

# DASE 기반 데이터방송 기술 개발 현황

삼성전자  
디지털 영상사업부

수석연구원 이 효 건

2000. 11. 3

Samsung Electronics

## Contents

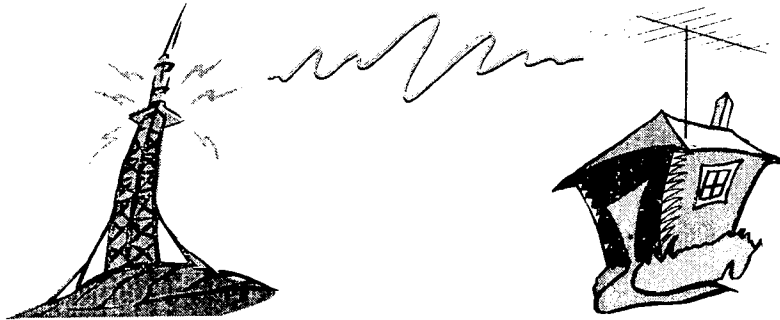
- Why Interactive?
- Data Service Mechanism
- Overview of ATSC DASE
- ATSC Data Broadcast Protocols
- Samsung's Preparation for DASE
- Summary

Samsung Electronics

# DTV = VIDEO + AUDIO + DATA

SAMSUNG DIGITall  
everyone's invited.

- MPEG-2 Transport Streams carrying multiplexed:
  - Service Information (ATSC PSIP + MPEG-2 SI)
  - Audio, video and data elementary streams

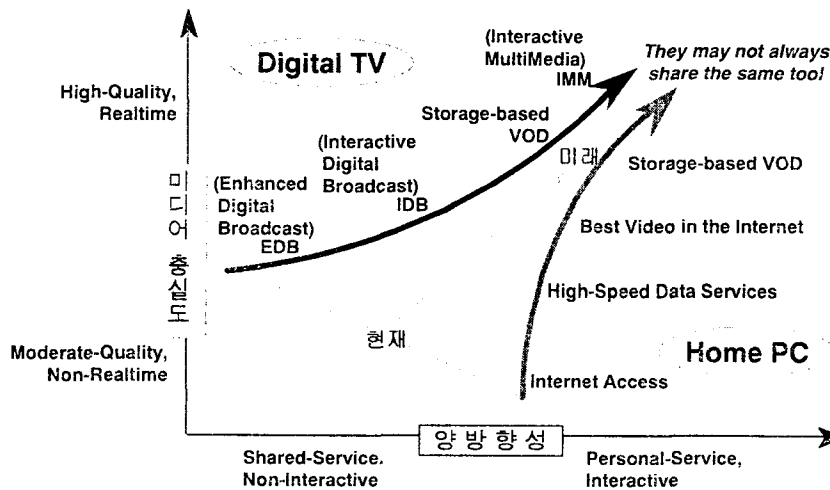


Samsung Electronics

# Evolution of Interactivity

SAMSUNG DIGITall  
everyone's invited.

Interactivity is the name of the game!



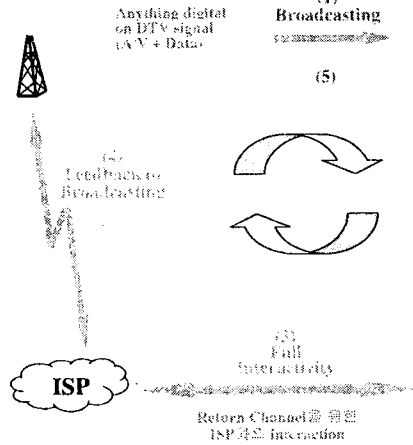
Samsung Electronics

# Digital TV as a Convergence Device

SAMSUNG DIGITall  
everyone's invited...

## One Device for Multi-Media

Entertainment, Information, Communication, T-Commerce, ...



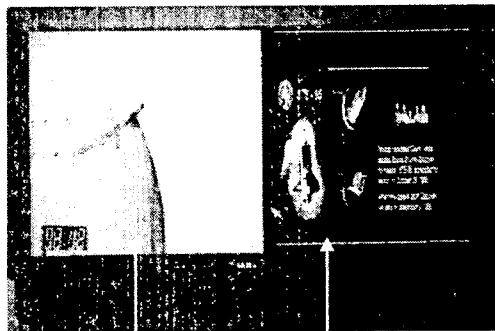
HOME

Full Interactivity  
방송과 인터넷의 Interaction

Samsung Electronics

# Interactive Broadcasting

SAMSUNG DIGITall  
everyone's invited...



HD급 A/V

방송파에 실려온 데이터



실시간  
추가 정보



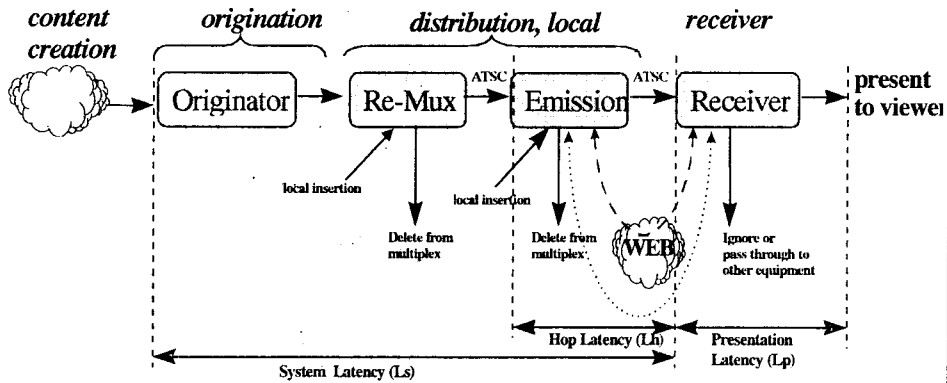
대화형 광고



부가 정보  
서비스

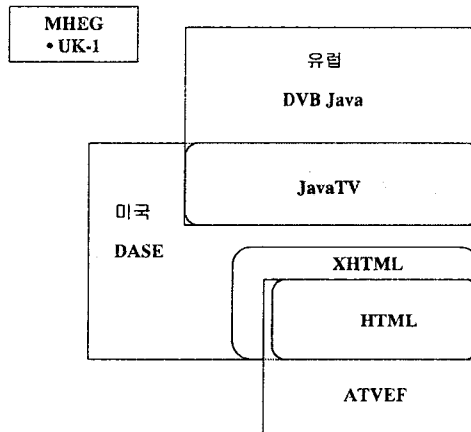
Samsung Electronics

## Data Service Mechanism



Samsung Electronics

## Interactive DTV Standards



Samsung Electronics

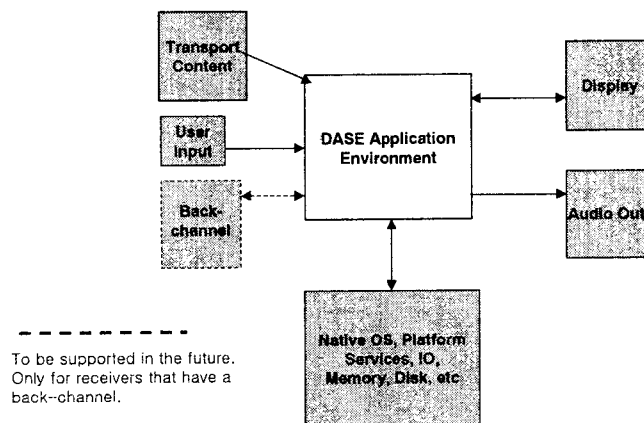
## DASE?

- **ATSC DASE (T3/S17)**
  - DTV Application Software Environment
  - 대화형 방송/데이터 방송 수신을 위한 Software 규격 (미국)
  - downloaded application을 위한 통일된 수행 환경 제공
  
- **관련 ATSC 규격**
  - T3/S8: PSIP
  - T3/S13: Data Broadcast Protocol
  
- **DASE Contents**
  - Java (xlets)
    - Procedural contents
    - Platform-independent via VM concept
    - Well-defined APIs and good security mechanism
  - HTML
    - Declarative contents
    - Platform-independent via interpretation
    - Very popular in Internet and IT community

Samsung Electronics

## DASE Receiver Model

- **Inputs and outputs for the DASE Application Environments.**



Samsung Electronics

## ■ DASE-Java APIs

- Personal Java 1.2 and standard APIs
- JavaTV API 1.0 to provide standardized access to DTV H/W and data
- JMF 1.1 for media control and synchronization
- HAVI User Interface API 1.0 for TV friendly user interface.
- ATSC DASE-specific APIs
- Selected DAVIC API 1.4

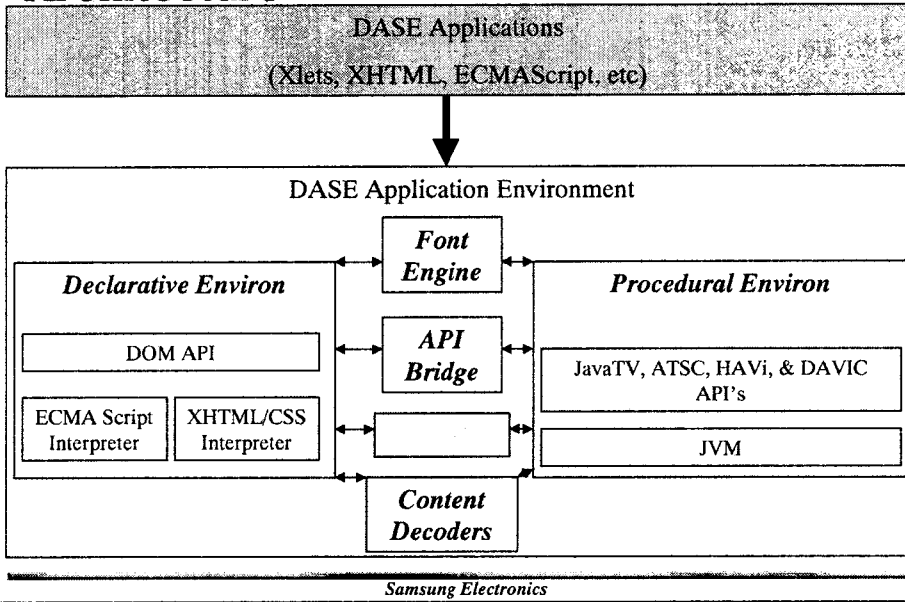
## ■ Declarative Application Environment :

- XHTML (A Reformulation of HTML 4.0 in XML) Modules
- CSS-2 for adding style (e.g. fonts, colors, spacing)
- DOM-2 to access and update the content, structure and style of documents.
- ECMAScript 3<sup>rd</sup> Edition
- Graphics Content: JPG, MNG
- Trigger Content
- Non-streaming Audio Content
- Streaming Video Content: mpeg1 or mpeg2 video
  
- Archive Content: Jar archive
- Active Objects Content: JavaTV xlets
- Non-streaming Video Content: MNG
- Streaming Audio Content: AC3
- Font Content: TrueDoc Portable Font Resource(PFR)

# DASE Receiver Software

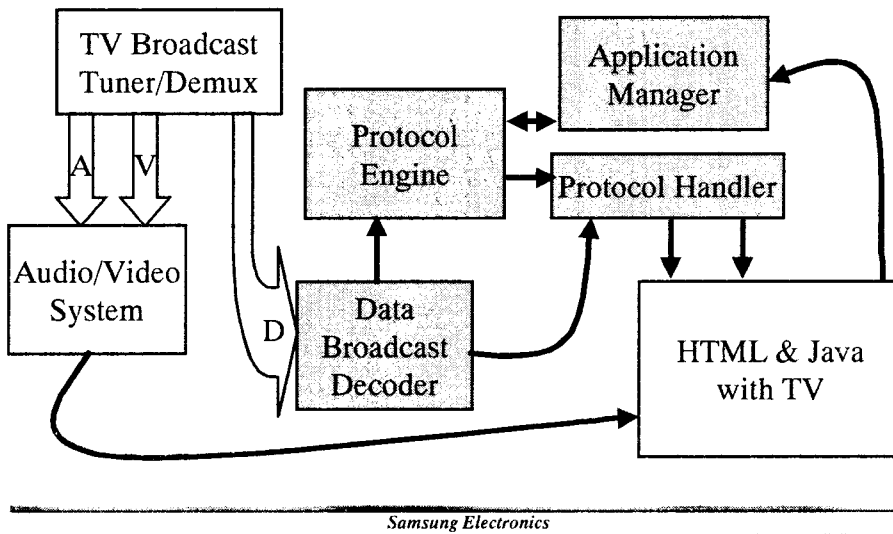
SAMSUNG DIGITall  
everyone's invited.

## Architecture



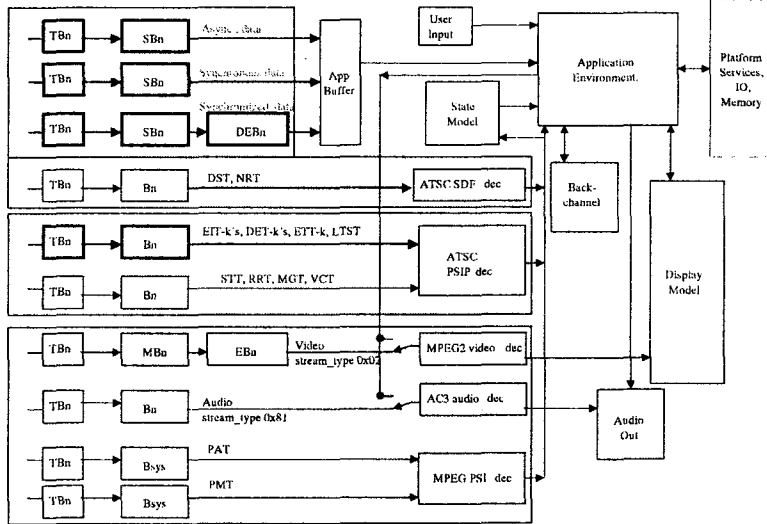
## Logical Data Flow in DASE Receivers

SAMSUNG DIGITall  
everyone's invited.



# Application Reference Model

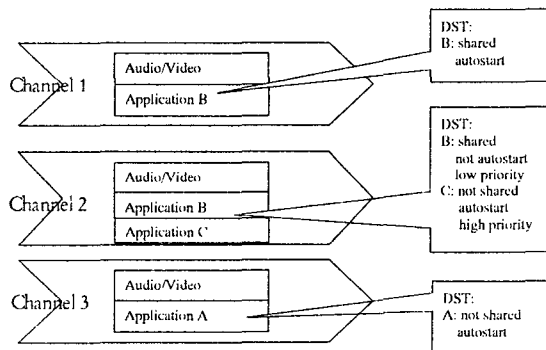
## Data Flow for a one-tuner ATSC receiver



Samsung Electronics

# Application Categories

- Channel Bound Applications
  - Either Auto-start or not
- Shared Applications
- Unbound Applications



Samsung Electronics



## Application State Model

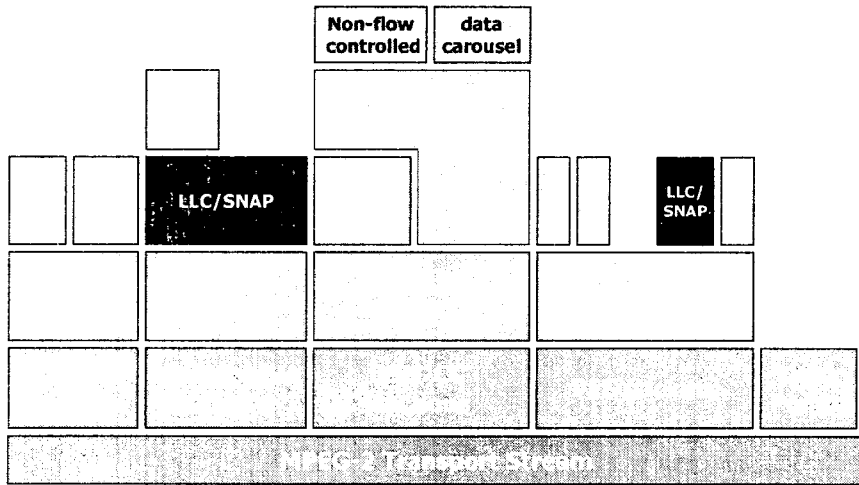
- Unloaded
- Loading
- Running
- Suspended

## Data Model and Encapsulation

- Supported Data Models
  - Internet Protocol(IP) Packets
    - Standard carriage of IP packets
  - Files
    - Discrete-sized objects that have a version and life-cycle
  - Streams
    - A sequence of 8-bit bytes, usually unbounded and application dependent
  - Triggers
    - Small data items that are used to provide "right" synchronization with files
- Encapsulation
  - IP Packets
    - Asynchronous IP datagrams in Addressable Scenarios
  - Files
    - Asynchronous non-flow controlled & unbuffered scenario of DSM-CC Download
  - Streams
    - Asynchronous non-flow controlled scenario of DSM-CC Download
  - Triggers
    - TSD as defined by DTWG

# T3/13: Data Broadcast Protocols

## Applications and other Data Services(S16/S17)

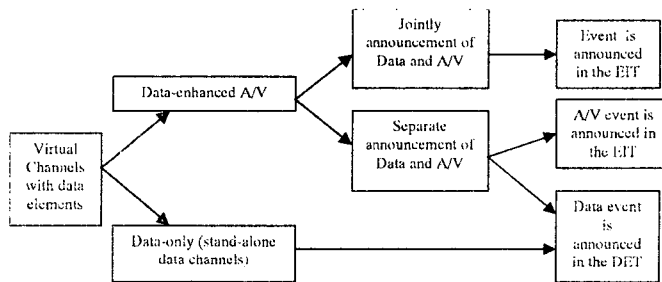


Samsung Electronics

# Application Delivery

### Application Announcement

➤ Using PSIP (A/SE), announce future availability of data services

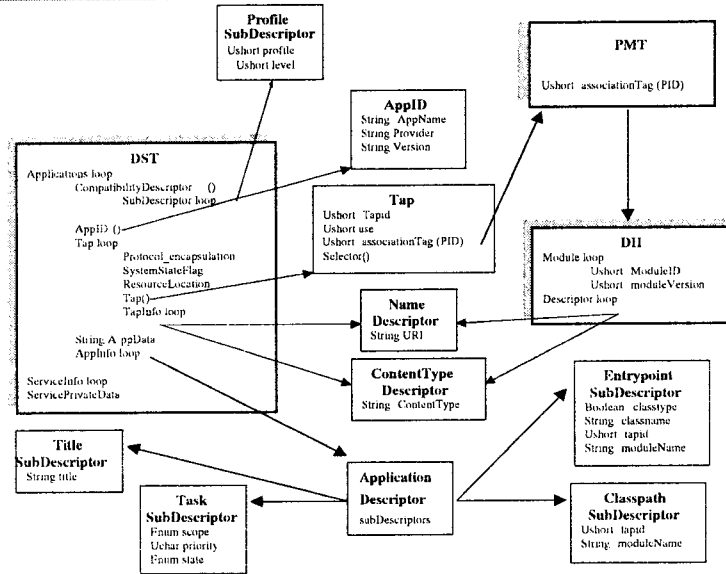


### Application Signaling

➤ Signal the intended roles of various objects to the application management layer

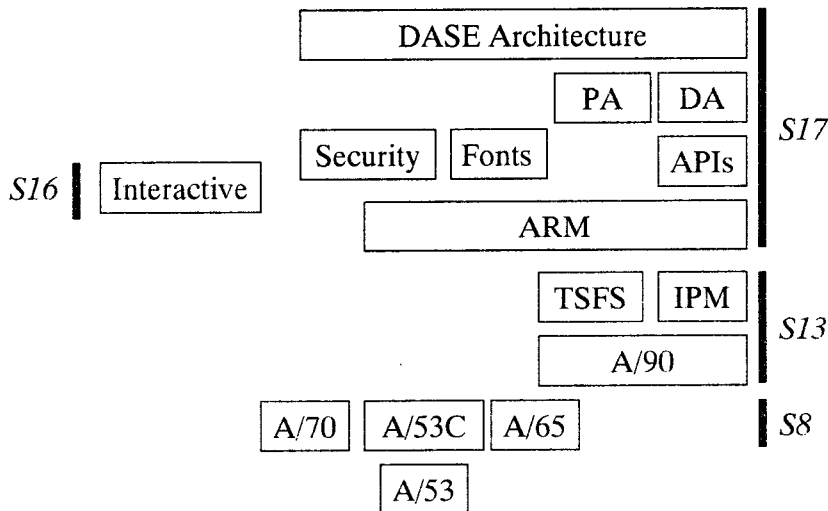
Samsung Electronics

## Use of Data Service Table



Samsung Electronics

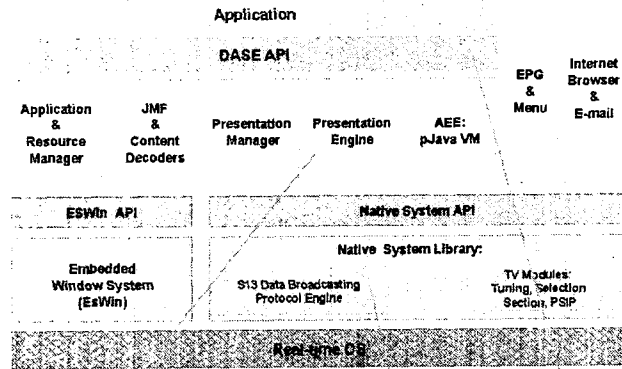
## Map of Some ATSC Technical Documentation Efforts



Samsung Electronics

# Samsung's DASE Implementation

SAMSUNG DIGITall  
everyone's invited.

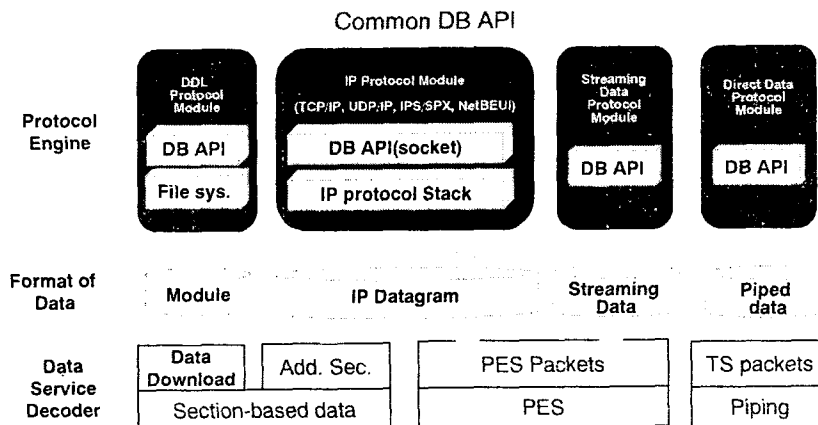


- |   |  |   |
|---|--|---|
| <p><u>DASE HTML</u></p> <ul style="list-style-type: none"> <li>- XHTML Modules</li> <li>- CSS-2</li> <li>- DOM-2</li> <li>- ECMAScript</li> </ul> | <p><u>ATSC Data Broadcast Protocols</u></p> <ul style="list-style-type: none"> <li>- Data Download</li> <li>- Addressable Sections</li> <li>- Data Streaming</li> <li>- Data Piping</li> </ul> | <p><u>DASE Java APIs</u></p> <ul style="list-style-type: none"> <li>- Java VM and standard APIs</li> <li>- Java TV1.0</li> <li>- JMF 1.1</li> <li>- HAVI UI 1.0</li> <li>- ATSC DASE specific APIs</li> </ul> |
|---|--|---|

Samsung Electronics

# Samsung's Protocol Engine

SAMSUNG DIGITall  
everyone's invited.



Samsung Electronics

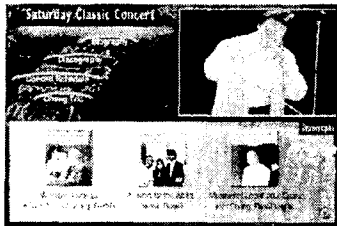
## 삼성의 데이터 방송 기술 개발

- 1998
  - 영국 디지털 지상파용 UK-1 MHEG 규격의 일체형 수신기 개발
  - 미국 ATSC DASE 규격 개발 시작
- 1999
  - ICES'99
    - 세계 최초로 Java와 HTML 연신이 탑재되어 동작하는 DASE 시제품 시연
  - 한국 전자전'99: (KBS, MBC)
    - 국내 최초 HD급 비디오와 DASE 기반 데이터 서비스의 On-Air 수신 성공
- 2000
  - ICES'2000, ATSC T3 Meeting, DASE2000 Symposium 시연
  - NAB'2000 (Harris, NDS, SkyStream, 4DL)
    - 데이터 방송을 이용한 MP3 music download 및 결제 시스템 시연
    - 전송된 MP3 파일을 smart media에 저장 및 MP3 플레이어에서 재생
  - KOBA'2000 (SBS, 4DL)
    - 최초의 End-to-End 실시간 데이터 방송(DASE) Prototype 환경 시연
  - DASE API v1.08.02에 따른 구현 완료
    - 미확정 부분 제외

Samsung Electronics

## 시연되었던 대화형 서비스의 예

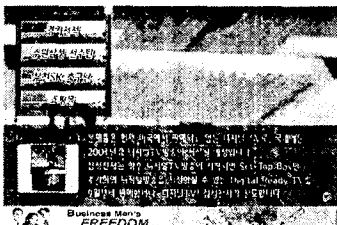
Program에 연동된 부가 정보서비스



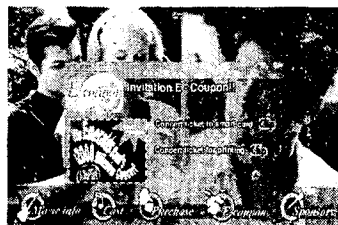
• HTML application



• Java (Xlet) application



• Animated-GIF를 이용한 광고



• E-Coupon Service

Samsung Electronics

# 시연되었던 대화형 서비스의 예

SAMSUNG DIGITall  
everyone's invited.

## Program과 독립적인 데이터서비스



• 게임: Java application



• 주식: Java application

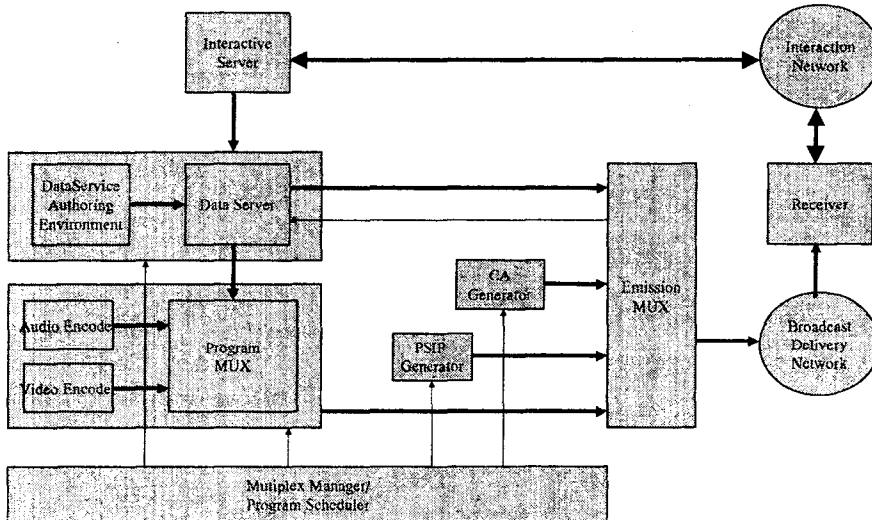


- MP3 Music Download 서비스
- Smart Card를 이용한 결제
- Smart Media를 이용한 타제품 활용
- Network 매체로서의 DTV 방송의 예

Samsung Electronics

# Interactive Data Broadcast Env.

SAMSUNG DIGITall  
everyone's invited.



Samsung Electronics

## Summary

### ■ DASE 방식의 장점

- Open Standard
  - Chances are open to everyone
- Platform Independence
  - Hardware, OS에 상관없이 동일한 application 이형 변환 가능
- Rich functionality
  - Java™ HTML technology 모두 수용
- Extensibility
  - 향후 추가 및 서비스 제공 수월 가능
- ATSC 규격과의 호환성 보장
  - PSIP, S12, DWG 등
- 다른 대화형 규격과의 유사성
  - DVB MHP, OpenCable

### ■ Ready for the Interactive Future!