

## RECOMMENDATION ITU-R BT.1122-1\*\*\*

**User requirements for emission and secondary distribution systems for SDTV, HDTV and hierarchical coding schemes**

(1994-1995)

The ITU Radiocommunication Assembly,

*considering*

- a) that Recommendations ITU-R BT.601 and ITU-R BT.709 define the parameters of  $Y$ ,  $C_B$ ,  $C_R$ -based digital luminance and colour difference signals;
- b) that signals conforming to that standard are required to be transmitted through digital secondary distribution networks or emission systems (terrestrial, satellite, cable, etc.);
- c) that coding algorithms have been devised and standards established or proposed to enable such transmission to be effected using bit rate reduction techniques;
- d) that prototype codec equipment using these algorithms is being developed and needs to be assessed;
- e) that general advice on methods of assessment is contained within ITU-R texts, and that, in particular, subjective evaluation methods are defined in Recommendations ITU-R BT.500 and ITU-R BT.710;
- f) that such assessment will need to take account of basic picture quality and the failure characteristic in the presence of errors on the transmission and emission link;
- g) that both the design of codecs and their assessment will need to take account of user requirements;
- h) that in order to be complete, the user requirements should specify the test procedures and test material that should be used to check that the requirements are being met;
- j) that many organizations are requesting an early establishment of user requirements,

*recommends*

**1** that the following user requirements should govern the specification design and testing of systems for the secondary distribution and emission of  $Y$ ,  $C_B$ ,  $C_R$ -based SDTV, HDTV and hierarchical television signals.

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\* This Recommendation should be brought to the attention of Telecommunication Standardization Study Group 9.

\*\* Radiocommunication Study Group 6 made editorial amendments to this Recommendation in 2007 in accordance with Resolution ITU-R 44.

TABLE 1

## User requirements for secondary distribution and emission

User requirements	Specification
<i>Functional requirements</i>	
Input television signal format	SDTV: 4:2:2 level of Rec. ITU-R BT.601 HDTV: studio standard pictures of Rec. ITU-R BT.709
Input audio signal format	To be specified
Number of audio channels	To be specified
Ancillary data	To be specified
Access control	To be specified
HDTV/SDTV compatibility	Not required for some HDTV applications
Scalability	To be specified
<i>Performance requirements</i>	
Requirements assumed for a complete broadcast chain	
Codecs in cascade	Cascade of one contribution codec, one primary distribution codec and one secondary distribution codec.
Basic quality	Quality difference $\leq 18\%$ of the DSCQS scale <sup>(1)</sup> for at least 4 sequences chosen from Recommendations ITU-R BT.710, ITU-R BT.802, ITU-R BT.1128 and ITU-R BT.1210, must be met and by at least 75% of the sequences chosen, the rest must achieve $\leq 36\%$
Change in overall delay after major disturbance	Less than 20 $\mu$ s
Total delay from origination to home	To be specified
Requirements for secondary distribution	
Good reception condition	Quality difference $\leq 12\%$ of the DSCQS scale <sup>(1)</sup> for at least 4 sequences chosen from Recommendations ITU-R BT.710, ITU-R BT.802, ITU-R BT.1128 and ITU-R BT.1210, must be met and by at least 75% of the sequences chosen, the rest must achieve $\leq 30\%$
Poor reception condition <sup>(2)</sup> – applicable to hierarchical coded systems	Quality difference $\leq 36\%$ of the DSCQS scale <sup>(1)</sup> for at least 4 sequences chosen from Recommendations ITU-R BT.710, ITU-R BT.802, ITU-R BT.1128 and ITU-R BT.1210, must be met and by at least 75% of the sequences chosen, the rest must achieve $\leq 50\%$ for the same test material and under the same viewing conditions
Lower resolution display <sup>(3)</sup>	Quality difference $\leq 12\%$ of the DSCQS scale <sup>(1)</sup> for at least 4 sequences chosen from Recommendations ITU-R BT.710, ITU-R BT.802, ITU-R BT.1128 and ITU-R BT.1210, must be met by at least 75% of the sequences chosen, the rest must achieve $\leq 30\%$ when compared with a down converted picture
<i>Functional requirements</i>	
Basic audio quality	To be specified
Vision failure characteristics	To be specified
Image recovery time	500 ms after a break of 50 ms
Audio recovery time	To be specified
Vision/audio failure characteristics	Vision failure first
Audio video relative delay	Less than $\pm 2$ ms
<i>Design requirements</i>	
Hardware complexity	Coder/decoder asymmetry to be favoured, i.e., a complex coder but simple receiver

DSCQS: double stimulus continuous quality scale.

- (1) Performance requirements – all quality assessment ratings in this section are carried out using the procedures given in Recommendations ITU-R BT.500, ITU-R BT.710 and ITU-R BT.1129 using the subjective assessment methods indicated.
- (2) Picture quality under rugged receiving conditions – under difficult receiving conditions, in some systems, a lower resolution picture is extracted and up-converted for display. For this mode of operation, quality assessment should use the higher resolution picture as reference.
- (3) Display at lower resolution – this condition applies when the receiver is capable of displaying only at lower resolution. For this mode of operation, quality assessment should use a down-converted version of the higher resolution picture as reference.

