

NHK conducts world's first Super Hi-Vision multi-program, live transmission experiments

Super Hi-Vision broadcasting takes a step forward for future satellite broadcasting

- NHK is currently conducting research and development targeting a next-generation Super Hi-Vision (SHV) TV that offers an even greater sense of reality than existing Hi-Vision TVs. Using a newly developed wideband RF modem, NHK will conduct SHV multi-program, live transmission experiments via the ultra high-speed Internet satellite "WINDS"^{*1} at the NHK Science & Technical Research Laboratories (STRL) Open House, in collaboration with the National Institute of Information and Communications Technology (NICT).
- This experiment will be the world's first open demonstration of the technical viability of SHV multi-program, live broadcasting using WINDS satellite.
- Based on the assumption that satellites of the future will have wide transmission bands, NHK developed a wideband RF modulator/demodulator with a transmission bandwidth of 300 MHz. Because it can transmit data at high speeds of up to 500 Mbps^{*2}, it can transmit multiple SHV programs on a channel simultaneously. The WINDS satellite can be used for these transmission experiments because it has a wide transmission bandwidth of more than 550 MHz.
- In this experiment, images including live image from Sapporo will be transmitted via satellite from Kashima. From Sapporo, images of the city streets will be captured using a SHV camera with a zoom lens installed on the Sapporo TV tower, and this live image and recorded SHV videos will be transmitted to Tokyo. A microphone array comprised of 24 microphones at Sapporo will also be used to provide 22.2 channels of sound for a multi-channel audio feed. Two SHV contents recorded in advance will be multiplexed and sent from Kashima. In total, three SHV contents will be transmitted via satellite to NHK STRL.
- In this experiment, each SHV video is compressed for transmission at 100 Mbps. The SHV picture is divided into 16 segments (Hi-Vision size), and compression encoding^{*3} is applied to all segments in parallel to achieve the real-time processing required for the live feed.
- NHK will provide a demonstration of this multi-program, live broadcast SHV satellite experiment as part of the Open House to be held at STRL from May 21 to 24.

*1 WINDS: Wideband InterNetworking engineering test and Demonstration Satellite. A stationary test satellite developed jointly by the Japan Aerospace Exploration Agency (JAXA) and the National Institute of Information and Communications Technology (NICT).

*2 At 8PSK modulation and an encoding rate of 2/3.

*3 MPEG4 AVC/H.264 video encoding. This is a high-performance compression method.

(Ref)

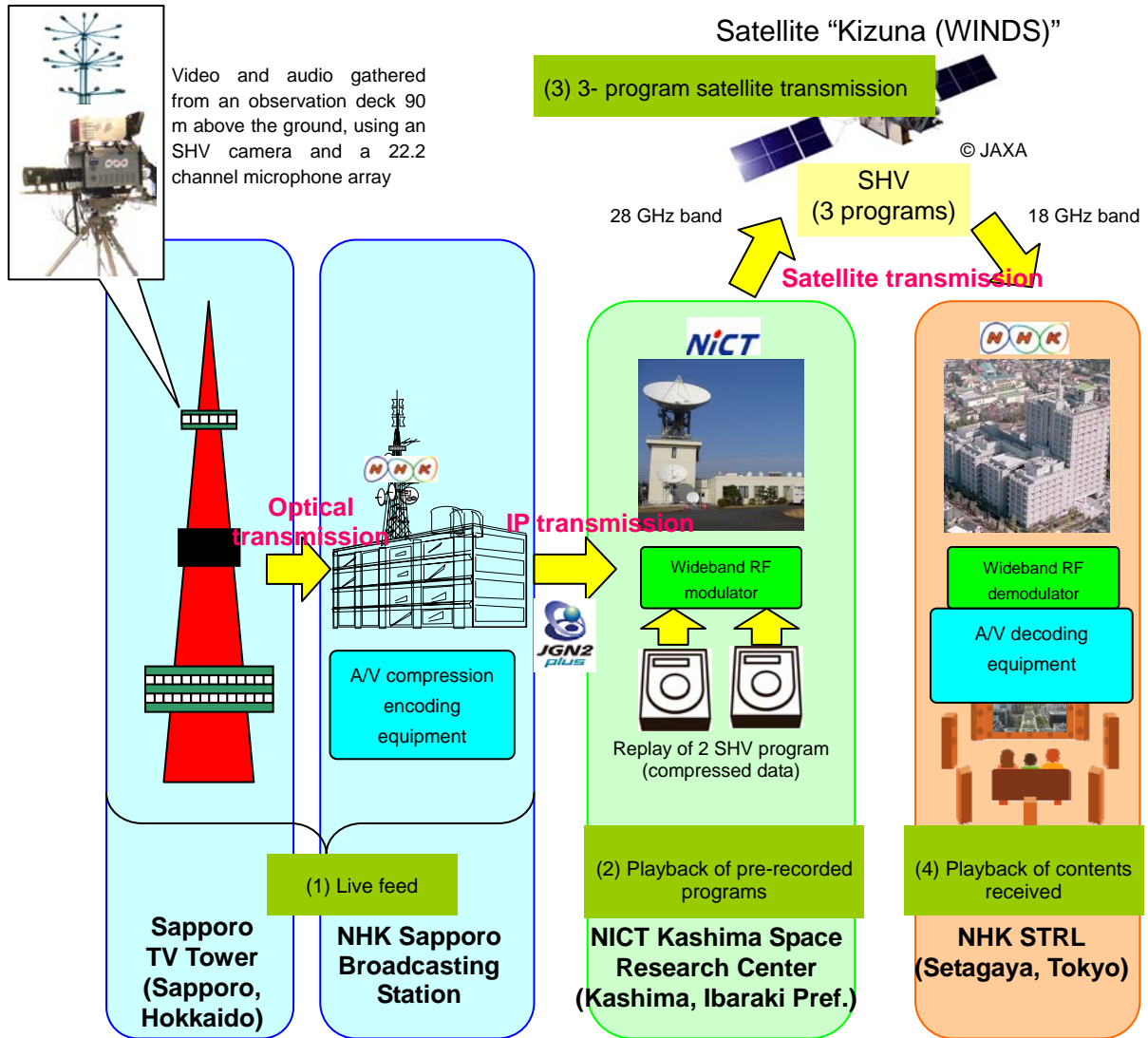


Fig. 1: Outline of SHV satellite multi-channel transmission experiment

In these experiments, three programs of SHV contents (1 live feed program from the Sapporo TV tower + 2 programs replaying pre-recorded programs) will be transmitted using the satellite "Kizuna (WINDS)."

(1) Live feed from Sapporo TV Tower

Activity on the Sapporo city streets will be captured in audio and video using a 22.2 channel microphone array and a SHV camera with a zoom lens installed on the observation deck of the Sapporo TV tower (90 m above the ground). This content is then transmitted, without compression, to the NHK Sapporo Broadcasting Station via optical fiber. The content is then compressed to 100 Mbps using compression encoding equipment at the Sapporo Broadcasting Station, and sent to the NICT Kashima Space Research Center using "JGN2plus," which is a high-speed, high-performance experimental network maintained and operated by NICT.

(2) Playback of pre-recorded programs

Two pre-recorded SHV programs (each data already compressed to 100 Mbps) are played back at the NICT Kashima Space Research Center.

(3) 3-program satellite transmission

The SHV contents described above (total: 3 programs) are transmitted to the NHK STRL via the satellite "Kizuna (WINDS)" from the NICT Kashima Space Research Center using a wideband RF modulator recently developed by NHK.

(4) Playback of contents received

The signals from the satellite are received using a 2.4m diameter parabola antenna temporarily installed at the front entrance to the NHK STRL facilities. After passing through a wideband RF demodulator and A/V decoder, all three programs of SHV contents are played back and displayed.



Fig. 2: External view of wideband RF modem (left: demodulator; right: modulator)

Table 1: Specifications of new wideband RF modem and codec

Modulation method	QPSK/8PSK
Transmission bandwidth	300MHz
Symbol rate	250Mbaud
Transmitted information bit rate	370Mbps (QPSK 3/4) 500Mbps (8PSK 2/3)
Error correction methods	LDPC+BCH
SHV signal multiplexing method	Time division multiplexing
Video encoding	MPEG-4 AVC/H.264
Audio encoding	MPEG-2 AAC
TS rate after compression encoding	100Mbps