

ATTACHMENT 5

Advanced ISDB - New Applications

One of the most remarkable advantages of ISDB is its flexibility to accommodate a wide variety of applications. By making use of this unique characteristic of ISDB, several studies and developments on new applications are being undertaken by NHK Science & Technical Research Laboratories (STRL).

1. Data Services for Digital Terrestrial Broadcasting

1.1 Background and purpose

In addition to television sets at home, digital terrestrial broadcast signals will reach automobile receivers and mobile receivers. A viewing method and a data service that take advantage of the characteristics of terrestrial digital broadcasting are presented here.

1.2 Features

Portable receivers will make it possible for viewers both to receive broadcast signals directly and watch the broadcast program from memory cards or other storage media. Data storage will then allow viewers to enjoy broadcast contents whenever they like. Furthermore, mobile receivers will enable users to access the net, obtain detailed information on the broadcasts which they are watching, and use interactive services.

Portable receivers for terrestrial digital broadcasts will vary in size. For example, relatively large personal digital assistance (PDA), cellular phones, and ultra mini receivers attached to spectacles will be available.

NHK is currently proposing the following data services for terrestrial digital broadcast receivers.

- Scalable data services for various receivers - stationary receivers, automobile receivers, and other portable receivers
- Read-out services for automobile drivers
- Location based data services that supply information specific to a recent position

NHK is now studying services and receivers to examine various data use and broadcast viewing methods.



Figure 1: Receiving style for digital terrestrial broadcasts on a portable receiver

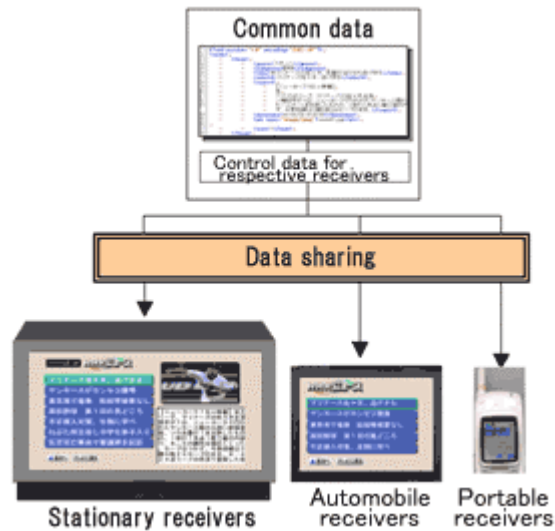


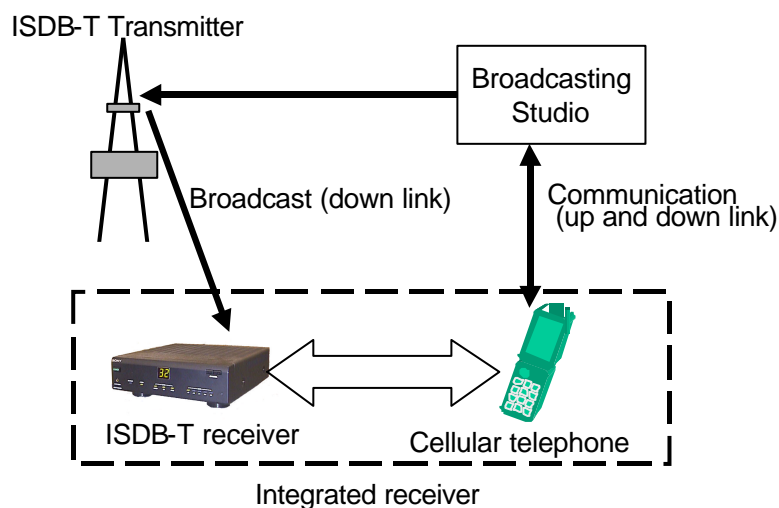
Figure 2: Scalable services for various receivers

2 Partial reception receiver in Personal Digital Assistant (PDA) and cellular telephone

2.1 Background and purpose

In ISDB-T one transmission channel is divided into 13 bands (segments) in which transmission parameters and the amount of transmitted information can be set separately for each segment. In ISDB-T the so-called partial reception receiver can receive centered segment selectively. To this centered segment can be assigned transmission parameters that make it robust to disturbances so that services can be applicable to mobile reception by car and portable devices.

A study on LSI chip which can be applied to PDA and next generation cellular telephone is going on in Japan.



3. Broadcasting services based on home server

3.1 Background and purpose

The home server is a large-capacity home storage system that can store programs and information provided by digital broadcasting and the Internet so that viewers can retrieve them at any time at their convenience. The broadcasting system based on home servers fully utilizes this "anytime" functions, allowing users to access not only digital broadcasting programs, but also a variety of other program-linked contents on the Internet. NHK demonstrated in 2001 NHK STRL Open House an image of the broadcasting services based on home server

3.2 Features

NHK have developed a home server that enables viewers to watch a program already stored or Internet contents alongside the program being shown on the television screen. The following new services are available:

- The user can quickly find the program by checking the spots on the EPG screen, or can watch programs stored on the home server.
- If the program is not stored on the home server, the user can still watch it by downloading it from the server of a television station via the Internet.
- The system automatically selects for the user the preferred program from either those on the air or those stored on the home server based on preferences preset by the user.

The user can view information or contents related to the program being watched from the information stored on the home server or via the Internet.

4. Quick navigation to homepages of TV program

4.1 Background and purpose

Broadcasting stations put many web pages of their programs on the Internet. However, often it is not easy to access the web page of a particular program: for example, first, the viewer has to access the top page of the broadcasting station, then select a genre of program, and then the title and date of broadcasting program. To eliminate this inconvenience of having to perform a number of procedures before finally reaching the program information, NHK has developed "ch@NET *," a web page navigation service that provides instant access to the desired web page of the program while it is on air, in which the user only needs to click the channel button on his computer. NHK is currently conducting a trial service at INPAKU (Internet Fair 2001, Japan).

*ch@NET: channels on the Internet

4.2 Features

This new service features are the following:

- Instant access to web pages of TV programs. Easy-to-use web browser as if using a television remote controller.
- No special setting is required. The service is available on personal computer.
- Broadcasting stations need not change their web pages.
- A number of new ways to enjoy broadcasting with the Internet. For instance, a user can watch a television program while accessing the Internet sites at the same time.

4.3 Future works

Based on the test results, NHK will attempt to make the ch@NET service more practical. Further research will also be made to make the Internet more accessible when using a variety of broadcasting services.



5. Advanced Broadcasting Services by Download

5.1 Background and purpose

New broadcasting services have generally required consumers to buy new receivers or adapters. But in the near future, digital broadcasting is expected to eliminate the need for such purchases, enabling consumers to download software that will update their receivers for new services whenever needed. Only digital media allow such downloads. An example of functional enhancement made possible by software downloads is presented here

5.2 Features

- Easy downloading

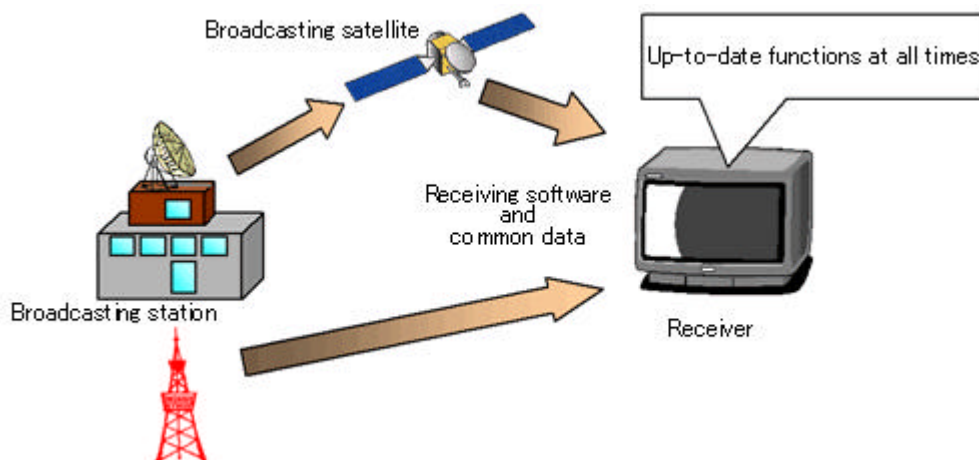
Broadcasters will provide a date, time, and channel in advance for transmission to receivers.

Receivers will download software automatically based on these instructions.

- Software selection by viewers.
Digital broadcasting will allow viewers to choose the software they download. In case of downloading translation software, viewers will also be able to select the language.
- Reliable transmission and reception schemes
Broadcasters will transmit the same software repeatedly over an extended period to ensure successful downloads.

5.3 Future works

NHK will explore the possibility of a next-generation receiver architecture that will be able to handle advanced services and new downloading methods that are well suited to the characteristics of digital terrestrial broadcasting.



6. Multimedia System for Network-based Education Services

6.1 Background and purpose

NHK is investigating multimedia education services suitable for the digital-broadcasting and high-speed-network era making use of NHK's high-quality video archives.

These services will deliver topics or themes that are expected to motivate learning through broadcast programs, and will support a learning process whereby students first search for various types of information over the network and then collect their

findings for presentation. The services will also provide knowledge through the retrieved contents itself. Another important objective is to help students develop self-study skills, analytical powers, and "media literacy" (ability to "read" and "write" in the world of electronic information media) that is essential in the information technology era.

NHK is developing tools to construct an environment enabling bi-directional education services via a high-speed network that connects schools and broadcasting stations. NHK are also conducting various technical trials and studies in relation to learning support.

6.2 Demonstration systems

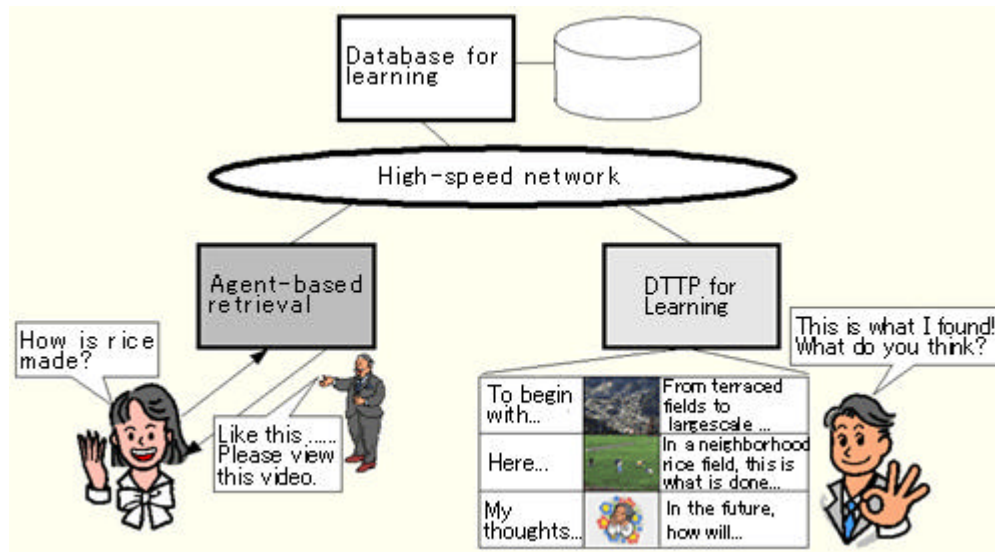
In 2001 NHK STRL Open House NHK demonstrated two prototype systems that provide abstract figures and ideas of the network-based multimedia education services.

Agent-based information retrieval system

This system helps a student to search for video and text data over the network by providing simple dialog functionality with an agent.

DTTP (Desk-Top Program Production) system for learning purposes

This system enables a student to combine video and information that he or she has retrieved and edited into a "multimedia report" that summarizes what has been learned. This report can then be stored in a database to provide further support for research and study.



7. Broadcasting wave network technologies for digital terrestrial broadcasting

7.1 Background and purpose

In the field of digital terrestrial broadcasting, we are studying a single frequency network (SFN) in which relay stations broadcast at the same frequency as the master station. When configuring an SFN using a broadcast wave relay system, the radio

wave radiated from the transmitting antenna of a relay station feeds back to the antenna receiving the master station signal. This causes signal degradation, and in the worst case, oscillation in the relay station. Specifically, coupling loop interference (CLI) at these antennas causes such degradation and oscillation to occur. There are various methods to counteract CLI. These include canceling the feedback electrically, devising an appropriate antenna beam pattern, and isolating the receiving antenna from the transmitting antenna. Stable broadcast-wave relays can be achieved by combining these measures appropriately.

7.2 Coupling loop interference (CLI) canceller

This equipment cancels out the actual feedback signal by generating a similar component of the feedback and subtracting it from the received signal. This is accomplished by measuring the disorder of the frequency characteristic in the OFDM signal transmitted from the relay station and generating the similar component by a transversal filter. In this way, the relay station can be operated in a stable manner even in the case of a strong feedback signal (CLI) that causes oscillation to occur immediately.

7.3 Flat receiving antenna

This flat receiving antenna is used at an integrated-type relay station, such as one where the receiving antenna is installed directly beneath the transmitting antenna. The flat antenna can suppress feedback (CLI) since vertical gain with respect to the antenna surface is sufficiently reduced.

7.4 Radio wave transmitting system using an optical modulator

In the event that a desired signal from the master station cannot be received at the transmitting point, the receiving antenna will be isolated from the transmitting antenna. This has the added effect of suppressing feedback (CLI). This radio wave transmitting system directly modulates an optical signal by the received radio wave and transmits that signal to the transmitting point using an optical fiber line. Since the receiving point does not require a power feed here, this system is strongly resistant to lightning.

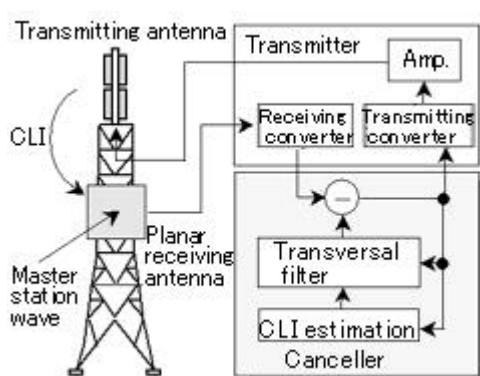


Figure 1: Coupling loop interference canceller and planar receiving antenna

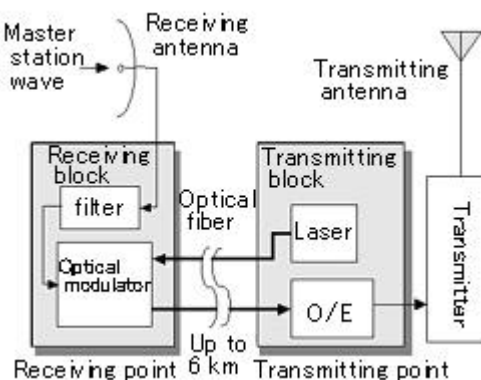


Figure2: Radio wave transmitting system using an optical modulator