

# Broadcasting Technologies in the 21st Century

(From the keynote speech at ABU Engineering Committee on November 3, 2002)



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The NHK Science and Technical Research Laboratories (NHK STRL) was established in 1930, five years after Japan's first radio broadcast. Since its establishment, STRL has produced a large number of research results instrumental to the development of the technologies of HDTV, satellite broadcasting, digital broadcasting, etc. Digital satellite broadcasting, which started in December 2000, is based on years of intensive research. In fact, STRL has already started studying new broadcasting technologies that may succeed satellite or terrestrial digital broadcasting.

The new STRL building was completed in October 2001. It embodies the third generation of STRL. The original building dated from 1930 and has been demolished. Crucial to the eventual use of the new building, STRL released in June 2001 its "mid- to long-term vision" that defines research directions and objectives to be pursued over the next ten to fifteen years. The document cites three key topics for research: "advanced ISDB," "content production technologies," and "future broadcasting services and fundamental technologies."

Seamless services and human-friendly broadcasting will be provided by "Advanced ISDB." Seamless services mean anytime, anywhere access to whatever programs the viewer wants. This can be achieved by using the Internet, cellular phones, broadband and other communications infrastructures and home servers, as well as conventional broadcasting. One of the research areas we are investigating is digital terrestrial data broadcasting. We expect that a location-linked service will be supplied to PDAs and other portable receivers. Broadcasting services based on home servers are also expected to open the way to new styles of television viewing.

By promoting human-friendly broadcasting, elderly people and hearing or visual impaired

people will be able to enjoy the advantages of digital programs, the same as anyone else. STRL has developed an automatic subtitling system that works by using speech recognition technology. The system recognizes the announcer's voice and superimposes captions on the screen in real time. It is currently used in NHK's news and some of its live programs.

"Content production technologies" support efficient program production by using computers and networks. We are developing an advanced virtual studio where attractive programs can be produced with new image expression methods. Development of new program production equipment is also included in this research area. Our ultrahigh-sensitivity HDTV camera is a very useful tool for emergency reporting at night and the production of science programs. Its Super HARP pickup device, which is 100 times more sensitive than conventional CCDs, captures clear images even under moonlight.

As for "future broadcasting services and fundamental technologies," our research emphasis is on development of an ultrahigh-definition image system with 4,000 scanning lines. We have developed a television camera and a display that can capture and display moving images with 4,000 scanning lines. Attention will also be paid to the basic research of materials and devices for recording, imaging, and displaying. We are researching two kinds of flexible display material: a film liquid crystal and an organic EL. Finally, development of new frequency resources, including microwaves and millimeter waves, is also important.

Broadcasting is a culturally creative activity based on advanced technology. In the 21st century, NHK STRL, as a public broadcasting organization will continue to contribute to better broadcasting services. We will meet any challenges that may come our way.