The *TV-Anytime* Forum

Specification Series: S-1

On:

Phase 1 Benchmark Features

(Informative)

Document: SP001V1.1
Date: 21 December, 2001

Series Overview

This is the first in a series of five “S-series” documents produced by the *TV-Anytime* Forum. These documents establish the fundamental specifications for the services, systems and devices that will conform to the *TV-Anytime* standard, to a level of detail that is implementable for compliant products and services.

As is common practice in such standardization efforts, these specification documents were preceded by requirements documents (“R-series”), which define the requirements for the *TV-Anytime* services, systems, and devices.

Congruent with the structure defined in *TV-Anytime*’s Call for Contributions (TV014r3), these specifications are parsed into three major areas, each described in a separate document of the series: Metadata (S-3), Content Referencing (S-4) and Rights Management (S-5). See the Call for Contributions for more detail on the derivation and background of these categories and their respective roles in the *TV-Anytime* standardization process.

The other two documents in the S-series are intended to define the environment and system architecture in which the standards in S-3, S-4, and S-5 are to be implemented. The first document in the series (S-1) provides benchmark business models against which the *TV-Anytime* system architecture is evaluated to ensure that the *TV-Anytime* standard enables key business applications. The next document in the series (S-2) presents the *TV-Anytime* System Architecture. These two documents are placed ahead of the other three for their obvious introductory value; S-1 and S-2 are both informative.

Although each of the S-series documents is intended to stand alone, a complete and coherent sense of the *TV-Anytime* system standard can be gathered by reading all five of the specification documents in numerical order.

Phase 1 Benchmark Features S-1 Revision History

Version	Status	Date	Author	Comments
SP001V1.0	Version 1.0	16 February, 2001	Business Models Working Group	First open release
SP001V1.1	Version 1.1	21 December, 2001	Business Models Working Group	Second open release

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About the *TV-Anytime* Forum

The global *TV-Anytime* Forum is an association of organizations which seeks to develop specifications to enable audio-visual and other services based on mass-market high volume digital storage in consumer platforms – simply referred to as *local storage*.

The *TV-Anytime* Forum was formed at an inaugural meeting held in Newport Beach, California, USA, on 27-29 September 1999. It has started work to develop open specifications designed to allow Consumer Electronics Manufacturers, Content Creators, Telcos, Broadcasters and Service Providers to exploit local storage.

As part of its formation, the *TV-Anytime* Forum has established four fundamental objectives for the organization, which are:

- The *TV-Anytime* Forum will define specifications that will enable applications to exploit local persistent storage in consumer electronics platforms.
- The *TV-Anytime* Forum is network independent with regard to the means for content delivery to consumer electronics equipment, including various delivery mechanisms (e.g. ATSC, DVB, DBS and others) and the Internet and enhanced TV.
- The *TV-Anytime* Forum will develop specifications for inter-operable and integrated systems, from content creators/providers, through service providers, to the consumers.
- The *TV-Anytime* Forum will specify the necessary security structures to protect the interests of all parties involved.

Member organizations from Europe, the USA, and Asia, are drawn from a wide variety of industries: Traditional Broadcasters, Internet Broadcasters, Content Owners, Service Providers, Telcos, Consumer Electronics Manufacturers, IT Industries, Professional Equipment Manufacturers, Component Manufacturers and Software Vendors.

The *TV-Anytime* Forum invites *participation* from all interested organizations. Membership is open to all who sign the Membership Agreement and attend meetings. Meetings are held approximately every two months in Europe, the USA, and Asia.

For more information or to get involved with the work of the *TV-Anytime* Forum, visit the *TV-Anytime* Forum (www.tv-anytime.org) or contact:

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1. Scope

This document lists and defines the TV-Anytime Phase 1 features that are identified in document "R-1: The TV-Anytime Environment" (TV035r6) which describes PDR (Personal Digital Recorder) usage models that the TV-Anytime standards facilitate. It is recommended that the reader familiarize him/herself with TV035r6 prior to reading this document.

- Phase 1 is the first full and synchronized set of specifications established by the *TV-Anytime* Forum. TV-Anytime Phase 1 Features enable search, select, acquire and rightful use of content on local and/or remote personal storage systems from both broadcast and online services. These features shall be supported and enabled by the Phase 1 *TV-Anytime* tools that are defined in the Metadata, Content Referencing, and Rights Management and Protection specifications, respectively S-3, S-4, and S-5. All Phase 1 Features listed in Table 6.1 are enabled by the normative TV-Anytime tools specifications. This list of Phase 1 Features are to be used as guidance to manufacturers, service providers and content providers regarding the implementation of the Phase 1 *TV-Anytime* specifications.

Appendix A of this document provides a set of Benchmark Business Scenarios as examples to aid manufacturers and service/content providers in understanding the intended nature and capabilities of TV-Anytime systems/services. These business scenarios will also be used as general guidance by the TV-Anytime Systems Design, Content Referencing, Metadata, and Rights Management and Protection groups to verify that their Phase 1 specifications fully enable the TV-Anytime Phase 1 Feature set.

2. Glossary of Terms

Agent	Application that performs a function as a proxy for a consumer, such as searching based on a personal profile
Bi-directional	Two way flow of content and/or information
Consumer profile	Data that represents the interests and preferences of the consumer
Content	Digital media that can be stored on a PDR such as A/V material, Internet information or software applications
Content creator	Producer of content
Content owner	Entity that owns the intellectual property rights to content
Content provider	Entity that acts as the agent for and is the prime distributor of content
Consumer-centric	Viewing the system from the perspective of the consumer
Electronic Content Guide (ECG)	Means of presenting available content to the consumer, allowing selection of desired content
Delivery chain	The system that provides the distribution of content and information from providers to consumers
Home network	Distribution system within the consumer's local home environment
Home server	Networked storage device within the consumer's local home environment
Network provider	Entity responsible for content distribution infrastructure
Pay TV	Any service in which consumers can elect to access specific content for a fee, such as pay-per-view, content rental, etc.
"Pull" content	Content that is delivered only after a consumer requests it
"Push" content	Content that is delivered to consumer(s) without their intervention or request, i.e., broadcast.
Return path	The part of a bi-directional distribution system over which data flows from the consumer to the service provider
Service provider	An aggregator and supplier of content which may include gateway and management roles
Smart Card	An IC card that contains data such as personal profiles, access keys, etc.
Super Distribution	Process by which consumers redistribute content to third parties
Trickle Cast	Download of content to a consumer device (PDR) over time, when possible via the return path connection between the consumer device and the content/service provider
TV-Anytime devices	Components that comply with *TV-Anytime* specifications and requirements
Uni-directional	A system that allows one-way flow of content and information
Value chain	A group of entities that interact to deliver content and services to users

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Note to Business Models Group: To we want to scrub the "Glossary of Terms" to include only those terms that are used in the SP001v1.1 document?

Abbreviations

A/V	Audio and Visual material
AVD	Audio video and/or data
CA	Conditional Access
CFC	Call for Contributions
ECG	Electronic Content Guide
EPG	Electronic Program Guide
IC	Integrated Circuit
I/O	Input/Output
IPR	Intellectual Property Rights
PDA	Personal Data Assistant
PDR	Personal Digital Recorder
PVR	Personal Video Recorder
STB	Set-Top Box
TV	Television
TVA	*TV-Anytime*
TVAF	*TV-Anytime* Forum
URL	Universal Resource Locator
VOD	Video on Demand

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Note to Business Models Group: Should we scrub the "Abbreviations" list to ensure it is in sync with the SP001v1.1 document?

3. TV Anytime Participants - Rights Considerations

3.1 Consumer Privacy and Provider Rights

TV-Anytime defines new environments that arise from consumer-centric scenarios of services offered by traditional and new types of providers. In order to welcome a wide range of participants across all of the many and varied value chains of the *TV-Anytime* environment, the *TV-Anytime* Forum respects and embraces the basic rights of all participants. These include preserving the basic right of a content consumer to privacy and acknowledging the legitimate rights of all participants such as content creators and providers, service providers, advertisers and network operators.

The *TV-Anytime* Forum is dedicated to respecting and assuring the rights of a content consumer to privacy. As personal profile information is the sole property of the end-consumer – using this information as currency for content offerings by sharing it with external bodies remains the sole prerogative of the end-consumer. The keys for dissemination of private information with other parties will always respect the amount of privacy intrusion the consumer is willing to allow.

The TVAF fully supports the environment in which all interactions involving privacy issues conduced by content and service providers and personalization engines/agents/software/services preserve this right for privacy.

It is the end-users' decision as to the amount of privacy invasion and profiling capabilities done by these participants, and will be allocated by the end-consumer to a vendor or service provider at his discretion.

Providers that accept the end-user's choice to allocate to them the responsibility (partial or in full) to profile him/her, through a contract with a service/technology/content provider, will adhere to strict privacy regulations. This will effectively eliminate breaches of security of the collected private information in order to avoid any use of it that was not explicitly permitted by the end-consumer.

3.2 The intended use of the TV-Anytime CRID - Content Provider Rights

CRID's are unique content reference identifiers and are effectively signposts to content that can be 'found and/or retrieved' at a later date. They are a key part of the TV-Anytime system. There are many different scenarios in which CRID's are created and utilized, involving content creators, content owners, service providers, the set top box and 3rd parties. All of these can be "resolving entities" which means that if there are not defined business relationships between those stakeholders then there may be incorrect and unauthorised mapping to content. This could result in a poorer consumer experience. The flexibility of the TVAF CRID specification also enables business models for 3rd party suppliers of CRID and resolution data that when implemented properly can provide a richer consumer experience.

Generally, for the case of 3rd party resolving, some data is passed from the CRID issuing authority through the resolving party to the viewer. For example:

> *A provider of an EPG service, who has an indirect relationship with the content providers on the EPG, can issue CRID's that they do not resolve themselves. A 3rd party (which could be the original content provider) can then offer a service to the EPG provider to resolve those to content locations.*

In order for the intentions of the issuing authority to be honoured there will have to be a business and/or legal relationship between the issuing authority and the resolver. In the simple case the issuing authority will author the resolution information that is carried or published by the 3rd party. In this case the relationship involves the correct and timely carriage of the data.

In a more complex case the issuing authority may only describe the content they are referring to (e.g. by metadata identifying the content) and expect the 3rd Party to author and provide the resolution data. In this case the relationship must define the scope of the content referenced by the CRID and the locations returned for the CRID.

The most conceptually straightforward use of the CRID is the case in which an authority issues a CRID with the express intention of providing the corresponding resolution data. The delivery of this data to the consumer may or may not be under the direct control of the CRID authority.

A common use of the CRID will fall into this category in which the integrity of the decomposition of the CRID to a number of specified locators is of paramount importance to the success of the business strategy.

In order to accommodate a wider range of TV-Anytime business models, it is recognised that a CRID issued by an authority may be resolved using resolution data authored and/or provided by another party.

In order that all cases can co-exist, care must be taken to be clear under what conditions a CRID is issued such that, where appropriate, only authorised parties will offer resolution of these CRID.

In the case of third party resolution of a CRID, there may still be conditions imposed upon the resolution service, which limit the scope of resolution consistent with the published metadata. These conditions must be made clear by the CRID authority to the resolution provider as part of the business arrangements. For more details on CRID's see document S4 covering content referencing.

4. Definitions

To aid the reader in understanding this Phase 1 Benchmark Features specification, definitions of words, terms, and phrases used in this document are provided below.

4.1.1 TV-Anytime Phase 1

Phase 1 is the first full and synchronized set of specifications established by the *TV-Anytime* Forum. This document describes in Table 6.1 an evolutionary range of features that are supported by the normative specification documents for Metadata, Content Referencing, and Rights Management and Protection, which are S3, S4, and S5 respectively, and are numbered as Versions 1.X. These specifications will enable search, select, acquire and rightful use of content on local and/or remote personal storage systems from both broadcast and online services. These features require firm standardization. There will be further TV-Anytime phases published and Business Models for Post-Phase 1 are currently being defined to include Private and public domains, portable recordable media, super distribution (legal sharing of content between consumers), peripheral device support and mobile devices, amongst others.

4.1.2 Normative and Informative

Benchmark features (detailed in Table 6.1) are basic functionalities that are supported and enabled by the normative Phase 1 *TV-Anytime* specifications. Normative features are those that will be supported by implementers of TV-Anytime Phase 1 systems. Informative features are optional and can be implemented or not at the discretion of service/content providers and manufacturers. When TV-Anytime Phase 1 Normative and Informative Features are enabled, they must be implemented according to the TV-Anytime Phase 1 tools specifications for Metadata, Content Referencing, and Rights Management and Protection, specifications S-3, S-4, and S-5 respectively.

4.1.3 The PDR

The Personal Digital Recorder (PDR) is central to the *TV-Anytime* specifications. It is a consumer device that includes high-capacity disk storage. The high-capacity storage of digital content has recently become available to consumers as a result of disk storage technology advancing and the cost for such storage decreasing. Storage of A/V content and data on devices accessible by individual consumers opens the possibility of a whole new range and quality of content, applications and services. The consumer can now record content and watch it independent of broadcast schedules; thereby, taking advantage of more sophisticated and personalized content and services via a device that gathers input from all sources connected to it. The consumer can also communicate with broadcasters/service providers from PDRs that have a bi-directional connection (either intermittent or always-on) allowing them to, for example, request specific content or make their personal interests known to service providers.

4.1.4 The NDR

The Network Digital Recorder (NDR) is a remote storage device(s), which can include virtual storage, outside the home. It emulates physical device(s) and is accessed via a persistently-protected network, such as a service provider's closed path via the Internet. Since the NDR is part of the persistently-protected consumer domain, content can be securely transferred between remote NDR and local PDR device(s.)

The NDR can be used as a remote PDR which functions like an in-home PDR (personal storage on a remote device.) The protocol and command set used by the Network Digital Recorder are considered inside the scope of *TV-Anytime*; however, implementation of services are considered outside the scope of *TV-Anytime*. Content copying agreements may vary in different countries as specified within the protocol.

4.1.5 'Home' Network and the Consumer Domain

Traditionally, the home network is defined as a range of components networked together within the boundaries of the consumer's physical home.

In the NDR and remote access scenarios described above, we use the term 'consumer domain' to mean the consumer's ability to control the distribution of personal content over persistently-protected local and remote networks which may be private or service provider maintained.

4.1.6 Service-Providers Closed Network

A service-providers network is a virtual network over different physical networks that is established and managed by the service provider. It is a closed network that provides only authorized access to devices and resources as supported and configured by the service provider. The closed network ensures that all content that is accessed over the network is persistently protected.

4.1.7 Three TV-Anytime Functional Models

For the purposes of understanding and implementing *TV-Anytime* capabilities, three functional models are defined and are referred to throughout the *TV-Anytime* specifications. As noted below, the models begin with Model 1, which provides for unidirectional delivery of content with no return path, and increase in capability to Model 3, which includes a full-capability return path. For more details regarding *TV-Anytime* functional Models 1, 2, and 3, refer to TV-Anytime Requirements Series R-1, "The *TV-Anytime* Environment." The three *TV-Anytime* functional models are:

- **Model 1 - Broadcast Model (via unidirectional delivery)**

- **Model 2 – Intermittent Return Path Model (limited, occasional return path)**
- **Model 3 - Bi-directional Broadband Model ('always on' network connectivity)**

4.1.8 Electronic Content Guide (ECG)

An essential element in the *TV-Anytime* system is the Electronic Content Guide (ECG). The ECG allows the consumer to browse, navigate and select different types of content. They allow consumers to make value judgments about what they want to view or capture. Some ECGs can provide in-depth reviews, personalized recommendations and detail about a whole range of content both local and remote.

ECGs may exist locally in a physical PDR or remotely on a network such as the Internet. There may be more than one ECG available to a consumer. Some may be resident; some specific, to a particular service provider and others may be delivered by a content provider or 3rd party.

4.1.9 Capture

Capture is a term used to describe the transfer to a personal storage device of A/V streams, data files such as web content, applications etc. regardless of delivery methods or who controls the process.

4.1.10 Agents

As the amount of content, and number of sources of content, available to consumers increase, it becomes valuable to the consumer to have an intelligent “agent” that can evaluate and filter the available content on the consumer’s behalf. These agents are software applications, which “learn” the preferences of consumers and automatically identify/capture content that is of interest to individual consumers. Agents continuously track the consumer’s preferences and adjust over time to become more and more finely tuned to the preferences of each consumer, and to adapt as consumer’s preferences evolve. Agents can be located at many places within the *TV-Anytime* architecture, including the PDR, the NDR, or the service providers system.

4.1.11 Targeting

Targeting allows providers to deliver relevant content to specific individuals or groups of individuals. There are three ways to target content to viewers in correlation with the three *TV-Anytime* models as described below:

- Model 1 – Broadcast: Local agents on the PDR filter personal relevant content for the consumer based on the locally stored consumer profiles and/or preferences.
- Model 2 – Intermittent Return Path: As in Model 1, but here the service provider can receive verification that the targeted content reached its intended audience. Also, the return path allows providers to aggregate the audiences consuming habits and provide more effective niche programming as well as optimize targeted ads or promotions.
- Model 3 - Bi-directional Broadband: As in both models above, but here individuals can be 'pushed' relevant content in real-time and the target content could exist more easily in the network. Therefore, unlike Models 1 and 2, the targeted content does not have to be previously downloaded to local (i.e., PDR) storage. It can be ‘pushed’ to the consumer from the service provider’s storage in real-time as appropriate based on the content that the consumer is viewing.

4.1.12 Segmentation, Highlights and Book-marking

Segmentation is defined in this document as a logical division of content into different parts (e.g. scenes.). These may be individually captured sections or simple indexes on longer format content.

Highlights are segments of content played back in a logical sequence, e.g., all of the scores in a sporting event.

Book-marking/personal indexing is defined as a consumer-generated index point along side the content.

5. Conceptual Diagrams & Key Business Models

This section provides six diagrams that represent connectivity concepts for *TV-Anytime* implementations. The six concept diagrams evolve in complexity from

Figure 5.1, that shows a standard PDR interfaced to a service provider, to the multi-faceted concept in

Figure 5.6, which includes a NDR and a mobile PDR (mPDR) in addition to the standard in-home PDR. In this latter concept, content can be transferred by the consumer among all three storage devices.

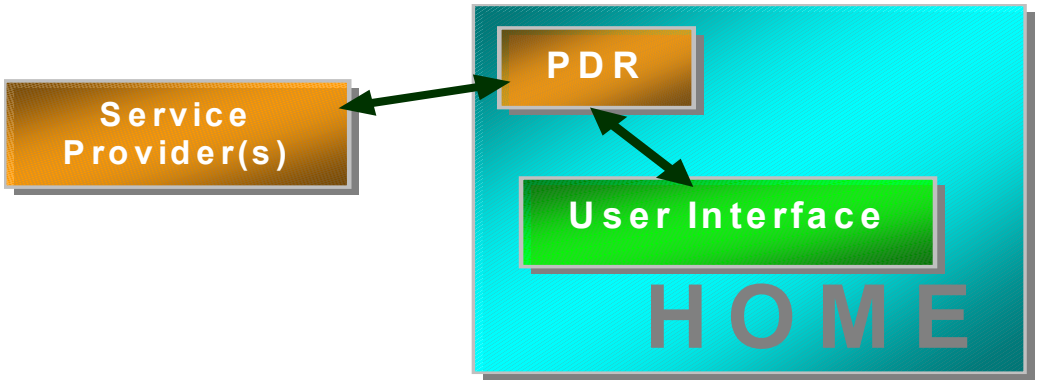

Figure 5.1 - Local *TV-Anytime* Implementation

Local device or devices (STB, Integrated TV, PC for example) in the consumer's home

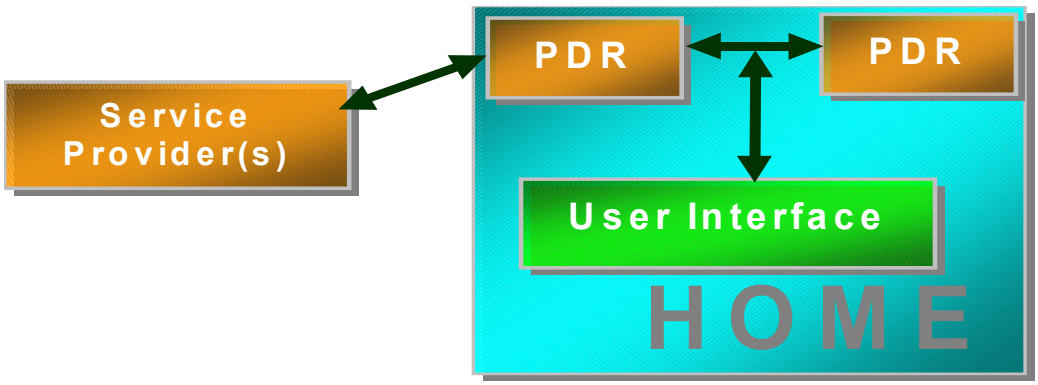

Figure 5.2 - Home network *TV-Anytime* Implementation

Multiple storage devices inside the home. A personal local storage system in the home may also contain multiple PDRs, content archiving components (such as DVD-R) and a wired or wireless home network (including hand-held devices).

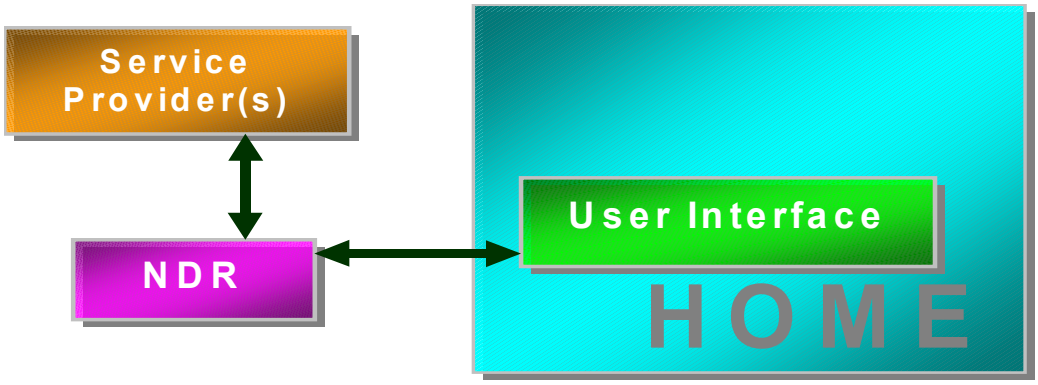

Figure 5.3 - Distributed *TV-Anytime* Implementation

Remote storage using the Network Digital Recorder (NDR) and/or virtual storage device(s) outside the home emulating physical device(s) and accessed via a network such as the Internet or a service provider's dedicated path.

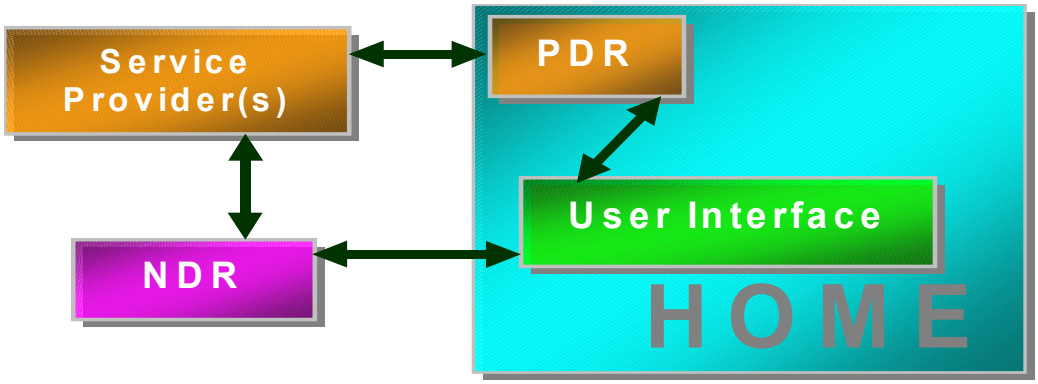

Figure 5.4 - Hybrid *TV-Anytime* Implementation

Hybrid combination of remote and local content storage.

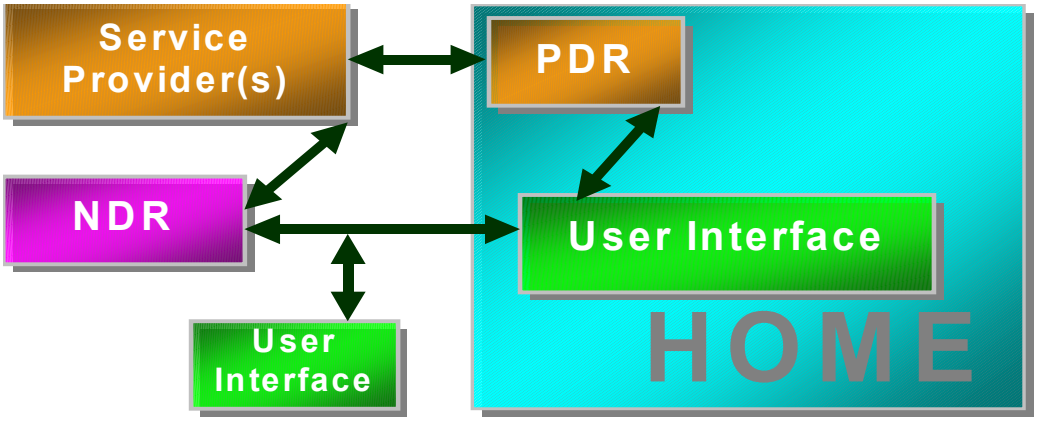

Figure 5.5 - *TV-Anytime* Implementation with External User Interface

As in (c) above, but allowing remote control of and access to PDR content (via PDA, mobile phone, etc.).

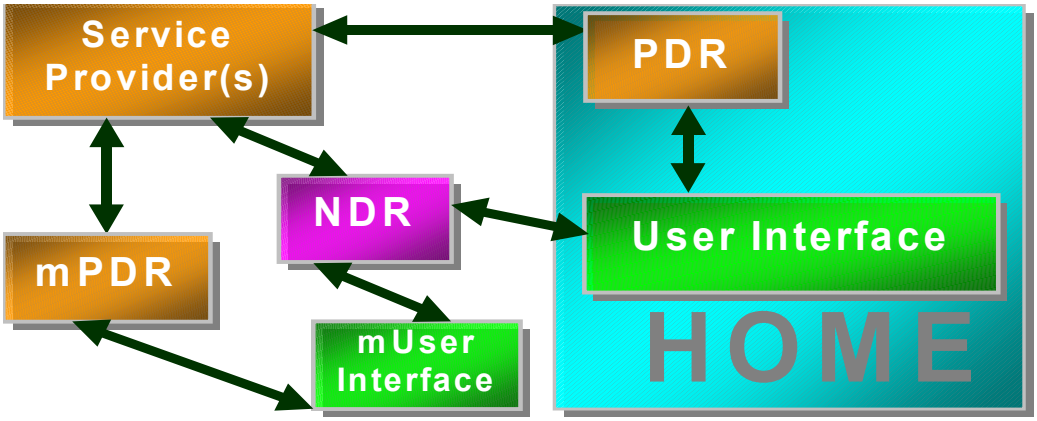

Figure 5.6 - Mobile *TV-Anytime* Implementation

As in

Figure 5.3 above, but with PDR functionality in a mobile device (mPDR), using occasional or persistent network connectivity to content provider(s) and other PDR content.

NOTE: For all of the above models, sources of content can be from multiple networks (broadcasting of any format) or online access to a network such as Internet.

5.1.1 Key Business Models Enabled by Phase 1 specifications

The list of business models that follow is intended to be informative only. These were used to develop the features enabled by the normative specifications in section 6 and are distilled from a large range of potential business models. The order of the items in the list is meant to suggest the order in which business models are likely to be required and implemented in a Phase 1 TVAF System. The following models also focus attention on the user experience - each of which has implications for the TV-Anytime Requirements Series.

Note: The scenarios in Appendix A were built from this list and the features enabled by the normative specifications in section 6, so the following two tables 5.7 and 6.1 can be used as a tool kit to create a variety of other value chain business scenarios and benchmark applications from the technical specifications. The column on the right indicates the features in section 6 that enable each particular Business Model and the enabling components of the specification series on Metadata, Content Referencing and Rights Management Protection will refer to these features.

They are non-exhaustive, and within Phase 1 specifications.

Table 5.7 – Key Phase 1 Business Models

	KEY BUSINESS MODELS PHASE 1	
BM001	A PDR can capture and play back content.	6.1.1
BM002	The PDR can offer live pause.	6.1.1
BM003	A PDR has an on-screen menu of content already captured.	6.1.1
BM004	The PDR system provides a schedule so a viewer can choose content to record from it.	6.1.2
BM005	A PDR can enable new content to be captured and replaced or be added alongside old content on the PDR.	6.1.9
BM006	The PDR allows users to select for capture, single or multiple episodes of a series or other program groupings.	6.1.2
BM007	The PDR allows the management of items 'cued' for capture.	6.1.1, 6.1.2
BM008	The PDR enables retro-record (capture entire program or ad starting up to x minutes into the live stream) or gives option to capture at later date when it is available.	6.1.1, 6.1.6
BM009	The PDR system supports storage partitioning and management of multiple users and/or service providers.	6.1.21
BM010	The storage space on a PDR system can be managed by consumers or providers eg: items to be deleted next, permanently stored etc:	6.1.1
BM011	The PDR system can automatically capture content based on viewer behavior (profiling)	6.1.5
BM012	Viewer profiles can be aggregated and analyzed from individual or groups of PDR's for targeting services	6.1.13
BM013	The PDR enables the insertion of pre-captured advertisements or promotions into live/broadcast content based on viewer	6.1.8, 6.1.5

	profiling.	
BM014	The PDR allows the insertion of pre-captured advertisements or promotions into stored content being played back, based on viewer profiling.	6.1.5, 6.1.8
BM015	There can be remote control of the PDR system functionality (eg: capture settings, profile settings, etc.).	All of 6.1
BM016	The PDR system allows the selection of segments of programs for recording based on information provided by the service or content provider.	6.1.7
BM018	Some content is provided with index points and a playlist enabling 'passive' highlight or other playback modes.	6.1.4
BM019	The PDR system allows the navigation and exploration of content segments using provider indexes (eg: step through, short/long form etc.).	6.1.4, 6.1.7
BM020	The PDR system can create single, personalized programs from individual 'personally linked' segments.	6.1.5, 6.1.7
BM021	There is support for multiple users (separate recorded content menus, profiling, parental control etc.).	6.1.5
BM022	There are flexible usage rules (limited viewing windows for example) on the PDR system.	6.1.5
BM023	Consumers (on a bi-directional PDR system) can store their 'personal' content on Network storage devices.	6.1.23
BM024	Consumers can move their personal profiles to different PDR's or PDR systems in other physical locations.	6.1.20
BM025	3rd parties or service/content providers can provide recommendations, content referencing and resolution of content potentially from many other providers.	
BM026	Providers can force download 'premium/PPV' content to the PDR system (i.e. LocalVOD).	6.1.16, 6.1.21

6. *TV-Anytime* Phase 1 Features – Normative and Informative

6.1 Phase 1 features enabled by the normative specifications

This section describes key TV-Anytime features that are directly enabled by the **normative** Phase 1 *TV-Anytime* tools specifications: Metadata, Content Referencing, and Rights Management and Protection specifications, respectively S-3, S-4, and S-5. The Phase 1 specifications are numbered as Version 1.X.

The list of Phase 1 features in Table 6.1 and Table 6.2 below, and the subsequent descriptions of each feature, provide information to manufacturers, service providers and content providers regarding the capabilities that can be implemented using the Phase 1 *TV-Anytime* specifications. These features enable search, select, acquire and rightful use of content on local and/or remote personal storage systems from both broadcast and online services.

The TV-Anytime Phase 1 Features shall be enabled by the normative TV-Anytime specifications. To differentiate the features in Table 6.1 are identified as “Normative” and those in Table 6.2 are identified as “Informative.” Informative features are optional and can be implemented or not at the discretion of service/content providers and manufacturers. When TV-Anytime Phase 1 Normative Features are enabled, they shall be implemented according to the TV-Anytime Phase 1 tools specifications for Metadata, Content Referencing, and Rights Management and Protection, specifications S-3, S-4, and S-5 respectively.

The TV-Anytime specifications (S2, S3, S4 and S5) are being defined over a time period as described in the TV-Anytime Work Plan.

Four key levels of the Phase 1 specifications are envisaged. To define these levels, the Phase 1 features listed below have been collated into four groups corresponding to each of the Phase 1 specification levels: Broadcast Level 1, 2 and 3 and intermittent return path

The first three "profiles" are for the Broadcast model and as the level increases, the complexity of the system and the number of provided services increase. The last "profile" (Intermittent Return Path Model) requires some kind of "back channel” which is necessarily not always on.

The column on the left side of Table 6.1 indicates the progressive increase in functionality of the TVAF system. These ‘levels’ or profiles are labeled as Broadcast Level 1, 2, 3 and Intermittent Return Path. TV-Anytime specification for all four levels includes specification SP001, version 1.1 developed by the Business Models group, which is this document; as well as System Description specification SP002, version 1.1; Content Referencing specification SP004, version 1.1; and Metadata specification SP003, version 1.1. TV-Anytime specification release Broadcast Level 1 does not include a Rights Management and Protection specification. Therefore, any rights management capabilities required in conjunction with features enabled by TV-Anytime specification release Levels 1-4 is provided by a private or proprietary method.

TV-Anytime Phase 1 specification levels BL2, 3 and Return Path (intermittent and always-on) build on the foundation established with specification BL1. Release BL2 adds additional capabilities to BL1, and profile BL3, which is the complete and final Phase 1 specification release, adds further capabilities to Release BL2. These are developed for information in the scenarios 1-4 in Appendix A below. These scenarios indicate what extra business models are enabled by the increase in functionality provided by each additional level.

There is the third Model to be considered which is the broadband, bi-directional case. It is deemed that there are no extra Phase 1 features enabled by an always on bi-directional connection apart from implementation, network benefits such as real time reporting of usage/targeting or content stored in the network. Content can be captured to remote 'personal' storage areas via the service provider's closed network (NDR model) (See Figure 5.3).

Table 6.1 – *TV-Anytime* Phase 1 Profile Levels and 'Normative' Features

Model	Profile Level	Paragraph	Feature (directly enabled by the specification 1.x)
1	Broadcast Level 1	6.1.1	Capture and playback of audio, video and data [4]
		6.1.2	Use of ECG to find and capture broadcast content
1	Broadcast Level 2	6.1.3	Personal indexing on captured content
		6.1.4	Playback of content in highlight or indexed mode
		6.1.5	Support of user preferences and profiles
1	Broadcast Level 3	6.1.6	Cross linking of content to related content [1]
		6.1.7	Capture and playback segments of programs
		6.1.8	Dynamic insertion of segments during playback
		6.1.9	Content can be updated/replaced/appended by newer in-coming versions [2]
2	Return Path Level	6.1.10	Verification of delivery of content to PDR
		6.1.11	Verification of updating of content on PDR
		6.1.12	Verification of usage of content on PDR [3]
		6.1.13	Ability to collect user profile data

[1] Various types of content can be cross-linked using MediaLocator (see Metadata specification S-3.) In TVA Current Release, the program metadata does not contain a CRID for cross-linking to other programs.
[2] Entire programs can be overwritten, but segments of programs cannot be overwritten in current release
[3] Collection of information regarding viewer usage of content is enabled in TVA Release 1A. The method of accessing the information by the service provider is not specified in Release 1A. This may be an implementation issue.
[4] The RMP specification currently supports audio video content primarily with data content protection part of current work

6.1.1 Capture and playback of audio, video and data

PDR records content to storage and plays it back from storage. The various 'implementation' forms of playback (menu selection, trick modes, live pause etc) and capture (real time, menu driven etc) are discussed further in implementation options below in this section.

6.1.2 Use of ECG to find and capture broadcast content

Record the content that the consumer selects from the ECG. The ECG allows the consumer to browse, navigate and select different types of content to view or capture. Possible search criteria on programs or program segments can include characteristics such as title, a particular channel or provider, date, media type, ratings, actor/director, genre, critic's choice, format, language, keywords, etc. Once a program is selected via the ECG an option may be to record every episode of the program series, for example.

6.1.3 Personal indexing on captured content

Consumers can bookmark captured content and later playback this "indexed" content by skipping through the previously logged index points. Also index points from other consumers can be transferred and played on the device.

6.1.4 Playback of content in highlight or indexed mode

Consumers can playback content by skipping between index points. For example, a long format sports or magazine show can be viewed in 'highlight mode' (playback 'automatically' skipping between index points without user intervention.) Various highlight mode packages may be captured alongside the material at time of capture by the service/content provider.

- Basic Indexing - Jumping through provider-created index markers at meaningful points, chapter headers, key moments, magazine 'sections', main items, scene change detections, etc.
- Highlight Modes – Viewing a long-format sporting event, for example, in 'highlight mode'. This may be in addition to the content provider's set of index points.

- Access to service or 3rd-party-provided index sets for use on pre-captured material.
- Various highlight mode packages captured alongside the material at record time. The option to have a long program played back in 'auto highlight' mode, e.g. just the goals scored, means that the viewer may have this option available as a pre-play facility if it is provided.

6.1.5 Support of *consumer* preferences and profiles

User/s in the household are able to have some control over their device by setting viewing preferences for themselves or other users. For example a parent can set playback or capture preferences that protect children from unsuitable material. A user can also carry their personal preferences to other devices. The consumer can also locate and filter content by using agents (a technology that performs a task on behalf of any or all stakeholders). Local or remote filtering agents can be manually set-up by the consumer in terms of program, genre, rating or other viewing-preferences and/or automatically adapt to the consumer by creating the user preferences based on viewing habits (profile/s).

6.1.6 Cross linking of - content to related content

Programs can have cross-links to related content, for example while watching trailers the user can initiate capture for the complete program, or while watching a movie the user can be notified and directed towards related material, e.g.: 'making of'. The consumer may be provided with options to capture, playback (if pre-recorded) or receive a notification regarding when and where the content is available. This covers many types of relationships, including one-to-one (a promo to the full program) and one-to-many (such as recommended programs or content).

6.1.7 Capture and playback of segments of programs

Program material that is appropriately meta-tagged in segments can be captured as isolated elements of the main program. Once that segment is stored an example of the playback capabilities is cross-linking similar segments from different sources – e.g., jumping among similar news segments from several content providers.

6.1.8 Dynamic insertion of segments during playback

- Providers can insert an additional segment within any program being played back from a PDR, e.g., an advertisement. A viewer or agent could set segment

preferences for example that will specify a range of preferred short-form content to be inserted from the PDR during natural or regular breaks in real-time or live transmission.

6.1.9 Content can be updated/replaced/appended by newer in-coming versions

It is possible to automatically replace or append to segments or complete programs when requested by providers or consumers. For example, a consumer preference for the “latest news” then leads to a replacement of the recorded news shows, whenever a new news report is made available. Providers can overlay a sequence within a program with an alternative segment, e.g., a promo, updated news item.

6.1.10 Verification of delivery of content to PDR

Service providers can know whether the content has been successfully delivered to the consumer’s PDR. This feature enhances pay-per-view scenarios.

6.1.11 Verification of updating of content on PDR

Service providers can know whether a requested update of the content on the PDR has been successfully fulfilled on the consumer’s PDR. For example, this functionality can be used for subscriptions of news updating services.

6.1.12 Verification of usage of content on PDR

Service providers can track the actual usage of content on individual PDRs pursuant to regional regulation. See the *TV-Anytime* privacy statement at the beginning of this document.

6.1.13 Ability to collect user profile data

Based on regional regulation content or service providers can gather consumer profile data. This feature is needed for targeting service scenarios on the basis of certain characteristics of the audience, such as preferences, demographics, etc. See the *TV-Anytime* privacy statement at the beginning of this document.

Phase 1 Informative Features

The following table of features is not directly enabled by the TVAF specification but are highlighted as important enough features that further enable some of the key Business Models described above. They should be considered as informative features that are optional and can be implemented or not at the discretion of service/content providers and manufacturers.

Table 6.2 – *TV-Anytime* Phase 1 ‘Informative’ Features

Paragraph	**Broadcast Model**
6.1.14	Support for a variety of broadcast content types
6.1.15	Compliance to all broadcast content delivery mechanisms
6.1.16	Remote storage management
	Intermittent Return Path
6.1.17	Updated listings/capture data can be delivered to 'broadcast' analog personal recorders (via return path or other mechanism)
6.1.18	Updated listings/capture data can be delivered to 'broadcast' PDRs

6.1.19	Content can be found and captured via return path
6.1.20	Consumers can have portable profiles
6.1.21	Remote storage management with interactions
	Bi-directional Broadband Model (The following features require secure transfer, and persistently-protected storage.)
6.1.22	Content can be individually found and captured, on-demand to the local PDR (See **Figure 5.1)**
6.1.23	Content can be captured to remote 'personal' storage areas via the service provider's closed network (NDR model) (See **Figure 5.3)**
6.1.24	Capture and playback of local and remotely stored, requested content (PDR and NDR hybrid model) (See **Figure 5.4)**
6.1.25	*Consumer* controlled, secure transfer of content from local to remote 'personal' store via the service provider's closed network

6.1.14 Support for a variety of broadcast content types

Support for the common broadcast content types (e.g., MPEG, JPEG, XML, BML, MHEG5.) The PDR receives and synchronizes a hybrid mixture of looped, streamed content and pre-recorded segments, providing a seamless, linear experience to the consumer.

6.1.15 Compliance to all broadcast content delivery mechanisms

Analog personal recorders (PVRs) and PDRs have the ability to capture authorized content delivered through all broadcast mediums (e.g. terrestrial, cable, satellite, or other closed-network broadcast delivery schemes.)

6.1.16 Remote storage management

Remote entity e.g.: service provider/s requests, reserves and utilizes space on the PDR. A service provider/s could place and delete content or manipulate existing content. There is no verification back to the service provider/s that these processes have taken place.

6.1.17 Updated listings/capture data can be delivered to 'broadcast' analog personal recorders (via return path or other mechanism)

Analog personal recorders (PVRs) can utilize a low bandwidth back channel to maintain current program listings.

6.1.18 Updated listings/capture data can be delivered to 'broadcast' PDRs

Digital recorders can maintain current program listings with the data likely carried as part of the transport stream.

6.1.19 Content can be found and captured via return path

The return path can be used to find and/or deliver content to the device. For example:

- Advertisements can be captured on the device using the return path, delivered via trickle cast.
- **A consumer can request listings of available content using a range of criteria.**

6.1.20 Consumers can have portable profiles

The consumers' profiles can be portable between different PDRs. These user profiles can contain subscription data, manually edited preferences, agent assisted data or demographics. Secure portability of user profiles must be maintained.

6.1.21 Remote storage management with interactions

Remote entity e.g.: service provider/s requests, reserves and utilizes space on the PDR. A service provider/s could place and delete content or manipulate existing content. There is verification back to the service provider that these processes have taken place and additionally negotiation of service provider/s requests may take place.

6.1.22 Content can be individually found and captured, on-demand to the local PDR (See Figure 5.1)

The consumer can initiate the capture of certain content from various network sources to the local PDR (on-demand-scenarios.) The content is transferred to the local PDR via broadband network. The transmission will start instantly, which could allow the immediate use of the content.

6.1.23 Content can be captured to remote 'personal' storage areas via the service provider's closed network (NDR model) (See Figure 5.3)

Consumer can capture content also to NDRs (Network Digital Recorders). These NDRs could consist of dedicated storage space in the service provider's private network. This space must be protected from any illegal access.

6.1.24 Capture and playback of local and remotely stored, requested content (PDR and NDR hybrid model) (See Figure 5.4)

A seamless inter-operation of PDR and NDR must be provided. The consumer can control the NDR through the user interface of the PDR and browse seamlessly through the contents on the PDR and the NDR. Based on consumer's choice, the PDR could request additional space from the NDR automatically.

6.1.25 *Consumer* controlled, secure transfer of content from local to remote 'personal' store via the service provider's closed network(s)

The consumer can transfer content from the local PDR to the NDR using a secure connection. For example, the consumer can free storage space on his local PDR by moving contents to the NDR.

Appendix A - TV-Anytime Phase 1 Benchmark Scenarios

Comment: Page: 1
The scenarios below in this draft of Appendix A have been inserted as they were developed at the TV-Anytime meeting in Seattle in June 2001. The scenarios need to be reviewed for appropriateness for this document and finalized for inclusion in the provisional version of SP001v1.1.

Appendix A provides a suite of benchmark scenarios for TV-Anytime Phase 1. These are examples of possible business scenarios to aid content and service providers and manufacturers in understanding the capabilities of TV-Anytime Phase 1 systems and services. The four scenarios correspond to each of the four levels in Table 6.1 and therefore grow in sophistication and increase the richness of the services available on the system.

These business scenarios are also for use by the TV-Anytime Systems Design, Content Referencing, Metadata, and Rights Management and Protection groups to verify that their Phase 1 specifications fully enable the TV-Anytime Phase 1 Feature set. As such, these scenarios are intended to exercise the complete list of Phase 1 Features in Table 6.1 of this document.

Please note each scenario assumes the availability of all the features of the preceding scenarios (i.e. all Broadcast Level 1 features must be implemented in order to support Broadcast Level 2 feature implementation).

List of TV-Anytime Phase 1 Benchmark Scenarios

A.1. Broadcast Level 1

Scenario	**BM001**
Scenario Level	Broadcast Level 1
Scenario Viewpoint (consumer, service provider, advertiser etc)	Consumer
Synopsis of Scenario	Using an ECG, the consumer selects content to record. The PDR captures various content based on consumer instructions. The consumer browses this content and watches it.
Scenario Participants (viewer, broadcaster etc.)	Consumer Service provider Content provider
The Devices in the scenario (networks, devices etc.)	PDR home system Any broadcast network
Steps	1. Consumer uses ECG to select content to record.

- Interaction between participants and the system **- Description of what happens in the scenario**	*(6.1.2)* 2. PDR records the specified content. *(6.1.1)* 3. Consumer views on-screen menu with list of recorded content and chooses content to view. *(6.1.1)* 4. Consumer views content. *(6.1.1)*

A.2. Broadcast Level 2

Scenario	**BM002**
Scenario Level	Broadcast Level 2 – Recording primary and related content from the ECG
Scenario Viewpoint (consumer, service provider, advertiser etc)	Consumer
Synopsis of Scenario	Consumer creates preferences, PDR captures content based on those preferences, the consumer can set index points and watch content using those index points.
Scenario Participants **(viewer, broadcaster etc.)**	Consumer Service provider Content provider
The Devices in the scenario (networks, devices etc.)	PDR home system Any broadcast network
Steps **- Interaction between participants and the system** **- Description of what happens in the scenario**	1. Consumer may select content from ECG for recording and/or set preferences using an on-screen interface (i.e. selects genre, keywords, actors, etc.) (6.1.2, 6.1.5) 2. PDR records desired content, based on specific selections by consumer and/or based on consumer's preferences . *(6.1.1)* 3. Consumer views some or all of the content. *(6.1.1)* *4.* While viewing content, consumer sets index points (bookmarks) in content for later referencing. *(6.1.4)* *5.* While viewing the same content at a later date, the consumer has the option to jump to previously-set index points, or view in highlight mode. (6.1.4)

A.3. Broadcast Level 3

Scenario	**BM003**

Scenario Level	Broadcast Level 3 – Profile-based dynamic news program
Scenario Viewpoint (consumer, service provider, advertiser etc)	Consumer
Synopsis of Scenario	PDR suggests related content, news segments are captured, and played back in highlight/index mode. Advertisement is dynamically inserted, and news segments are appended as story unfolds.
Scenario Participants **(viewer, broadcaster etc.)**	Consumer Service provider Content provider
The Devices in the scenario (networks, devices etc.)	PDR home system Any broadcast network
Steps **- Interaction between participants and the system** **- Description of what happens in the scenario**	1. While browsing the ECG, the consumer selects content for recording, and the PDR suggests related program(s) for possible recording based on cross-link information specified in the metadata. (6.1.2, 6.1.6) 2. The PDR captures content, including a news program with segments. (6.1.7) 3. Upon playing the news, the consumer is presented with pre-indexed highlights from the recorded news segments in the form of a headline summary. (6.1.4) 4. While watching the news, a recorded advertisement is dynamically inserted between segments. (6.1.8) 5. The consumer can jump easily from segment to segment or select a segment from an index menu. (6.1.4) 6. As updates to an unfolding news story are captured, the PDR stores updates and allows the consumer to view them sequentially, tracking the unfolding story. (6.1.9)
System requirements (social, rights, security, privacy...)	
Remarks or issues	

A.4. Return Path Level

Scenario	**BM004**
Scenario Level	Return Path Level – Targeted Promos, Acquisition, Viewing & Billing of Pay Per View
Scenario Viewpoint (consumer, service provider,	Consumer

advertiser etc)	
Synopsis of Scenario	A service provider sends a promo (or triggers trailer recording) in a consumer's STB for a PPV film selection. The consumer views it, selects it, and it is captured locally. The consumer watches it and is billed accordingly.
Scenario Participants **(viewer, broadcaster etc.)**	Consumer Service provider Content provider (content, keyword metadata)
The Devices in the scenario (networks, devices etc.)	PDR home system with return path (minimally POTS) Any broadcast network
Steps **- Interaction between participants and the system** **- Description of what happens in the scenario**	1. Consumer profile and viewing behaviour are sent up the return path to the service provider at a scheduled connection time. *(6.1.13)* 2. The service provider sends a message down to the PDR (a promotional link or entire trailer for the consumer to see) suggesting PPV content of interest to the consumer (based on the profile). (6.1.1, 6.1.13) 3. Consumer sees the promotional message and selects the PPV content to be recorded. *(6.1.6)* 4. PDR captures the PPV content and notifies service provider via return path (at next scheduled connection time) of receipt of the content. *(6.1.10)* 5. Consumer views the PPV content. A targeted advertisement based on the consumer profile is played from storage during playback. *(6.1.8)* 6. PDR sends (at next scheduled connection time) usage notifications upstream for both the PPV content and the advertisement. *(6.1.12)* 7. Based on the usage notification of the original advertisement, the advertisement is replaced with a newer or subsequent version, and the PDR sends an update notification upstream. (6.1.11)