



European Radiocommunications Committee (ERC)  
within the European Conference of Postal and Telecommunications Administrations (CEPT)

**SUPPLEMENTARY INFORMATION TO ANNEX 5  
OF THE CHESTER AGREEMENT**

**Wengen, February 2001**

**revised in Baden, June 2002**  
**revised in Sesimbra, October 2002**



## **EXPLANATORY MEMORANDUM**

### **1 INTRODUCTION**

The purpose of this ERC Report is to update and add information on systems, other than terrestrial broadcasting, to Annex 5 of the Chester Agreement. The annexes to this report contain the new technical information for each of the systems studied.

### **2 BACKGROUND**

The Chester 1997 Multilateral Coordination Agreement provides the technical criteria, coordination principles and procedures for the introduction of Terrestrial Digital Video Broadcasting (DVB-T) in Bands III, IV and V, within CEPT countries.

At the time when the Chester Agreement was prepared, information on services other than terrestrial broadcasting was incomplete. For some of the systems no technical information was available, for other systems only preliminary information was available which needed to be confirmed or updated by measurements. In view of this, Resolution 3 was agreed inviting the ERC to conduct further studies on the technical criteria to be used in the coordination of DVB-T and the methods and criteria for assessing compatibility between digital terrestrial television broadcasting and services other than broadcasting.

### **3 REQUIREMENT FOR AN ERC DECISION**

The technical information given in this ERC Report is intended to be used to support the coordination and compatibility considerations necessary for the introduction of DVB-T in CEPT countries. An ERC Decision will be required to give this technical information an appropriate regulatory status as supplementary information to the Chester Agreement.

## ANNEX 1

### TACTICAL RADIO RELAY (SERVICE IDENTIFIER MD8)

The existing information in Annex 5 of the Chester Agreement concerning the protection of Tactical Radio Relay (Service Identifier MD8) against interference of DVB-T is originally based on a theoretical study only.

The protection ratio for TRR has now been measured, a new calculation for the minimum field strength has been carried out and a more accurate antenna height is specified.

#### Protection ratio for TRR

The measurement results are presented in CH97 format as follows:

$\Delta f$ (MHz)	-6,0	-5,0	-4,0	0,0	4,0	5,0	6,0
PR (dB)	-46	-39	7	11	7	-39	-46

Protection ratios of TRR (MD8; 1024 kbit/s) vs. DVB-T/8 MHz.

#### Minimum field strength for TRR

A new calculation based on the latest and most accurate data was carried out resulting in a value of **35 dB $\mu$ V/m**.

The formulas for the equivalent minimum field strength  $E_{\min}$  at the receiving place, as mentioned on page 30 in CH97, were used for the calculation based on the following parameters:

- $P_{s(\min)}$  = -95 dBm
- $f$  = 862 MHz
- $G$  = 15 dBi
- $L_f$  = 8 dB.

#### Receiving antenna height

The default receiving antenna height should be **30 m** in accordance with practice.

## ANNEX 2

### POINT-TO-MULTIPOINT SYSTEM IN UKRAINE

The existing information in Annex 5 of the Chester Agreement does not include a point-to-multipoint system used in Ukraine for wireless access as it did not yet exist when the Agreement was prepared.

#### Frequency range

The frequency range used is 824-844.23 MHz. In this frequency range the base station = central station receives and the terminal station transmits. (The frequency range 869-889.23MHz where the central station transmits and the terminal station receives is not considered to be of interest here because it is well above the frequency range for DVB-T which ends at 862 MHz.).

#### Protection ratio for the point-to-multipoint system

The theoretically derived protection ratios are as follows:

$\Delta f$ (MHz)	-6.0	-4.2	-3.9	-3.4	0	3.4	3.9	4.2	6.0
PR (dB)	-65	-54	-4	-1	-1	-1	-4	-54	-65

Protection ratios of P-MP interfered with by DVB-T/8 MHz.

$\Delta f$ (MHz)	-6.0	-3.7	-3.4	-2.9	0	2.9	3.4	3.7	6.0
PR (dB)	-65	-53	-3	-0.5	-0.5	-0.5	-3	-53	-65

Protection ratios of P-MP interfered with by DVB-T/7 MHz.

#### Minimum field strength for P-MP

For the minimal field strength a value of 18 dB $\mu$ V/m has been calculated.

This value is based on the following parameters for the P-MP equipment :

- Minimum receiver input power                      -130 dBW
- Wavelength    0.36 m
- Antenna Gain    17 dBd
- Cable loss    3 dB.

#### Receiving antenna height

The receiving antenna height is 30 m.

### ANNEX 3

#### AIR-TO-GROUND COMPONENT OF RSBN SYSTEM (SYSTEM IDENTIFIER AA)

##### Background information

Information on the RSBN system, which is used in many East European countries, has been included in Annex 5 of the Chester Agreement. Table A5.1 in Section 1.1 of Annex 5 shows in which countries the system is used in which frequency ranges. In section 2 of Annex 5 a table with default field strength to be protected and protection ratios as a function of frequency separation between carriers has been included.

However, all this technical material has been gained as a result of one measurement of the unwanted DVB-T signal level at which the system noise of the RSBN receiver increased and the assumption that RSBN is a narrowband system with an ideal filter.

After the Chester Agreement was completed, many measurements as well as some theoretical work have been made. However, the results of the measurements differ, i.e. the measured values for the level to be protected differ significantly by around 20 dB and the measured values for the protection ratio values show some difference in addition.

##### Field strength to be protected and protection ratios for the air-to-ground component of the RSBN system

Considering the theoretical and measurement values the use of a field strength to be protected of 42 dB $\mu$ V/m corresponding to a C/I value of 3 dB has been accepted. This leads to an operational range of 400 km and sometimes even more for the RSBN system.

The protection ratios given below are close to the measured protection ratios for RSBN receivers with field strength values to be protected between 42 dB $\mu$ V/m and 49 dB $\mu$ V/m.

Wanted:	Aero Radio Nav RSBN		Default field strength to be protected (dB $\mu$ V/m)				42	Default Receiving antenna height (m)		10
Service Identifier	AA8									
Unwanted	DVB-T/8 MHz									
$\Delta f$ (MHz)	-12.0	-10.0	-8.0	-6.0	-4.0	-2.0	-0.0	+2.0	+4.0	
PR (dB)	-65.0	-50.0	-27.0	-16.0	-5.0	0.0	0.0	0.0	-5.0	
$\Delta f$ (MHz)	+6.0	+8.0	+10.0	+12.0						
PR (dB)	-16.0	-40.0	-52.0	-65.0						

##### Guidance for application

Protection is sought for the RSBN ground receivers at airports or zones around airports, but not for the countries as wholes as defined by the border. It is recommended to take into account additional decoupling of both stations caused by e.g. terrain irregularity, transmitting and receiving antenna pattern. Moreover realistic assumptions for the operational range of the RSBN station should be made.

The field strength to be protected given in the table corresponds to the lowest possible field strength, received by RSBN receiver. During the coordination of DVB-T assignments it is advisable to use the field strength to be protected values close to the realistic useful signal strengths, which could be received by RSBN receiver, derived by taking into account the location of the RSBN ground receivers.

To calculate the interfering field strength of the DVB-T station, propagation curves from the ITU-R Recommendations P.370 or P.1546 have to be used. The time percentage to be applied needs to be agreed between the Administrations concerned.

The above mentioned set of values should apply for the co-ordination of new digital TV stations. For the conversion of analogue TV assignments coordinated through Stockholm 61 procedures, the conversion procedure given in the Annex 6 of the Chester Agreement should be applied.

## ANNEX 4

### DVB-T INTERFERED BY TACTICAL RADIO RELAY

The existing information in Annex 5 of the Chester Agreement includes protection ratios for DVB-T subjected to narrow band transmissions, only. Protection ratios of DVB-T subjected to transmissions of larger bandwidth, e.g. tactical radio, are not supplied.

#### Technical characteristics of the tactical radio relay system (Chester system identifier: MF8)

- modulation 2-FSK
- bandwidth at -60 dB: 2 MHz (for the bandwidth of 2MHz the NATO standard supplies -45 dB)

#### Basic conditions for the measurements

The protection ratios given below are based on the following characteristics of DVB-T:

- modulation 64-QAM
- code rate 2/3
- channel bandwidth 8 MHz

The measured receiver sensitivity is -78 dBm.

For all the measurements of the protection ratios a wanted DVB-T signal level of -70 dBm or greater is assumed. (This is the wanted signal level at which the protection ratios are stable, for smaller levels of the wanted signal larger protection ratios are needed.)

#### Protection ratio for DVB-T subjected to transmissions of tactical radio relay

The following protection ratios are derived from the measurements:

$\Delta f$ (MHz)	-12	-4.5	-3.75	0	3.75	4.5	12
PR(dB)	-45	-27	1	4	1	-27	-45

Protection ratios of DVB-T interfered with by tactical radio relay