

TV Anytime 표준 및 기술 개발

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강경욱

Kohang@etri.re.kr

한국전자통신연구원



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Metadata

Metadata (1)

■ Metadata

- ◆ 콘텐츠를 기술(**Description**)하는 부가 데이터
- ◆ 콘텐츠 활용의 전 과정 기능, 내용기반 탐색 및 획득 기능 제공
- ◆ 개인 취향(**user preference**)에 따른 자동 필터링 및 선택적 저장
- ◆ 시청자 취향에 특화된 광고/프로그램 제공
- ◆ **Personalized TV**
- ◆ **Advanced EPG** 기능
- ◆ **Content-Based Browsing/Non-linear Navigation**

- ◆ More structured metadata needed in the broadcast streams to allow searches on programs
- ◆ Usage of metadata creates the opportunity to include content-based retrieval features into new and existing databases

Metadata (2)

■ Professional applications

- ◆ MPEG-7
- ◆ EBU/SMPTE Task Force for the exchange of TV program material
- ◆ TV Anytime Forum
 - *Content management metadata* for content transfer & control in the SP
 - *Navigational metadata* for usage of the content, controlled by the client and server applications
 - This set of metadata must be easily stream-able, in a separate form or multiplexed with source

■ Consumer applications

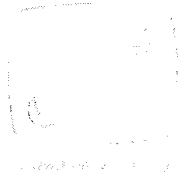
- ◆ So far seems not to have drawn the attention of people
- ◆ *Why metadata at home?*
 - To let users get information about available programmes
 - To let users interact with or program the system to search programmes fitting their personal profile
- ◆ DVB-SI (Service Information) (ETS 300 468)
- ◆ ATSC-PSIP (Program and System Information Protocol)

Metadata (3)

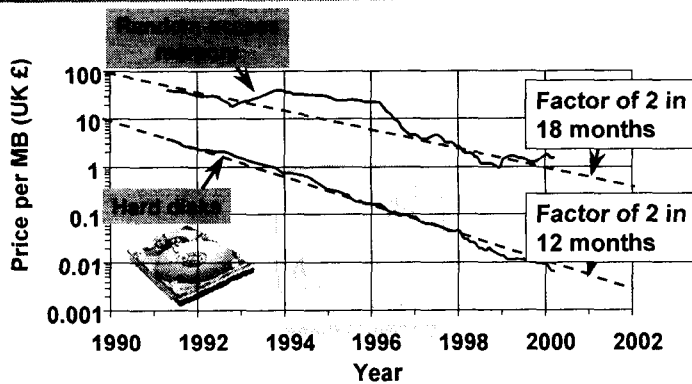
■ Technical aspects related to metadata

- ◆ Audio-visual material must be analyzed and processed before being distributed to generate the meta-information for retrieval
- ◆ The metadata will be then streamed and distributed with the original content
- ◆ A content description interface for home storage applications
- ◆ Key challenges on the consumer storage system
 - *Automatic* user profiling, filtering, and indexing
 - *Easeness* of use for retrieval of content from the storage device and management of stored material

TV Anytime Forum Standardization



Disk storage 가격 하락

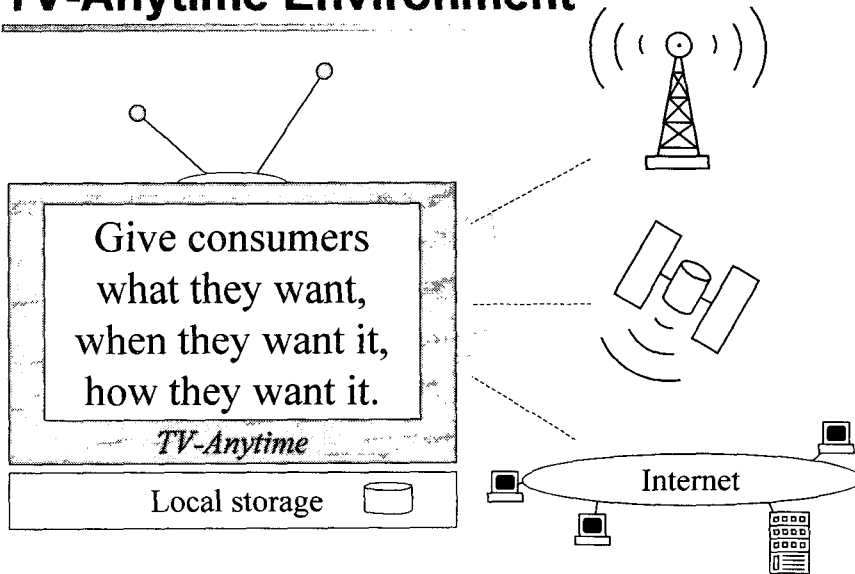


- Allows random access to content
- Metadata can be stored along with content
 - Search, selection, management of content much easier
 - Segmentation of content possible (skip forward, back)
 - Richer interaction possible, DVD-like options
- Transfer and redistribution of content easier

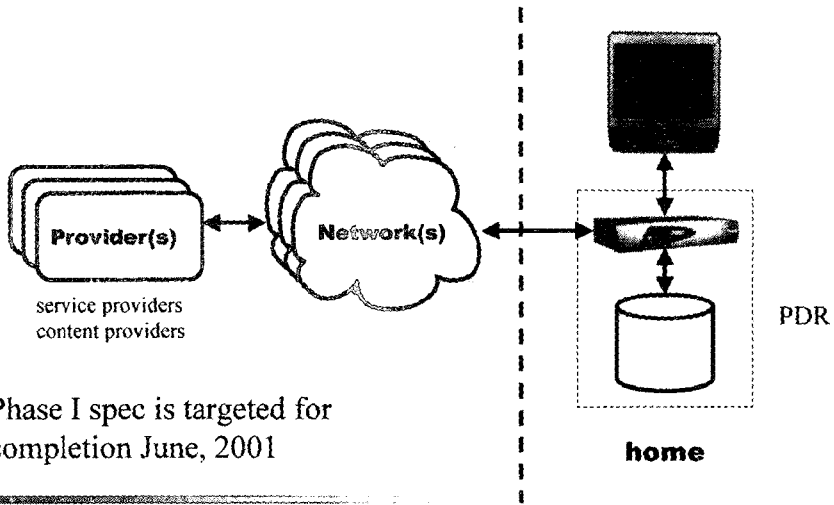
Personal Digital Recorder (PDR)

- Storage-based recorder for AV content
- Already many PDRs on the market, but...
 - ◆ Proprietary solutions restrict user to a single service or a single content provider
 - ◆ Locks together broadcaster, service provider and PDR manufacturer
- To achieve interoperability, some standardization is required.
 - ◆ This will lead to a wider market, better choice for the consumer, and reduced cost.
- But TV-Anytime specifies only the minimal standard necessary for interoperability.

TV-Anytime Environment

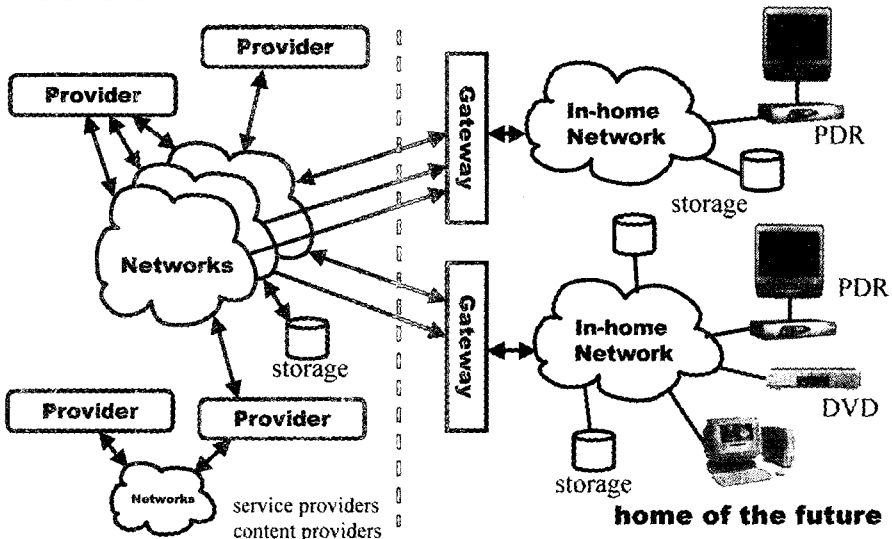


Phase I: Simple System

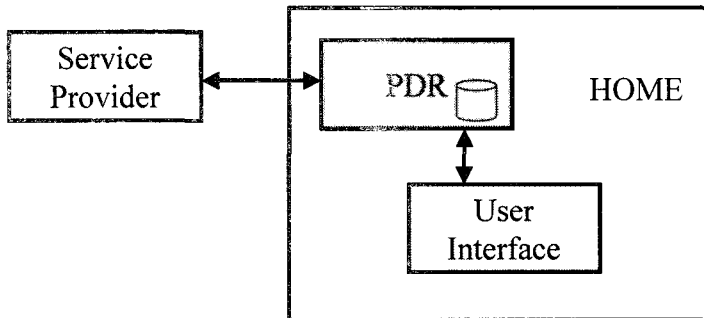


Phase I spec is targeted for completion June, 2001

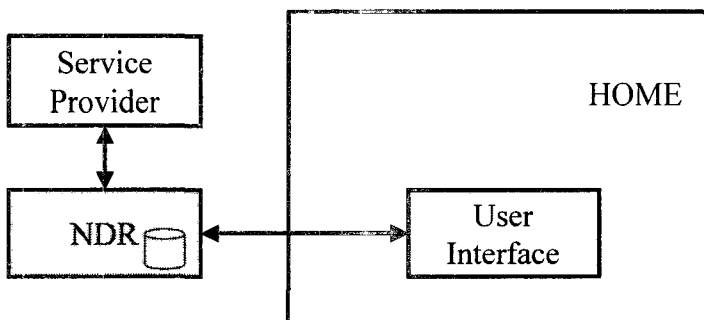
Phase II: Scaled System



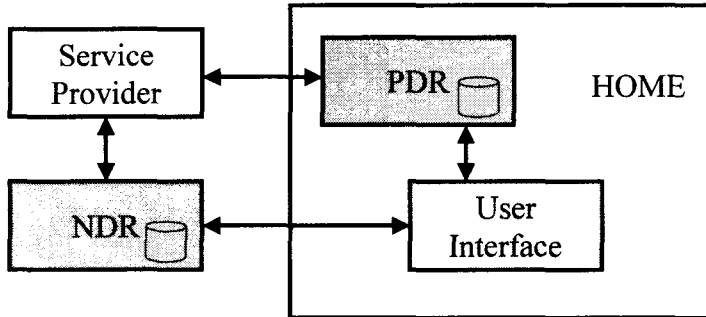
Local PDR



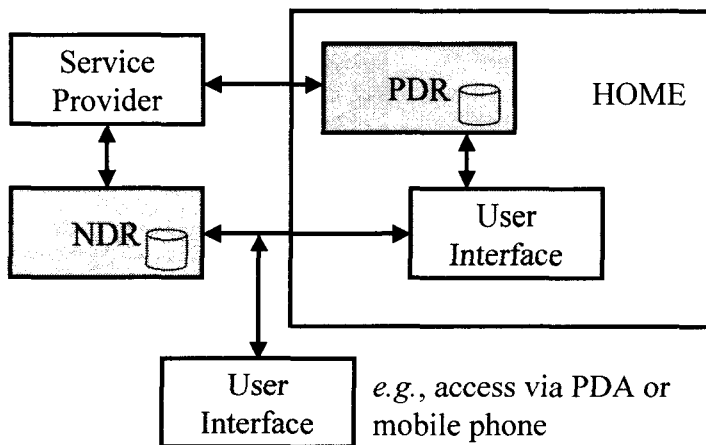
NDR



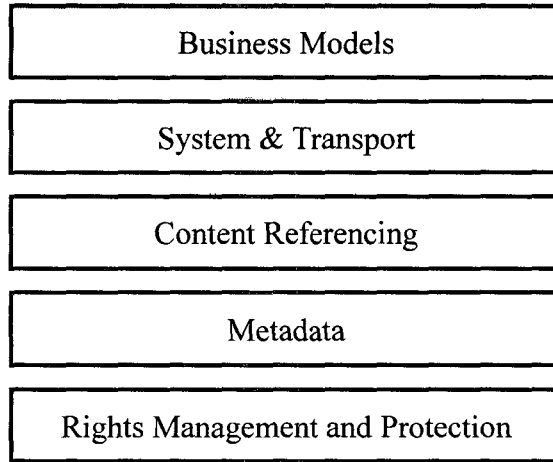
PDR+NDR combination



Remote Access to Content

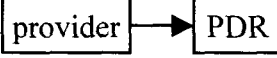


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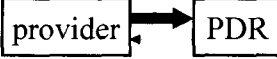


TVA Model


- **Model 1: unidirectional (e.g., broadcast)**



 - ◆ PDR 내의 agent 에 의한 시청자의 profile/preference 기반 콘텐츠 필터링
- **Model 2: bi-directional (e.g., with a return path)**

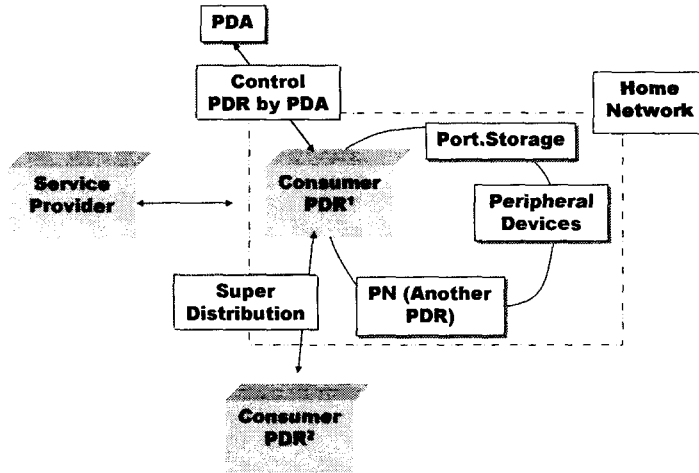


 - ◆ return path를 통한 시청자 메시지 또는 정보 전달
 - ◆ 프로그램 사이에 소비자가 원하는 광고 삽입 가능
- **Model 3: bi-directional with broadband**



 - ◆ 원하는 콘텐츠의 실시간 전달 가능

Post Phase 1



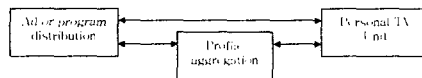
Phase 2 Scenario

Targeting

- ◆ 시청자 프로파일에 따라 선호 프로그램의 자동 추출, 전송해 주는 기능
- ◆ 시청자의 프로파일 정보
 - 개인 PDR이나 NDR의 특정 영역에 저장
 - 정적 특성: 등록시 입력하는 인적 사항, 선호도 정보, 우편번호에 의한 그룹핑 정보
 - 동적 특성: viewing history와 "thumbs up" rating등의 실시간 동작에서 생성

Targeting Framework

- ◆ Targeting이 요구되는 세가지 주된 컨텐츠
 - Programming, Advertising, Promotions
- ◆ Targeting을 위한 주요 동작 기능
 - ① 개인 소비자들이 구입하기 위한 프로그램의 다운로드
 - ② 프로그램 시청시 자동 삽입하기 위한 광고나 판촉물들의 다운로드
 - ③ PDR그룹으로의 멀티캐스팅을 위한 프로파일 정보 수집



Phase 2 Scenario

Redistribution(Super Distribution)

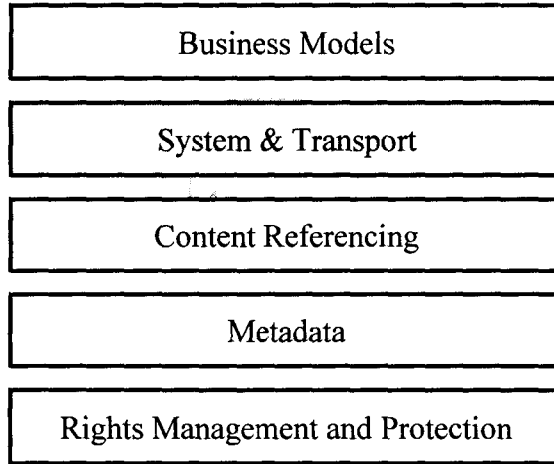
- ◆ Network 기능을 제공하는 PDR
- ◆ Multi-screen, 이동 저장 장치와 같은 networked 장치들이 common PDR(media distribution hub)에 연결
- ◆ 방송 콘텐츠의 재분배
- ◆ Scenario
 - Content Sharing : peer-to peer distribution
 - Home Networking : Multiple storage and display terminals within private physical network
 - Removable Media

Phase 2 Scenario

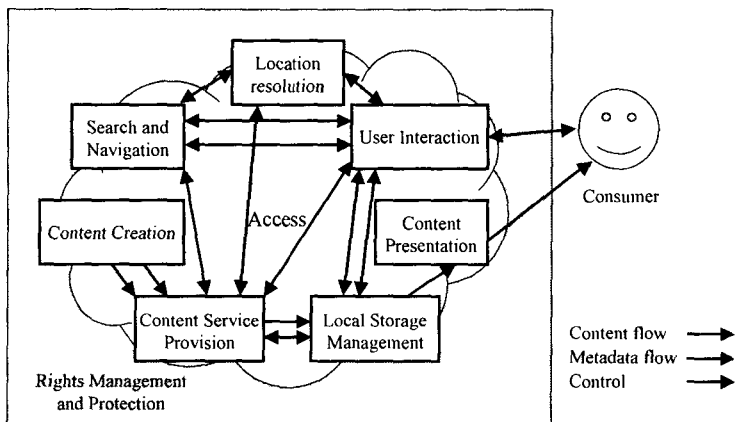
New Content Types(Extended PDR Service)

- ◆ 게임, enhanced TV, 웹 페이지, 음악 파일, 그래픽, 데이터 등의 다양한 콘텐츠를 통합 제공하는 서비스
- ◆ TV는 통합 오락/정보의 gateway
- ◆ 다양한 media format 제공
 - Linear programme with non-synchronised, non AV content
 - Linear programme with synchronised non AV content
 - Non-linear single AV programme
 - Hybrid VOD and nVOD
 - Linear broadcast programme with dynamically inserted content from other sources
 - Single video stream with multiple audio
 - Multi, parallel stream linear audio/video programme
 - Non-linear multi, parallel stream audio/video programme

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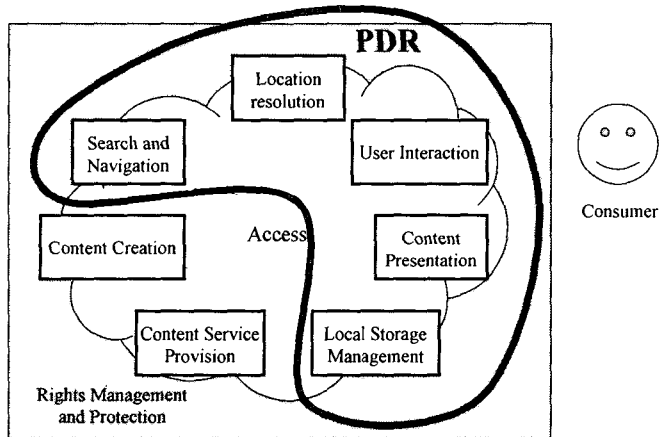


TV-Anytime Functional Elements

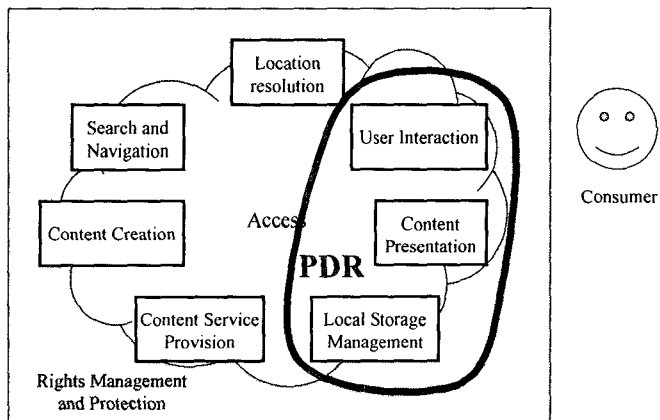


S & T WG defines normative transport requirements for the unidirectional system

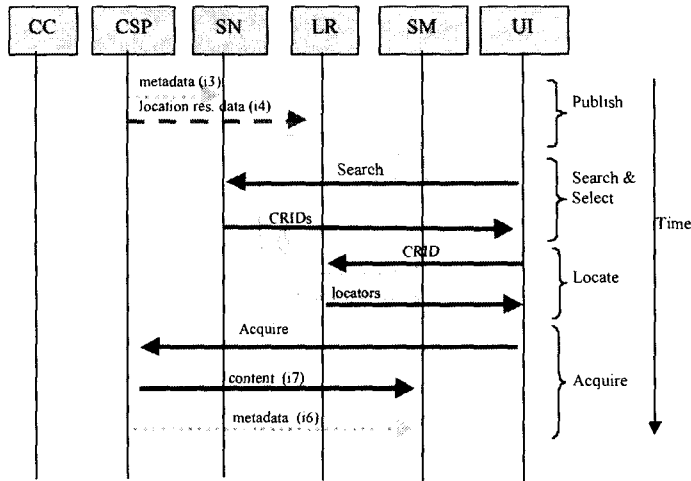
Broadcast (Model 1)



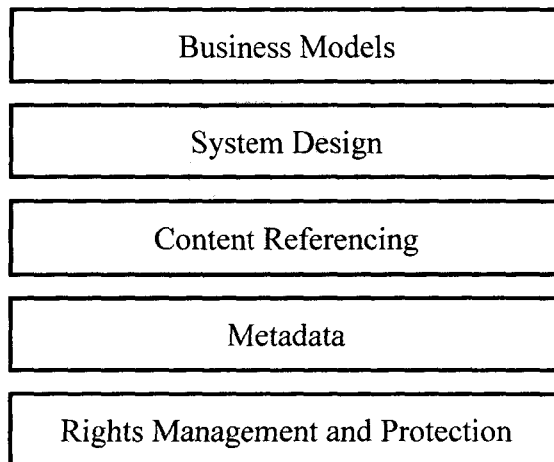
Bi-directional (Models 2 & 3)



Dynamic Behavior of TVA System



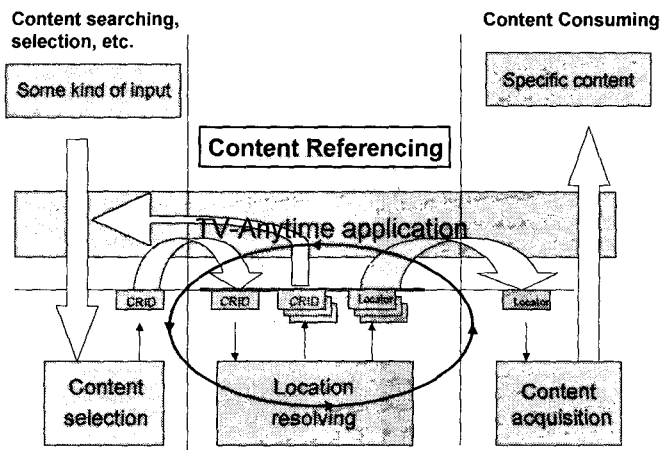
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Content Referencing: Purpose

- To allow acquisition of a specific instance of a specific item of content.
- To provide the ability to refer to content independent of its location,
 - ◆ whether that location is on a particular broadcast channel on some date and time,
 - ◆ or on a file server connected to Internet, or wherever.
- To provide the ability to (subsequently) resolve such a reference into one or more locations where the content can be obtained

Content Referencing: Environment



The key concept is the separation of the reference to a content item – the CRID – and information that is related to its retrieval.

CRID Definition

CRID:// <authority> / <data>

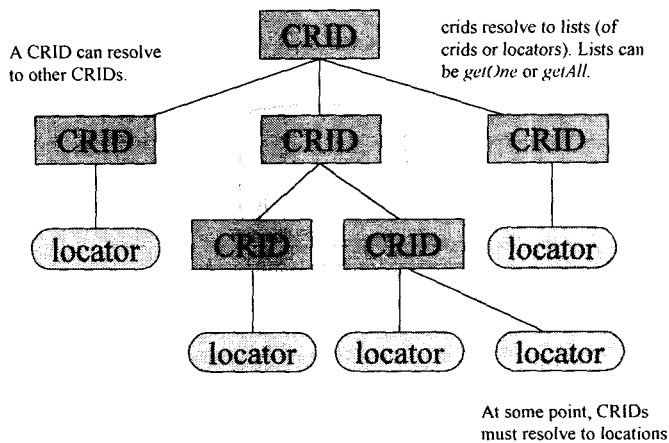
Format of authority:

<DNS name>[;<path>]

Example of CRID:

- CRID://www.tv-tokyo.co.jp/vpn-tv/
- crid://sony.com;columbia-tristar/jeopardy
- CRID://nbc.com/UPID92f3-a30b-5177-08ac-4

CRID Resolution



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Business Models

System Design

Content Referencing

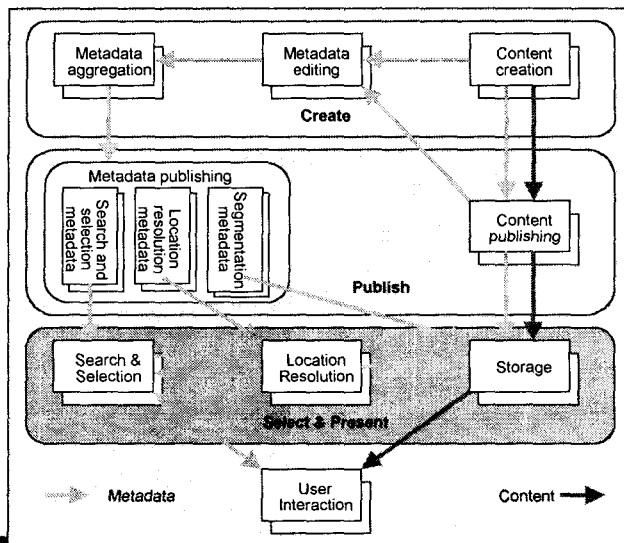
Metadata

Rights Management and Protection

What is TVA metadata?

- XML-based description
 - ◆ for interoperability
 - ◆ metadata schema - MPEG-7 DDL
- TV-Anytime namespace
 - ◆ schema definition
 - xmlns="http://www.tv-anytime.org/2001/04/metadata"
 - ◆ MPEG-7 namespace
 - ◆ dictionary
 - a semantic reference for the creation of new schemas
 - attribute, element
- Main features
 - ◆ specifies metadata structures using XML schema
 - ◆ not specify transport encoding of metadata
 - ◆ much borrowed from MPEG-7
 - ◆ main areas - EPG, segmentation, user profile

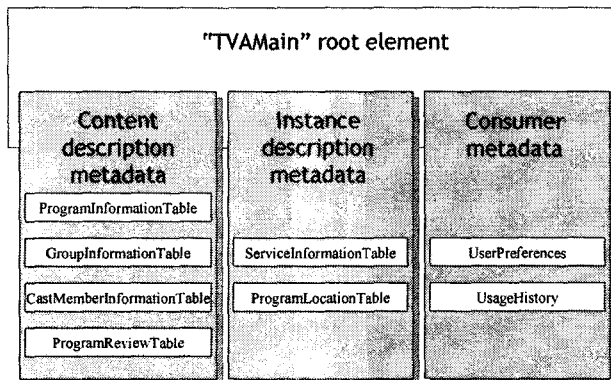
TVA Process Model



Kinds of Metadata

Content Description metadata	program title, genre, summary, critic's review
Instance Description metadata	location (broadcast time & channel), usage rules, delivery parameters
Consumer metadata	user preferences, usage history, personal bookmarks

TVA Document Structure



Content Description Metadata

- Content description metadata
 - ◆ describe content independently of instantiation (broadcast, internet publishing) of that content
 - ◆ program information
 - ◆ group information
- Content description model
 - ◆ program
 - an editorially coherent piece of content
 - may be found in many locations
 - ◆ program group
 - group of program
 - series, show

Instance Description Metadata

- Instance description metadata
 - ◆ describe a particular instance of a piece of content
 - ◆ assigned by content provider
 - ◆ content location, usage rule, delivery format
- Program location data model
 - ◆ program location
 - broadcast service and the Web
 - ◆ schedule event
 - specific type of program location
 - describing broadcast program locations (service, time, duration)

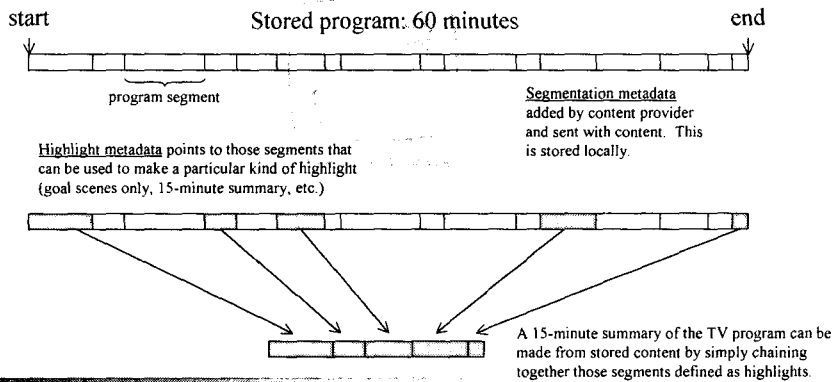
Consumer Metadata

- Usage history DS
 - ◆ a list of the user's actions for an observation time
 - ◆ used in automatic generation of user preference
 - ◆ interoperable exchange of usage history info.
 - ◆ application areas
 - build a personalized TV guide
 - selling viewing history to advertisers/service provider
 - tracking/monitoring the content viewed by individual
- User Preference DS
 - ◆ User's preference pertaining to content consumption
 - ◆ Personalization of content access/consumption
 - matching preference and media descriptions to search, filter, select and consume
 - ◆ Enabled usage scenarios
 - identification of multiple users
 - filtering comb. of preference on genre, time, etc.
 - accurate and efficient agent operations
 - preference for particular kinds of highlights
 - exchange personal profiles

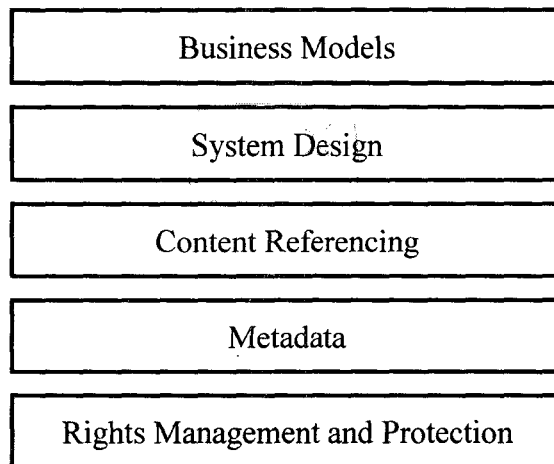
Segmentation Metadata

■ Segmentation metadata

- ◆ restructure and re-purpose for alternative view
 - highlights, bookmarking



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RMP 규격

▣ 2nd Draft on SP005v1.0 (2002. 4.)

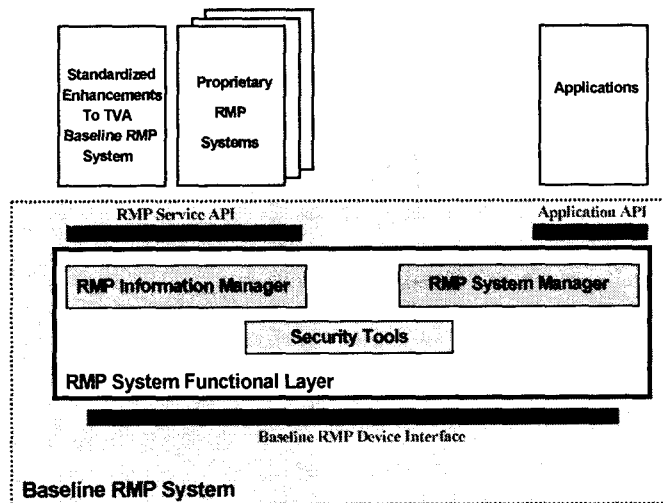
▣ 일반 요구사항

- ◆ 공통적이고 상호동작 가능한 양단간 콘텐츠 보호 메커니즘의 지원
- ◆ RMPI(RMP Information)를 포함한 RMP 시스템의 완전한 정의
 - 베이스라인 이외의 몇몇의 RMP 기능과 모듈은 선택 사항
 - CE 제조업자들에게 보다 충분한 유연성 제공

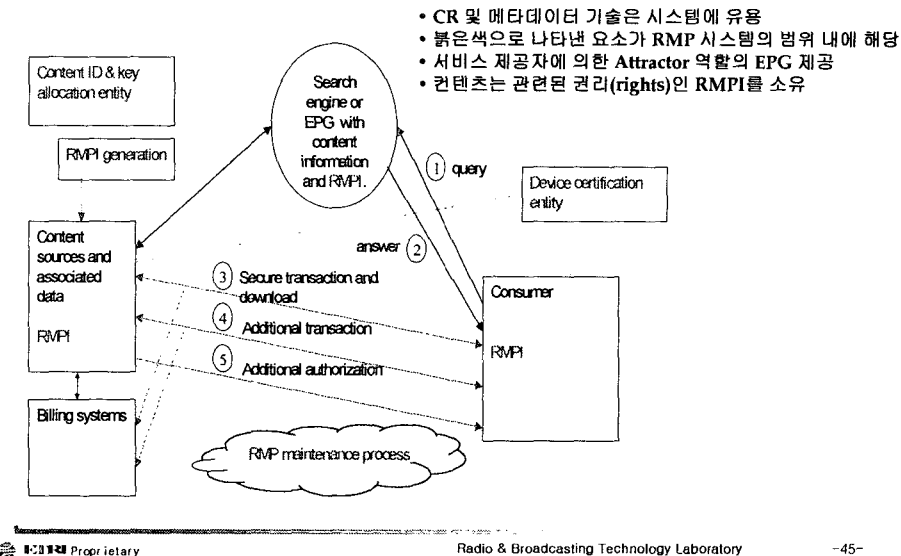
▣ 세부 요구사항

- ◆ 콘텐츠의 생성과 전송
- ◆ 콘텐츠의 획득과 배분
- ◆ 콘텐츠의 복사와 재배포
- ◆ 개인적 사용

RMP 시스템의 논리도



RMP 시스템의 프로세스 구조



ATSC RFP on Metadata

Metadata for advanced EPG

- ◆ Revision to ATSC (PSIP)
- ◆ ATSC specialist group on transport T3/S8
- ◆ Scope
 - Channel and event logos
 - Browsing/searching by metadata (genre, performer, etc)
 - Multimedia descriptions (trailer)
 - Link to other sources (web)

Propose to the RFP

- ◆ Content referencing and location resolution mechanism (S-4)
- ◆ Metadata Specification (S-3)
- ◆ Continued cooperation as these specifications evolve
- ◆ Review and feedback from ATSC on S-3 and S-4

Transport encoding

■ Carriage of metadata over MPEG-2 TS

- ◆ ISO/IEC 13818-1:2000/PDAM 1:2001
- ◆ Metadata can be carried by
 - PES packets (for synchronized metadata)
 - metadata sections (asynchronous, non-carousel, 4093 bytes)
 - DSM-CC data carousel (for non-hierarchical metadata)
 - DSM-CC object carousel (for hierarchical, file-based structures)

■ Binary encoding

- ◆ MPEG-7 Systems FCD
 - provides a interface for textual and binary formats "BiM"
 - Binary access unit

TV Anytime 표준 기반 방송 기술

기술 개발 현황

STORit(Acts 프로젝트 AC312)

- ◆ STORit-Box(DVB와 인터넷의 매체 통합)와 IHDN의 결합
 - 원격교육, 방송 프로그램 선택, 대화형 방송 등의 신규 서비스 제공
- ◆ 사용자 프로파일 기반 지능형 에이전트를 이용한 맞춤형 서비스 제공

myTV(IST programme 11702)

- ◆ 디지털 TV 방송을 위한 맞춤형(personalized) 서비스 제공
 - TV Anytime 저장매체에서 상호운용성이 보장된 DVB-compliant 시스템 개발
- ◆ 새로운 서비스 개발: 비선형 브라우징/네비게이션 및 대화형 광고
- ◆ 2002년부터 후속과제로 홈 네트워크 환경하의 Share-it 프로젝트 추진

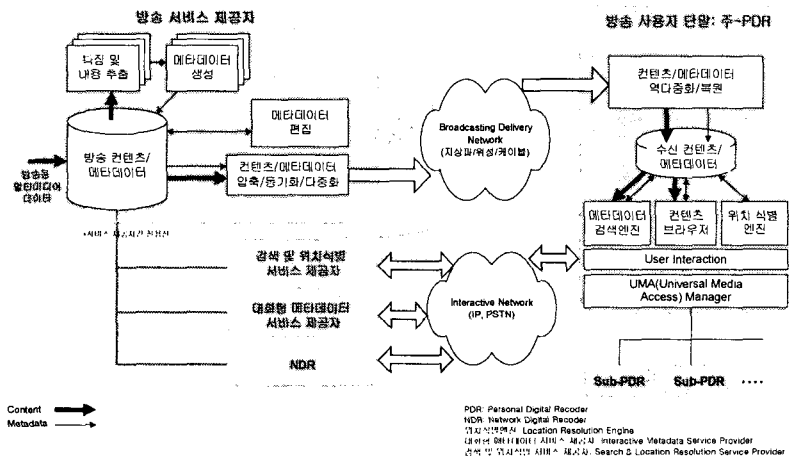
NHK의 ISTV(Integrated Service TV)

- ◆ EPG, Anytime 서비스, 메타데이터에 의한 진보된 부가 서비스 개발

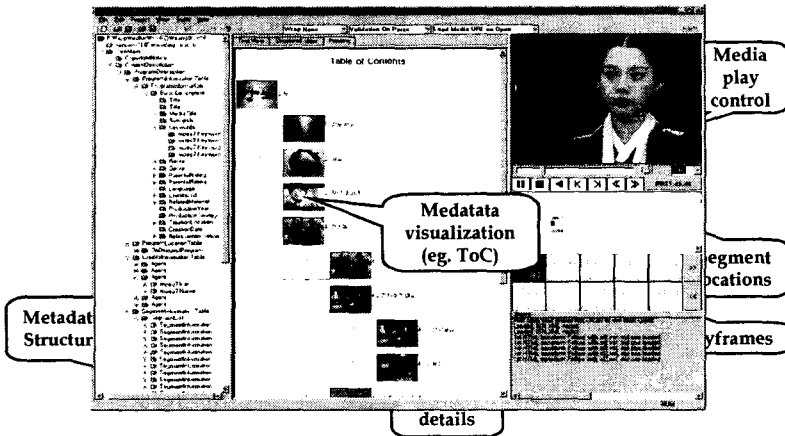
- EPG: Electronic Program Guide
 - IHDN: In-Home Digital Network

메타데이터 방송응용 시스템 개념도

Conceptual View

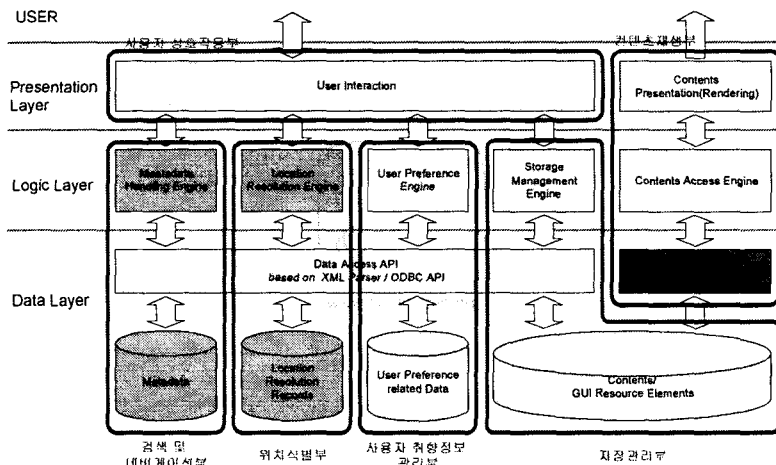


Metadata editor based on TV-Anytime



- Based on the normative specification of TV Anytime Forum metadata
- Visualization of XML-based metadata structure and contents
- Interoperation between the media and metadata processing modules
- Exporting/Importing to/from the MPEG-7 compliant metadata

메타데이터 처리 엔진 기능 블록도



MD Processing Engine & Browser

Electronic Contents Guide

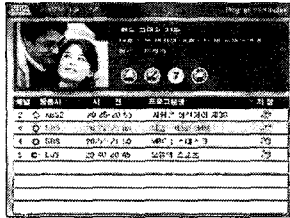


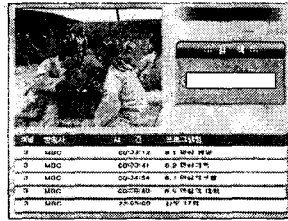
Table of Contents (ToC) Browser



Event-based Summary Browser

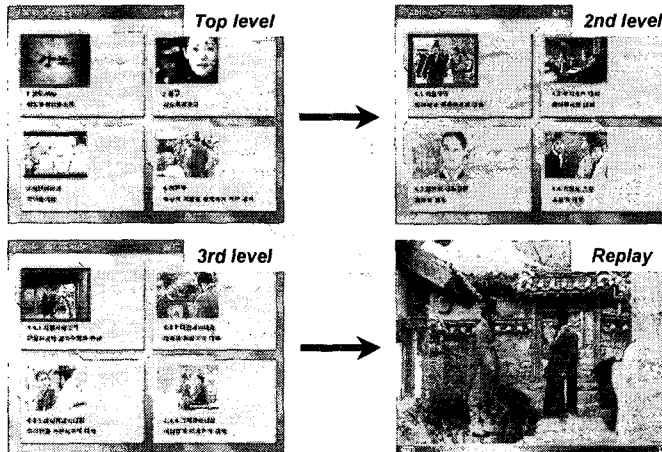


Segment-based Search

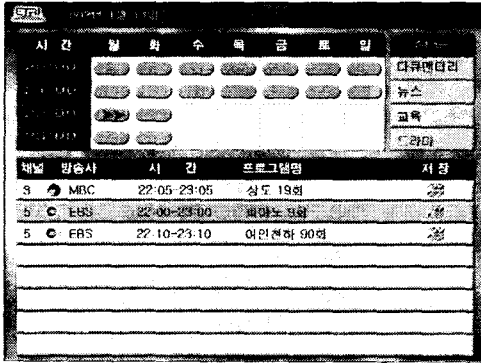


Advanced Contents Browser

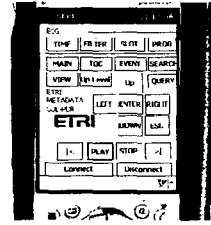
ToC View Example



Networked ACG Browser



Main-PDR(Set-top Box)

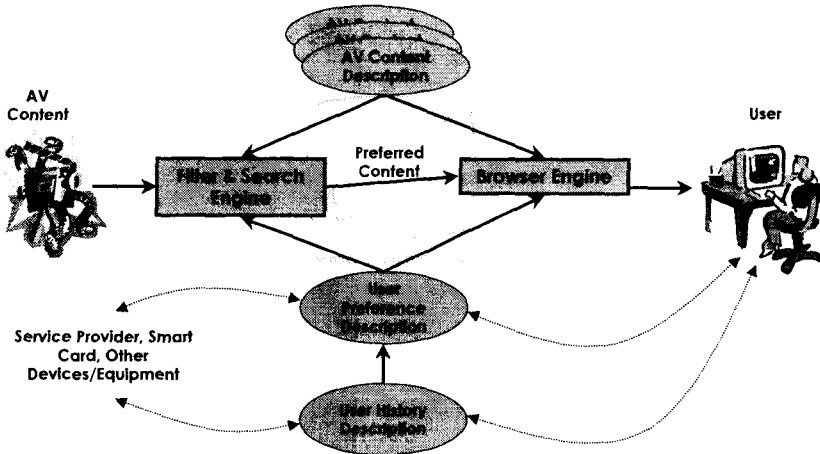


Sub-PDR(PDA)

Remote control of Set-top Box by PDA

사용자 취향 기반 지능형 방송 응용

□ 사용자 선호도 기반 프로그램 필터링 및 검색 프레임워크



감사합니다.