DVB Data Broadcasting

Data by Cable, Satellite and Terrestrial TV channels

Earlier this year, the DVB Project released its long awaited Data Broadcasting specification. This specification paves the way for high speed data transfer via satellite, cable and terrestrial television channels. Examples of data broadcasting applications include data-casting, downloading software, providing Internet services over broadcast channels, and interactive TV.

For standard 6,7 or 8 MHz TV channels, the DVB standard offers a data throughput potential of between 6 Mbit/s and 38 Mbit/s, depending on whether only a part of the channel or the full channel or transponder is used.

DVB Systems provide a means of delivering MPEG-2 Transport Streams via a variety of transmission media. These transport streams traditionally contain MPEG-2-compressed video and audio. The use by DVB of MPEG-based "data containers" opens the way for anything that can be digitised to occupy these containers.

The DVB Data Broadcasting standard will allow a wide variety of different, fully-interoperable data services to be implemented, a milestone in digital broadcasting.

Data-casting and Surfing via Satellite

DVB-S Satellite transmission of data is much faster than traditional telecommunications methods. For example, a file containing 10 Mb of information normally takes almost 100 minutes to be downloaded over a typical standard telephone modem operating at 14,4 kb/s per second. The same file, via satellite, to a high-end server, will take just 2.2 seconds to download at a bit-rate of 38 Mbit/s. Into a high performance Pentium® PC, it will take 14 seconds, at a speed of 6 Mbit/s.

Figure 1 shows how with a DVB receiver plug-in PC Card, it is possible to use Internet services via satellite, in an application becoming known as "Turbo-Internet".

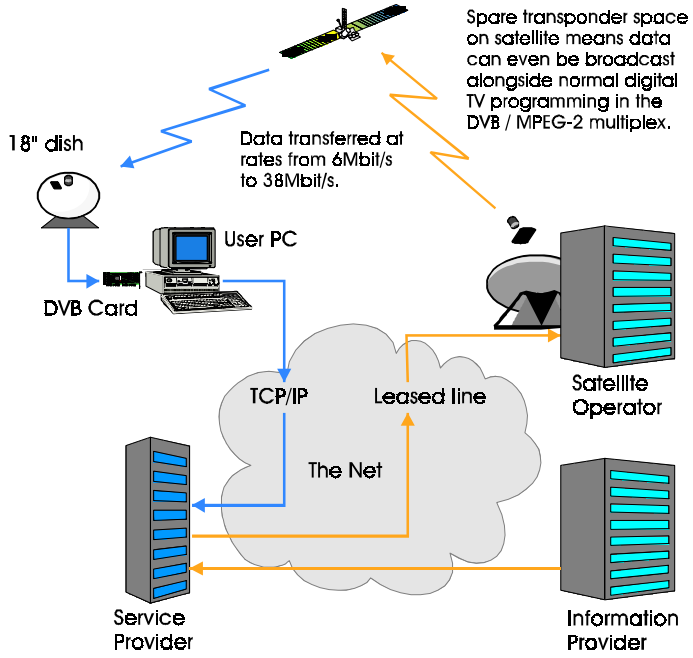

Figure 1: Turbo Internet uses spare satellite transponders and PSTN "Return Channels" to deliver high speed TCP/IP data.

Various European satellite operators including Astra, Eutelsat, and Hispasat have implemented satellite DBNs. With more than 16 million PCs bought in Europe in 1996, and more than 30 million households having direct access to satellite transmissions, there is already wide acceptance of the standardised technologies involved.

Data-casting or Internet services would typically use a broadcasters' extra satellite transponder space to broadcast content into the home via the consumer's 18-inch satellite dish. The received content is then directed to the consumer's PC via a coaxial cable interfaced with a DVB compliant plug-in PC card. Once decoded, it may be viewed on a browser, or saved on the PCs hard disk for later use.

Where there is a need to have two-way communications, the user connects via the public network to a specific host computer, or to a specific site on the world wide web, for example. At the end user or subscriber end, Conditional Access components built into the PC card integrate with the subscriber management system, allowing the broadcaster to track and charge for the data that every subscriber receives.

The wide area coverage offered by a single satellite footprint ensures that millions of subscribers can receive data in seconds from just one transmission. Since much of the infrastructure is already in place, very little additional investment is needed from both broadcasters and subscribers to take advantage of data broadcasts over satellite.

With possible bit rates of more than 30 Mbit/sec per transponder, a typical CD-ROM could be transmitted to a whole continent in under three minutes. In the future this will be possible over all the DVB delivery media, including cable and digital terrestrial, allowing the data to arrive alongside normal television services.

The DVB Data Broadcasting standards

The DVB Data Broadcasting Specification is based on MPEG-2 DSM-CC (Digital Storage Media Command and Control) and is designed to be used in conjunction with the DVB-SI (Service Information) standard.

Although DSM-CC is a complex, indeed cumbersome specification, it allows the choice of only the relevant sections, so providing the flexibility that an area as wide as data broadcasting required. Furthermore, the DVB has maintained a vigorous policy of adopting MPEG-2 specifications where appropriate, and DSM-CC is ideally suited to the problems of data broadcasting. In spite of DSM-CC's complexity, a good deal of work was needed to incorporate DSM-CC into the DVB's existing Service Information system.

The specification is designed to allow operators to download software over satellite, cable or terrestrial links, to deliver Internet services over broadcast channels (using IP tunnelling), to provide interactive TV, etc.

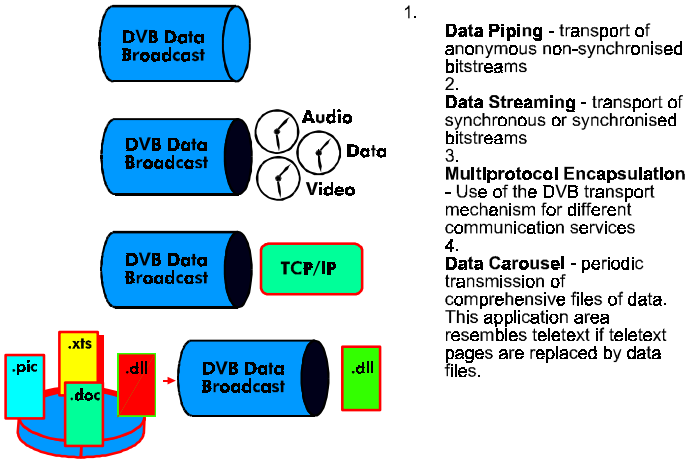

Figure 2: Data broadcasting application areas / profiles

1. **Data Piping** - This is the simple, asynchronous, end-to-end delivery of data through DVB compliant broadcasting networks.
2. **Data Streaming** - This supports data broadcast services that require a streaming-oriented, end-to-end delivery of data in either an asynchronous, synchronous or synchronised way through DVB compliant broadcast networks.

   Asynchronous data streaming is defined as the streaming of only data without any timing requirements (e.g. RS232 data).

   Synchronous data streaming is defined as the streaming of data with timing requirements in the sense that the data and clock can be regenerated at the receiver into a synchronous data stream (e.g. E1, T1).

   Synchronised data streaming is defined as the streaming of data with timing requirements in the sense that the data within the stream can be played back in synchronisation with other kinds of data streams (e.g. audio, video).
3. **Multiprotocol Encapsulation** - The data broadcast specification profile for multiprotocol encapsulation supports data broadcast services that require the transmission of datagrams of communication protocols via DVB compliant broadcast networks.
4. **Data Carousels** - The data broadcast specification for data carousels supports data broadcast services that require the periodic transmission of data modules through DVB compliant broadcast networks.

In addition to these four profiles, an **object carousel** specification has been added in order to support data broadcast services that require the broadcasting of objects as defined in the DVB's Network Independent Protocols specification.

In order to cope with the existing proprietary data broadcasting solutions based on the DVB transmission standards that already exist in the market place, the DVB Data Broadcasting solution also includes a registration mechanism, similar to that currently employed for the registration of SI codes.

In order to integrate the large number of existing data broadcasting applications currently in operation using the DVB transport standards, the DVB has established a registration mechanism, whereby the different data broadcasting systems can be registered.

Interactivity - interfaces and return channels

Interactivity is a feature of other important entertainment and informational media such as can be seen in the wildfire growth of the World Wide Web and home computing technology. Convergence has put developments in this area into the critical path for the future of broadcasting.

As the DVB project has progressed, interactive TV has been identified as one of the key areas ideally suited to an entirely digital transmission system. Many DVB members have developed comprehensive plans for the introduction of interactive TV and 1997 has seen a number of large-scale trials in Europe.

Since the inception of DAVIC (Digital Audio-Visual Council), the central coordinating body for aspects of digital media convergence, DVB has understood its importance. For DVB, close collaboration between the two organisations means ensuring that technical and operational solutions produced by the DVB Project harmonise, wherever possible, with the work of DAVIC.

This work covers an extremely wide field, generally extending well outside the area of broadcasting, and DAVIC seeks to provide end-to-end interoperability for the use of digital images and sound across countries and between applications and services. DAVIC liaison officers have been appointed in DVB, to co-ordinate the efforts of both groups.

As with the other DVB work, the key has been the gathering together of these commercial requirements to drive the technical work. In the case of Interactive, these requirements were especially important to help focus the specifications, given the wide diversity of applications that can be envisaged.

The result is a set of specifications for interactive services and a series of network-independent and network-specific specifications designed to suit both the needs of the DVB membership and the physical characteristics of the individual media.

The various DVB Return Channel specifications have been published by ETSI. These include DVB-RCC (Cable) and DVB-RCT (Telephone or ISDN). These are complemented by the DVB-NIP (Network Independent Protocols), based on the MPEG-2 DSM-CC (Digital Storage Media –Command and Control) again published by ETSI.

DVB has produced specifications for interactive return channels based on Public Switched Telephone Networks (PSTN), Integrated Services Digital Networks (ISDN), and Cable Networks (CATV), including Hybrid Fibre Coaxial (HFC) Networks. The work is now concentrating on finding suitable technical solutions for Terrestrial Systems, Satellite Master Antenna Television Systems (SMATV), Local Multipoint Microwave Systems (LDMS) and Digitally Enhanced Cordless Telecommunications (DECT).

The new revised DECT Return Channel specification contains a vital “Data Service Profile for Point-to-Point-Protocol (PPP)”, which ties in with the DVB’s Network Independent Protocols.

The new LMDS return channel specification is based on the DVB-RCC specification, currently in the final stage of approval in ETSI.