Broadcasting System Committee, Telecommunications Technology Sub-Council,
Telecommunications Council—11th Meeting
Summary of Minutes

1. Date and Time

Friday, January 25, 2008; 14:00–16:00

2. Location

Special Conference Room 4

3. Agenda

(1) Confirmation of the summary of minutes of the previous meeting

(2) Technical requirements for gap-fillers as a measure for improved TV broadcasting reception

(i) Results of the public comment procedure

(ii) Draft Report from the Broadcasting System Committee

(3) Technical requirements concerning advancement of satellite digital broadcasting

(i) Interim report on the proposed provisional system

(4) Other

4. Attendees (honorifics omitted; in no particular order)

Ito (Chair; Tokyo University of Science), Tsuzuku (Vice Chair; Meijo University), Katto (Waseda University), Kobayashi (Association of Radio Industries and Businesses), Noda (Japan Cable Laboratories), Yamada (Kwansei Gakuin University)

Presenters: Ohta (National Institute of Information and Communications Technology), Nagatsuma, Ozaki (NHK Integrated Technology Inc.), Tanaka (Association of Radio Industries and Businesses)

Secretariat: Oku, Fuseda, Yamaguchi, Toda, Endo, Takemura (Broadcasting Technology Division, MIC)

5. Documents Distributed

Document 11-1: Broadcasting System Committee (10th Meeting) Summary of Minutes (Draft)

Document 11-2: Draft Results of the Public Comment Procedure

Document 11-3: Revisions to the Draft Report Presented at the Last Meeting

Document 11-4: Draft Report from the Broadcasting System Committee, Telecommunications Technology Sub-Council, Telecommunications Council

Document 11-5: Draft Report

Document 11-6: Outline of the Interim Report on the Proposed Provisional System for Advanced Satellite Digital Broadcasting System

Document 11-7: Draft Interim Report on the Proposed Provisional System for Advanced Satellite Digital Broadcasting System

6. Meeting Summary

After introduction of the presenters and confirmation of the distributed documents, the agenda items were discussed as follows:

(1) Confirmation of the summary of minutes of the previous meeting

The Broadcasting System Committee (10th Meeting) Summary of Minutes (Draft) was approved.

(2) Technical requirements for gap-fillers as a measure for improved TV broadcasting reception

(i) Results of the public comment procedure

The Secretariat reported the results of the public comment procedure on the technical requirements for gap-fillers as a measure for improved TV broadcasting reception. Subsequently, the following questions and answers were made:

Q (by Kobayashi): Page 2 of the Draft Opinions of the Committee states that the Committee will consider the comment as a request with regard to future policy. Does it mean the comment will be reflected in future policymaking?

A (by Chair Ito): The role of this Committee is to study technical matters. The expression should be corrected accordingly.

A (by Secretariat): We would like to delete the sentence (three lines at the bottom of the Draft Opinions of the Committee).

A (by Chair Ito): I agree. By the way, the word, “building owners,” was mentioned as an example of persons who may install gap fillers in response to the question raised during the last Committee meeting, which asked whether anyone could install gap fillers. I would

like to know if the addition of "building owners" provoked the comment.

A (by Secretariat): The section "Relay Broadcasting System to Improve TV Broadcasting Reception" on page 9 of the report lists various cases and causes of poor reception, such as behind buildings and behind towers. The basic rule in these cases is that the person who causes poor reception should take the measure. Building owners are not excluded from the persons who may install gap fillers, so they should be left as one of the examples.

A (by Chair Ito): I understand.

(ii) Draft Report from the Broadcasting System Committee

The Secretariat explained the amendments made to the last draft report, the draft committee report and the Draft Report, based on Documents 11-3, 11-4 and 11-5, respectively. Subsequently, the following questions and answers were made:

Q (by Chair Ito): The Secretariat has explained technical regulations conformity certification (hereinafter, "technical conformity"). Is technical conformity not covered in the report? If gap fillers should be a target of technical conformity, should their manufacturers conduct self-confirmation as to whether the gap fillers conform to the technical regulations?

A (by Secretariat): That is related to institutionalization. Usually, details of technical conformity are not covered in our report. By the way, technical conformity can be roughly categorized into the third-party certification system and the self-confirmation system. We assume the third-party certification system would apply in this case.

Q (by Tsuzuku): Under the section, "3. Measurement Method (2) Occupied Bandwidth" on page 1 of Document 11-5, it is stated that the bandwidth of 0.5% of the total power should be measured. Is "total power" correct? The OFDM system, which is used for terrestrial digital, defines the value as 99% of the endmost carrier's power, instead of 99% of the total power, which makes a considerable number of carriers at both ends "out-band."

A (Chair Ito): This should be checked as soon as possible so that the Secretariat could present a revised draft via e-mail.

After the above discussion, leaving the revisions to Chair and the Secretariat was approved. It was also announced that any comment on matters other than today's agenda should be submitted to the Secretariat by Tuesday, January 29.

(3) Technical requirements concerning advancement of satellite digital broadcasting

Katto, head of Satellite Broadcasting System Working Team, explained the Draft Interim Report on the Proposed Provisional System for Advanced Satellite Digital Broadcasting based on Document 11-6. Subsequently, the following questions and answers were made:

Transmission Coding:

Q (by Tsuzuku): On page 4, it says, "improve transmission efficiency by using the integral multiple of MPEG 2 TS (hereinafter, "TS") as the code length (44880)." Why using the integral multiple of TS for LDPC as the inner code? It may be more efficient to use the integral multiple of TS for the outer code as an interface with TS.

A (by Tanaka): Upon receipt of TS, the BCH process first processes codes according to different encoding ratios. Eventually, at the stage of LDPC (low-density parity check), the codes are made to be the same length, 44880 bit. The length of LDPC packets can vary, so different hardware is required for respective packets. In terms of hardware, it is more effective if the all lengths become constant after LDPC.

A (by Tsuzuku): Is it because it does not require null packets for adjustment so it can improve transmission efficiency?

A (by Tanaka): The design concept is to minimize null data such as stuff bits. The design focuses on the ease of processing.

Q (by Tsuzuku): With regard to the reason for "change from BPSK to π/2 shift BPSK" on page 4, I would like to know if the occupied bandwidth of π/2 shift BPSK is narrower than that of BPSK, or does it mean the output is narrow because it is insusceptible to distortion due to nonlinear characteristics of TWT (traveling wave tube)?

A (by Tanaka): It means the output is narrow because it is insusceptible to the influence of TWT.

A (by Tsuzuku): If so, it is more appropriate to write, "it will become insusceptible to the influence of distortion," rather than "the occupied bandwidth becomes narrower so that symbol rate increases."

Please look at "Signal Trajectory of Each Modulation Method" on page 27 in Attachment 1 of Document 11-7. Particularly when nonlinear TWT is used, the wave pattern is considerably distorted due to large amplitude variability. In order to avoid it, the current

system uses phase modulation with constant amplitude.

A (by Tanaka): The use of terms is not appropriate. In the case of BPSK, the signal trajectory always passes through the original point, so a nonlinear amplifier will cause distortion, which results in the radiation of unnecessary energy. Consequently, the occupied measured bandwidth becomes wide. Compared with that, the measured bandwidth is narrower in the case of π/2 shift BPSK, where the signal trajectory does not pass through the original point. That is what is meant. The discussion is about the bandwidth before being filtered. As "Figure 2: Simulation Results" on page 26 in Attachment 1 of Document 11-7 shows, the experiments revealed that, at the selected symbol rate (32.5491 Mbaud), the occupied bandwidth was narrower by nearly 1 MHz, compared with BPSK.

When we determined the value of the symbol rate, we chose a rate that becomes the optimum value with 8PSK, which is more frequently used, rather than with BPSK, with which the measured bandwidth is wide.

Q (by Kobayashi): The characteristics of distortion may differ between amplifiers of earth stations and amplifiers of relay stations. Does this case refer to relay station amplifiers?

A (by Tsuzuku): Repeater amplifiers suffer from the influence of distortion to a greater extent, and this case is about the repeater amplifier.

Q (by Noda): Does the reference, "Signal Trajectory of Each Modulation System (Ideal Transmission Path)" on page 27 in Attachment 1 of Document 11-7 show the results of an experiment conducted with a rolloff rate of 0.2? Given the facts that TWT will change the parameter of nonlinear characteristics and that the rolloff rate of 0.1 was finally adapted although 0.2 was used for the simulation, I am concerned whether the distortion due to nonlinear characteristics will have a greater impact.

A (by Tanaka): The report shows the results of the experiment conducted with 0.2 rolloff rate. We decided to adopt the rolloff rate of 0.1 and the symbol rate of 32.5941 Mbaud, considering the results of laboratory demonstration experiment using TWT as well as various degrading factors including the influence of nonlinear distortion. In our future satellite transmission experiments, we will also use a configuration that includes TWT.

Q (by Noda): According to the earlier explanation, π/2 shift BPSK will considerably reduce

the nonlinear distortion. Is it possible to operate with the 0.1 rolloff rate even for the same value as the backoff of the existing satellite (rolloff rate of 0.35)? It has become possible to increase the number of filter taps for receivers, but it will also increase the factors that expand beyond the ideal constellation. It may be required to allow considerable backoff for the amplifier—I am concerned about this.

A (by Tanaka): I think there is no problem in using the same backoff. The laboratory experiment proved that, with regard to BPSK and 8PSK, operations even at the saturation point would have as little wave pattern degradation as conventional systems. We will confirm this point in our future satellite experiments.

A (by Tsuzuku): It is a phase modulation, so it will have little distortion.

Q (by Noda): Page 4 states that "the introduction of pilot signals" will improve the deterioration of reception performance due to the nonlinear characteristics of satellite. How great an effect will the improvement bring about?

A (by Chair Ito): Do you send all pilot symbols even for 8PSK, which have little linear distortion? If so, should the degree of improvement drastically change depending on how the receiver processes signals after receiving them?

A (by Tanaka): We send all symbols, even for 8PSK. We conducted experiments using a prototype for the provisional system and improved C/N by about 1.4 dB for 32APSK. The degree of improvement was slightly smaller for 16APSK, and much smaller for 8PSK, but we must note that 8PSK is a parameter to be operated at saturation.

Q (by Chair Ito): With regard to "review of the rolloff rate" on page 4, does the "degradation" of necessary C/N mean "the value becomes greater"?

A (by Tanaka): That is correct.

Q (by Chair Ito): Could you describe the mechanism of "Operating Point Setting for Satellite Repeater with TMCC (Transmission and Multiplexing Configuration Control)" on page 4?

A (by Tanaka): The system to determine the signal points by using pilot signals for synchronization was explained earlier. Now, I would like to explain the mechanism of pilot signals first. In Figure 4 on page 34 in Attachment 1 of Document 11-7, you can see the red points within "(a): Transmission Signal Points." They are the symbol points of

transmission signals. The phase of received signals changes depending on the nonlinear characteristics of transponder—the signal is farther out, the larger the phase rotation becomes. The distance between symbols changes accordingly, and the constellation will have Gaussian noise (red points in "(b): Received Signal Points (After Passing Nonlinear Transmission Path)."

By transmitting pilot signals in slots and averaging pilot signals with the receiver for several seconds, you can obtain data on signal points after Gaussian noise is averaged and reduced (red points in "(c): Averaging Pilot Points").

While extracting signal point information from pilot signals, the receiver does not have fixed signal points. We send provisional backoff data with a TMCC signal so that the receiver can determine the initial symbols and accelerate the time to the initial synchronization.

A (by Chair Ito): Since the set value does not change every time, such as per program, it seems unnecessary to transmit the value every time. The value can be preset on the receiver.

A (by Tanaka): As you pointed out, it is not necessary to transmit the value every time. It is necessary when input/output characteristics are changed, or when the backoff value is changed, due to the change of the satellite to use.

Q (by Kobayashi): Where is the assumed point of reception for the antenna diameter suggested on page 4?

A (by Tanaka): I suppose you asked that question because you think that the antenna diameter must be larger in the fringe areas. We assume that there is no problem with the diameter.

Video Coding:

Q (by Chair Ito): The description on page 9 does not include the "4:2:0" format, which is widely used in existing commercial services. Why is that? In the case of the "4:2:2" format, the ratio between the total samples for luminance and those for color difference is "1:1," and the resolution is quite high.

A (by Katto): Currently, "4:2:2" is mainly used.

Q (by Noda): The detail of MPEG-4 AVC hardware codec performance test is shown on

page 23 in Attachment 2 of Document 11-7. How does it relate to the proposal?

The coding of the experiment shown on page 23 is 8-bit and the format is “4:2:0,” but the coding on page 12 of Document 11-6 is “4:2:2.”

A (by Tanaka): It means that the video input format is “4:2:2” while the transmission format is “4:2:0.”

A (by Chair Ito): Do you mean that the “4:2:2” format is used for input to an encoder, but the data structure after compression will be “4:2:0,” and interpolation at decoding and reproduction finally makes it “4:2:2”?

A (by Tanaka): That is correct.

Audio Coding:

Q (by Noda): With regard to the experiment on page 14 in Attachment 3 of Document 11-3, did you transmit data with 24-bit quantization even for linear PCM? If so, the data quantity will be 24 bit times 48 kHz, which is enormous.

A (by Tanaka): That is correct. The rate will be 2 Mbps or higher for stereo audio, or 6.9 Mbps for 5.1 channel.

A (by Chair Ito): That rate seems too high. With the advancement in H.264 performance, transmission at 3 Mbps or lower may become possible for SDTV in the near future. Under such circumstances, is it acceptable to allow only audio to use a wide band? If PCM is continually used only for audio while H.264 is introduced for video, there will be an imbalance. As long as we are seeking an advanced satellite system, we should adopt the most advanced technologies, such as lossless coding. Someone said that the application to commercial services is difficult because of the inconstant rate, but lossless is entropy coding, so it is quite natural that the rate is inconstant.

A (by Katto): It is not that we are negative about lossless coding. The compression rate of ALS is about 70%, although it depends on the target of compression, but 70% is just an average. If there is much white noise, the worst value becomes the same as that for PCM. There is an operational system integrating video and audio, but there may be demands for using audio independently. In the meantime, it is technically impossible to reduce the rate for lossless audio so that, inevitably, the rate for video should be reduced. In order to do that, we need to decide operational rules.

A (by Chair Ito): In the case of audio-only service, the number of slots will be allocated according to the worst value, which does not give us the benefits of lossless. Considering

that most of current satellite services are TV services accompanying video, it may be practical to use variable rates for each and control the total rate at a constant value with statistical multiplexing.

Initially, many providers launched a wide variety of satellite services, including video, independent data broadcasting and independent audio broadcasting. Today, most of the providers using narrow bands have withdrawn from the market, and existing services are mostly video. Under these circumstances, it does not make sense to argue that lossless cannot be adapted because of the existence of independent audio service.

A (by Katto): The point of discussion is where lossless is used. It is difficult to use it for live broadcasting because predicting the upcoming bit rate is hard, but it can be effectively used for taped broadcast.

A (by Kobayashi): Some people have a really severe attitude toward audio quality.

A (by Chair Ito): And because of that, lossless coding has a point. Lossless literally means there is “less” losses. That is, the sound is “exactly the same” as the original, the same as linear PCM in quality. It is not that lossless is “equivalent” to the original sound—we must note that.

Q (by Tsuzuku): On page 15, the sampling frequency is stated as 48 kHz. Considering this argument about lossless coding, we may also need to handle much higher frequencies.

A (by Katto): We are considering 96 kHz sampling as well.

Multiplexing:

Q (by Chair Ito): Page 18 states that it is “possible to receive with simple processing.” What does that mean?

A (by Tanaka): Using TLV in the data format makes the format structure comparatively simple, and therefore lightens the burden of the processing on the receiver side.

Q (by Kobayashi): Page 18 says, “there is no assumption for server-based broadcasting.” What does this mean? Does it imply that such service is not assumed under the standards for the current server-based broadcasting?

A (by Katto): I understand so.

A (by Kobayashi): Such an expression will hardly be understood, as no server-based broadcasting service is provided now.

A (by Chair Ito): Type 2 allows you to download files. It can offer a wide variety of services. What kinds of services are not assumed for Type 2? It seems more appropriate to write, “new services can be provided,” rather than “there is no assumption for server-based broadcasting.”

Following the discussion above, general questions and answers were made as follows:

Q (by Kobayashi): Does this Committee approve the proposed provisional system?

A (by Secretariat): What we have now is just an interim report. Experiments should be conducted to compile a report by around June.

Q (by Kobayashi): The other day, I had a chance to talk to a person from India, and heard that TV programs in India are broadcast in at least five languages. Considering the possibilities of global launch of Japan’s broadcasting services in the future, we may need to study broadcasting in two or more languages.

A (by Tanaka): As you can see under “3. Multilingual Audio Service” on page 5 of Attachment 3, we are conducting technical study in view of introducing AAC and SBR.

A (by Chair Ito): In which point do you switch the audio? Do you have any field in the header to designate it?

A (by Katto): I suppose that it is identified in the PID or EPG field.

Q (by Noda): I have a request for a future report. If you adapt the rolloff rate of 0.1, you should use 0.1 for all future simulations. I suppose your original target was 0.2, so that some experiments shown in the report use 0.2. Using 0.1 consistently will give integrity between the experiments and adapted values.

A (by Tanaka): We conduct laboratory experiments by using 0.1. We would like to use 0.1 in all reports.

(4) Other

Lastly, Director Oku of the Broadcasting Technology Division, on behalf of Secretariat, expressed his gratitude for the past study and deliberations on gap fillers to improve reception.