



**Recommendation ITU-R BT.1872-1**  
(12/2017)

**User requirements for broadcast auxiliary  
services including digital television outside  
broadcast, electronic/satellite news  
gathering and electronic field production**

**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.

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### Series of ITU-R Recommendations

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

Series	Title
<b>BO</b>	Satellite delivery
<b>BR</b>	Recording for production, archival and play-out; film for television
<b>BS</b>	Broadcasting service (sound)
<b>BT</b>	<b>Broadcasting service (television)</b>
<b>F</b>	Fixed service
<b>M</b>	Mobile, radiodetermination, amateur and related satellite services
<b>P</b>	Radiowave propagation
<b>RA</b>	Radio astronomy
<b>RS</b>	Remote sensing systems
<b>S</b>	Fixed-satellite service
<b>SA</b>	Space applications and meteorology
<b>SF</b>	Frequency sharing and coordination between fixed-satellite and fixed service systems
<b>SM</b>	Spectrum management
<b>SNG</b>	Satellite news gathering
<b>TF</b>	Time signals and frequency standards emissions
<b>V</b>	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.1872-1

**User requirements for broadcast auxiliary services including digital television outside broadcast, electronic/satellite news gathering and electronic field production**

(2010-2017)

**Scope**

This Recommendation deals with user requirements for broadcast auxiliary services (BAS). It contains typical operational requirements for digital TVOB, ENG/SNG and EFP, which may be used by administrations when planning usage of their fixed and mobile TVOB, ENG and EFP applications.

**Keywords**

BAS, EFP, ENG, SAP, TVOB

The ITU Radiocommunication Assembly,

*considering*

- a)* that electronic news gathering (ENG), television outside broadcast (TVOB) and electronic field production (EFP) are more generically referred to as services ancillary to programme (SAP) making and broadcast auxiliary services (BAS);
- b)* that some administrations have implemented television SAP/BAS applications in SDTV and HDTV modes which have varying bandwidth requirements;
- c)* that SAP/BAS applications are required to operate in many parts of the world, and in locations where events of national, regional and international importance may occur;
- d)* that coverage produced by SAP/BAS applications must be delivered to the appropriate network facility, which is often remote from the area where the BAS applications operate;
- e)* that delivery of SAP/BAS coverage may be effected, depending on circumstances:
  - by physical delivery of recorded media;
  - by transmission of the signal over portable microwave links; and
  - by injection of the signal in a switched telecommunication network;
- f)* that the user requirements specific to SAP/BAS operations in terms of:
  - received picture quality;
  - received sound quality;
  - number of sound channels;
  - transmission channel bandwidth and reliability;
  - equipment size and weight; and
  - talkback facilities, etc.,

are often different from those that apply to normal sound and television broadcasting contribution transmissions, and they are often specific to the operating environment of SAP/BAS in a serviced or originating administration;

- g)* that such user requirements are generally independent of the delivery method used,

*noting*

- a) Report ITU-R BT.2069 – Tuning ranges and operational characteristics of terrestrial electronic news gathering (ENG), television outside broadcast (TVOB) and electronic field production (EFP) systems;
- b) Report ITU-R BT.2344 – Information on technical parameters, operational characteristics and deployment scenarios of SAB/SAP as utilized in broadcasting;
- c) Recommendation ITU-R BT.1868 – User requirements for codecs for transmission of television signals through contribution, primary distribution, and SNG networks;
- d) Recommendation ITU-R F.1777 – System characteristics of television outside broadcast, electronic news gathering and electronic field production in the fixed service for use in sharing studies, provides user requirements for BAS in the fixed service;
- e) Recommendation ITU-R M.1824 – System characteristics of television outside broadcast, electronic news gathering and electronic field production in the mobile service for use in sharing studies, provides operational characteristics for BAS in the mobile service;
- f) Recommendation ITU-R BT.1203 – User requirements for generic video bit-rate reduction coding of digital TV signals for an end-to-end television system;
- g) Recommendation ITU-R BS.1196 – Audio coding for digital broadcasting;
- h) Recommendation ITU-R BS.1548 – User requirements for audio coding systems for digital broadcasting,

*recognizing*

- a) that some administrations operate extensive terrestrial SAP/BAS under fixed service operations;
- b) that some administrations operate extensive terrestrial SAP/BAS under mobile service operations;
- c) that some administrations have extended SAP/BAS to airborne and seaborne applications;
- d) that SAP/BAS applications have been increasingly linked to emergency and disaster relief situations and global circulation of radiocommunication equipment, taking into account Recommendation ITU-R M.1637,

*recommends*

that the description of the user requirements and key characteristics for digital UHDTV/HDTV/SDTV transmissions in the fixed and mobile services of digital terrestrial BAS in Annex 1 should be referred to by administrations when considerations are made toward interoperability and harmonization of SAP/BAS operational practices.

**Abbreviations**

BAS	broadcast auxiliary services
EFP	electronic field production
ENG	electronic news gathering
SAP	services ancillary to programme
SNG	satellite news gathering
TVOB	television outside broadcast

## Annex 1

### **User requirements for broadcast auxiliary services including digital TVOB, ENG/SNG and EFP**

The user requirements for BAS are provided for the information of administrations seeking to operate services ancillary to broadcasting when considerations are made toward interoperability and harmonization for the operation of BAS within one administration which may extend to another administration.

Table 1 provides user requirements and technical parameters in terms of basic video and audio quality for transmission of digital HDTV/SDTV using ENG systems that employ MPEG-2, H.264|MPEG-4 AVC, or H.265|HEVC codec.

Table 2 provides user requirements and the example of technical parameters for transmission of digital HDTV/SDTV using ENG systems when assigned in the fixed service.

Table 3 provides user requirements and the example of technical parameters for transmission of digital HDTV/SDTV using ENG systems when assigned in the mobile service.

Table 4 provides user requirements and technical parameters in terms of basic video and audio quality for transmission of digital UHD TV using ENG systems that employ H.265|HEVC codec.

Whilst in practice a range of operating parameters may be employed, these examples provide an indication of current system parameters.

TABLE 1

**User requirements and technical parameters in terms of basic video  
and audio quality for transmission of digital HDTV/SDTV signals in ENG applications**

Item	User requirements	Technical parameters
Basic video signal quality	Degradation of picture quality $\leq 12\%$ with DSCQS method as specified in Rec. ITU-R BT.1868. (See also Rec. ITU-R BT.1203)	HDTV: Video bit rate for 3 codecs in tandem: <ul style="list-style-type: none"> <li>– 52 Mbit/s (using ISO/IEC 13818-2   Rec. ITU-T H.262, 4:2:2P@HL)</li> <li>– 35 Mbit/s (using ISO/IEC 14496-10   Rec. ITU-T H.264, Level 4/ High 4:2:2, see Report ITU-R BT.2069)</li> <li>– 30 Mbit/s (using ISO/IEC 23008-2   Rec. ITU-T H.265 Main 422 10 Level 4.1)</li> </ul> Video bit rate for single codec: <ul style="list-style-type: none"> <li>– 21 Mbit/s (using ISO/IEC 14496-10   Rec. ITU-T H.264 Level 4/ High 4:2:2, see Report ITU-R BT.2069)</li> <li>– 18 Mbit/s (using ISO/IEC 23008-2   Rec. ITU-T H.265 Main 422 10 Level 4.1)</li> </ul> SDTV: Video bit rate: 15 Mbit/s (using ISO/IEC 13818-2   Rec. ITU-T H.262, 4:2:2P@ML with long-GOP) Video bit rate: 10 Mbit/s (using ISO/IEC 14496-10   Rec. ITU-T H.264, Level 3/High 4:2:2)
Basic sound signal quality	Audio quality $\geq 4.5$ in the impairment 5° scale as specified in Rec. ITU-R BS.1548. Comparable to uncompressed Linear PCM (48 kHz, 16 bit/ch, or more).	Uncompressed sound signal Linear PCM (e.g. 768 kbit/s per channel for 48 kHz, 16 bits or 1152 kbits per channel for 48 kHz, 24 bits) Compressed sound signal: e.g. MPEG-1 layer II 180 kbit/s per channel or MPEG-4 HE-AAC v2 with 96 kbit/s per channel. See Rec. ITU-R BS.1196

TABLE 2

**User requirements and the example of technical parameters for transmission of digital HDTV/SDTV signals in the fixed service**

Item		User requirements	Example of technical parameters
Latency		As short delay as possible	< 500 ms
Transmission bandwidth		8 MHz, 9 MHz, 18 MHz and 24 MHz	See Rec. ITU-R F.1777
Transmission power		1.76-7 dBW	
Frequency		6-7 GHz, 10 GHz and 13 GHz bands	
Antenna	Tx	0.6 m dish	Transmission distance: 6-7 GHz: 50-100 km (depending on necessary margin) 10 GHz: 7 km (with necessary rain margin) 13 GHz: 5 km (with necessary rain margin)
	Rx	0.6 m dish	
Modulation		Multi-QAM (16, 32, 64); QPSK-OFDM	See Rec. ITU-R F.1777
Transmission capacity		To support all the above transmission parameters	Up to 66 Mbit/s (depending on bandwidth and modulation, see Rec. ITU-R F.1777)
Environmental reliability		System should be reliable in all possible environmental conditions (temperature, humidity, etc.)	Temperature: 0° to 50° C (outdoor units) 5° to 45° C (indoor units) Relative humidity: 95% non condensing
Ease of alignment		System should have built-in facility to generate certain test signals	Colour bar generator with 16 character identity
Size and weight		Small in size and light in weight for easy and quick operationalization	
Recording media		Should have facility to record using all accepted media types	Tapes; DVDs; Blu Ray discs and hard discs

TABLE 3

**User requirements and the example of technical parameters for transmission of digital HDTV/SDTV signals in the mobile service**

Item		User requirements	Example of technical parameters
Latency		As short delay as possible	< 500 ms
Transmission bandwidth		9 MHz, 18 MHz, 27 MHz and 80 MHz	See Rec. ITU-R M.1824
UHF	Transmission power	7 dBW	Transmission distance: 4 km
	Frequency	800 MHz band	
	Tx antenna	Co-linear	
	Rx antenna	Yagi	
Microwave	Transmission power	4 dBW, 7 dBW	Transmission distance: 4 km
	Frequency	6-7 GHz, 10 GHz and 13 GHz bands	
	Tx antenna	Horn, parabolic, helix	
	Rx antenna	0.3 m dish	
Airborne	Tx antenna	0.2 m dish	Transmission distance: 6-7 GHz: 50-65 km (depending on necessary margin) 10 GHz: 7 km (with necessary rain margin) 13 GHz: 5 km (with necessary rain margin)
	Rx antenna	1.2 m dish	
Modulation		Multi-QAM (16, 32, 64), QPSK-OFDM	See Rec. ITU-R M.1824
Transmission capacity		To support all the above transmission parameters	Up to 60 Mbit/s (depending on bandwidth and modulation, see Rec. ITU-R M.1824)
Environmental reliability		System should be reliable in all possible environmental conditions (temperature, humidity etc.)	Temperature: 0° to 50° C (outdoor units) 5° to 45° C (indoor units) Relative humidity: 95% non condensing
Ease of alignment		System should have built-in facility to generate certain test signals for ease of alignment process	Colour bar generator with 16 character identity
Size and weight		Small in size and light in weight for easy and quick operationalization	



TABLE 4

**User requirements and technical parameters in terms of basic video  
and audio quality for transmission of digital UHD TV signals in ENG applications**

Item	User requirements	Technical parameters
Basic video signal quality	Degradation of picture quality $\leq 12\%$ with DSCQS method as specified in Rec. ITU-R BT.1868. (See also Rec. ITU-R BT.1203)	8K UHD TV:
		Video bit rate for 3 codecs in tandem: 285 Mbit/s (using ISO/IEC 23008-2   Rec. ITU-T H.265 Main 422 10 Level 6.1)
		Video bit rate for single codec: 140 Mbit/s (using ISO/IEC 23008-2   Rec. ITU-T H.265 Main 422 10 Level 6.1)
		4K UHD TV: Video bit rate for 3 codecs in tandem: 145 Mbit/s (using ISO/IEC 23008-2   Rec. ITU-T H.265 Main 422 10 Level 5.1) Video bit rate for single codec: 96 Mbit/s (using ISO/IEC 23008-2   Rec. ITU-T H.265 Main 422 10 Level 5.1)
Basic sound signal quality	Audio quality $\geq 4.5$ in the impairment 5° scale as specified in Rec. ITU-R BS.1548. Comparable to uncompressed Linear PCM (48 kHz, 16 bit/ch, or more)	Uncompressed sound signal Linear PCM (e.g. 768 kbit/s per channel for 48 kHz, 16 bits or 1152 kbit/s per channel for 48 kHz, 24 bits) Compressed sound signal: e.g. MPEG-1 layer II 180 kbit/s per channel or MPEG-4 HE-AAC v2 with 96 kbit/s per channel. See Rec. ITU-R BS.1196