

## RECOMMENDATION ITU-R BO.1776

**Reference power flux-density for the broadcasting-satellite service  
in the band 21.4-22.0 GHz in Regions 1 and 3**

(Questions ITU-R 22/6 and ITU-R 104/6, WRC-07 agenda items 6 and 7.1)

(2006)

**Scope**

From 1 April 2007, the allocation to the BSS in the band 21.4-22 GHz (decision taken by WARC-92, Torremolinos) will be effective. This Recommendation gives guidance on how to use the 21.4-22.0 GHz band for the BSS from 1 April 2007. It addresses the reference BSS pfd at the Earth's surface to be used in studies on sharing for the BSS in the band 21.4-22.0 GHz in Regions 1 and 3.

The ITU Radiocommunication Assembly,

*considering*

- a) that the BSS systems in the 21.4-22.0 GHz band have the possibility to deliver wide RF band signals, however high e.i.r.p. or high pfd is needed to compensate for large rain attenuation;
- b) that service availability of the BSS in the band 21.4-22.0 GHz in Regions 1 and 3 should be aimed at a high percentage to progress, to the maximum extent, towards more reliable high definition television (HDTV) broadcasting services;
- c) that it is stated in Resolution 525 (Rev.WRC-03) that  $-105 \text{ dB(W/m}^2\text{)}$  in any 1 MHz band for angles of arrival between  $25^\circ$  and  $90^\circ$  above the horizontal plane on the territory of any other country,  $-115 \text{ dB(W/m}^2\text{)}$  for angles of arrival between  $0^\circ$  and  $5^\circ$  and linearly interpolated values between  $-115$  and  $-105 \text{ dB(W/m}^2\text{)}$  for angles of arrival between  $5^\circ$  and  $25^\circ$  are threshold values for triggering coordination with terrestrial services before the date of 1 April 2007;
- d) that it is stated in Resolution 525 (Rev.WRC-03) that all existing services in the band 21.4-22.0 GHz in Regions 1 and 3 shall neither cause harmful interference to BSS in the 21 GHz band nor be entitled to claim protection from such systems from 1 April 2007;
- e) that Recommendation ITU-R BO.1659 shows that high service availabilities of more than 99% are expected in Regions 1 and 3 by emitting  $-105 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$  as required pfd to compensate for rain attenuation in the band 21.4-22.0 GHz,

*recommends*

- 1 that, in order to compensate for rain attenuation and to achieve high annual service availability,  $-105 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$  should be considered as the reference pfd at the Earth's surface to be used in studies on sharing for the BSS in the band 21.4-22.0 GHz in Regions 1 and 3.

NOTE 1 – Annex 1 gives the attainable annual service availability in some cities in Regions 1 and 3, assuming  $-105 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  as the pfd emitted from the BSS in the band 21.4-22.0 GHz.

NOTE 2 – For countries not subject to high rain attenuation, a lower value than  $-105 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  could be considered as the reference pfd at the Earth's surface to be used in studies on sharing for the BSS in the band 21.4-22.0 GHz in Regions 1 and 3.

## Annex 1

### Attainable annual service availability in some cities in Region 1 and 3, assuming $-105 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ as the pfd emitted from the BSS in the band 21.4-22.0 GHz

Tables 1a and 1b show attainable annual service availability in some cities in Regions 1 and 3 when applying  $-105 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$  as the pfd emitted by the BSS in the band 21.4-22.0 GHz, which are extracted from Recommendation ITU-R BO.1659. Modulation schemes of QPSK, 8-PSK are assumed. The required  $C/N$  for each modulation scheme is 7.5 dB and 10.7 dB, respectively, including a hardware implementation margin and satellite hardware loss margin, with reference to the Nyquist noise bandwidth. A receiving antenna diameter of 45 cm was assumed. From these Tables, it can be confirmed that annual service availability can be attained for cities in the range of between 99.73 and 99.99%.

TABLE 1a

**Service availability of 21 GHz band BSS downlink in some cities  
in Region 1 shown in annual time percentage**

|                                                  |         | Moscow | Paris  | Istanbul |
|--------------------------------------------------|---------|--------|--------|----------|
| Elevation angle (degrees)                        |         | 26.5   | 33.2   | 40.7     |
| pfd ( $\text{dB(W/(m}^2 \cdot 1 \text{ MHz))}$ ) |         | -105.0 | -105.0 | -105.0   |
| Overall $C/N$                                    | 7.5 dB  | 99.99% | 99.99% | 99.99%   |
|                                                  | 10.7 dB | 99.99% | 99.99% | 99.99%   |

TABLE 1b

**Service availability of 21 GHz band BSS downlink in some cities  
in Region 3 shown in annual time percentage**

|                                                  |         | Tokyo  | Seoul  | Bangkok |
|--------------------------------------------------|---------|--------|--------|---------|
| Elevation angle (degrees)                        |         | 38.0   | 44.9   | 73.5    |
| pfd ( $\text{dB(W/(m}^2 \cdot 1 \text{ MHz))}$ ) |         | -105.0 | -105.0 | -105.0  |
| Overall $C/N$                                    | 7.5 dB  | 99.96% | 99.99% | 99.82%  |
|                                                  | 10.7 dB | 99.94% | 99.98% | 99.73%  |