



Doc T-22/20-6

STATUS REPORT

Organisation:	NHK (Japan Broadcasting Corporation)		
Period:	Sep.2021-Aug2022	Date of Report:	16 November 2022

PART A

Technical Developments during the past year:

- System upgrades/changes to practices for improved quality/efficiency

The SKYip System:

An IP transmission system integrating satellite and mobile Networks

It is extremely important that disaster reports convey disaster conditions as quickly as possible, to support viewers' safety and security. Mobile devices are widely used as a means of conveying such information, but the quality of transmission can be greatly reduced by external factors such as network congestion or damage to base stations due to the disaster. As such, we have developed the SKYip system, which is a new IP transport solution, integrating the mobility and convenience of mobile systems with the stability and broadcast nature of satellite communications into one system.

By integrating multiple mobile networks and satellite networks, and operating them as one network, the SKYip system is able to ensure transmission quality even when mobile network performance drops. It is capable of unicast transmission, as with Internet communication, and also of simultaneous multicast transmission to multiple broadcast stations, through satellite networks. Remote control via the satellite network also reduces operation work that previously required special skills, including full automation of satellite uplink operation.

- New Services/new projects initiated

Automatic commentary training text-to-speech system for broadcasting

Thanks to the rapid progress in deep learning technology, the text-to-speech (TTS) system we developed has achieved the same quality as human speech, enabling us to launch a fully automatic program production system known as "AI Anchor." The TTS system needs a large amount of speech and label data, but data production costs are high and TTS speakers cannot be easily added. We developed a novel TTS method featuring automatic training from broadcast commentary. It uses an approach that allows for a new semi-supervised learning method using an accentual data recognition method specialised for TTS. We have automated the entire training process for generating training data and performing label data recognition from broadcast commentary. We use the automated program production such as an automatic weather forecast system for radio, automatic sports commentary system, and slow and easy-to-understand commentary news using our automated TTS training system based on broadcast commentary.

- Research projects

CMAF Multilayer-compatible VVC Decoder

NHK Science & Technology Research Laboratories (STRL) has developed a real-time video decoder compliant with H.266/VVC (Versatile Video Codec) international standard for video coding. This device can decode and output videos with a suitable resolution for the resolution of display

devices, and auxiliary videos, if necessary, from a VVC video bitstream efficiently compressed by hierarchizing multiple resolutions and the auxiliary video. It is also compliant with the Common Media Application Format (CMAF) increasingly used in video streaming on the web services. In addition to the research and development of technologies to improve the frequency utilization efficiency, such as video coding technology, NHK STRL is also responding to the diversifying viewing styles resulting from the spread of various display devices by promoting research and development of technologies enabling viewers to enjoy a variety of services by integrating broadcasting and communications. Separately transmitting multiple video bitstreams with the appropriate resolution for various individual display devices such as tablets, 4K, and 8K TVs, is not efficient. The developed decoder (implemented real-time decoding software) can decode videos of multiple resolutions suited to display devices from a bitstream. Moreover, if an auxiliary video is layered, the receiver can freely select the video to be overlaid on the main video.

“Gamut Rings” New International Standard Method to Visualize Color Gamut

“Gamut rings,” invented by NHK Science & Technology Research Laboratories (STRL), is a new method for visualizing the range of reproducible colors or color gamut of a color reproduction device in a twodimensional (2D) diagram. The International Electrotechnical Commission (IEC)1), International Committee for Display Metrology (ICDM)2), and International Commission on Illumination (CIE)3) adopted the gamut ring framework as an international standard in January, July, and November 2021, respectively. NHK STRL has also developed a system that automatically measures the display color gamut boundary and renders gamut rings. Conventionally, the “color gamut” is represented by the area of a triangle connecting the points of the red, blue, and green primary colors in a chromaticity diagram. Although this conventional representation is simple, expressing the color gamut in a 3D color space that includes a lightness axis (L^*) is suitable for an effective evaluation. However, a single-angle view in a 3D plot can often be misleading because parts of the gamut are always obscured from the view. It has therefore been a challenge to develop a method to convert the 3D color gamut in a 2D format. Gamut rings invented by NHK STRL can accurately represent a 3D color gamut in a 2D diagram and are rendered by the following procedure. The gamut solid is cut into pieces at regular intervals of lightness (L^*). Each piece is then stretched into a slice of unity lightness; the area of the slice corresponds to the volume of the piece. Gamut rings are formed by placing one slice at the lowest lightness level, followed by positioning the other slices around the bottom slice consecutively. The angle from the center represents the hue such as red, green, and blue. Gamut rings can potentially be applied in the design and evaluation of color reproduction devices, such as displays and printers, and can be used to conduct performance comparisons for both professional and consumer uses.

- Internet and Mobile Broadcasting Services

Japanese-English AI translation system that is used for English subtitles of special news broadcast live in an emergency

In June 2022, NHK launched a new "AI English subtitle service" that utilizes this Japanese-English AI translation system to add English subtitles to special news on General TV and broadcast live on the Internet.

The AI English subtitles service is intended for foreign residents and visitors to Japan.

In principle, it will be implemented when an earthquake with a seismic intensity of 5 lower or higher occurs, and when a tsunami advisory, tsunami warning, major tsunami warning, or heavy rain emergency warning is announced.

When the service is provided, it can be accessed from the NHK WORLD JAPAN website or app through an induction banner.

			Radio	Television
Coverage %			MF Radio1:99.9% Radio2:99.9% FM:98.0%	Digital Terrestrial:98.2%
Programme Channels			AM Radio:2 FM Radio:1	Digital terrestrial:2 Digital Satellite (HD):2 Digital Satellite (UHD):2
Studios (Production)	File-based Set-up	R/N/D		
	SDTV	R/N/D		
	HDTV	R/N/D		
	UHDTV			
	IP Based Set-up	R/N/D		
Transmission & Delivery	HF	R/N/D	10	Transmission & Delivery
	MF	R/N/D	Radio1 :280 Radio2 :146	
	FM	R/N/D	532	
	TV	R/N/D		Digital:2,214
	OTT/IBB/Internet Services	R/N/D		
	Mobile Services	R/N/D		

R = Replacement/upgrade
N = New
D = Discontinued

**PART B
CURRENT ACTIVITIES**

	Activities	Area	Brief Details: 1. Objectives 2. Progress to date	Challenges/Problems Faced: 1. Lack of resources 2. Lack of know-how 3. Others (e.g. up-skilling)	Solutions Implemented/Type of assistance requirement from ABU
1.	Development projects/Upgrading facilities/Training				
2.	Participation in ABU Activities	Area	Level of Participation	Reasons for not participating (though interested)	
3.	Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities, information exchange platform	Activity 1			
		Activity 2			
		Activity 3			