

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

(Questions ITU-R 1/8 and ITU-R 7/8)

(2007)

Scope

This Recommendation, dealing with system characteristics of television outside broadcast (TVOB), electronic news gathering (ENG) and electronic field production (EFP) in the mobile service to assist sharing studies, contains the typical operational and technical characteristics of broadcast auxiliary services (BAS)¹, which are required for sharing studies between the BAS in the mobile service and other radiocommunication services.

The ITU Radiocommunication Assembly,

considering

- a) that some administrations operate extensive terrestrial broadcast auxiliary services (BAS) under mobile service allocations;
- b) that some administrations are migrating from analogue to digital terrestrial BAS under mobile allocations;
- c) that many administrations are likely to operate BAS including both terrestrial analogue and digital electronic news gathering (ENG) and television outside broadcast (TVOB) equipment in the mobile allocations for a reasonable amount of time;
- d) that the frequency bands used for these BAS including TVOB, ENG and electronic field production (EFP) are, in many cases, shared by the mobile service and other services;
- e) that the technical and operational characteristics of terrestrial BAS deployed under the mobile service are different from those systems deployed under the fixed service;
- f) that several types of antennas are used by the BAS operated in various vehicles, and those antennas are controlled in elevation and azimuth during their operation to establish reliable links to the studio;
- g) that it is desirable to identify the system parameters and operational characteristics to facilitate sharing with other services,

noting

- a) Recommendation ITU-R F.1777 dealing with system characteristics of television outside broadcast (TVOB), electronic news gathering (ENG) and electronic field production (EFP) in the fixed service for use in sharing studies;

* This Recommendation should be brought to the attention of Radiocommunication Study Group 6.

¹ The term “BAS”, also known as services ancillary to broadcasting (SAB), is defined in Report ITU-R BT.2069.

b) Report ITU-R BT.2069 – Spectrum usage and operational characteristics of terrestrial electronic news gathering (ENG), television outside broadcast (TVOB) and electronic field production (EFP) systems;

c) that the World Radiocommunication Conference in 2003 adopted Recommendation 723 recommending the ITU-R study, as a matter of urgency, the technical, operational and frequency issues of ENG on a global basis,

recommends

1 that the parameters described in the Annex 1 should be used for sharing studies between BAS deployed in the mobile service and other services.

Annex 1

Operational and technical characteristics of BAS systems deployed in the mobile service

1 Operational characteristics of BAS systems in the mobile service

Broadcasters use several frequency bands and several types of antennas depending on the situation where terrestrial crews send and receive live images. Figures 1 and 2 are examples of link situations. These systems are used for reporting the events of national disasters, contents production outside studio, etc. noting that the timing and location of national disaster events cannot be predicted.

Moreover, since broadcasters need to send the live video of national disasters and the contents which are needed in programme production; the geographical relation between the ENG equipments and collecting station or relay station installed on the helicopter or vehicular cannot be predicted. As a consequence, the antennas of ENG equipment need to point to any azimuth and elevation angle.

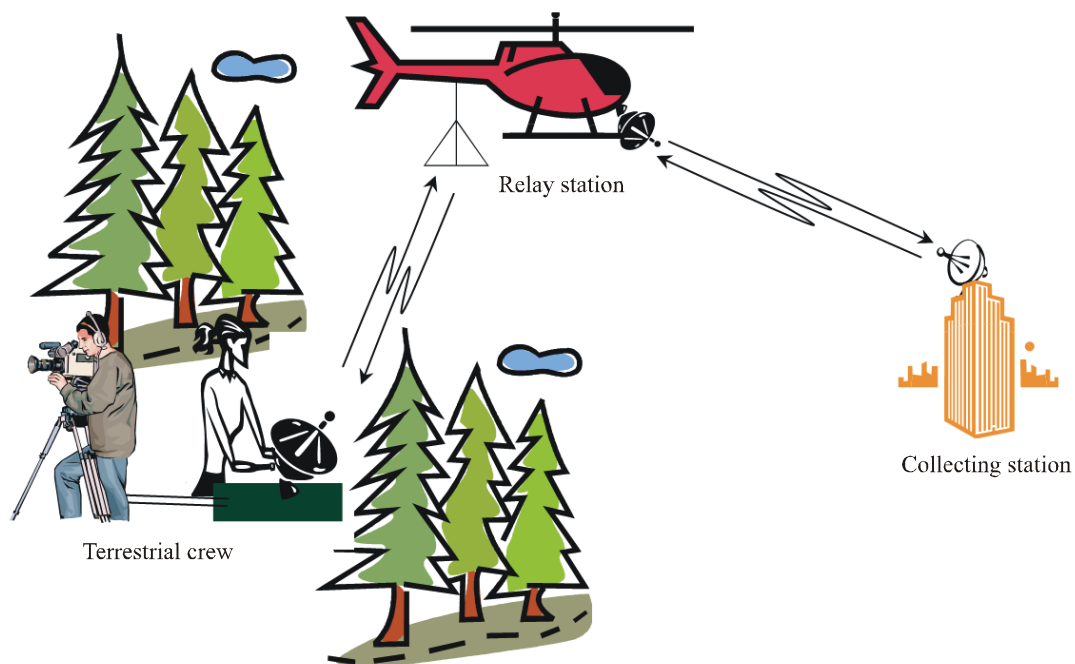
Figure 1 shows the example operation for transmitting live video to the collecting station, in order to broadcast the events which occur at the suburban area. In this case, the terrestrial video engineer who controls the microwave equipment points the antenna to the relay station installed on helicopter to avoid terrestrial obstacles. The relay station on the helicopter relays the live video to the collecting station which sends it to the broadcasting studio. The return link is also necessary to allow the terrestrial video engineers to collect information from the broadcasting studio.

Figure 2 shows the example of operation for transmitting live video to the collecting station, in order to broadcast the events which occur at the urban area. In this case, there are several ways to make a microwave link to the collecting station. The camera crew riding on the motorcycle takes the live video, and transmits it to the relay station installed on the vehicle which is also running in front of the motorcycle. In some cases, the relay station installed on the helicopter picks up the video which is transmitted by the camera crew riding on the motorcycle. A low gain antenna is usually used in these cases. The relay station installed on the vehicle also transmits live video to the helicopter which relays it to the collecting station, or directly transmits it to the collecting station by using a high gain antenna.

Broadcasters choose the antenna and frequency band depending on circumstances where the microwave links are to be established.

FIGURE 1

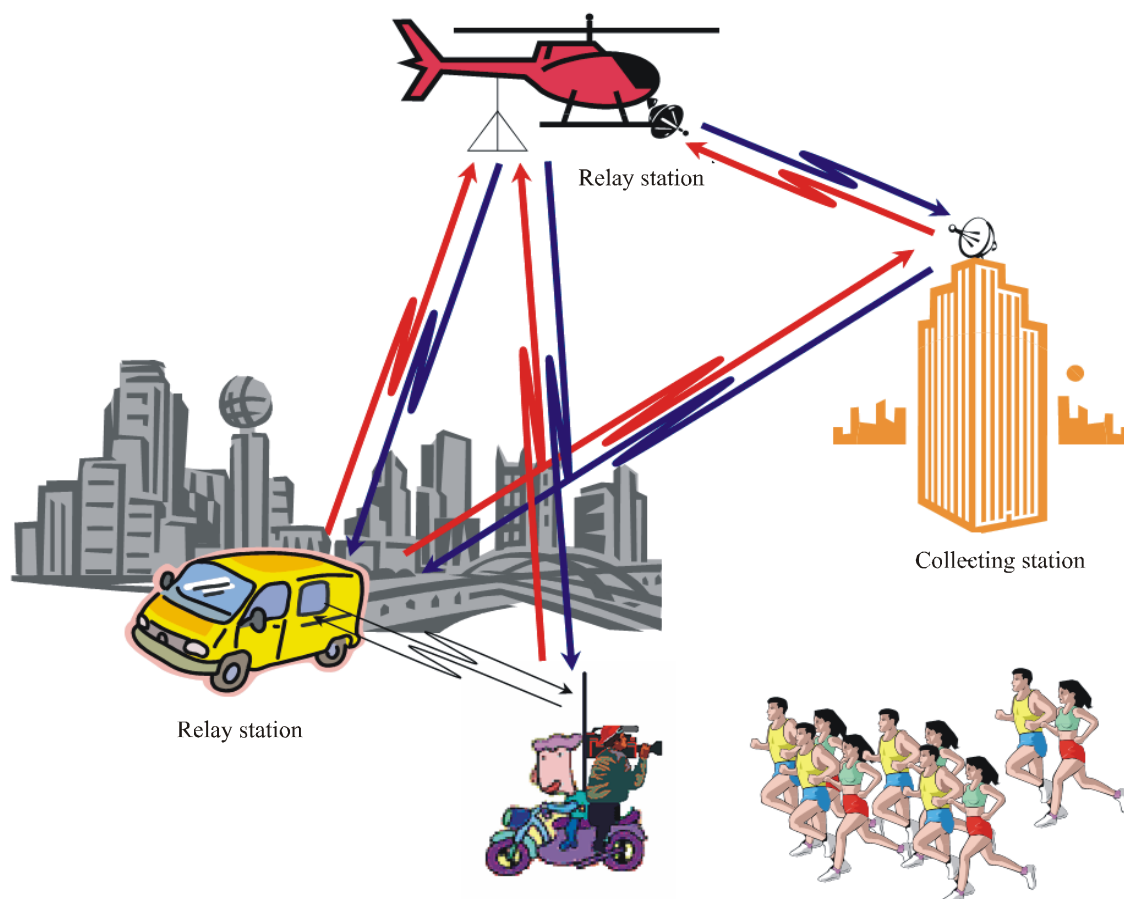
Example of operation for transmitting video to the collecting stations via helicopter



1824-01

FIGURE 2

Example of operation for transmitting live video to the collecting stations via vehicles



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2 Technical characteristics of BAS systems deployed in the mobile service²

Table 1 summarizes the technical parameters of BAS video link systems.

Table 2 summarizes the technical parameters of BAS talkback and walkie-talkie³ systems.

Table 3 summarizes the technical parameters of BAS audio link systems⁴.

² The radio microphone systems, which are currently operated in the bands 40.68 MHz to 47.27 MHz and 779.125 MHz to 805.875 MHz on a licensed basis in Japan, are not included in this Recommendation.

³ These systems are used as the BAS audio link application in absence of alternative measures to establish the audio link.

⁴ The terminologies of video link, talkback and audio link systems are defined in the Report ITU-R BT.2069.

TABLE 1

Parameters of BAS video link systems operated in the mobile service

Frequency allocation ⁽¹⁾	770-806 MHz (r2, R3, 5.293) 790-862 MHz (5.314, 5.316)	5 850-5 925 MHz (R1, R2, R3) 6 425-6 570 MHz (R1, R2, R3) 6 870-7 125 MHz (R1, R2, R3)	10.25-10.45 GHz (R1, R3, 5.480) 10.55-10.68 GHz (R1, R2, R3) 12.95-13.25 GHz (R1, R2, R3)		41.55-41.95 GHz (r1, r2, r3, 5.551F)		Note	
Antenna type and gain	Helix (10-13 dBi)	Parabolic (22-35 dBi) Helix (10-13 dBi)				Parabolic (38-41 dBi)		H, V or circular polarization
	YAGI (12-19 dBi)	Horn (5-20 dBi)				N/A		Circular polarization
	Co-linear (5-6 dBi) Non-directional (2 dBi)	Horn (15-20 dBi) Non-directional (2 dBi)				Horn (19 dBi)		H and V polarization
Tracking method	Automatic or Manual							
Modulation	QPSK-OFDM 16-QAM-OFDM 32-QAM-OFDM	QPSK-OFDM 16-QAM-OFDM 32-QAM-OFDM 64-QAM-OFDM				N/A		16-QAM-OFDM is normally adopted
	FM	FM				FM		
Maximum capacity (Mbit/s)	16	30	60	30	60	N/A	N/A	
Channel spacing (MHz)	9	9	18	9	18	N/A	N/A	For the digital system
	9	N/A	18	N/A	18	33	100	For the FM system
Feeder/multiplexer loss (typical) (dB)	1	1	1	1	1	1	1	For both transmitter and receiver

TABLE 1 (*end*)**Parameters of BAS video link systems operated in the mobile service**

Frequency allocation ⁽¹⁾	770-806 MHz (r2, R3, 5.293) 790-862 MHz (5.314, 5.316)	5 850-5 925 MHz (R1, R2, R3) 6 425-6 570 MHz (R1, R2, R3) 6 870-7 125 MHz (R1, R2, R3)	10.25-10.45 GHz (R1, R3, 5.480) 10.55-10.68 GHz (R1, R2, R3) 12.95-13.25 GHz (R1, R2, R3)	41.55-41.95 GHz (r1, r2, r3, 5.551F)	Note			
Maximum antenna input power (dBW)	7	4	7	4*	7**	0	0	* –6 dBW in 10.60-10.68 GHz by the transmitter power. ** –3 dBW in 10.60-10.68 GHz by the transmitter power.
e.i.r.p. (maximum) (dBW)	25	38	41	38*	41**	40	40	* 29 dBW in 10.60-10.68 GHz. ** 32 dBW in 10.60-10.68 GHz.
Receiver IF bandwidth (MHz)	9	9	18	9	18	27	80	
Receiver noise figure (dB)	4	4	4	4	4	6	6	
Receiver thermal noise (dBW)	–130.5	–130.5	–127.4	–130.5	–127.4	–123.7	–119.0	
Normal Rx input level (dBW)	–88	–88	–85	–88	–85	–82	–77	
Rx input level for 1×10^{-3} BER (dBW)	–120 –113 –110.7 –	–120 –113 –110.7 –108.2	–116.9 –109.9 –107.6 –105.1	–120 –113 –110.7 –108.2	–116.9 –109.9 –107.6 –105.1	N/A	N/A	QPSK-OFDM 16-QAM-OFDM 32-QAM-OFDM 64-QAM-OFDM
Rx input level for CNR = 27 (dB)	–103.5	N/A	–100.4	N/A	–100.4	–96.7	–92.0	For FM system
Nominal long term interference (dBW)	–140.5	–140.5	–137.4	–140.5	–137.4	–133.7	–129.0	
Spectral density (dB(W/MHz))	–150.0	–150.0	–150.0	–150.0	–150.0	–148	–148	

⁽¹⁾ Each table contains the letters “R1”, “R2” and “R3”, “r1”, “r2”, “r3”, and the reference to footnote 5.xxx. The letters “R1”, “R2” and “R3” stand for the ITU-R Region which has a primary mobile allocation to the specified frequency band, the letters “r1”, “r2” and “r3” stand for the ITU-R Region which has a secondary mobile allocation to the specified frequency band, and the reference to footnote 5.xxx refers to the country footnote in the table of frequency allocations.

TABLE 2

Parameters of BAS talkback/walkie-talkie* systems operated in the mobile service

Frequency allocation⁽¹⁾	26.574 MHz (R1, R2, R3)	143-144 MHz (5.211, 5.212, R2, R3) 146-148 MHz (R1, 5.217, R3) 148-149.9 MHz (R1, R2, R3) 149.9-150.05 MHz (5.223) 150-156.7625 MHz (R1, R2, R3) 156.8375-174 MHz (R1, R2, R3)	166.5-166.9 MHz (R1, R2, R3) 168.5-168.9 MHz (R1, R2, R3)	459.5125-460 MHz (R1, R2, R3) 469.5-470 MHz (R1, R2, R3)
Antenna type and gain	Co-linear, 8 dBi for base station (BS), non-directional, 2 dBi for mobile station (MS)			
Modulation	SSB	FM	RZ-SSB	FM
Channel spacing (kHz)		20	6.25	25
Feeder/multiplexer loss (typical) (dB)	Tx: 1.5 (BS), 0 (MS) Rx: 1.5 (BS), 1 (MS)	Tx: 1 (BS), 0 (MS) Rx: 1	Tx: 4 (BS), 0 (MS) Rx: 1	Tx: 1 (BS), 0 (MS) Rx: 1
Maximum antenna input power (dBW)	17 (BS), 14 (MS)	17	17	13
e.i.r.p. (maximum) (dBW)	17.5 (BS), 16 (MS)	24 (BS), 19 (MS)	21 (BS), 19 (MS)	20 (BS), 15 (MS)
Receiver IF bandwidth (kHz)	3	12/ 16	3.4 /5.8	12/16
Receiver noise figure (dB)	4	4	4	4
Receiver thermal noise (dBW)	-165.0	-159.0/-157.7	-164.5/-162.2	-159.0/-157.7
Minimum Rx input level (dBW)	-147	-147.1/-145.9	-146.5/-144.2	-147.1/-145.9
Nominal long term interference (dBW)	-175.0	-169.0/-167.8	-174.5/-172.2	-169.0/-167.8
Spectral density (dB(W/kHz))	-179.8	-179.8	-179.8	-179.8
Audio frequency range	300 Hz-3 000 Hz	300 Hz-3 400 Hz	300 Hz-3 400 Hz	300 Hz-3 400 Hz

* These systems are used as the BAS audio link application in absence of alternative measures to establish the audio link.

⁽¹⁾ Each table contains the letters “R1”, “R2” and “R3”, “r1”, “r2”, “r3”, and the reference to footnote 5.xxx. The letters “R1”, “R2” and “R3” stand for the ITU-R Region which has a primary mobile allocation to the specified frequency band, the letters “r1”, “r2” and “r3” stand for the ITU-R Region which has a secondary mobile allocation to the specified frequency band, and the reference to footnote 5.xxx refers to the country footnote in the table of frequency allocations.

NOTE 1 – Antenna height and altitude above sea level of base stations will be required for sharing studies. For example, the antenna height more than 20 m and the altitude above sea level more than 1 000 m are used in some cases.

TABLE 3

Parameters of BAS audio link systems operated in the mobile service

Frequency allocation⁽¹⁾	38.96 MHz (R1, R2, R3)	164-167 MHz (R1, R2, R3)	462-465 MHz (R1, R2, R3)	3 405-3 423 MHz (r1, r2, r3, 5.432)
Antenna type and gain	Non-directional (2 dBi)	Yagi (13 dBi) Non-directional (2 dBi)	Yagi (13 dBi) Non-directional (2 dBi)	Parabolic (22-26 dBi)
Modulation	FM AM	FM		
Channel spacing (kHz)	–	240	240	1 000
Feeder/multiplexer loss (typical) (dB)	Tx: 0 Rx: 1	Tx: 0 Rx: 1	Tx: 0 Rx: 1	Tx: 1 Rx: 1
Maximum antenna input power (dBW)	17	17	13	0
e.i.r.p. (maximum) (dBW)	19	30	26	25
Receiver IF bandwidth (kHz)	16/30	100	100	400
Receiver noise figure (dB)	4	4	4	4
Receiver thermal noise (dBW)	–157.8/–155.1	–149.8	–149.8	–139.8
Minimum Rx input level (dBW)	–125.7/–123	–123	–123	–95
Nominal long term interference (dBW)	–167.8/–165.1	–159.8	–159.8	–149.8
Spectral density (dB(W/kHz))	–179.9	–179.9	–179.9	–179.9
Audio frequency range	7 kHz	10 kHz	10 kHz	17 kHz

⁽¹⁾ Each table contains the letters “R1”, “R2” and “R3”, “r1”, “r2”, “r3”, and the reference to footnote 5.xxx. The letters “R1”, “R2” and “R3” stand for the ITU-R Region which has a primary mobile allocation to the specified frequency band, the letters “r1”, “r2” and “r3” stand for the ITU-R Region which has a secondary mobile allocation to the specified frequency band, and the reference to footnote 5.xxx refers to the country footnote in the table of frequency allocations.

NOTE 1 – Antenna height and altitude above sea level of collecting radio stations will be required for sharing studies. For example, the antenna height more than 20 m and the altitude above sea level more than 1 000 m are used in some case.