RECOMMENDATION ITU-R SNG.722-1*

Uniform technical standards (analogue) for satellite news gathering (SNG)

(1990-1992)

The ITU Radiocommunication Assembly,

considering

a) that satellite news gathering (SNG) using portable transmitting earth stations is essential for broadcast operations and provides a valuable method of transmission for the rapid acquisition and broadcasting of news events;

b) that to facilitate the international coverage of news and to optimize the design of equipment, it would be desirable to adopt uniform technical standards for SNG, taking into account the possibility for interference to other satellites and systems;

c) that SNG requirements include various communication and transmission support systems and that it is necessary to provide, preferably on the same satellite transponder, auxiliary signals for the operation of SNG earth stations;

d) that SNG earth stations operate mainly in the fixed-satellite service, and should comply with the relevant provisions of the Radio Regulations, and any relevant domestic regulation requirements;

e) that SNG transmissions should conform to certain technical criteria with regard to off-axis e.i.r.p. and other antenna characteristics;

f) that the technical characteristics of an appropriate identification signal should be specified,

recommends

1 that SNG earth-station transmissions should comply with the uniform technical standards as described in Annex 1;

2 that SNG earth stations equipped to provide two-way satellite communications circuits should comply with Recommendation ITU-R SNG.771.

ANNEX 1

Technical parameters applicable to SNG terminals

1 General performance

An SNG terminal must be able to be rapidly deployed, to transmit (with a minimum of impairments) vision and associated sound or sound programme signals, to provide limited receiving

* Radiocommunication Study Groups 4 and 9 made editorial amendments to this Recommendation in 2001 in accordance with Resolution ITU-R 44 (RA-2000).

capability to assist in the pointing of the antenna and to monitor (where possible) the transmitted signals, and to provide two-way communications for operation and supervision.

SNG terminals consist of the following main units:

– antenna and feed system with polarization adjustment;
– antenna mount with azimuth/elevation adjustment;
– high-power amplifier (HPA) for vision/sound and auxiliary (voice/data) communication channels;
– receiver unit in order to assist antenna pointing;
– baseband/modulation equipment and IF to RF upconverter;
– two-way voice/data communication equipment;
– system local/remote control panel;
– optional power generator.

2 Transmission performance requirements

The baseband signal shall be transmitted with a minimum of impairment.

2.1 SNG for analogue television broadcasting

Video signal: refer to ex-Recommendation 567-3 (Düsseldorf, 1990). (Requirements for random noise may be relaxed by the user.)

Audio signal: refer to ex-Recommendation 505-4 (Düsseldorf, 1990). (Requirements for random noise may be relaxed by the user.)

2.2 SNG for analogue sound broadcasting

Baseband: as per ex-Recommendation 504-2 (Geneva, 1982). (Requirements for random noise may be relaxed by the user.)

3 RF performance requirements

3.1 Off-axis e.i.r.p. density

Shall comply with Recommendation ITU-R S.524 or the satellite operator's requirements, whichever is more stringent.

3.2 Polarization discrimination

Some satellites use overlapping channels with orthogonal polarization discrimination. The cross-polarization design for linearly polarized antennas should be better than 30 dB within the –1 dB points of the main axis of the beam and 25 dB elsewhere.

3.3 e.i.r.p.

The necessary e.i.r.p. of the SNG terminal depends on the required uplink carrier-to-noise ratio C/N and satellite G/T. However, e.i.r.p. is often limited by the off-axis e.i.r.p. density limits as indicated in § 3.1.

3.4 Necessary RF bandwidth

The necessary RF bandwidth for SNG can be determined by taking into account the signal format, the required signal-to-noise ratio, the e.i.r.p., the number of associated carriers for auxiliary circuits and the available bandwidth of the transponder.

SNG for analogue television broadcasting	*SNG for analogue sound broadcasting*
17.5-36 MHz	100-300 kHz

4 Modulation characteristics

The equipment providing the modulation shall include: video lowpass filter which can be bypassed, switchable pre-emphasis networks, selectable IF bandpass filters, one or more frequency agile sound subcarrier modulators, dispersal generator where required, IF power control, and a linear video FM modulator. The d.c. component of the video signal should be preserved to take advantage of the available bandwidth.

The upconverter should be frequency agile with a suitable frequency step size for the satellite system used. The phase noise and frequency stability should be adequate to allow upconversion of the auxiliary communication signals if necessary. To preclude accidental interference to other traffic on the same satellite, it is recommended that the upconverter be equipped to inhibit transmission in the event of off-frequency operation.

All controls such as main deviation, operating carrier frequency, subcarrier frequencies, subcarrier deviation, pre-emphasis, dispersal, power adjustment, etc., should be readily accessible.

It may be desirable to provide remote access to the power on/off and raise/lower controls from the satellite operator's communication control centre or from the broadcaster's premises.

4.1 SNG for analogue television transmission

Modulation: FM

Deviation: 8-28 MHz peak-to-peak for 1 V peak-to-peak baseband signal input

Sense of modulation: Positive (positive-going voltage for positive-going frequency)

Associated audio: Subcarrier or sound-in-sync (SIS) techniques may be used

4.2 SNG for analogue sound transmission

Modulation: FM

Deviation: 50-300 kHz peak-to-peak for modulating signal of 1 kHz at +9 dBm0s

Pre-emphasis: 75 μs

Energy dispersal: Fixed/adaptive, depending upon requirement to meet Recommendation ITU-R S.524 (see § 3.1)

5 Identification signal

Transmitted by suitable means (method to be further studied).

6 Antenna and feed system

The antenna should be small in diameter, lightweight, easy to assemble and easy to transport.

The antenna radiation patterns in the plane of the orbital arc at the earth station location are such that the off-axis radiation will comply with § 3.1. The cross-polarization discrimination shall comply with § 3.2.

Repeated assembly and disassembly of the antenna shall not affect the radiation and cross-polarization discrimination performance.

7 Auxiliary communications (see Recommendation ITU-R SNG.771)

SNG uplink signals are often originated from remote areas. In these cases, communication using the public switched telephone network (PSTN) is difficult or impossible. The SNG terminal should therefore be equipped to provide all of its own communications through the satellite to both the satellite operator's communication control centre and the broadcaster's premises, with the following facilities:

– *between SNG terminals and the satellite operator's communication control centre:* a minimum of one, two-way narrow-band, voice/data communication circuit. This should be available at all times and not be restricted to the transponder booked times. It is desirable that these circuits are provided in the same transponder as the programme vision and sound;

– *between the SNG terminal and the broadcaster's premises:* four (4) two-way, narrow-band, voice/data communication circuits. These circuits should be available for a short time before and after as well as during the transponder booked times. It is essential that these circuits are provided in the same transponder as the programme vision and sound.

7.1 Communication channels for supervision and coordination

SNG terminals require two-way communication channels, in addition to the vision and associated sound, to provide for communications capability with satellite operator's communications control centre and the broadcaster's facilities.

The SNG terminals are assumed to be located in the downlink footprint.

If the SNG terminal is not in the downlink footprint, other solutions, as described in Annex 2 to Recommendation ITU-R SNG.771, are required.

It should be noted that several domestic systems are presently in operation using various communication techniques.

7.2 Circuits between SNG terminal and satellite operator

Liaison with the satellite operator's communications control centre should be available at all times and should not be restricted to the duration of the transponder booking. For this purpose it is

desirable that coordination circuits, in each direction, be provided preferably in the same transponder as the programme vision and sound.

If it is necessary to provide these carriers elsewhere on the satellite, and linear polarization is being used, they should be provided on the appropriate polarization to avoid the need for a dual polarization feed on SNG terminals.

7.3 Channels between SNG terminal and broadcaster's premises

For the purpose of communicating with the broadcaster's premises, typically up to four (4) two-way (duplex) voice/data circuits are required per broadcaster. These circuits generally operate for brief periods before and after transponder bookings and during actual programme transmissions.

These "two-way" circuits between the SNG terminal and the broadcaster's premises could be used for:

– production coordination;

– engineering coordination;

– programme-related data transmission;

– more than one broadcaster;

– more than one language.

7.4 Communication channels for SNG (sound)

For SNG sound broadcasting, many of the concepts contained in § 7.1 to 7.3 apply.

The minimum requirements for an SNG (sound) terminal are as follows:

– one two-way voice communication circuit between the SNG terminal and the satellite operator's communication control centre;

– two two-way voice/data communication circuits between the SNG terminal and the broadcaster's facilities.

8 Video/audio/RF monitoring equipment

To allow the SNG terminal operator to properly set up the terminal, monitoring equipment is essential. To simulate the satellite transponder it is advantageous to provide a loop-test translator and video/audio receiver to verify the performance of the uplink equipment.

Due to the low G/T of the SNG antenna system and the particular operational configuration of the satellite system, it is normally not possible to monitor the transmitted video and audio signals at full quality. In such cases, narrow IF bandwidth monitoring of the satellite receive signal may provide limited monitoring capability. However, G/T should be adequate for communication channels.

9 Other design considerations

The SNG terminal can be designed with all the equipment next to the antenna or with the HPA at the antenna and the other equipment located some distance (e.g. less than 50 m) away from the

antenna. The latter option, which is operationally preferable, allows the SNG terminal to be operated and monitored from indoors after antenna alignment.

The HPA must be located as close as possible to the antenna to minimize the waveguide losses.

The system should be designed to accept redundant high power amplifiers.

System interconnections must be reduced to a minimum to allow quick and easy set-up under all weather conditions, all external connections must be waterproof.

It is desirable that the SNG terminal can accept a power input of 100-250 V/50-60 Hz, and that the power consumption should not be greater than 2.5 kVA.

The design of the shipping cases should allow the terminal to be operated in direct rain with the lids removed. The cases must provide a controlled environment for the electronics to allow proper operation during extremes of both high and low temperatures.

The SNG terminal must be designed to offer the maximum possible safety to the operator.

10 Additional technical parameters

Considerations on pointing accuracy and spurious emission to be developed.