

International Telecommunication Union

ITU-R
Radiocommunication Sector of ITU

Recommendation ITU-R BT.1691-1
(09/2009)

**Adaptive image quality control
in digital television systems**

BT Series
Broadcasting service
(television)



Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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Series of ITU-R Recommendations

(Also available online at <http://www.itu.int/publ/R-REC/en>)

Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R BT.1691-1

Adaptive image quality control in digital television systems

(Question ITU-R 98/6)

(2004-2009)

Scope

The Recommendation specifies that in adaptive digital TV systems methods of global optimization of image quality should be used, and additional information should be inserted in the bit stream so that it may be read by adaptative signal processing devices at the transmitting and receiving ends.

The ITU Radiocommunication Assembly,

considering

- a) that digital TV systems have been developed as a compromise between image quality and compression ratio with consideration of image statistics, human visual perception, methods of image processing, characteristics of transmission and receiving equipment, and capturing and display systems;
- b) that use of digital representation brings an opportunity to transmit additional information inside the digital TV signal, the use of which provides the possibility of control of video signal processing characteristics at the transmitting and receiving ends;
- c) that new methods of image processing and transmission, such as fractal analysis, wavelet transformation, object-based coding, transmission of content and corresponding tools, are now developed and may be used in future digital TV applications, and that parameters and characteristics of these methods may be controlled during video transmission;
- d) that modern methods of the digital video coding for image presentation are oriented towards either image sample coding or object-based coding. The usage of object-based presentation of video information allows significant bit-rate reduction to be achieved and its use in TV broadcasting is under study worldwide;
- e) that use of object-based presentation of video information implies the possibility of differences in the conditions of capturing, production and processing of separate objects, and that in the process of programme production or some other video processing in the TV light-to-light chain the possibility of separate object information matching should be provided by metadata, and this information should be brought to the common viewing conditions on transmission and/or on receiving;
- f) that an objective of television broadcasting is to obtain optimum (for digital TV applications) subjective quality of the reproduced image for any programme content, any type of image compression, any source and reproducing devices, and any viewing conditions;
- g) that the receiver of the future may implement adaptive processing that can calculate necessary processing parameters for optimum image quality;

h) that nominal parameters for image processing at the transmitting and receiving ends may be generated at the transmitting end and transmitted for use by image processing devices at the receiving end;

j) that an important part of adaptive image quality optimization is colour reproduction quality optimization and that this specific matter is a subject of Recommendation ITU-R BT.1692;

k) that the new methods should be compatible with existing colour transmission methods, so that future TV systems may operate at either of two levels:

- non-adaptive digital TV systems;
- adaptive digital TV systems,

recommends

1 that in adaptive digital TV systems methods of global optimization of image quality should be used, either by optimization of individual parameters, or by optimization of grouped parameters;

2 that for image quality optimization, information is needed on the characteristics of the transmitted image, on viewing conditions, on transmission conditions, on the method of presentation, and on any intermediate devices in the signal path which may affect the signal quality. This information should be inserted in a defined location in the bit stream so that it may be read by adaptive signal processing devices at the transmitting and receiving ends;

3 that in the case of object-based image presentation, metadata should desirably carry parameters related to the specific object capturing, processing, transmission, etc.;

4 that adaptive digital TV systems should be compatible with existing digital TV systems.
