

대화형방송 표준화 및 서비스 동향

강대갑

2001. 11. 23

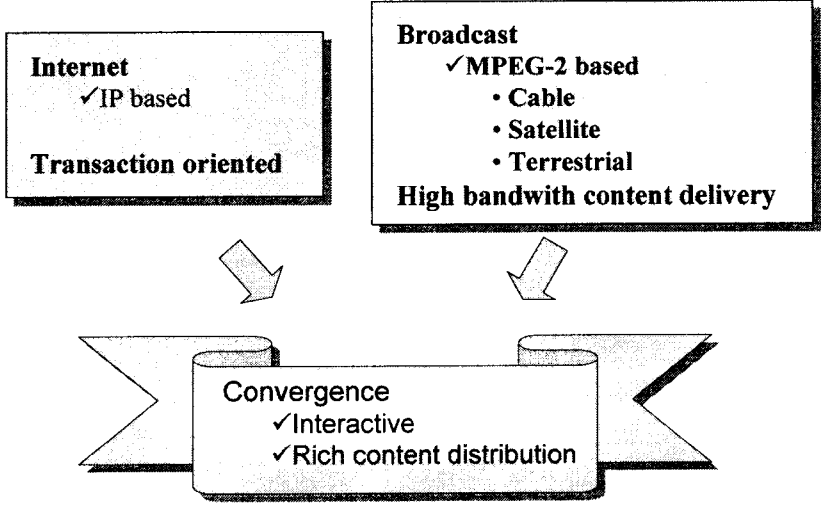
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Outline

- Introduction
- Overview of Standardization in Data Broadcasting
- ATSC Standard
 - PSIP
 - Data Broadcasting(A/90)
 - DASE
- Data Broadcasting System in KBS
- Service Examples

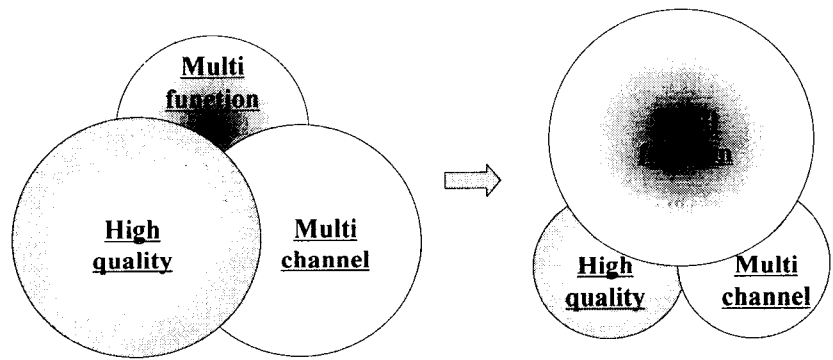
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The Two Networks



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Future's DTV



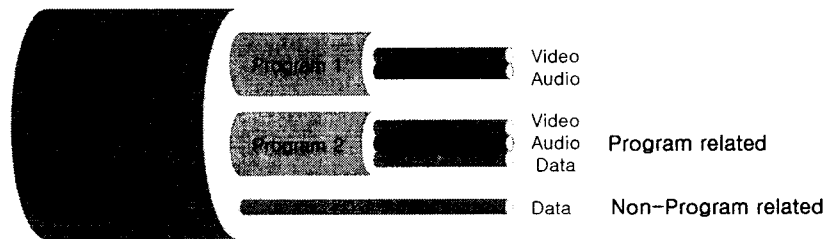
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DTV

DTV = VIDEO + AUDIO + DATA

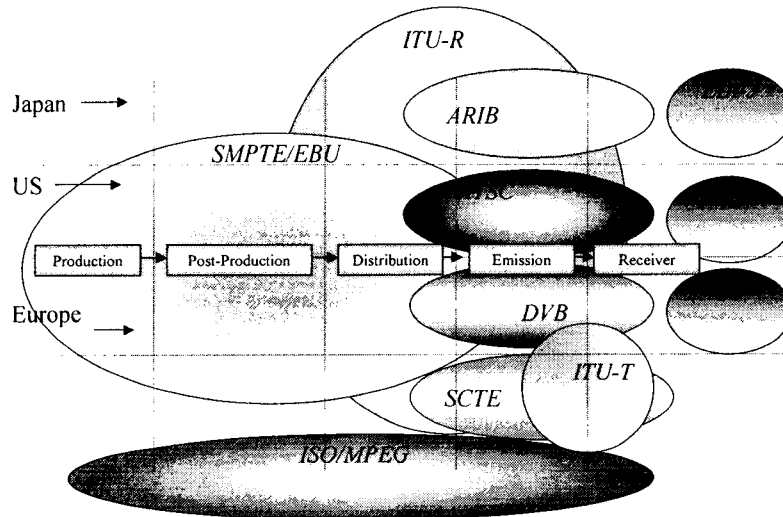
• MPEG-2 Transport Streams carrying multiplexed:

- ✓ Service Information (ATSC PSIP + MPEG-2 SI)
- ✓ Audio, video and data elementary streams



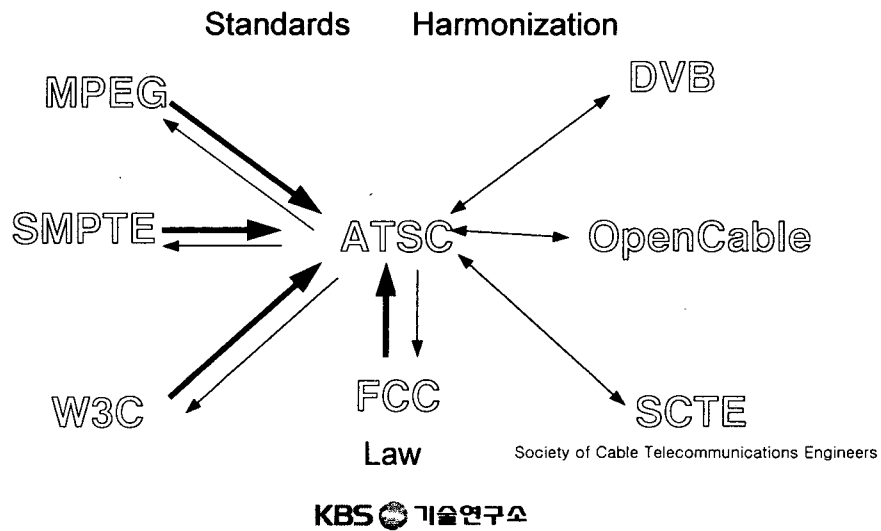
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Interactive Television Standards Body Scope



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ATSC Interactions

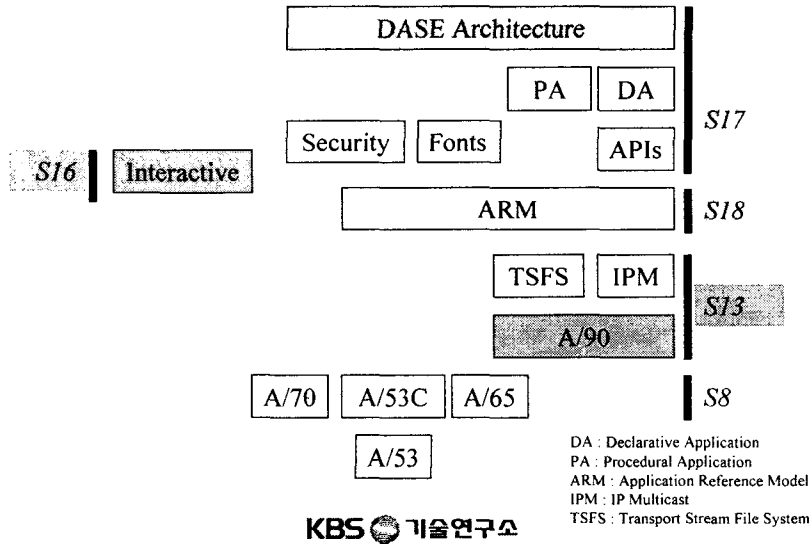


ATSC Standard

- ATSC Transport Stream carrying multiplexed:
 - ✓ AC-3 audio streams (A/53)
 - ✓ MPEG-2 video streams (A/52)
 - ✓ Service Information (A/65 + MPEG-2 SI)
 - ✓ data elementary streams (A/90)



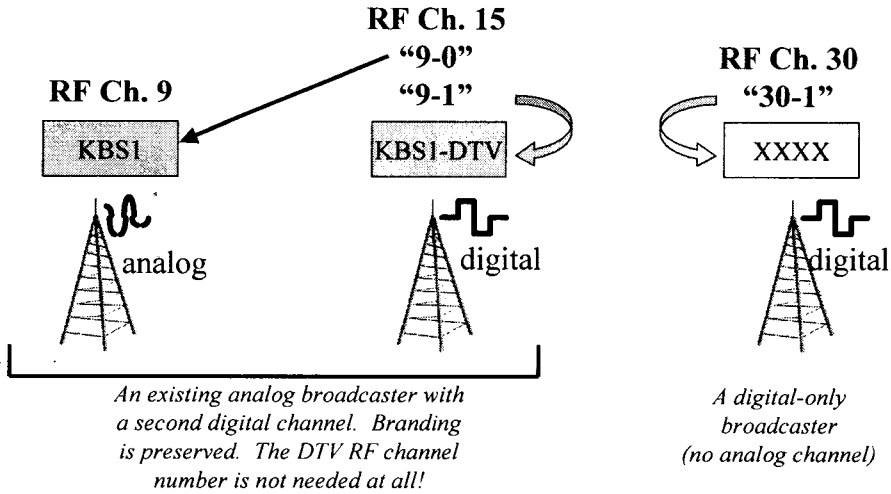
ATSC Standards Relationship



PSIP Tables (A/65)

STT	<u>System Time Table</u> - provides time
MGT	<u>Master Guide Table</u> - provides version, size and PID's of all other tables (except STT)
VCT	<u>Virtual Channel Table</u> - provides attributes for all virtual channels in this Transport Stream
RRT	<u>Rating Region Table</u> - provides rating information for multiple geographic regions
EIT	<u>Event Information Table</u> - provides information for events on the virtual channels
ETT	<u>Extended Text Table</u> - provides detailed descriptions of virtual channels and events
DCCT	<u>Directed Channel Change Table</u>
DCCST	<u>Directed Channel Change Selection Code Table</u>

Virtual Channel Number (Major/Minor)



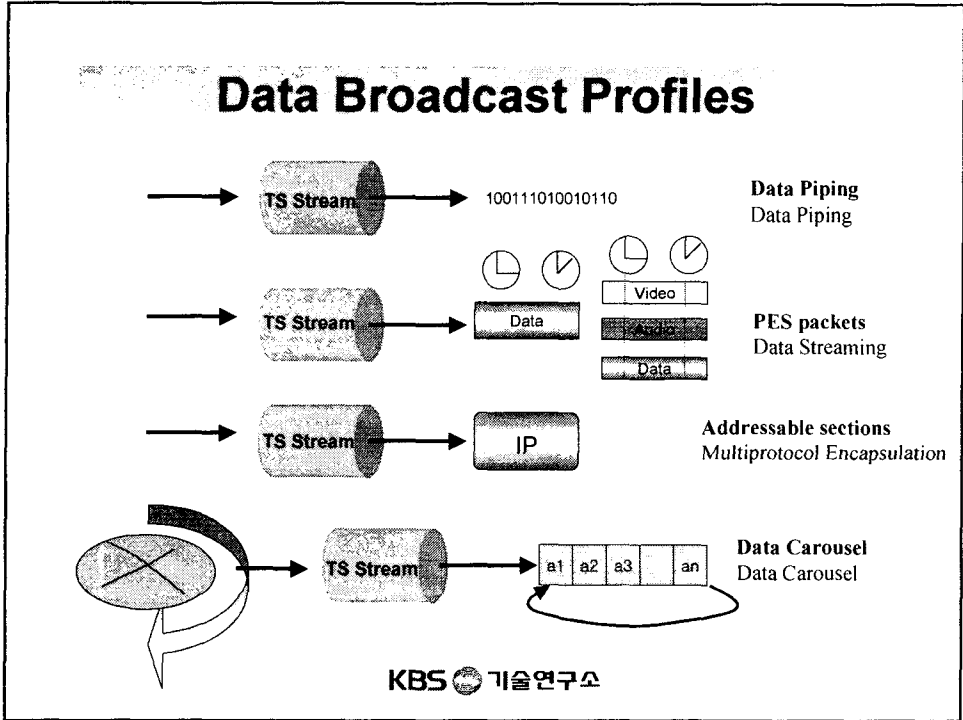
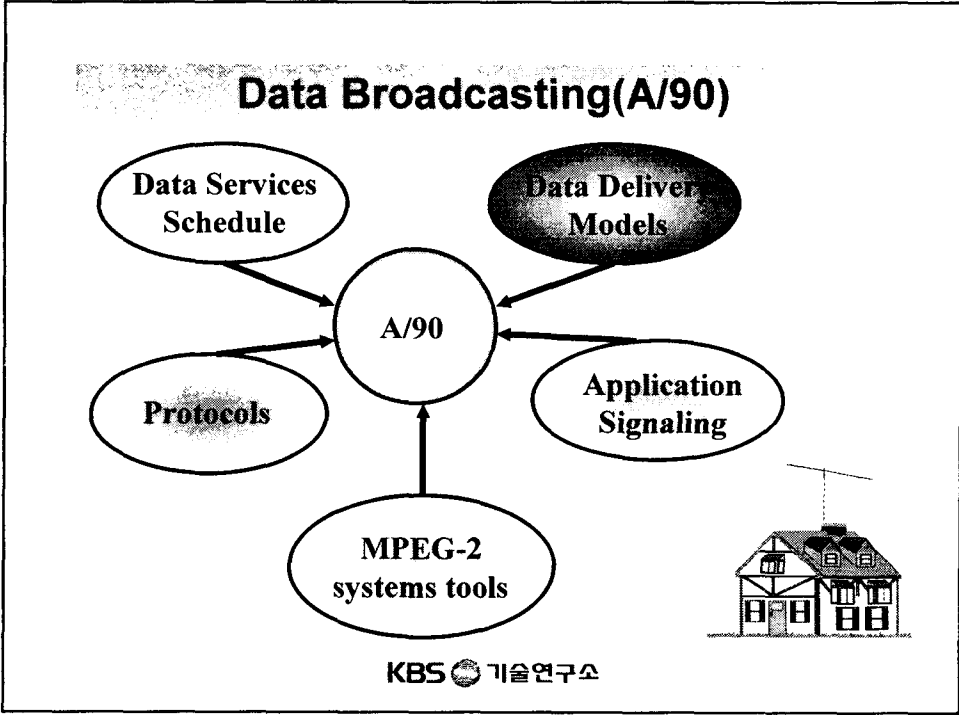
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Electronic Program Guides

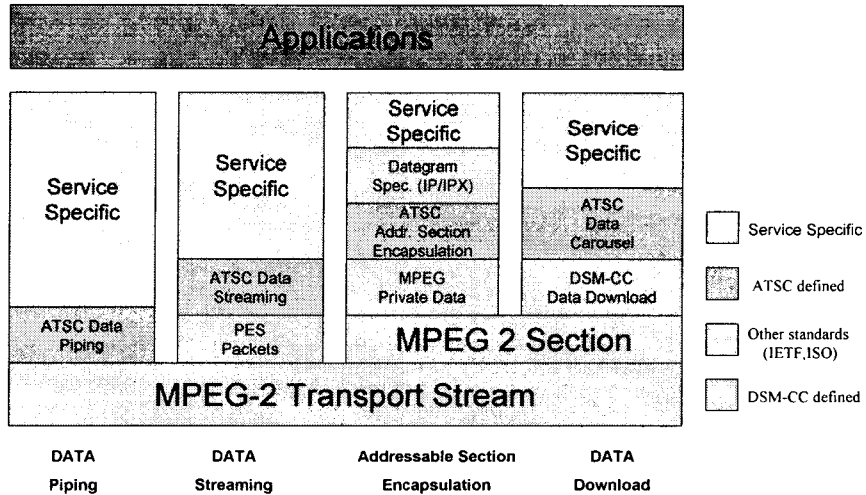
Chan	Name	6:00 pm	6:30 pm	7:00 pm	7:30 pm	8:00 pm	8:30 pm
9-0	KBS1	City Life		KBS News 7		JSA (Movie)	
9-1	KBS1	City Life		KBS News 7		JSA (Movie)	
7-0	KBS2	Local News		Drama	Music Bank		
7-0	KBS2	Local News		Drama	Music Bank		

- Interactive and Useful
 - Event, Channel and Purchase Information
 - Automatic Recording
 - With Future Extensions, can enable Thematic Browsing and Sorting

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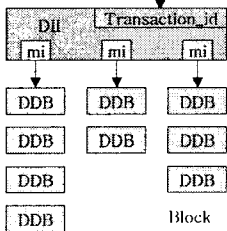
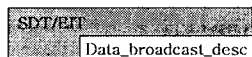
Data Broadcast Specification



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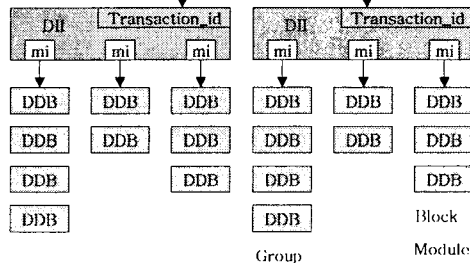
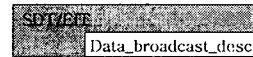
Structure of a Data Carousel

One-layer download scenario



DSI: DownloadServerInitiate
 gi: GroupInfoBytes
 DII: DownloadInfoIndication

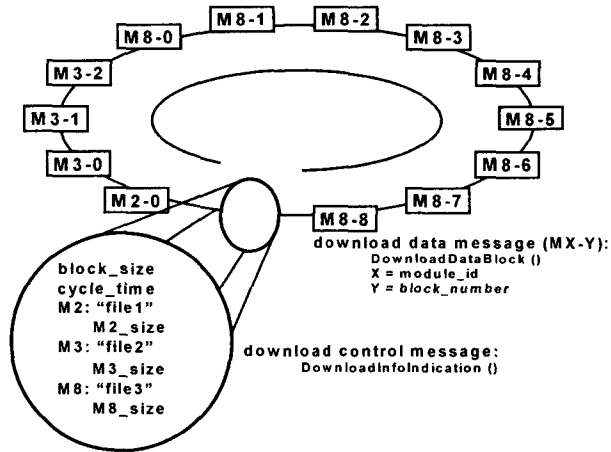
Two-layer download scenario



mi: ModuleInfoBytes
 DDB: DownloadDataBlock
 → : Location reference (transactionId)

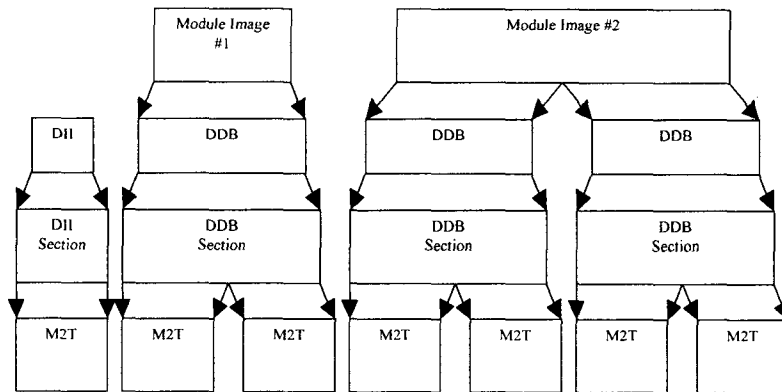
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Data Carousel



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Data Download Protocol Module Fragmentation



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Signaling

- Real time information about the transport resources
- Includes
 - appID
 - Compatibility Descriptor
 - Identifiers
 - Content Types
 - Broadcaster Permissions

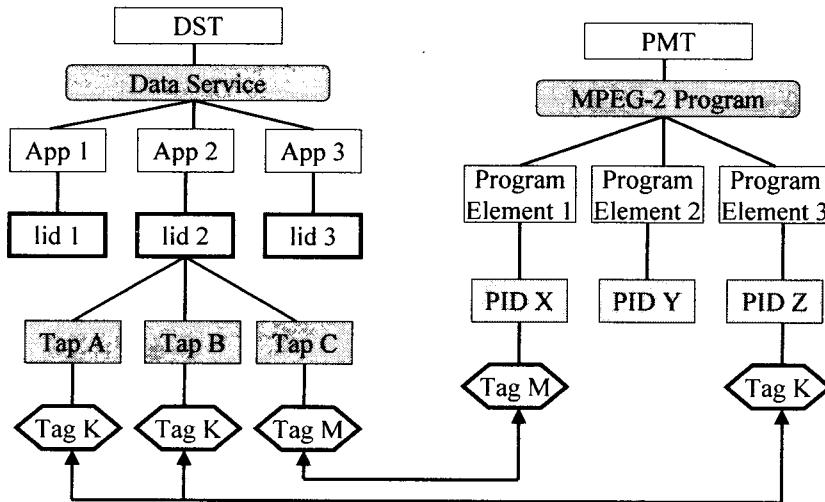
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Announcement

- Advance notification of service information
- Used to make EPG and scheduling decisions by both receiver and viewer
- Placed in EIT and optionally, DET
- Compatibility Descriptor primarily, but also
 - Title, start time, and duration, if they are unique

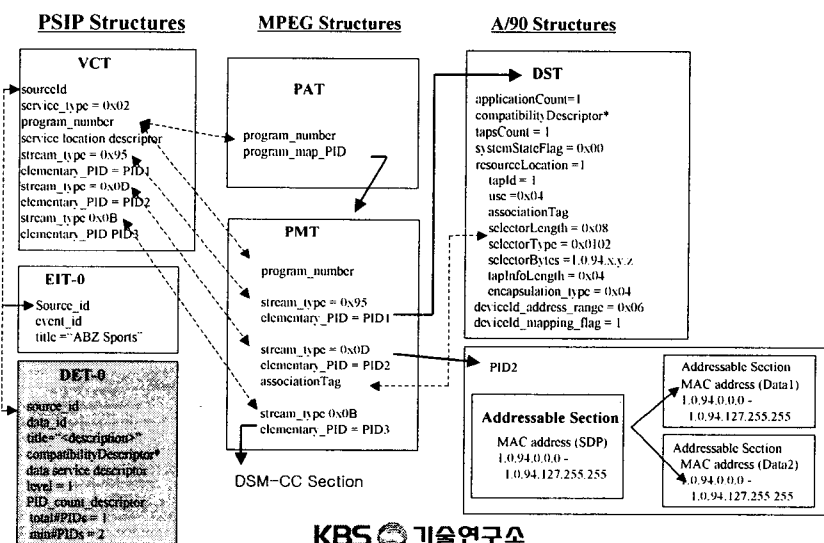
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Links between the PMT and the DST



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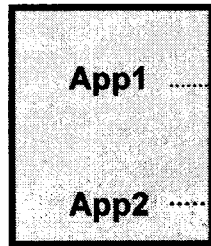
Example ATSC Table Hierarchy



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REFERENCE TO DATA WITHIN THE SAME VIRTUAL CHANNEL

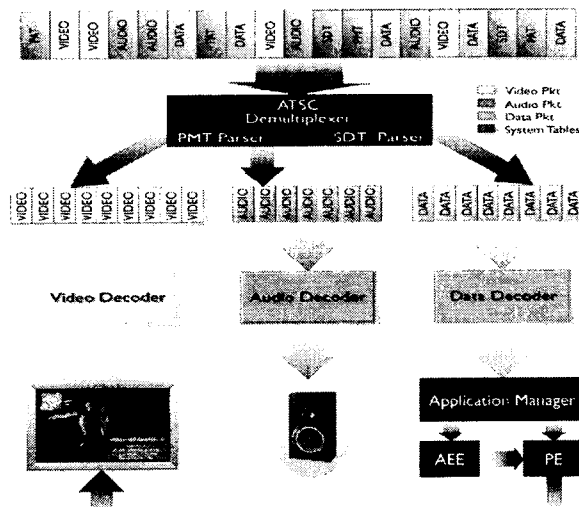
ATSC multiplex



Data Service Table

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Processing at the Receiver-End



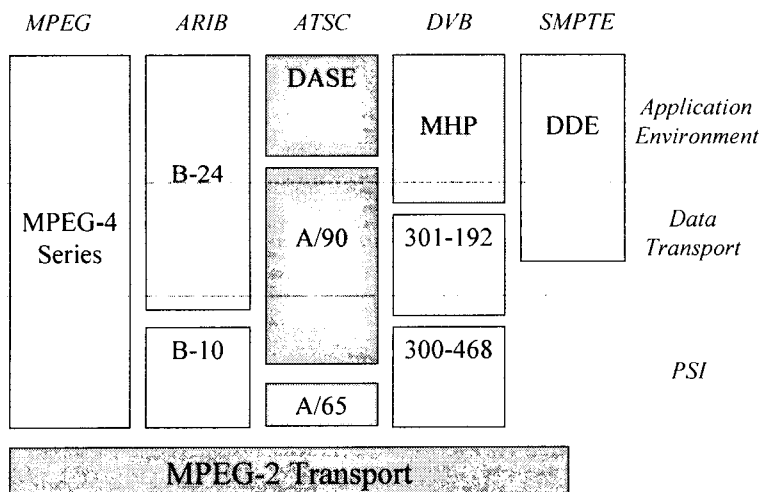
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Major Standardization Organizations

- **ATVEF (Advanced Television Enhancement Forum)**
 - ✓ HTML4.0 Base
- **ATSC-DASE (DTV Application Software Environment)**
 - ✓ Java, XHTML(XDML) Base
- **DVB-MHP (Multimedia Home Platform)**
 - ✓ Java, XHTML Base
- **ARIB (Association of Radio Industries and Business)**
 - ✓ BML Base
- **Some proprietary**
 - ✓ MediaHighway
 - ✓ OpenTV

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Comparison with Data Broadcasting



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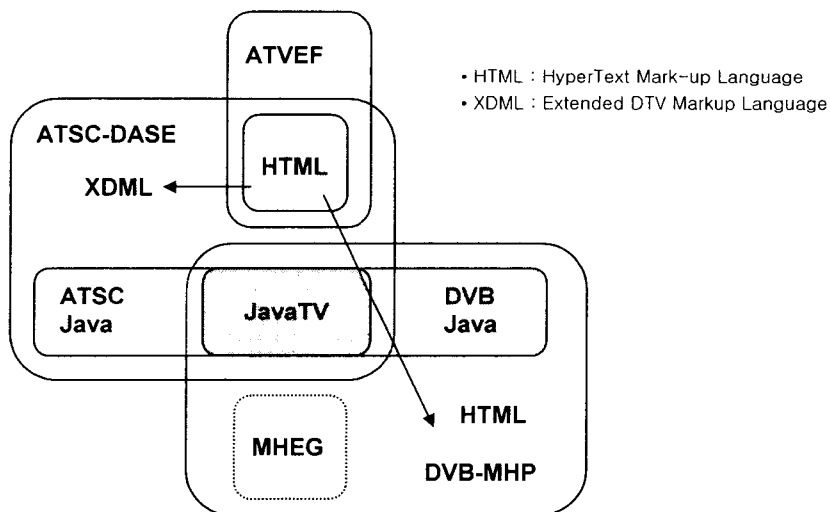
Comparison Matrix

Technology	ISO/MPEG	ARIB B24	ATSC DASE	DVB MHP	SMPTE DDE
Analog Transport					V
MPEG-2 Transport	V	V	V	V	[1]
MPEG-4 Transport	V				
Files	V	V	V	V	V
Streams	V	V	V	V	
IP Packets		V	V	V	
Triggers		V	V	V	V
JVM	V		V	V	
PJAE	[2]		V	V	
JavaTV			V	V	
HAVi			V	V	
org.atsc.*			V		
org.dvb.*				V	
HTML/XHTML	V	V	V	V	V
DOM		V	V	V	V
CSS		V	V	V	V

[1] Transport Independent via IP
 [2] MPEG-J is early work in process

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DASE vs. MHP



- HTML : HyperText Mark-up Language
- XDML : Extended DTV Markup Language

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DASE vs. MHP

- **DASE-1 expected to be completed by end of 2001**
- **DASE-2 requirements development under way**

- **MHP 1.0**
 - ✓ Frozen by DVB : February 2000
 - ✓ Published by ETSI : August 2000
- **MHP 1.1**
 - ✓ frozen by DVB in June 2001
- **Test suite**
 - ✓ Should be frozen by DVB Q4, 2001
- **First MHP compliant terminals are expected Q4, 2001**

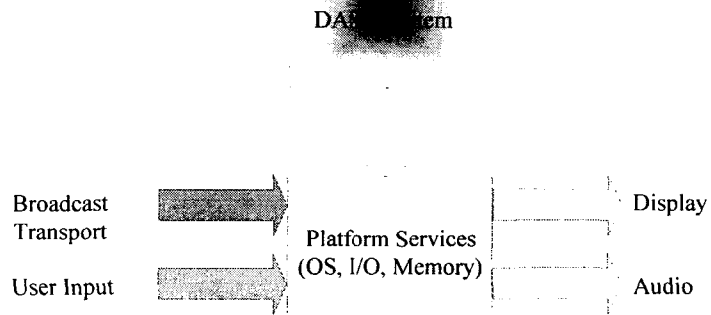
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DASE Levels

- **Level 1 (Local Interaction) : Enhanced TV**
 - ✓ Basic Foundation
 - ✓ Broadcast Only
 - ✓ No Return Channel
- **Level 2 (Remote Interaction) : Interactive TV**
 - ✓ Builds upon Level One
 - ✓ Return Channel
 - ✓ Enhanced Security Framework
 - Digital Signatures
 - Return Channel Encryption
 - ✓ Plug-Ins, Persistent Applications
 - ✓ T-Commerce Applications
- **Level 3 (Internet Enabled) : Internet TV**
 - ✓ Builds upon Level Two
 - ✓ General Internet Content
 - Must handle invalid, non well-formed content to be interoperable
 - ✓ Web TV

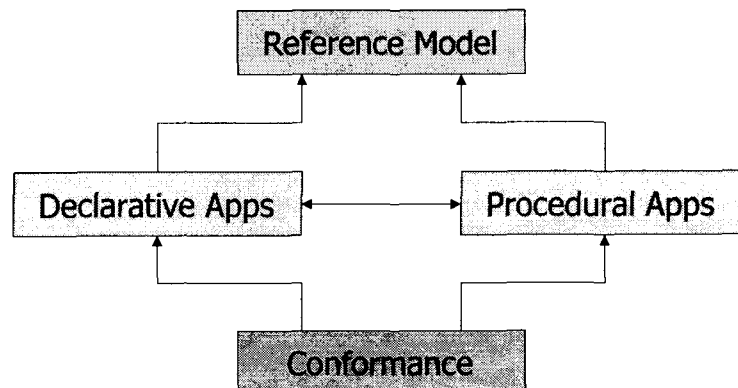
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DASE System Interconnect



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DASE Specification Dependencies



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DASE Application Reference Model

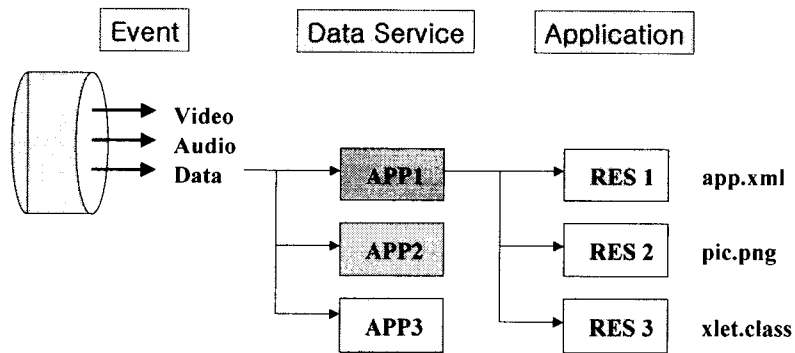
- Application Delivery Model
 - T3/S13 Data Broadcast Bindings
- Application Instantiation Model
- Application State Model
- Display Model
- Interaction Model

Referencing Resources

- Local Identifier "lid:" Scheme
 - Unique identifier associated with resource, assigned by local naming authority (i.e., content author or emissions station)
- Television "tv:" Scheme
 - Refers to "this" video program
- Examples
 - ``
George!
``
 - `body { background: url("tv:") }`

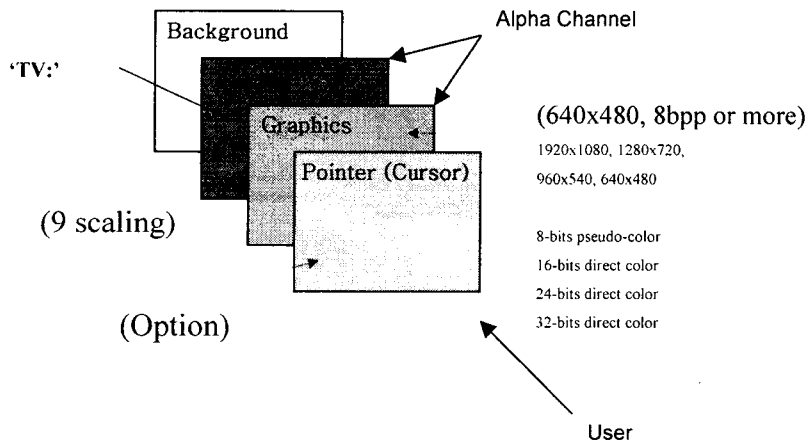
Application Resources

- **Event** : a collection of elementary streams with a common time base
- **Data Service** : a collection of applications
- **Application** : a collection of information



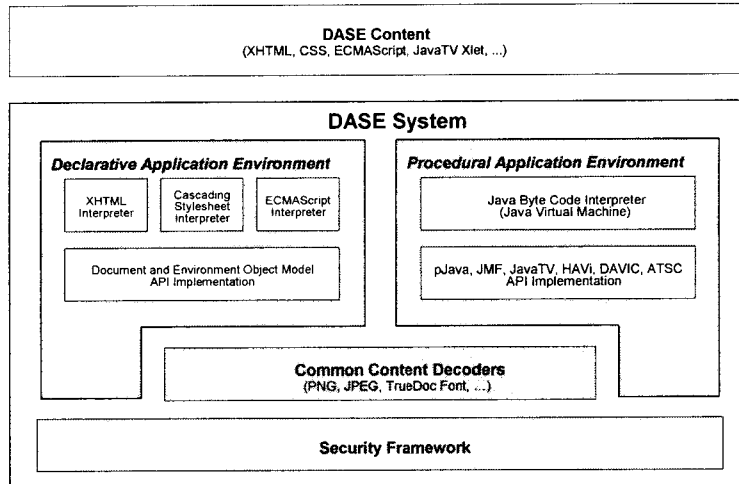
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DASE Display Model



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DASE-1 Architecture



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DASE Declarative Applications

- Declarative Content Type
 - XDML (XHTML Subset)
- Supporting Content Types
 - CSS, ECMAScript, Graphics, etc.
- Document Object Model (DOM)
- Declarative Application Environment
 - System Behavior

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DASE Procedural Applications

- Procedural Content Type
 - Java™ Class File Format
- Supporting Content Types
 - Graphics, Audio, Video, etc.
- Procedural Application Environment
 - Java™ Virtual Machine
 - APIs (PJAE, JMF, JavaTV™, HAVi UI, ATSC)
 - System Behavior

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Common Content Types

- **Graphics Content**
 - image/jpeg
 - image/png
- **Non-Streaming Video Content**
 - video/mng
- **Non-Streaming Audio Content**
 - audio/basic
- **Streaming Video Content**
 - video/mpeg
 - video/mpv
- **Streaming Audio Content**
 - audio/ac3
- **Font Content**
 - application/font-tdpfr
- **Archive Content**
 - application/jar
- **Trigger Content**
 - application/dase-trigger

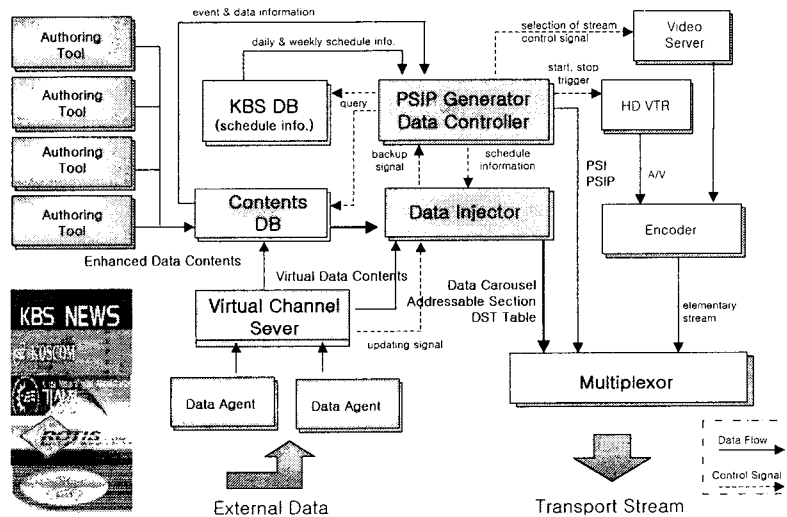
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DASE Future Work (DASE-2)

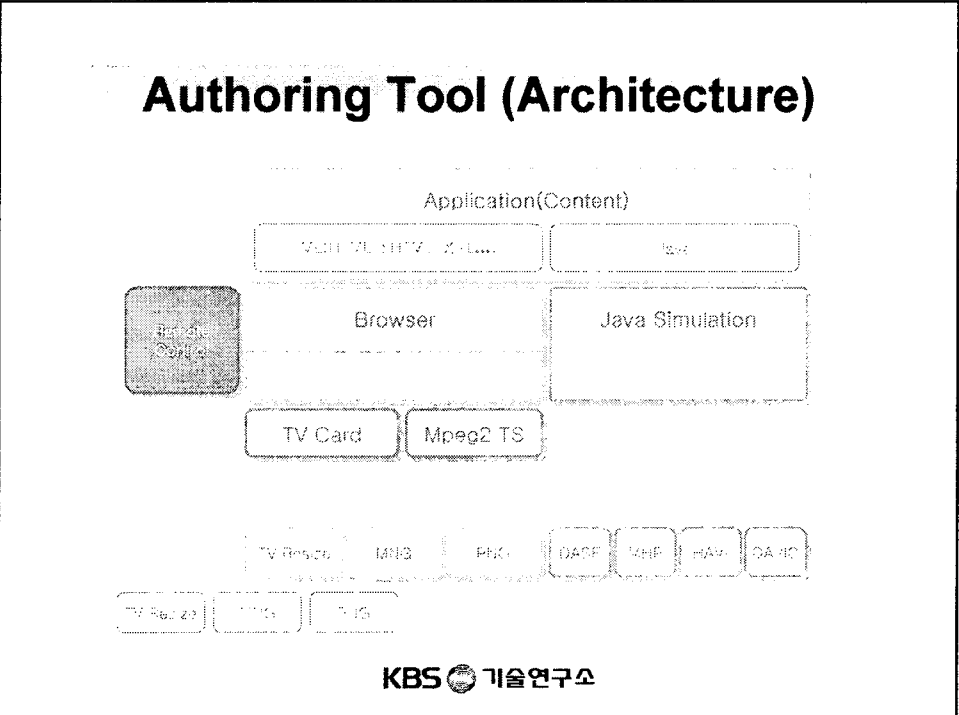
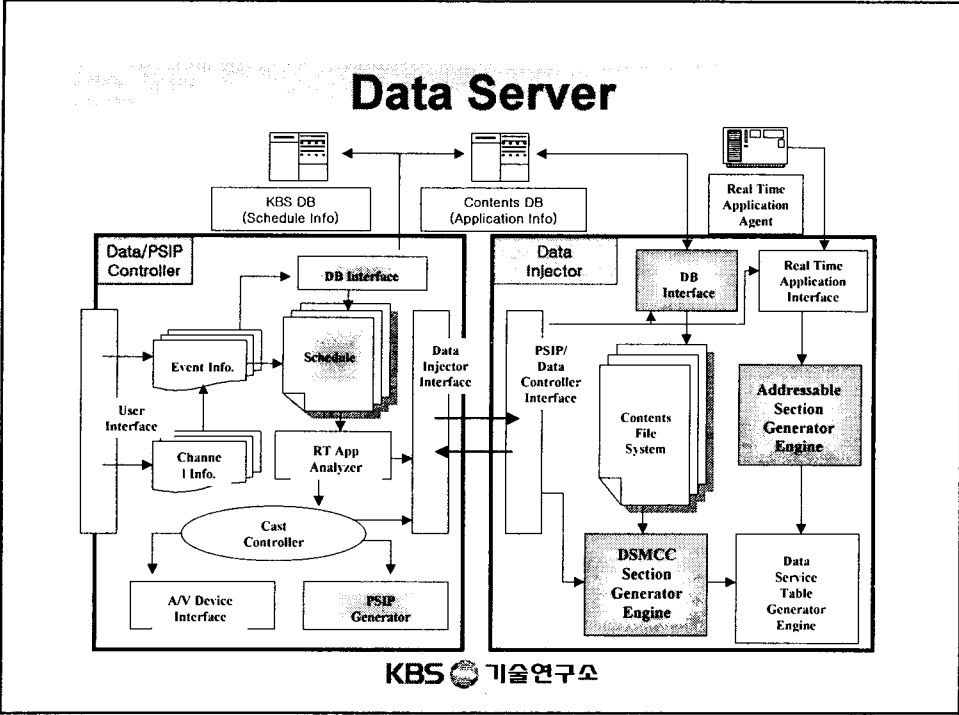
- Closed Captioning Services
 - CC Parsing and Presentation Services
- Return Channel
 - Modem Control Services
 - Application Layer Protocols
 - http
 - https
- Concurrent Applications
 - Partial Concurrence
 - Full Concurrence
- Device Services
 - PVR Services
 - Home Networking Services
- etc

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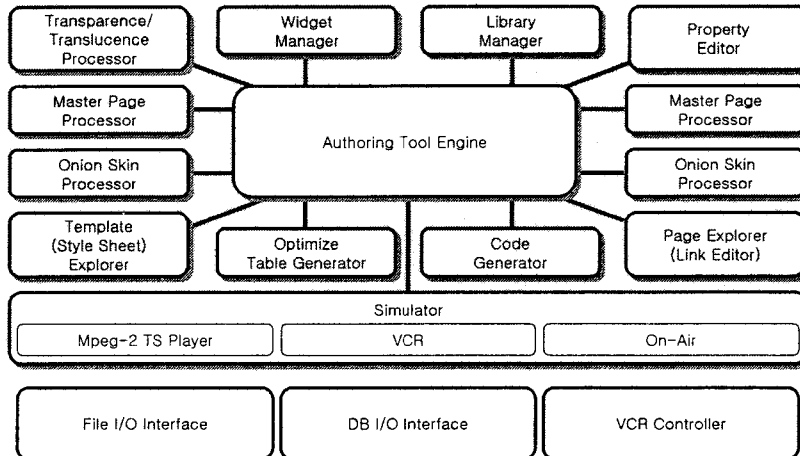
Data Broadcasting System



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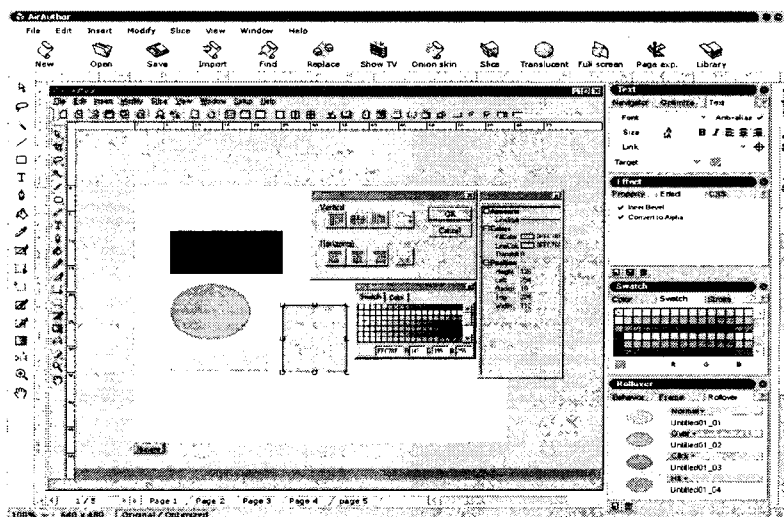


Authoring Tool (S/W Engine)



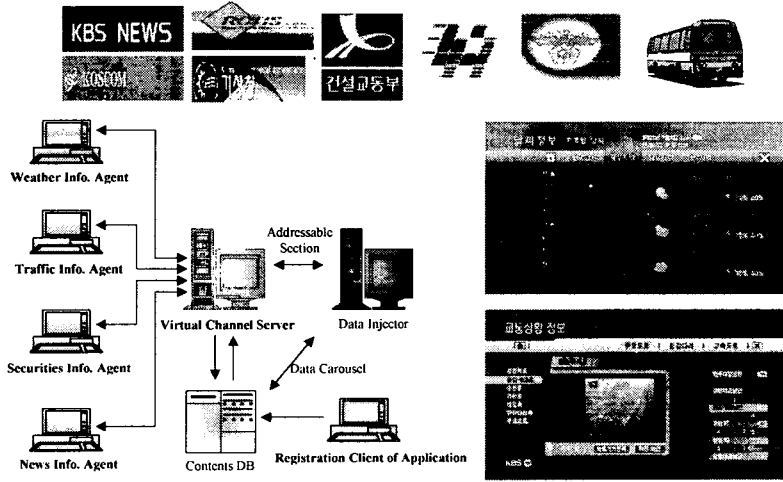
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Authoring Tool



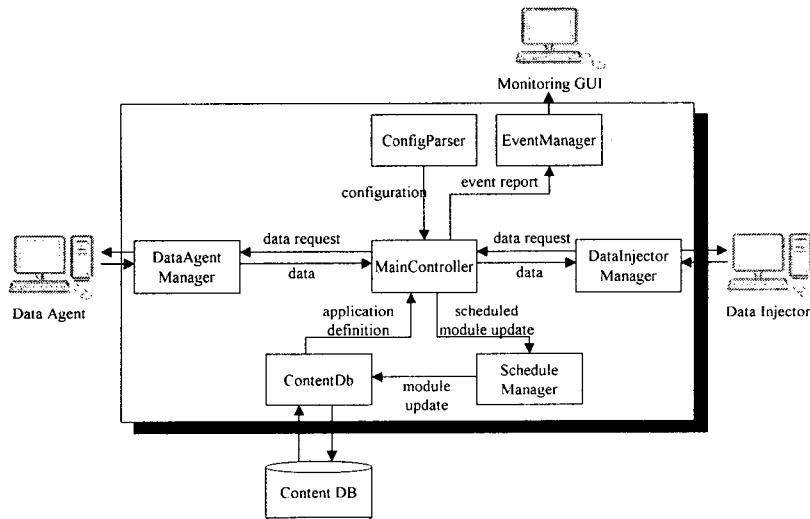
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Virtual Channel System



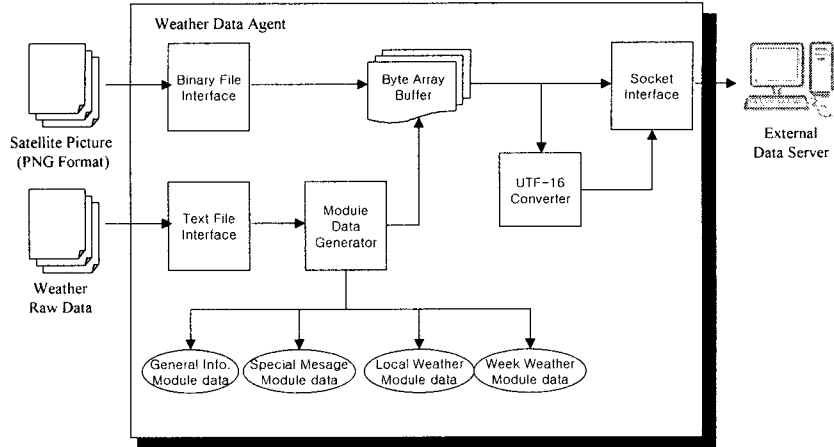
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Virtual Channel Server



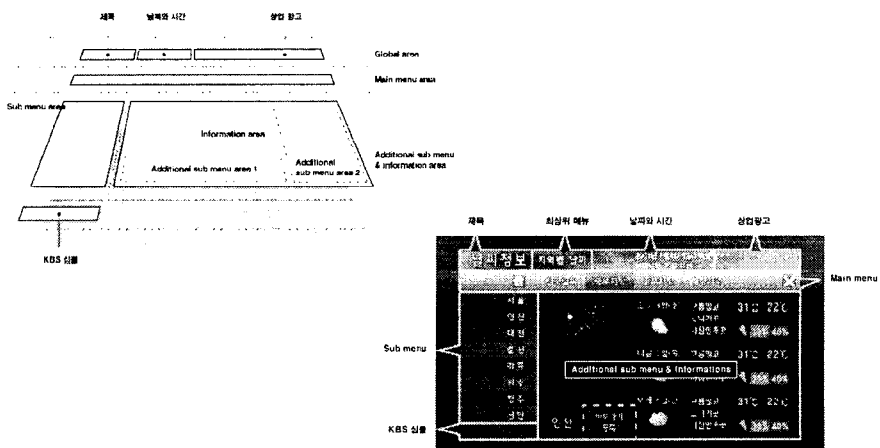
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Data Agent



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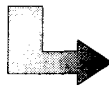
Menu Design



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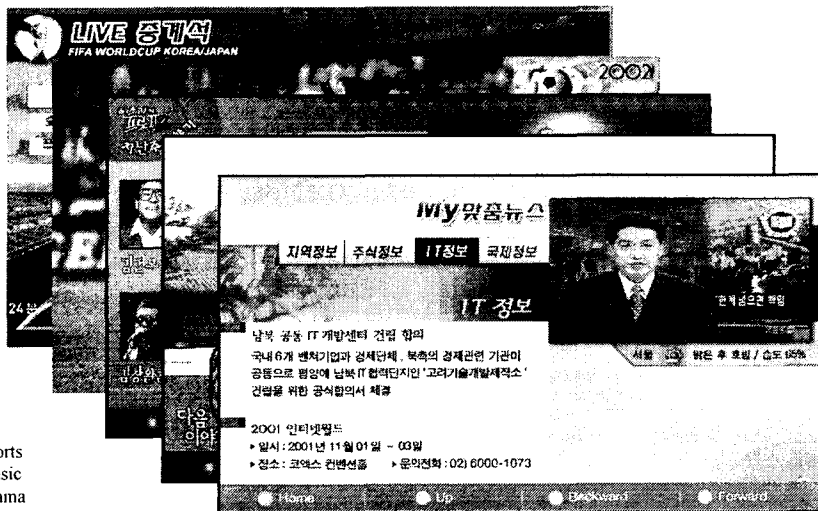
T - Commerce

- Allows consumer to purchase on impulse
 - ✓ One click to buy or get added information
 - ✓ NO unstructured browsing
- Uses power of broadcast to deliver information or purchase opportunity
 - ✓ Internet protocols to purchase from any commerce server



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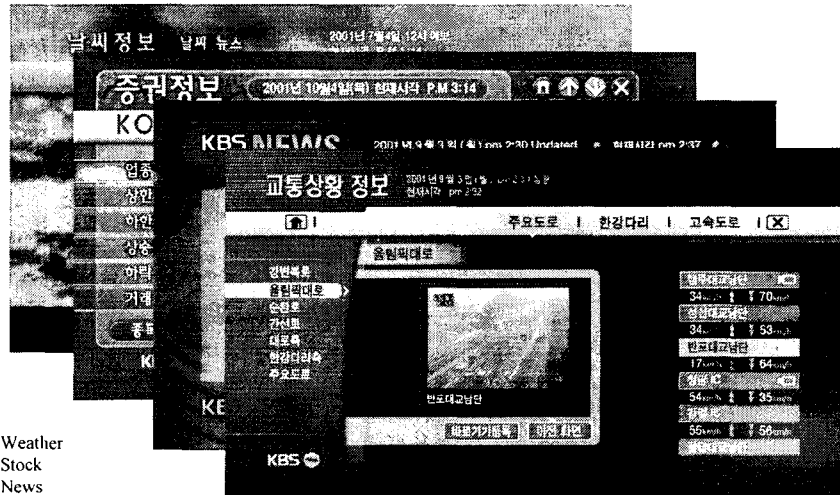
Program related Service



Sports
Music
Drama
News

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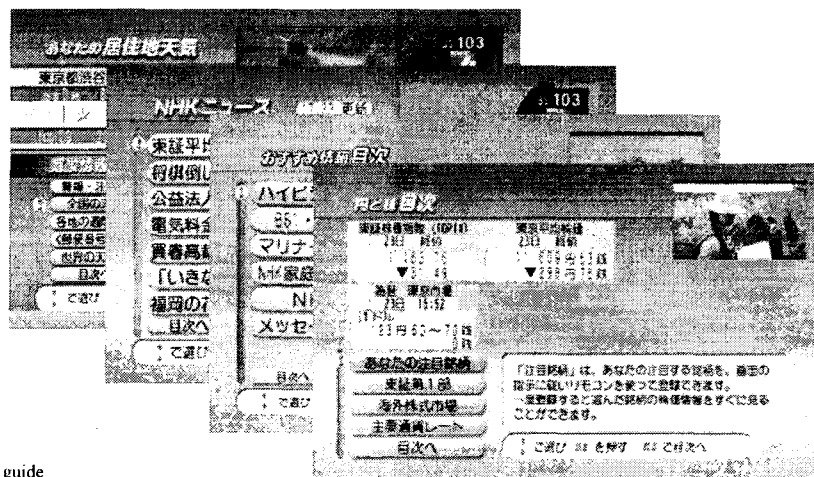
Non-Program related Service



Weather
Stock
News
Traffic

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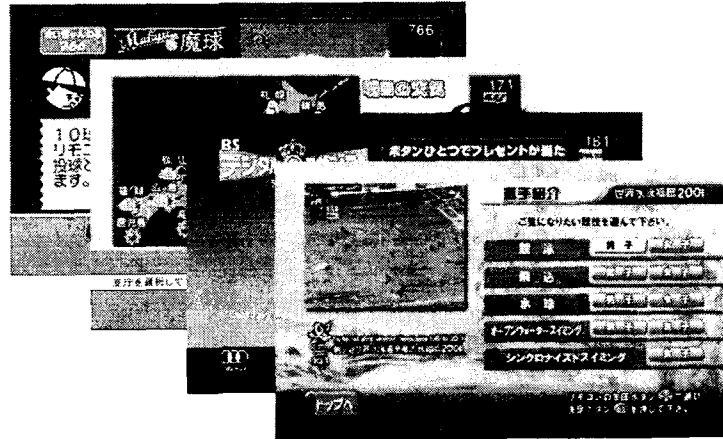
NHK Service



Weather
News
Program guide
Stock

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BS Service



Game
Weather
Home shopping
Sports

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DirecTV Service



Weather
Sports
Ad(Land's End)
Ad(Gevalia)

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OpenTV & Mediahighway



Program guide (OpenTV)
Entertainment (OpenTV)
Sports (Cannal+)
Ad (Cannal)

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