



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



**DSI PHASE II (900 MHz ISSUES)**  
**ANALOGUE PUBLIC MOBILE NETWORKS**

**Saariselkä, January 1998**



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ANALOGUE PUBLIC MOBILE NETWORKS**

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**DSI PHASE II (900 MHz ISSUES)  
ANALOGUE PUBLIC MOBILE NETWORKS**

**1 SUMMARY**

The DSI Phase II study, conclusion (**Rec 22**) that analogue public mobile networks should be closed not later than 2008 (section 11.3), seems quite arbitrary. But when consideration is given to the facilities offered by present day terminals as compared to terminals available in the year 2008, it is quite likely that present day analogue terminals operating at 900 MHz will (by 2008) have fallen into decline and possibly even disuse. This topic is the subject of ongoing discussion within WG-FM.

The ERC response to the DSI Phase II report recommendations **21** and **22** are shown below:

**21.** An in depth study should be conducted as soon as possible concerning the possibilities likely to occur for PMR and other non public mobile applications through the decreasing use of the 450 MHz range for public mobile networks. (Section 8.3)

*R. The ERC accepts this recommendation. The ERO has already commenced a study on the evolution of PMR services. The study will develop scenarios for an estimate of spectrum needs applicable to the majority of CEPT countries.*

*One task is to analyse the short and long term possibilities of transferring the current applications other than PMR from the band 450 – 470 MHz to alternative frequency bands or whether it will be possible to cease the operation of these applications. Currently the ERC is of the opinion that spectrum from the analogue mobile networks could be released on a gradual basis in a phased manner as use declines, rather than releasing all of the spectrum at the end of a predefined period.*

*All possible avenues for identification of spectrum for PMR should be explored, not solely the release of spectrum from analogue public mobile telephone systems in the UHF spectrum.*

**22.** Analogue public mobile networks should be closed not later than 2008. (Section 11.3)

*R. From the current perspective the ERC does not unanimously support the recommended closure date. However, the ERC does agree that:*

- a) no new analogue public mobile radio networks should be introduced;*
- b) administrations should be encouraged to close down analogue public mobile network by the year 2008, taking into account the results of the studies mentioned in recommendation 21;*
- c) analogue cellular public mobile radio networks are likely to be in use in some countries into the next century.*

In addition the DSI Phase II study, conclusion (**Rec 23**) that CEPT ERC Recommendation T/R 75-02 should be revised and a new CEPT ERC Decision be prepared which designates the frequency bands 880-890 MHz paired with 925-935 MHz on a European basis, as extension bands for the GSM digital pan-European communication system. (Section 11.16), is already in hand within PT-FM25, but suspended until the DSI Phase II work is complete.

The ERC response to the DSI Phase II report recommendation **23** has been included below:

**23.** CEPT ERC Recommendation T/R 75-02 should be revised and a new CEPT ERC Decision be prepared which designates the frequency bands 880-890 MHz paired with 925-935 MHz on a European basis, as extension bands for the GSM digital pan-European communication system. (Section 11.16)

*R.. The content of Recommendation T/R 75-02 is now reflected in the European Table of Frequency Allocations and Utilisation's. See ERC Report 25.*

*An ERC Decision on EGSM, (ERC/DEC/(97)02), has been adopted.*

The following WG-SE conclusions are to be noted;

- Administrations should endeavour to close their present 900 MHz analogue networks by the year 2008 and that the expansion of digital networks should not be hindered by these existing analogue services.
- No new analogue public mobile radio networks should be introduced.
- The principle of harmonised spectrum in the specified bands for GSM allocations are recognised, however, some countries with alternative public radiophone bands, would not necessarily need the full tranche of harmonised GSM spectrum. Therefore these allocations should not be made exclusive and should only be made where a need exists.
- Transition arrangements must be made for existing services, so that existing operational systems can fulfill their design life, with an agreed specified cut-off date and a scaling down of protection in the intervening years.
- In some countries, where the bands proposed for EGSM and UIC are currently used for analogue cellular services, account must be taken of the need to protect existing services from adjacent band compatibility problems that may arise.

Note;

that **Rec 21** referred only to the 450 MHz band, but this ERC response does reflect the general thrust applicable also for the 900 MHz issues addressed in this study.

## 2 INTRODUCTION

The second phase of the Detailed Spectrum Investigation (DSI-II) was launched by the European Radiocommunications Committee (ERC) of the Conference of European Postal Telecommunications Administrations (CEPT) in March 1993 with terms of reference as follows:

- to investigate the current and foreseen use of the radio spectrum in CEPT countries in the frequency range 29.7 MHz to 960 MHz,
- to investigate the way this spectrum is currently managed and administered,
- to produce a detailed document addressing the issues which shall include, as appropriate, recommendations to the ERC of the CEPT.

A principle objective of the DSI process is to establish a European Table of Frequency Allocations and Utilisation's, effectively a harmonised band plan for Europe. A proposed table covering this phase of the DSI is to be found at **Annex 1** to the Results Document of the Detailed Spectrum Investigation report, pages 163 - 179 inclusive.

The DSI Phase II report concludes that analogue public mobile networks should be closed not later than 2008 and that Recommendation T/R 75-02 should be revised - designating the frequency bands 880-890 MHz paired with 925-935 MHz on a European basis, as extension bands for the GSM, see below;

**Rec 22.**

Analogue public mobile networks should be closed not later than 2008. (Section 11.3)

**Rec 23.**

CEPT ERC Recommendation T/R 75-02 should be revised and a new CEPT ERC Decision be prepared which designates the frequency bands 880-890 MHz paired with 925-935 MHz on a European basis, as extension bands for the GSM digital pan-European communication system. (Section 11.16)

This ERC report is based upon the earlier study on DSI-II carried out within CEPT WG-SE, entitled *DSI Phase II Examination of 900 MHz Issues*, see SE(96)21 Annex 8.

See ERC response in the Summary on page 1.

The report considers the spectrum engineering issues associated with the recommendation embodied within the DSI Phase II report and lists recommendations for consideration by frequency managers.

Definitions of the following terms used within this report are shown within **Annex 1**;

- Minimum Carrier Separation,
- Minimum Frequency Separation,
- Co-exist.

### 3 STUDY

A number of analogue radiotelephone systems are operational within Europe, with some still experiencing a degree of expansion.

Such systems include;

- NMT-900 in Finland, Sweden, Norway and Denmark,
- TACS in the UK, Italy, Ireland, Spain and Austria.
- Radiocom 2000 in France.

These existing systems have differing operational characteristics / frequencies and as a result lend themselves to sharing by different degrees.

e.g. theoretical as well as practical studies have indicated that Radiocom 2000 and NMT-900 are similar in terms of their adjacent band compatibility performance, and are not given to co-existing easily with GSM whereas TACS is less problematic.

System parameters	R2000	NMT	TACS
Output power (base)	8 dBW	10 dBW	6 dBW
Output power (mobile)	8 dBW	8 dBW	6 dBW (class 2) & 2dBW
Sensitivity (base)	-112 dBm	-115 dBm	-113dBm
Sensitivity (mobile)	-112 dBm	-113 dBm	-113dBm
Protection Ratio	12 dB	8 dB	8 dB
Bandwidth	12.5 kHz	25 kHz	25 kHz

In calculating the frequency separations required between these 900 MHz systems, the following observations were noted;

**NMT-900.** Typical minimum frequency separation in excess of 1.5 MHz for most scenarios. The summary table below indicates a worst case separation distance of 1.6 MHz for analogue radiotelephone systems in general from typical GSM/UIC interferers.

**TACS.** No significant compatibility problems envisaged from the existing use of GSM or CT2 to TACS.

**Radiocom 2000.** Minimum frequency separation between GSM or R2000 and tactical radio relays is expected to be 2 MHz.

#### 4 MINIMUM FREQUENCY SEPARATIONS - MHz

(For Worst Case Base to Mobile, or Mobile to Base, Interference Scenarios)

SYSTEM	Minimum Separation Spectrum
GSM/UIC	1.6 MHz (Radiocomm2000)
CT1/CT1+	Note 1.
TETRA	0.6 MHz - Note 2.
FRENCH RADIO RELAY	2 MHz

##### NOTE 1

Allocated frequencies provide enough separation.

##### NOTE 2

MS to MS and BS to BS interference scenarios would generally require a greater separation. This is a potential problem in the border of uplinks and downlinks, such as in the region of 915 MHz. Detailed GSM/UIC minimum coupling loss interference calculations (section 7.3 and 7.9 within se(95)48) show a need for about 6 MHz separation.

The frequency separations shown are based on a Minimum Coupling Loss (MCL) of 80 dB which equates to interference distance of 100 metres using the HATA propagation model, or 1 kilometre using free space path loss.

#### 5 CONCLUSIONS

The ERC response to the DSI Phase II report recommendations **21**, **22** and **23** are shown below:

**21.** An in depth study should be conducted as soon as possible concerning the possibilities likely to occur for PMR and other non public mobile applications through the decreasing use of the 450 MHz range for public mobile networks. (Section 8.3)

*R. The ERC accepts this recommendation. The ERO has already commenced a study on the evolution of PMR services. The study will develop scenarios for an estimate of spectrum needs applicable to the majority of CEPT countries.*

*One task is to analyse the short and long term possibilities of transferring the current applications other than PMR from the band 450 – 470 MHz to alternative frequency bands or whether it will be possible to cease the operation of these applications. Currently the ERC is of the opinion that spectrum from the analogue mobile networks could be released on a gradual basis in a phased manner as use declines, rather than releasing all of the spectrum at the end of a predefined period.*

*All possible avenues for identification of spectrum for PMR should be explored, not solely the release of spectrum from analogue public mobile telephone systems in the UHF spectrum.*

**22.** Analogue public mobile networks should be closed not later than 2008. (Section 11.3)

*R. From the current perspective the ERC does not unanimously support the recommended closure date. However, the ERC does agree that:*

- a) no new analogue public mobile radio networks should be introduced;*
  - b) administrations should be encouraged to close down analogue public mobile network by the year 2008, taking into account the results of the studies mentioned in recommendation 21;*
- analogue cellular public mobile radio networks are likely to be in use in some countries into the next century.*

**23.** CEPT ERC Recommendation T/R 75-02 should be revised and a new CEPT ERC Decision be prepared which designates the frequency bands 880-890 MHz paired with 925-935 MHz on a European basis, as extension bands for the GSM digital pan-European communication system. (Section 11.16)

***R. The content of Recommendation T/R 75-02 is now reflected in the European Table of Frequency Allocations and Utilisation's. See ERC Report 25.***

***An ERC Decision on EGSM, (ERC/DEC/(97)02), has been adopted.***

Analogue cellular radiotelephones are likely to be in use in some member states well into the next century, however it is concluded that administrations should endeavour to close their present 900 MHz analogue networks by the year 2008 and that the expansion of more digital networks should not be hindered by these existing analogue services.

The principle and benefits of harmonised spectrum in the specified bands for GSM allocations are recognised, however these allocations should not be made exclusive and only where a need exists:

Some countries with alternative public radiophone bands, would not necessarily need the full tranche of GSM spectrum.

The date of 2008 seems quite arbitrary, but when consideration is given to the facilities offered by present day terminals as compared to terminals available in the year 2008, it is quite likely that present day analogue terminals operating at 900 MHz will (by 2008) have fallen into disuse in many member states. This topic is the subject of ongoing discussion within WG-FM.

In the interim, transition arrangements must be made for existing services, so that existing operational systems can fulfill their design life, with an agreed specified cut-off date and a scaling down of protection in the intervening years.

In some countries, where the bands proposed for EGSM and UIC are currently used for analogue cellular services, account must be taken of the need to protect existing services from adjacent band compatibility problems that may arise.

## ANNEX 1

### DEFINITIONS OF TERMS USED IN THIS REPORT:

#### MINIMUM CARRIER SEPARATION: -

The minimum separation (kHz) required between the nearest carriers of two adjacent band systems for them to co-exist.

#### MINIMUM FREQUENCY SEPARATION: -

The minimum separation (kHz) required between the band edges of two adjacent band systems for them to co-exist.

Minimum Frequency Separation is less than the Minimum Carrier Separation.

The difference is of the order of one half of the sum of the two systems channel spacing.

e.g. for GSM and TETRA a minimum frequency separation of 'x' kHz equates to a minimum carrier separation of 'x' + 112.5 kHz. See **Figure 1** below.

#### CO-EXIST: -

The systems will operate satisfactorily in adjacent bands.

i.e. the magnitude of the interference anticipated is considered acceptable.

**Figure 1**

