

TV Anytime Forum - Opportunities

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“*TV Anytime* will allow viewers to watch programs in the way they want and when they want. Viewers will be able to explore and acquire TV content from a variety of sources, including traditional broadcast and new on-line interactive services – for presentation at any time. *TV Anytime* will combine the immediacy of television with the flexibility of the Internet.”

- **The Forum**
- Business Opportunities
- Technical Opportunities

- The *TV Anytime* Forum is a non-profit association of organizations which seeks to develop specifications to enable audio-visual services based on persistent local storage.
- Membership is open to all who sign the Memorandum of Understanding and attend meetings.
- Attendees are drawn from a wide variety of industries: Traditional Broadcasters, Internet Broadcasters, Content Owners, Navigational Service Providers, Telecom Companies, Consumer Electronics Manufacturers, Professional Equipment Manufacturers, Component Manufacturers and Software Vendors.
- **Contacts**
 - For more information or to get involved with the work of the *TV Anytime* Forum please contact:

Interim Chair	Simon Parnall (simon.parnall@rd.bbc.co.uk)
Interim Vice-chair	Henry D. Chadwick (hdchad@us.ibm.com)
- **Forthcoming meetings**

27 th - 29 th September, 1999	Newport Beach, CA, USA Jointly hosted by DAVIC and NDS
29 th November - 1 st December, 1999	Geneva, Switzerland Hosted by the EBU

- The Forum
- **Business Opportunities**
- Technical Opportunities

- New technologies, such as MPEG, HDTV, and video streaming and file transfer over IP networks, are enabling an explosion in the availability of digital content.
- Viewers are now demanding content that they can watch when *they* want, rather than being constrained by rigid scheduling.
- Viewers are also demanding content which meets specific and sometimes minority interests, which will not be available to them at peak times on traditional broadcast channels.
- Exponential growth of consumer media access (e.g. via digital satellite, cable and the Internet) will oblige broadcasters to embrace new business models in order to attract and sustain viewers
 - Although such broadcast media are often seen to be in direct competition with one another, strategies can be adopted and technologies utilised that enable diverse media to operate together and to enhance each other.
- Viewers will require new tools (including hard disk storage, set-top boxes, and high-speed Internet access) in order to navigate, manage and benefit from the increased availability of content. *TV Anytime* will provide mass opportunities for consumer electronics manufacturers.
- *TV Anytime* will provide opportunities both for traditional broadcasters and other innovative service providers such as webcasters (defined as Internet broadcasters), digital satellite content providers and navigational service providers to increase revenue by expanding their consumer base, and to offer a wider range of content to consumers using both traditional and a variety of new payment schemes.

- **Disk drives enabling local storage, retrieval and manipulation of audio, video and data are increasing in capacity and falling in price**
 - Future projections vary only as to the *rate* for these trends. We can see by both conservative and realistic estimates, that low cost mass storage is imminent:

Year	Conservative - assuming capacity doubles every 18 months	Realistic - assuming capacity doubles every 10 months
2000	4 hours	4 hours
2005	40 hours	240 hours
2010	400 hours	14,400 hours

Video content stored on disk for \$100

- **Digital broadcast content allows descriptive information (known as metadata) to be associated with the video stream, enabling the identification, location and acquisition of multimedia content**
 - Modern television systems already feature Electronic Program Guides (EPGs) which use a form of metadata, and Internet users are familiar with portal sites which enable them to search for content using keywords.
- **The ubiquitous Internet provides low-cost connectivity anywhere**
 - Internet broadcasters, Webcasters and narrowcasters seek to bring their Web-based content to the wider audience of television;
 - Traditional broadcasters seek to leverage the Internet as a means to complement broadcast content as well as to act as a portal for attracting viewers.

In 1997, DAVIC initiated a program to develop tools that would exploit local storage devices. Out of this activity, TV Anytime has gained significant global interest. The following is a list of reasons why those closely associated with this work feel it imperative to establish a new forum to carry forward the TV Anytime work.

- **Equipment manufacturers are already working to develop solutions with mass storage**
 - Ventures include TiVo and Replay Networks who are already selling hardware that provides time-shifting features;
 - Component vendors such as C-Cube, iCompression, Quantum, and Seagate are focusing on low-cost encoding and mass storage products to address this market even via analog distribution networks.
- **Reliance on proprietary solutions leads to vertical market implementations and restricts viewers to a single service/content provider**
 - and locks the broadcaster, the *TV Anytime* service provider and the STB manufacturer together.
- **Standardized content referencing/APIs/metadata standards are needed to enable solutions that can be adopted by multiple vendors or system operators (encouraging horizontal rather than vertical markets), allowing the viewer the choice between:**
 - Different broadcasters;
 - Different service providers (e.g. the trusted guide, the virtual channel provider and any number of other ‘metadata vendors’);
 - Different STB manufacturers;
 - Different local storage device manufacturers.
- **Broad adoption of standards will help all players to leverage content, equipment and services. This will lead to:**
 - Lower costs for service providers and device manufacturers alike;
 - A greater and wider choice of content for viewers.
- **Why create a new forum to look at *TV Anytime* applications?**
 - No existing group or standards body is explicitly addressing these issues from a complete systems viewpoint.

TV Anytime held preliminary meetings in May and July 1999, at which the principles for its operation were developed. These are that:

- 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 ‘agnostic’ about the means for content delivery to consumer electronics equipment; including various broadcast delivery mechanisms (e.g. ATSC, DVB, DirecTV etc.) and the Internet.
- The *TV Anytime* Forum will develop specifications for interoperable and integrated systems, from content creators through service providers to consumers.
- The *TV Anytime* Forum will specify the necessary security structures to protect the interests of all parties involved.

- By the appropriate use of content descriptors, markers, links and agent technologies, local storage systems will offer the viewer a number of new and exciting ways to capture and view broadcast content
 - Capture mechanisms will ensure accurate and automatic acquisition of content regardless of any channel and schedule time changes;
 - Digital storage will allow bit-perfect capture of content and broadcast-quality playback;
 - *TV Anytime* services will offer access to a range of broadcast and Internet/narrowcast content, operating seamlessly across PC and TV platforms;
 - Content descriptors, markers and links – collectively referred to as metadata – will greatly facilitate easy-to-use viewer control, enabling the viewer to search and select content for viewing or capture;
 - Agent technology may also exploit metadata in order to make recording, deletion and disk management decisions on behalf of the viewer based on user profiles and/or previous user behavior;
 - *TV Anytime* services will increase content choice and accessibility. Not only will captured content be available effectively on demand, but *TV Anytime* will also allow viewers to access broadcast content in new ways via EPGs, Web links or trailers. It will allow viewers to capture not just one content item but whole sets of related items such as a TVseries.
- By capturing content onto local storage prior to viewing, *TV Anytime* will free the viewer from the traditional linear viewing experience. In addition to the usual VCR functions such as pause, fast-forward/rewind etc., *TV Anytime* will support enhanced non-linear viewing features:
 - Instant and random access to content;
 - Time-shifted viewing of content with simultaneous record and replay which allows ‘pausing’ of live TV programs. Viewers can take short breaks or follow program-related Web sites without missing anything;
 - Random access to items within programs, allowing viewers to use a ‘table of contents’ in a magazine or news program, and embedded links to move interactively within a program.

Broadcasters, such as traditional terrestrial services, cable and satellite operators, ISPs, Webcasters and narrowcasters can all benefit from the use of TV Anytime.

- *TV Anytime will allow broadcasters to offer innovative new services, attracting and sustaining viewers and differentiating their 'product' from traditional broadcasting*
 - New revenue opportunities arising from such value-added services will also allow broadcasters to generate increased revenue from their existing audience.
- *TV Anytime will enable broadcasters to decouple advertisement revenues from the scheduling time*
 - Much greater use, and greater revenue will be derived from broadcasting during off-peak hours. For instance, minority programming can be saved on the hard drive at night and viewed at peak-time, freeing viewers from the constraint of the broadcaster's schedule;
 - In essence, if viewers increasingly resort to watching captured content, the notion of prime-time TV will diminish. Instead, advertising revenues will be even more closely linked to the quality and popularity of the content;
 - *TV Anytime* will allow advertising revenue to be maximized through advanced techniques such as targeted advertising.
- *TV Anytime will allow a more efficient use of bandwidth for ad-hoc delivery of regularly occurring programs*
 - For example, news or weather forecasts can be stored on the hard disk and updated via the delivery network to provide on-demand access to the information without the need to broadcast 24 hours a day.
- *TV Anytime will allow broadcasters to use and leverage their existing network infrastructure, providing 'new' services on 'old' networks. The fundamental and significant investment in TV Anytime capability is made by, or on behalf of the consumer, not by the broadcaster or network providers.*

TV Anytime will provide new mechanisms to distribute content to consumers and to establish links and connections between content items. It will offer the opportunity to establish and develop new markets, and to develop the relationship between content owners and consumers.

- *TV Anytime* content may be distributed to consumers through broadcast channels, both in real time during peak and off-peak hours and through file transfers in the background and over the Internet
 - From specialist content with extremely limited Internet-based point-to-point or multicast distribution to broadcast material for mass consumption, *TV Anytime* will provide appropriate distribution technologies with common navigation tools.
- However delivered, audio-visual content may be tightly integrated with the Web, allowing A/V content to lead consumers to relevant Web sites – extremely useful when products are being advertised
 - Conversely, Web sites may be developed which lead consumers to a selection of a content owner's A/V material, available through a number of different channels. Such sites will help to strengthen the owner's brand and increase public awareness of their range of products.
- With the development of appropriate payment management tools and mechanisms, *TV Anytime* will, for example, make it possible to provide pay-per-play and differential pricing for content, and allow content owners to optimise audiences and maximise revenues.

TV Anytime will introduce new and compelling features which will accelerate the introduction of digital television, increase sales of receivers and home equipment and stimulate competition between service providers.

- **The potential requirement for a hard disk drive in every TV set or STB provides new and exciting markets for component manufacturers**
 - There are many times more TV sets in the world than there are PCs;
 - The storage of audio-visual material requires large capacity disk drives.
- **TV Anytime will open opportunities for new high-margin consumer devices**
 - STBs and TV receivers with integrated storage;
 - Home servers, Content Management Systems and Resident Navigators;
 - In-home networks.
- **There will be interesting opportunities for broadcast equipment suppliers**
 - Integrated publication and presentation systems;
 - Metadata generation and insertion equipment;
 - Media server systems providing video streaming and FTP services;
 - Archives, database systems and content repositories.
- **There are significant opportunities to introduce new conditional access and content management tools**
 - Protection of stored content requires fundamentally new mechanisms;
 - New payment systems are required.

TV Anytime brings a plethora of new revenue opportunities to the whole broadcasting industry, including service providers, navigational services, network operators, content creators and owners, advertisers and market researchers.

- *TV Anytime services deliver added value*
 - Charges could be levied at any stage in the search, selection, capture or final viewing process;
 - Charges may be based on subscription, network connectivity, pay-per-view etc;
 - From one or a number of service providers.
- *TV Anytime offers the enticing possibility of targeted advertising*
 - Adverts could be matched to a viewer's demographics, profile or location;
 - Adverts could be made interactive.
- *TV Anytime will offer new opportunities for broadcasters and service providers to safeguard revenue from advertisements*
 - For many viewers, commercials can be an informative and enjoyable aspect of TV and any ability to skip adverts in stored content may encourage production that maintain viewers' interest. Nevertheless, *TV Anytime* could incorporate mechanisms which make advert skipping 'awkward' or encourage its viewing.
- *Personalized TV Anytime viewing signals the prospect of high precision market research*
 - With the provision of appropriate tools and safeguards, viewing statistics and consumer preferences could be harvested by market researchers and brokers.

- An integral part of *TV Anytime* is *rights management*. Local storage and management of content is one of the most exciting revenue opportunities, allowing broadcasters and service providers to offer viewers a variety of authorized content usage options and payment models
 - Copying of content may be prohibited by the local storage device or STB application;
 - Alternatively, copying may be permitted or even encouraged as part of the distribution process:
 - For example, copy control mechanisms might allow free copying while depending on encrypted storage to ensure continued revenue from playback control mechanisms;
 - Another example might impose a charge for each copy made and rely again on encrypted storage and authorization to ensure adherence to any viewer playback restrictions.
 - Playback control mechanism might be implemented that support a range of viewing models, such as:
 - pay-once-only for unlimited viewing;
 - pay-per-view (or for a limited number of times or period);
 - pay-for-time, in which viewer payment is linked to time spent watching.
- Opportunistic or off-peak use of network delivery capacity lends itself to the broadcast of content using non-real time file transfer technologies. Revenue opportunities include:
 - Efficient use of network capacity;
 - Increased commercial value of off-peak program scheduling slots;
 - The possibility of offering a high definition/quality film download service to compete with traditional video rental stores.
- There will be many other new revenue opportunities based on new media. Some of these might include:
 - Newspaper/Magazine TV: a hybrid collection of traditional video content and web pages broadcast over traditional broadcast networks;
 - Rich media broadcasts offering a viewing experience comprising video, hi-fi, graphics and software elements, all of which inherently rely on local storage.

The TV Anytime Forum does not intend to dictate any specific business model, but to provide support for a variety of approaches. Its goal is to provide an open and pervasive platform for innovative services and applications. Content providers and service providers will be able to provide their own solutions to questions such as:

- **What is the revenue model for the service provider?**
 - Freely available without restrictions
 - Public broadcast or advertising supported;
 - Copy protection optional;
 - Commercial skipping can be forbidden.
 - Subscription based
 - Consumer pays monthly fee for specific service options.
 - Copyright rights maintained
 - Charge per view or specific time period;
 - Charge for right to make copies.
 - Charges based on timeliness of viewing
 - Premium charge for real-time viewing, e.g. sporting events;
 - Reduced charge for later viewing.
 - Charges based on delivery time
 - Premium charge for immediate delivery;
 - Reduced charge for non-real time, off-peak delivery.
- **Who pays for the hardware and software?**
 - Consumer: purchase at retail store;
 - Service provider: leased to the consumer for a fee;
 - Or a combination: e.g. consumer-owned hardware with service provider software.
- **Who controls and manages the content on the disk?**
 - Consumer: has access to and control over all content;
 - Service provider: can load and erase disk at will and control access to contents;
 - Combination: disk is partitioned and regions are controlled separately by consumer and by service provider.

In addition to providing new revenue opportunities for existing businesses, TV Anytime creates the potential for entirely new businesses.

- Perhaps one of the biggest business opportunities that *TV Anytime* offers is the provision of *navigational services*
 - Navigational services can be a resident and integral feature of the STB, or offered as a Web-based service, independent from broadcaster and device manufacturer;
 - Using universal links or locators, third-party organizations will be able to ‘repackage’ content from several broadcasters in order to construct ‘virtual channels’ or ‘trusted guides’ – targeted at specific demographics or specialized interest groups. The service would be paid for say by subscription or advertising;
 - Service providers will be able to offer agent technology that can automatically capture desirable content from a broadcast stream, based on user preferences, profiles and past viewing habits.
- Providing a common local storage device or STB platform emerges, new businesses will be able to offer the viewer a choice of consumer content management software
 - Archiving applications will allow viewers to create offline ‘libraries’ of favorite content;
 - Other software applications will help consumers to manage the content of their local storage devices, automatically removing previously viewed, expired or no-longer relevant content.
- Metadata provisioning, or the creation and insertion/application of information about programs, will provide an important new service from which new businesses may generate revenue.
 - The creation of the metadata that describes *TV Anytime* content will almost certainly require editorial assessment and subjective review. In the multi-channel world, consumers will pay for information which leads them to the content they want.
- The ‘virtual video store’ might only be a click away
 - *TV Anytime* will make it simple to download films to view.
- Consumers will want *TV Anytime* services throughout the home, and require home network installations.

- The Forum
- Business Opportunities
- **Technical Opportunities**

- **Mechanisms and schemas for identifying and locating content**
 - A universal invariant and variant referencing scheme;
 - Resolution techniques (including for locally stored content);
 - Protocols for requesting resolution and response.
- **Content management, conditional access and authentication tools**
 - including content and metadata storage APIs.
- **A metadata schema & transport**
 - that is universal and network-type independent;
 - with a basic set of metadata for interoperability ;
 - which is extensible and has filtering capabilities;
 - which maps the metadata onto network specific and region specific transport formats.
- **Synchronisation and linking**
 - between metadata and program content;
 - between broadcast and Web content;
 - between locally stored content and live streams.