG-4 systems	MPEG-4 채택여부
Scene description & PE	PSIP + BIFS (xHTML)	HTML 수용
AEE	(Java VM)	Java VM 유력

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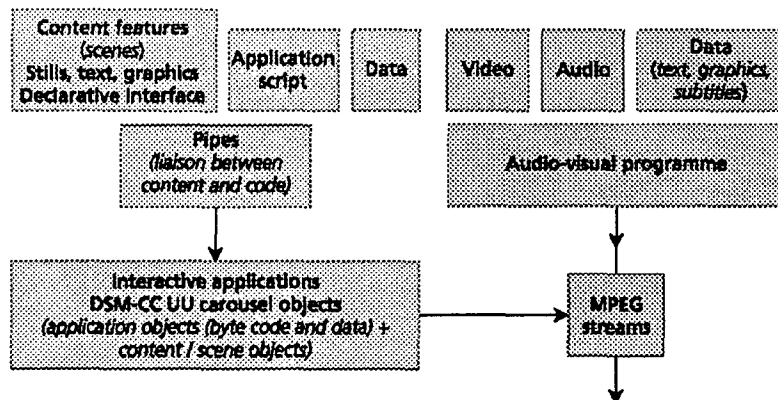
## Streaming for interactive services: environment



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## Streaming for interactive services: reference model

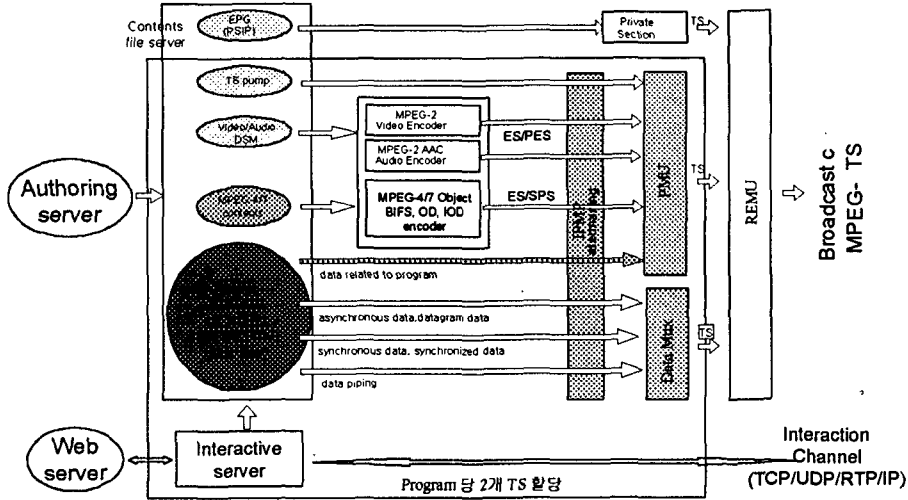


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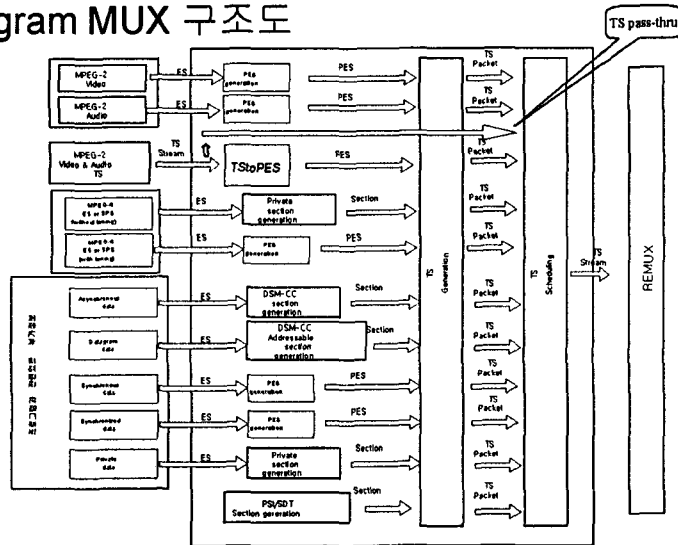
# Streaming for interactive services : architecture



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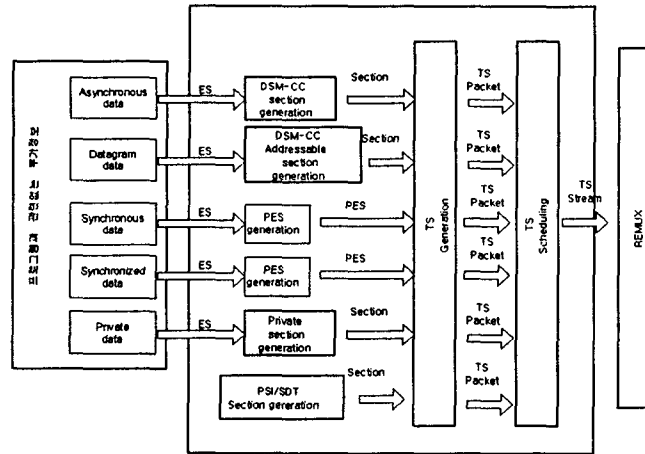
# 프로그램 관련 MPEG-4 및 부가정보 Program MUX 구조도



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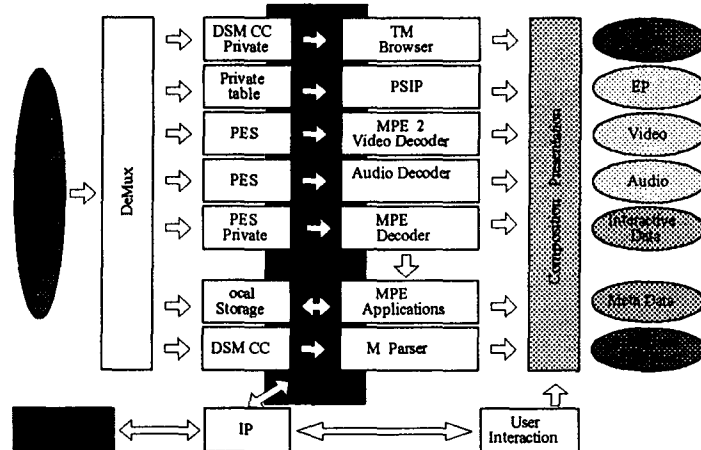
## 프로그램과 관련 없는 Data MUX 구조도



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## Interactive STB Structure



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## Issues to be solved

- o Contents production
  - multiple standards and tools : need to harmonize DASE, DVB, W3C, AICj, etc.
  - need to define contents exchange formats : mp4 file format
- o Delivery systems
  - streaming thru broadcasting, telecommunications, and Internet
  - transcoding, splicing, switching(routing) in compressed domain
  - contents IPMP, CAS related to E-Commerce
- o Client
  - universal STBs

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## Conclusion

- Need to specify what kind of interactive services be introduced in time: E-Commerce is the must
- Gradual development/deployment of services including required equipments
- Join international activities and develop domestic development platform

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