

RECOMMENDATION ITU-R BT.1832

**Digital video broadcast-return channel terrestrial (DVB-RCT)
deployment scenarios and planning considerations**

(Question ITU-R 16/6)

(2007)

Scope

This Recommendation sets forth some deployment scenarios and considerations to assist regulators whose task it will be to allocate spectrum for interactive return paths employing the digital video broadcast-return channel terrestrial (DVB-RCT) system.

The ITU Radiocommunication Assembly,

considering

- a) that the DVB-RCT is a telecommunication system, designed to operate in conjunction with the digital terrestrial television broadcasting system, DVB-T, to provide it with a return path and interactive application capabilities;
- b) that Recommendations ITU-R BT.1306-1 and ITU-R BT.1667, together with the cross-reference ETSI EN 301 958 V.1.1.1 (2002/03), have already identified potential system characteristics for the return path;
- c) that the return path can optionally be deployed as described in Annex 1 to provide a high-spectrum efficiency and spectrum reuse;
- d) that the orthogonal frequency division multiplex access (OFDMA) technology for the return path of DVB-RCT has an inherent flexibility and scalability, as it enables to trade-off the throughput (per user), capacity (number of users supported), available links and cell size. These features are implemented with adaptive modulation and coding together with power concentration in sub-path assignments, bringing about system gain from user sites;
- e) that DVB-RCT performance has been successfully tested in the field with several pilot systems in several countries. These systems involved different interactive applications, deployed to validate sharing of the return path among large numbers of users;
- f) that DVB-RCT is capable of high efficiency and large system capacity. It can be an optimum solution for deployment in large cells in underserved and rural areas, thus helping to bridge the digital divide,

recommends

- 1 that the planning for deployment of DVB-RCT should take into account the planning considerations as described in Annex 1;
- 2 that the DVB-RCT system performance data and possible deployment scenarios can be used as a basis for future co-existence studies without interference to primary services;
- 3 that pertinent measurement results, obtained from the field, should be used to update cell capacity and efficiency analysis defined in Annex 1.

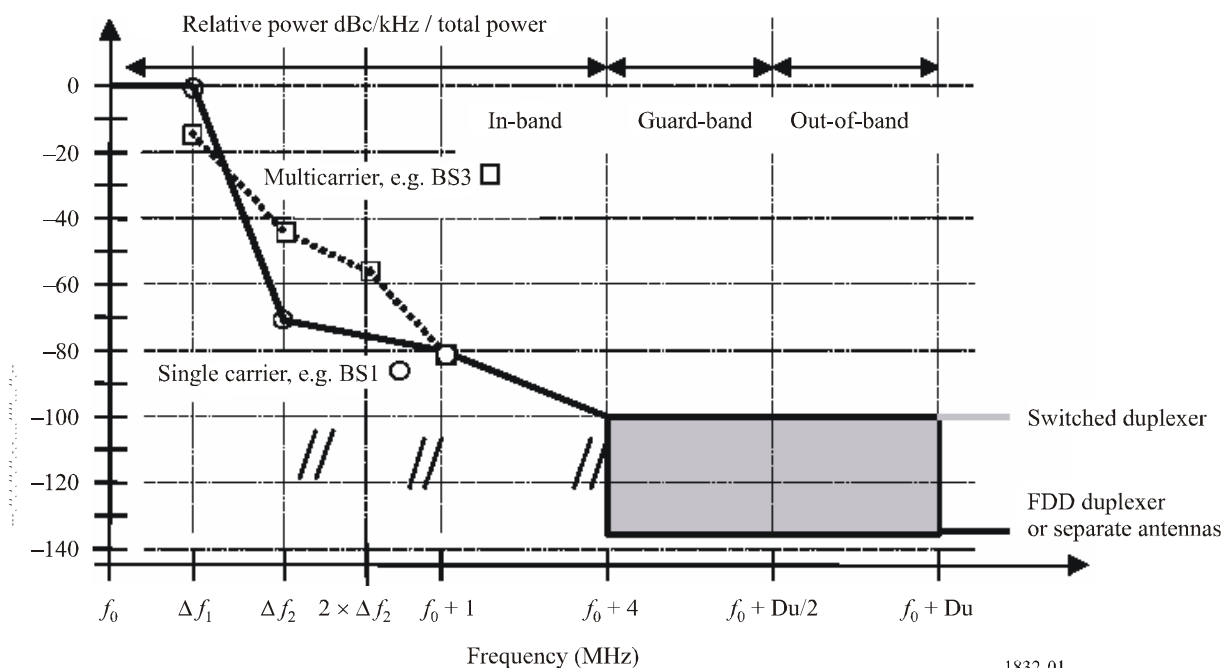
DVB-RCT deployment scenarios and planning considerations

1.1 System parameters

- Forward broadcasting path frequency VHF: 170 MHz to 230 MHz (174-230 MHz)
 UHF: 470 MHz to 860 MHz (470-862 MHz)
- Return transmission power: 20 dBm (typ.) to 30 dBm (max.)
- Return antenna gain: 13 dBi (directional)
- User antenna gain: 3 dBi (omnidirectional)
- Base station receiver sensitivity
 - Rural fixed, 1 kHz spacing, 4-QAM 1/2: -135 dBm
 - Urban/portable 4 kHz spacing, 64-QAM 3/4: -109 dBm
- Base station operational C/N
 - Rural fixed, 1 kHz spacing, 4-QAM 1/2: 5 dB
 - Urban/portable 4 kHz spacing, 64-QAM 3/4: 22 dB.

FIGURE 1

Return path RCT spectrum mask



In Fig. 1, f_0 indicates the central frequency, $\Delta f_1 = 0.375/T_s$ and $\Delta f_2 = 1.2515/T_s$, where $\Delta f = f - f_0$; and D_u is the duplex spacing and it depends on the chosen non-interference criteria and filtering technology.

In future analysis we suggest that for higher frequency duplex spacing the power can be reduced according to Table 1 (based on data measurements on commercialized user unit):

TABLE 1

Reduction of spectral density power as a function of frequency separation

Δf	16 MHz	24 MHz	32 MHz	40 MHz	48 MHz	56 MHz
Attenuation	17 dB	27 dB	37 dB	47 dB	57 dB	62 dB

Thus the overall RCT relative interference spectral density, as a function of frequency separation, is given in Table 2.

TABLE 2

RCT relative interference spectral density, A_f (dBc/kHz)

Δf	< 4 MHz	8 MHz	16 MHz	24 MHz	32 MHz	40 MHz	48 MHz	56 MHz
Switchedduplexer	0	-100	-117	-127	-137	-147	-157	-167
FDD duplexer	0	-137	-154	-164	-174	-184	-194	-204

It should be noted that the RCT path spectrum mask was designed to avoid interference between RCT transmission and DVB-T or analogue TV reception (which can operate in adjacent paths without causing any path interference). Commercially available duplexer provides for about 25-30 dB of isolation, so a duplex spacing of 24 MHz is an acceptable figure for a DVB-T/RCT set top box. In case of adjacent path assignment, an additional isolation has to be provided, which is typically achieved by using separate antennas, or outdoor installation as described in § 2.2.

2 Deployment scenarios

2.1 Cell configuration

The DVB-RCT standard describes two cell configurations, depicted hereunder in Fig. 2:

- One or more upstream links in a single cell (Fig. 2a)
- Sectorized cell (Fig. 2b).