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SERIES J: TRANSMISSION OF TELEVISION, SOUND PROGRAMME AND OTHER MULTIMEDIA SIGNALS

Ancillary digital services for television transmission

Electronic programme guides for delivery by digital cable television and similar methods – Reference operating scenario and requirements

ITU-T Recommendation J.90

(Formerly CCITT Recommendation)

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ITU-T Recommendation J.90

Electronic programme guides for delivery by digital cable television and similar methods – Reference operating scenario and requirements

Summary

This Recommendation specifies a reference operating scenario and a number of requirements applicable to Electronic Programme Guide (EPG) information delivered to the home by digital cable television and other similar distribution methods.

Delivery of EPG information may be implemented through various operating scenarios; a typical scenario is described in Appendix I by way of an example and to serve as a reference.

The importance of properly structured EPGs in which home viewers can readily navigate is becoming increasingly important with the current large increase in the number of programmes offered to the home, which is made possible by digital television delivery systems that employ bit rate reduction. This Recommendation is meant to catalyse the development of an efficient structure for EPG information, conducive to user-friendly interactive navigation tools that will help viewers to find their way among EPG information.

Source

ITU-T Recommendation J.90 was revised by ITU-T Study Group 9 (1997-2000) and approved under the WTSC Resolution 1 procedure on 18 May 2000.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSC Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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ITU-T Recommendation J.90

Electronic programme guides for delivery by digital cable television and similar methods – Reference operating scenario and requirements

1 Scope

This Recommendation specifies a reference operating scenario and a number of requirements applicable Electronic Programme Guides (EPGs) delivered to the home by digital cable television and other similar distribution methods.

The specified approach is based on the identification of the various items of information that should be delivered to the home; those items of information may be divided into categories having different degrees of importance or delivery priorities, and identification codes must be used for them, to allow unequivocal retrieval upon reception. Although the scope of this Recommendation is focused on EPG delivery over digital channels, its main operational concepts, and the structure for EPGs based on them are generally also applicable to EPGs delivered by teletext over analogue television channels.

A typical operating scenario is described in Appendix I as an example of the way the generation, assembly and delivery of EPG information may be organised. This scenario is taken as a reference in the presentation of the Recommendation.

This Recommendation does not cover the mechanism to download EPG information on user request (i.e. interactive applications), nor the labelling of the various components in the MPEG-2 ([1] of Appendix II) bit stream used to deliver digital television to the home: it just specifies the reference operating scenario and a number of user requirements for EPGs. Individual labelling of the various items of EPG information carried in the bit stream is specified in clause 2/J.94 [1], Service information for digital broadcasting in cable television systems.

2 Normative references

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] ITU-T J.94 (1998), *Service information for digital broadcasting in cable television systems*.

3 Terms, definitions and acronyms

This clause lists some specific terms, definitions and acronyms used in this Recommendation.

3.1 application-free EPG: An EPG in which the provider can freely select the content and the layout of the presentation, in a way that is implemented by the consumer television/multimedia display.

3.2 capacity provider: The entity that provides the technical facilities needed to deliver a programme schedule (e.g. the common carrier).

3.3 consumer premises equipment provider: The entity that supplies the television/multimedia equipment at the consumer premises (e.g. the equipment manufacturer).

3.4 content provider: The entity that provides the creative content of a programme (e.g. the programme producer or the owner of its rights).

3.5 electronic programme guide: A structured multimedia database, intended to provide information on programmes to be broadcast or cablecast.

3.6 EPG: Electronic Programme Guide.

3.7 EPG provider: The entity that collects, collates and assembles the elements of information that constitute the EPG database.

3.8 presentation-free EPG: An EPG for which the information content is specified, but the operation of the consumer television/multimedia display is not.

3.9 schedule provider: The entity that decides the schedule in which programmes are sequenced on a delivery channel (e.g. the broadcaster).

3.10 area availability code: A code used to denote that part of the area covered by a programme distribution service, to which a specific programme should be distributed.

4 Discussion on Electronic Programme Guides for delivery by digital cable television

4.1 Information to be provided by EPGs[1]

EPGs should preferably provide the following "basic" items of information, concerning the content of each delivered programme:

- programme title and subtitle or episode title;
- programme category (drama, sports, news, etc.);
- parental rating (children, adult, etc.);
- area availability code (blackout identification information);
- programme duration;
- talent (director, cast, photographer, music, author, etc.);
- producer;
- date of production;
- short text summary of the programme;
- technical format (wide screen, stereo sound, etc.).

EPGs may also optionally provide the following supplementary items of information on each delivered programme:

- long text summary of the programme;
- press reviews;
- press/critics' rating, if available;
- photos of the leading performers;
- photos of posters, if available;
- stage photos;
- video clips or "teasers";
- music excerpts or "teasers";

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[1] The content-related information and the delivery-related information listed in this clause are not necessarily arranged in order of importance, nor in the order in which they should be displayed.

- production company;
- production facility;
- production staff;
- intellectual property rights;
- copyright aspects;
- others.

EPGs should preferably provide the following "basic" items of information, concerning the delivery of each offered programme:

- designation of the broadcast or cable channel;
- day and time of broadcast;
- first screening on TV, repeat screening, etc.;
- ancillary services: subtitling, audio for the hearing-impaired, etc.;
- information on access entitlement, if any;
- codes to programme automatic video recording, etc.

It is clear from the lists above that EPG information can be described as a multimedia database.

4.2 Labelling of EPG information

Every item of EPG information delivered to the home must be labelled in a unique way, in order that it may be unequivocally retrieved and processed in the home. The objective is to allow consumers at home to freely navigate through the EPG information if their receiver has adequate intelligence and memory.

This Recommendation does not specify the label or the data length for EPG information. Such labelling is specified in clause 2/J.94 [1], Service information for digital broadcasting in cable television systems.

4.3 Conditional access

Delivery of EPGs is likely to be subjected to some degree of conditional access. A consumer that wishes to receive basic information on all programmes as a separate service is likely ready to pay for it. The mechanism for conditional access in this case may be similar to the one used for conditional access in television subscription services (see ITU-T J.93*,* Requirements for conditional access in the secondary distribution of digital television on cable television systems, [4] in Appendix II).

Delivery of EPG information to professional parties is also generally subject to conditional access. In this respect different professional parties are generally granted different degrees of access. For instance, "write" access is generally only granted to some selected parts of the EPG multimedia database, while "read-only" access is more generally granted.

Specifically, schedule providers are generally granted write access only to information that concerns programmes on their channels. Other professional parties such as publishers of printed programme guides may well be willing to pay a "professional" subscription fee to be entitled to receive the complete content of the EPG multimedia database and to print selected parts of it.

It is obvious that the EPG multimedia database must have adequate capacity to carry conditional access information for each part of it.

4.4 Delivery of EPG information to the home

Digital delivery of EPGs to the home amounts to downloading a digital multimedia application to the user. Since digital delivery of television to the home is based on the delivery of MPEG-2 transport streams, the logical choice for delivering EPGs to the home is to use that part of the capacity in the MPEG-2 transport stream that is set aside for data delivery.

EPG delivery in the MPEG-2 multiplex must obviously comply with the protocols specified for assembling a MPEG-2 transport stream. This Recommendation does not cover those protocols.

If it is not possible to set aside a sufficiently large capacity for EPG delivery in the capacity for data of the MPEG-2 transport stream, then only selected parts of the EPG database will be delivered in it. Delivery of the remaining parts of the database to the home will then require the use of some shared data capacity available in the delivery channel, outside the MPEG-2 transport stream. Standardisation of protocols for the management of the data capacity of a delivery channel is under study; some specifications already exist in regional standards.

Another approach may be to apply compression to the EPG database in order to achieve more efficient transmission and storage. Several algorithms exist for this purpose. If such an approach is used for the EPG database, then a compatible algorithm to expand the database needs to be provided in the consumer receiver.

Modulation of EPG data in view of its delivery to the home in the MPEG-2 transport stream must obviously comply with the modulation methods specified for the delivery of the MPEG-2 transport stream over broadcast and cablecast channels, e.g. in ITU-T J.83 and ITU-T J.84 ([2] and [3] of Appendix II).

4.5 Refresh rates

Another important aspect of EPG information delivery concerns its refresh rate, as there may be a need for several refresh rates or priorities, e.g.:

- a refresh rate of a very few seconds (perhaps one or two) is needed for the barely essential information that should be displayed to the "zapping" audience immediately after each channel change; such information is the title of the current programme, and the channel identification;
- a refresh rate of several seconds (perhaps ten) may be suitable for a somewhat larger but still basic information such as the schedule for the day on the selected channel;
- a much longer refresh rate (perhaps an hour or more) may be acceptable for a comprehensive information on all the programmes scheduled on several channels over several days.

The requirement for different refresh rates has repercussions on the occupation of the available capacity for data in the MPEG-2 transport stream, and it may require that the concerned information items in the EPG be properly labelled in respect of their priority also.

The need for a consumer receiver to be able to display EPG information on short notice, even when the information is refreshed at a low rate, requires that an adequate volume of (preferably non-volatile) data memory be built in the receiver.

4.6 Presenting EPG information on consumer receivers

This Recommendation does not specify the way in which EPG information is processed and presented to the viewer when it is delivered to the home.

Such presentation (the EPG "look" and "feel") may be controlled by means of software resident in the receiver or by means of applications downloaded to the receiver through the EPG provider. The latter approach would offer attractive features for future television receivers, since it would allow:

- the updating of the software environment of the receiver;
- a control of the user navigation interface by the EPG provider;
- the capability for each user to run "customized bouquet" EPGs.

When, on the contrary, the EPG look and feel is not controlled by an application downloaded to the receiver, it is then determined by software resident in the receiver itself, that software being chosen by the consumer equipment manufacturer; thus, equipment manufacturers would be free to compete in the market on this ground, while complying with the appropriate technical specifications.

It is recommended that consumer receivers should not alter the look and feel of the information they present, when this is determined by instructions downloaded to the receiver by the EPG provider.

4.7 Considerations on interoperability

It is stressed that the benefits of an orderly development in the use of EPGs in the home requires that a single set of technical specifications be applied by all parties concerned. The following paragraphs highlight some of the fundamental requirements related to various levels of interoperability.

1) It is essential that all content providers should use the sets of programme content categories specified in the present Recommendation, even if they use different labels for such categories; indeed different labels with the same meaning can readily be harmonised by means of look-up tables, while a divergence in the way content categories are specified by different content providers may well make it necessary to manually re-code each programme.

2) It is also desirable, albeit not essential, that all content providers and all schedule providers use the same sets of labels for programme content categories, otherwise EPG providers would be obliged to re-label programmes, in order to harmonise their labels; when necessary, it would be possible to automatically perform such re-labelling by means of look-up tables, but only on condition that all programme content categories be uniformly specified.

3) It is extremely desirable that all broadcasters and cable television operators that deliver EPGs to the home use the same programme delivery labels and the same syntax; otherwise, immediate compatibility among EPG databases delivered to consumer receivers through different delivery channels will be lost. This requirement amounts to the delivery of presentation-free EPGs, i.e. EPGs for which the information content is specified, but the operation of the consumer television/multimedia display is not.

4) It is also extremely desirable to ensure interoperability among various programme delivery media having different delivery capacity, such as terrestrial broadcasting, satellite broadcasting, cable television, SMATV, etc. In order to achieve this goal, the data rate needed to deliver the "basic" items of information listed in 4.1 must be designed to match the capacity available for the delivery of data in the delivery medium that has the lowest data capacity, e.g. analogue television teletext. The additional capacity provided by other media having a higher data capacity can be used to deliver the "supplementary" information.

5) It is also essential that interoperability be ensured among all the various services that may use the capacity for data delivery in digital distribution channels. In the context of EPGs, this requirement amounts to the delivery of application-free EPGs, i.e. EPGs in which the provider can freely select the content and the layout of the presentation, in a way that is implemented by the consumer television/multimedia display. To achieve this goal, it is necessary to tag various applications in the transport stream by means of appropriate descriptors. The "registration descriptor" of the "MPEG-2 TS description section" can be used for this purpose.

5 Summary of guidelines and specifications

The approach and criteria given below should be used in the design of properly structured EPGs for delivery to the home by digital cable television and similar delivery methods.

- The set of information items specified in ITU-T J.94 should be used by all parties that are involved in the preparation of EPGs.
- The set of labels specified in ITU-T J.94 for those information items should be used.
- EPGs should include provisions (currently under study) for a range of conditional access entitlements to different parts of the EPG multimedia database.
- EPGs must also include provisions for appropriate descriptors if the data channel must carry various applications.
- For cable television distribution to the home, at least part of the EPG should be delivered in part of the capacity available for data delivery in the MPEG-2 transport stream.
- Modulation methods for cable television delivery of MPEG-2 transport streams to the home are specified in ITU-T J.83 and ITU-T J.84.
- Future consumer television/multimedia displays should be designed to faithfully present the "look and feel" of EPG information on specific programmes or channels, when the "look and feel" are specified by the EPG; otherwise, consumer equipment manufacturers are free in their choice of an attractive and user-friendly presentation of EPGs.
- Future consumer television/multimedia displays should incorporate sufficient data memory to allow a slower refresh rate for the EPG.
- Future consumer television/multimedia displays should incorporate sufficient intelligence to allow the use of attractive EPG presentation and navigation applications resident in the receiver or downloaded to it.

APPENDIX I

Example of an operating scenario for the generation, assembly and delivery of EPG information

I.1 Introduction

This non-normative appendix describes, as an example, an operating scenario in which EPG information is generated, assembled, delivered and displayed to viewers.

Other operating scenarios can of course be developed and implemented, while meeting the requirements of this Recommendation. The scenario described in this Recommendation is the one used as a reference in the tutorial part of the Recommendation.

I.2 Sourcing EPG information

When the information provided by current programme guides, such as printed ones, is examined, it is seen that there are several categories of information, coming from two main sources.

- Information on programme content generally comes from the content provider, e.g. the producer of the programme or the holder of its rights.
- Information on programme delivery generally comes from the schedule provider, e.g. the broadcaster or cable television operator.

The main body of this Recommendation provides criteria applicable to EPG programme content information.

I.3 Assembling EPG information

The information supplied by the various content providers will not generally conform to a single format, unless this has been prearranged. Similarly, the information supplied by the various schedule providers will not generally conform to a single format.

There is thus a need for an entity that collates all the information supplied by all the content providers and all the schedule providers, and assembles a single, properly structured and formatted database in which all information on all programmes scheduled on all channels at all times during a predetermined period of time (e.g. a week) can be found.

The collated information constitutes a multimedia database in which each individual item of information must be separately labelled in order to be individually addressable, links and hyperlinks being built among related items of information, in order to set the stage for an easy navigation through the multimedia database.

I.4 Delivering EPG information

The multimedia database of EPG information so assembled must be broadcast or distributed by cable television to viewers at home. Different solutions may well apply in this respect to broadcasting and cable television distribution, due to the differences between the two media.

For instance, in the case of analogue television broadcasting, EPG information could be distributed by teletext, possibly by means of magazines personalised by the schedule provider for each individual programme channel. The limitation of analogue television broadcasting in this respect is in the modest data capacity of teletext, which limits the information to just the essential items for each programme (title, duration, day and time of broadcast, etc.). It would be impossible to supplement such very basic information with, for example photos or video clips of programmes, by just using teletext. Indeed, analogue television broadcasters may well have to select, in the multimedia EPG database, only those basic items of information that are of main interest to their own programming policy.

In the case of digital broadcasting, the quite large capacity provided for data delivery in the MPEG-2 transport stream shows promise to allow broadcasters to deliver a richer EPG database to the home.

In the case of cable television distribution, where it is expected that there would be some abundance of delivery channels, it may be possible for cable television operators to set aside, for example, a dedicated channel to provide a rich EPG, covering all the programmes to be delivered on all their channels, and to additionally use the data capacity in each channel in order to provide information on the current and the next programmes on that channel. Cable television operators would thus be free to select a larger range of items of information from the multimedia EPG database, again discarding those parts that do not fit their programming policy.

I.5 Presenting EPG information

The role of the receiver manufacturers in this perspective is to put receivers on the market that are capable to detect, decode, process and display EPG information received in the home, irrespective of the delivery channel and of the service provider.

It is essential for this purpose that a single approach be adopted to structure and format the delivered EPG information, either world-wide or at least regionally.

As to the approach used by the receiver to process and display the received EPG information, this is a matter that should be left to receiver manufacturers, who may wish to offer various degrees of completeness and sophistication in the displayed information, notably in relation to the class of their various receivers and their purchase price.

It should be noted nevertheless that there will likely be some aspects of the EPG, such as its "look" and "feel" when information on some programmes or on some channels is displayed, for which content providers or, respectively, schedule providers will wish to retain control, rather than leaving these aspects to the discretion of receiver manufacturers.

APPENDIX II

Bibliography

[1] ITU-T H.222.0 (2000) | ISO/IEC 13818-1:2000, *Information technology – Generic coding of moving pictures and associated audio information: Systems.*

[2] ITU-T J.83 (1997), *Digital multi-programme systems for television, sound and data services for cable distribution.*

[3] ITU-T J.84 (1997), *Distribution of digital multi-programme signals for television, sound and data services through SMATV networks.*

[4] ITU-T J.93 (1998), *Requirements for conditional access in the secondary distribution of digital television on cable television systems.*

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