
The 50th Anniversary of ITU-R Study Group 11 Chairman Mark I. Krivocheev, Guest Speaker

Geneva, December 16, 1999

Mr. Chairman! Mr. Deputy Secretary General of ITU, Mr. Roberto Blois! Ladies and gentlemen!

It was my 26th birthday, July 30, 1948, when I received an invaluable gift from providence. On that day at the CCIR Vth Plenary Assembly in Stockholm, the SG 11 was founded, and its first chairman, Erik Esping, was elected. Esping, was a remarkable man, who made a great contribution to the group's foundation and activities.

On the same day, former Study Group 6 (Broadcasting) was renamed Study Group 10, so SG 10 and 11 were born twins. Maybe this is one of the reasons we are merging now, and also celebrating the 50th anniversary of SG 10. During this period, SG 10 has elected five chairmen, and SG 11 only two: I am the second.

The Scope of SG 11

In 1948 I was invited by the USSR Ministry of Telecommunications to participate in SG 11 activities as the head of television production at the Moscow Television Centre. The scope of SG 11 was "Television, including questions related to single sideband." The first step the SG 11 took was the development of Rec. 29 "Television Standards," in which the general requirements for television systems were formulated, including some for color.

One group headed by well-known Swiss specialist Dr. Gerber was busy with the development of a television standard for Europe. The second group, headed by Mr. Hansen (Belgium) developed the technical basis for terrestrial television planning.

I believe that it is my duty to remember the first chairman of SG 11, Erik Esping, and to express to him my hearty thanks for having recognized me and giving a positive assessment of my activity in SG 11. In fact, after the meeting in 1968 held in

Palma de Majorca, Spain, he invited me to become vice-chairman of SG 11 (I was elected vice-chairman at the XIIth Plenary Assembly in India in 1970). When Erik Esping, fell ill in the beginning of the 70s, he proposed that his post be given to me. Thereafter, I was elected chairman of at the CCIR XIII Plenary Assembly in Geneva in 1974.

Of course, in this brief presentation, it's impossible to analyze the past 50 years in SG 11. That's why I'd like to mention that I've practically finished my report on its activities. It confirms the leadership of ITU-R Study Group 11 in the field of the international standardization of television broadcasting systems and technology. The report, contained in 21 large files, includes references to official documents of CCIR and ITU-R SG 11 and my personal archive collected over many years. I hope to have enough strength to be able to complete it after the SG 11 meeting in February 2000 and the Radiocommunication Assembly in May 2000. Then it can be truly called "International Standardisation of Television Broadcasting in the Second Half of the 20th Century."

Words of Appreciation

I would like to mention only some of the most important decisions of SG 11 activity and, unfortunately, only a very narrow circle of leaders. I apologize in advance to many individuals, companies, and administrations for not having reflected their contributions. I can explain this by saying that I have a very short period for my speech.

Many countries participate in these activities, but I believe, everybody will support me if I underline the importance of Japan. It was Japanese contributions that initialized the international research and development of HDTV and EHRI systems, which constituted an entire epoch in the history



Professor Mark I. Krivocheev was born in the USSR in 1922. In 1946 he graduated from the Moscow Telecommunications Institute and joined the Moscow Television Centre, where he worked on the development of the first 625-line equipment. On September 3, 1948, he pressed the button that switched on the world's first 625-line transmission. Krivocheev has had the merit of working both as a practical and a research engineer, with a great many publications and dozens of patents to his name. Well-known in both his own country and on the international scene, he is still contributing to the technical development of television on all fronts.

At the 141st SMPTE Conference in November 1999, Krivocheev was awarded the SMPTE Progress Medal, which recognizes an individual who has made outstanding technical contribution to the progress of engineering phases of the motion picture and/or television industries. The award cites, in part:

"To Mark I. Krivocheev, Radio Research Institute, Moscow. From his efforts in the development of conventional television in the 1940s to digital television and HDTV in the 1990s, he has made outstanding contributions to the progress of television technology for over 50 years.

He has been awarded over 90 patents for his work in advancing the television arts and sciences, and has served as the chief scientist of the Russian Radio Research Institute.

Krivocheev has been honored for his work with national awards, gold medals, and fellowships from across the globe, including Russia, Poland, Germany, France, England, the U.S., Australia, Japan, and China.

He is a Fellow of SMPTE."

of SG 11, as well as the recently proposed Integrated Services Digital Broadcasting (ISDB) system.

The number of recommendations developed by SG 11 to date is more than 154. A special acknowledgment, for their personal contributions to this success, is to be paid to the vice-chairmen of SG 11 and to the chairmen and vice-chairmen of the working parties and task groups, the special rapporteurs, and all the contributors and participants in the study group meetings:

Ralph Zeitoun (Canada), vice-chairman SG 11, has been chairing JWP 10-11S since 1986. During this time the group has made several advances in its studies on broadcast satellite systems and technology. It prepared the technical bases on BSS (television and sound) for several conferences. It currently provides technical support to the IRG and GTE for expanding the capacity of the BSS plans. Throughout this period, JWP 10-11S progressed with its studies on digital multiprogram, HDTV, and interactive and multimedia satellite broadcasting (sound and television).

T. Nishizawa (Japan), vice-chairman of SG 11 and former chairman of WP-11B, involved in solving the problems of digital television. In particular, he has executed important work on formulating requirements for the MPEG standard, which led to its worldwide use in broadcasting. Today, J. Johann (Germany) successfully heads WP-11B.

I believe that everybody will agree with me if I make a special mention of the work of David Wood (EBU). He has, not only as a chairman of WP 11A, participated in many studies of SG 11 in these years: quality assessment in HDTV; ITU-R Rec. 601; terrestrial digital broadcasting; recommendations for HDTV systems, data broadcasting, stereo TV, enhanced TV; and many others.

We should also acknowledge the great contribution of SG 11 in researching protection ratios and planning for terrestrial broadcasting, which are very important for every country. In this regard, a large contribution was made by the chairman of WP-11C, Mr. Perpar (Slovenia), Mr. Kussmann, and Mr. Dinsel (Germany).

The Study Group and Interactive TV

Study Group 11 was the first ITU body to become involved in interactive TV. In 1993, a new global approach to interactive TV systems, aimed at mobilizing all possible communication facilities, primarily radio systems, for the establishment of return channels, was proposed. Worldwide interactivity calls for more than 5 billion return channels, greatly exceeding total telephone capacity. Discussions at Telecom 97 and 99 supported the initiative of Study Group 11 and showed that interactivity will be a dominant component in telecommunications.

C. Perpar, chairman of Working Party 11C, developed a draft of the first recommendation on interactive television systems in 1995. Since 1997 B. Aldous (U.K.), chairman of Task Group 11/5 has continued the studies of interactive TV with great success.

I would like to express to Paolo Zaccarian (CBS), my appreciation of his work as chairman of Joint Working Party 10-11R and as secretary-general of the Electronic Cinema Festival. For more than 25 years, he has made fundamental contributions to recording and program exchange. He initiated coordination between format specifications of professional television and sound recording equipment and domestic equipment. Broadcasters and industry have accomplished serious work here, involving the manufacture of many millions of units.

P. Evain (EBU), chairman of Joint Working Party 10-11Q, was the first to harmonize works on subjective evaluations and objective measurements in the fields of sound and television. This group continues the SG 11 activity achieved through the efforts of J. Ost (Germany), T. Kilvington (U.K.), L. Goussot (France), D. Wood (EBU), Mr. Tejerina (Spain), Mr. Bourguignat (France), Ms. A. Karwowska-Lamparska (Poland), and others. I would like to mention that Mr. Tejerina was also elected honorary chairman of Working Part 11E for his contributions to picture-quality assessment.

C. Weinzwieg (U.S.), chairman of

Joint Task Group 10-11 for successfully working in multimedia broadcast evolution and the common content format.

Preparing International Standards

For more than fifty years, Study Group 11 has dealt with television broadcasting services from end-to-end. I would like to explain how we have been able, under the difficult conditions of a multitude of television technologies at different technical levels and the economic capabilities of individual countries, to elaborate on recommendations for television broadcasting that have been internationally approved.

On the basis of analysis of the chaos that existed in the multistandard analog color television situation, and on intense studies of the wide possibilities offered by digital methods to change the principles of television broadcasting and services connected with it, a new methodology was defined for preparing international standards. This methodology is based on:

- A global and complex approach to the system (end-to-end).

- Development of questions that formulate strict requirements for achieving systems unification, at the same time taking into account the progress of technology. The contributions presented should completely correspond to the questions.

- Development and unanimous approval of an international global model of the new system, reflecting its tasks, structure, frequency, etc. Such a model consolidates international developers at the initial stage of the study. It constitutes the basis for further development of the standardization process, because, after its approval, the contributions presented should deal with the technical characteristics of the model elements or the entire system.

- Quality assessment and measurements of system parameters related to systems and services.

- Elaboration of methods for efficient use of frequency spectrum in terrestrial and satellite networks.

- International exchange and recording for delivery of programs.

- Harmonization of the system with

other areas for multipurpose use (interactivity, multimedia, data transmission, etc.).

- Elaboration of a strategy for introducing systems in various conditions, taking into account the specific situations of countries and the progress and possibilities of equipment production.

- Preliminary testing of results of studies in international fora like Telecom, NAB, the Montreux TV Symposium, IBC, Asia Broadcast, and others.

We began the main part of this methodology with HDTV studies. In fact, the first time this idea was discussed and supported was during the CCIR Plenary Assembly, Dubrovnik, 1986 (chaired by I. Stojanovich, Yugoslavia), and after that, it continued to be enhanced and enlarged. Using this methodology, SG 11 has produced several sets of important recommendations. I will be very happy if the new broadcasting group would use our experience in developing its work.

Rec. 601 became a part of history as a world standard for digital television studios. In 1983, the CCIR received the Engineering Achievement Award of the American Academy of Television Arts and Sciences, an "Emmy." Agreement on this recommendation was the trigger for developing systems for the next link in the broadcast chain.

Many individuals were active in this project, among them were Joseph Flaherty and Richard Green (U.S.), Ken Davies (Canada), David Wood, Yves Guinet, and Horst Schachlbauer (Europe), T. Saito, (Japan), Valery Khleborodov (USSR).

I would like to take this opportunity to cite Mr. Arasteh (Iran), who in 1976 chaired a joint group to prepare, for the first time in the world, terminology related to digital broadcasting. In 1977 he chaired a group concerned with quality assessment in digital systems.

A major achievement of ITU-R Study Group 11 in this respect has been the development of an international strategy for the introduction of new digital television systems, while retaining existing terrestrial and satellite channels. This has made it possible to focus on a broad range of

research, worldwide, on data compression and new transmission methods for digital signals in the conventional 6, 7, and 8-MHz channels (the "6-7-8" concept).

It is important to stress the difference in analog and digital television broadcasting concepts and environments. Digital television systems were developed in a period of rapid innovation and cardinal improvement in digital technology. In the three analog color systems, there are significant differences, yet the result for the viewer is effectively the same in all cases. In the digital domain, each modulation system option offers new attractive possibilities for the consumer. Digital options, therefore, are not different ways of achieving the same objective, but a means of allowing the flexibility to suit different circumstances.

In 1997, Study Group 11 adopted a recommendation for digital terrestrial television. This recommendation unites the common elements of the systems originally developed in North America (ATSC) and in Europe (DVB-T). This process was due to the diligent efforts of a number of individuals principally Stan Baron (U.S.), chairman of Task Group 11/3 and David Wood.

The recommendation sees ATSC and DVB-T translated from regional systems to digital terrestrial television systems (A and B) and gives the rest of the world a better opportunity to consider its use as a non-region-specific system.

I am very pleased to note that three task groups, TG-11/1, TG-11/2, and TG-11/3 have completed their assigned work and produced very important recommendations for HDTV and for digital terrestrial broadcasting in the VHF and UHF bands, thus establishing global standards for the evolution of television into the new millennium. Before we go on, I would like to express thanks to the three chairmen, Ken Davies, Dominic Nasse (France), and Stan Baron for their leadership.

The effort to develop a new high-definition television service was initiated by the Japanese in "Proposal for a New Study Program—High Definition Television," CCIR Document 11/31, March 17, 1972.

The development of an HDTV studio standard was first assigned to Interim Working Party (IWP) 11/6, Y. Tadakoro (Japan), chairman, and after the reorganization of Study Group 11 activities in 1990 to Task Group 11/1, Richard Green (U.S.). Since 1994, Ken Davies has been chairman.

The draft text of HDTV Rec. 709 was presented by George Waters (EBU), chair of working Group 11A during the final meeting of Study Group 11 (October 1989). The draft recommendation was unanimously approved on October 25.

In June of this year [1999], WP 11A in collaboration with SMPTE prepared a significant new draft version of Rec. 709. It covers the requirements of HDTV broadcasting and the cinema industry, which has been a great success and opens many doors. George Lucas has announced that he will use the format for his new *Star Wars* movie. This may be an historic recommendation for the next millennium.

It has stimulated a wide range of new applications in electronic cinematography (EC), including live performances electronically distributed to remote theaters for which new special interactivity functions are envisaged. EC requires new approaches to the problems of digital compression, optimal transmission via different channels (terrestrial and satellite), control systems, parameters monitoring, and metrology. All these should be solved on the basis of compatibility and harmonization of EC delivery systems with existing transmission and broadcasting systems and networks.

As a result of this approach, a steep increase in traffic will occur, taking into account the character of EC, which requires the delivery of its programs to thousands of interactive theaters.

The opportunities arising for delivering programs (live and recorded) in electronic form by using the rapidly evolving interactive digital television broadcasting technologies and systems will require the use of many return channels for conventional and mass interactivity. This new global model, including additional elements required for distribution of high-definition pictures for EC will have to be

applied to all media delivery systems and may even dictate a new approach to the organization of studies of the ITU in the future. This will include compatibility with computer technologies, Internet, multimedia, etc.

All of these new and perspective problems should be taken into account in the preparation of proposals for ITU reform. Obviously it is advisable to pose new questions or to expand on existing ones in order to study the problems more intensely.

Recognition of Sub-Groups

Extensive work on harmonization of broadcasting and nonbroadcasting systems was made by WP 11F chaired by Ron Bedford (U.K.).

It is my pleasant duty to recognize Richard Barton (Australia) for his very fruitful activities in SG 11 and especially his chairmanship of CPM, where his contribution is appreciated worldwide. We must also remember and send our thanks to the family of Franco Capuccini (Italy) for his outstanding contribution to the standardization of data broadcasting.

WP 11A continues its studies of colorimetry and adaptive equalization systems. Such technologies will help optimize video compression systems, resulting in significant quality and bitrate gains. Special Rapporteur Oleg Gofaizen (Ukraine) leads this work.

Valod Stepanien (Iran) prepared the first report for the use of the 16:9 aspect ratio in 1989.

SG 11 has also made worthwhile progress in meeting the needs of broadcasting in developing countries, and established cooperation with ITU-D, thanks to the collaboration of N. Kisrawi (Syria). I should also note the mutual understanding between ITU and UNESCO exemplified by their joint pilot project on interactivity and to thank P. Kanchev (ITU-D).

I wish to express my profound appreciation and recognition to the chairman of the World Broadcasting Union Technical Committee, J. A. Flaherty, and his vice-chairman, Om Khushu, for their individual contributions and support in many recommendations and the work of SG 11. I would like to stress that Dr. Flaherty was the initiator of ENG and SNG systems studies and Rec. ITU-R BT.

601. His most important contribution was made in worldwide standards in HDTV; in fact, he is an eminent international leader and a catalyst for progress in this area. I am sorry that Dr. Flaherty is not with us and wish him good health.

Today, we're waiting for important decisions from Om Khushu's group on the use of standardized receivers in digital terrestrial broadcasting, which will be in the interest of consumers. The assistance of M. Akgun's (Canada) group is very valuable, as is utilization of the experience of JWP 10-11S-SRG-6, chaired by P. Anderson (U.S.) in dealing with manufacturers, having a similar problem of multiprogram satellite receivers.

I wish also to express gratitude for the constant support provided by the past chairman of SG 10, N. McNaughten (U.S.); A. Prose Walker (U.S.); C. Terzani; current chairman A. Magenta (Italy) and former chairmen CMTT, M. Angel (France) and W. G. Simpson (U.K.). To the current chairman of SG 11, J. Tejerina, as well as all the members Coordination Group and Joint Steering Committees of SGs 10 and 11.

I have been privileged to have known and received good advice from the directors of the CCIR and ITU-R, and I have always had great support from the CCIR and ITU-R Secretariat. I would like to express my appreciation to Jack W. Herbstreit; Richard Kirby, former director of CCIR; and Robert Jones, current director of ITU-R.

Special recognition is finally addressed to R. Froom and G. Grotelueschen, counselors; R. L. Nicolson, senior counselor, and, lately, to G. Rossi, head of the study groups department. His help in the work of SG 11 concerning not only important technical aspects but also delicate and difficult procedural matters is appreciated. I also want to express my appreciation to G. Mesias, counselor of SG 11; Mrs. R. Zecha for her valuable and efficient support; and P. Capitain, administrator, for his help and kindness.

Conclusion

Recently I was in Stockholm and, of course, I visited the grave of Erik

Esping. I stood near the marble gravestone, put my hand on it, and told Erik from my heart that we all remember him and highly rate his contribution in founding SG 11, and that SG 11 is entering the 21st century with important findings, assisting the further development of television broadcasting. Thanks a lot to him—one more time—from all of us.

Of all the technological developments of the 20th century, television has probably had the greatest impact on the lives of ordinary people. Human beings acquire more than 80% of their information through their eyes. Consequently, television has become—and will remain in the future—our main source of information. This fact alone is sufficient to highlight the importance to mankind of the medium of television. The work of Study Group 11 made a considerable contribution in this area as an international forum for the broadcasting activities.

I will be very happy to celebrate with all of you on the eve of the 21st century. In this connection I would like to draw your attention to the fact that this lucky number 21 appears several times in our activities. We have encountered this value, for example, in the concept of $6+7+8=21$, concerning the use of existing radio channels for digital TV.

The meeting of Task Group 11/4 in which we started the study of extra-high-resolution imagery was held in the Ritz Carlton Hotel on Massachusetts Ave. at 21st St. in Washington. During the conference in Malaga Torremolinos in 1992 (1992 itself summing to 21) the bandwidth allocated for HDTV broadcasting was in the 21-GHz band. In HDTV Rec. 709, "Common Image Format (CIF)—1080 x 1920": adding these digits equals 21. Merging 10 and 11 also make 21.

To the new broadcasting group and to each and all of you, and your families, I wish a very happy healthy and successful New Year. I thank the ITU-R for organizing this celebration, and I thank you for coming here tonight.