

## Seamless, Synchronous, and Supportive: Welcome to Hybridcast - An advanced hybrid broadcast and broadband system

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Akitsugu Baba, Kinji Matsumura, Shigeaki Mitsuya, Masaru Takechi, Hiroshi Fujisawa, Hiroyuki Hamada, Syunji Sunasaki, and Hisakazu Katoh

THE JAPAN Broadcasting Corporation (NHK) is developing an advanced hybrid system called Hybridcast to integrate broadband technology with broadcasting. The Hybridcast receiver provides many features, including broadcast-related applications that are executed simultaneously with broadcast programs, precise synchronization of content from different delivery channels, seamless interaction with multiple device types such as mobile terminals, and support for third-party applications. Broadcasters and commercial service providers can offer services through broadcast programs using Hybridcast applications. By using a Hybridcast receiver, viewers can enjoy television (TV) programs with rich and varied applications.

This article describes the technical aspects and application examples of Hybridcast. The former include the system requirements, basic architecture, draft of technical specifications, application programming interfaces (APIs), and featured functions supporting Hybridcast. For the latter, we introduce new kinds of services made possible by Hybridcast, such as program customization applications that synchronize broadcast and broadband content, social TV applications that depend on our trial social network service, and applications that work with mobile terminals.

## A Camera System Using Three 33-megapixel CMOS Image Sensors for UHDTV2

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Takayuki Yamashita, Ryohei Funatsu, Tadaaki Yanagi\*, Kohji Mitani, Yuji Nojiri\*\* and Tetsuo Yoshida\*

\* Hitachi Kokusai Electric Inc.

\*\* NHK Integrated Technology Inc.

This paper describe the world's first camera system that can capture images complying with the highest level image format specified in SMPTE 2036-1—(i.e., ultra-high definition television 2 [UHDTV2; 7680×4320/59.94 p, red, green, and blue (RGB) 4:4:4]). For this camera system, we developed a 33-megapixel complementary metal oxide semiconductor (CMOS) image sensor, an ultra-high-resolution lens, and a signal-processing function for correcting lens chromatic aberration in realtime. As a result, the limiting resolution of captured images was achieved over 4000 TV lines. Moreover, wavelength division (WDM) optical interface with nine 10-Gbit/s-serial digital interface (10G-SDI) modules was developed. Using this technology, the camera head and camera-control unit can be connected by a SMPTE 311 camera cable. In addition, the camera system's configuration and performance are also described.