



Electronic Communications Committee (ECC)  
within the European Conference of Postal and Telecommunications Administrations (CEPT)

**REARRANGEMENT ACTIVITIES FOR BROADCASTING SERVICES  
IN ORDER TO FREE THE SUB-BAND 790 - 862 MHz**

**Cork, February, 2010**

## **0 EXECUTIVE SUMMARY**

This ECC Report provides information and advice for administrations covering the issues which need to be openly discussed and considered during an attempt to introduce mobile/fixed communications networks in the band 790 - 862 MHz or to use additional resources for broadcasting in the UHF band. These issues also may be considered by any administration which does not wish to make a change because in the event of a neighbour wishing to introduce mobile/fixed communications networks or to use additional resources for broadcasting, there will still be a need for discussions.

**Table of contents**

<b>0 EXECUTIVE SUMMARY.....</b>	<b>2</b>
<b>LIST OF ABBREVIATIONS.....</b>	<b>4</b>
<b>1 INTRODUCTION.....</b>	<b>5</b>
<b>2 CONCEIVABLE SCENARIOS.....</b>	<b>6</b>
<b>3 GENERAL PRINCIPLES FOR THE IDENTIFICATION OF ADDITIONAL FREQUENCY RESOURCES .....</b>	<b>6</b>
<b>4 TECHNICAL MEASURES FOR THE IDENTIFICATION OF FREQUENCY RESOURCES IN CHANNELS 21 – 60 .....</b>	<b>7</b>
4.1 BASIC CONSIDERATIONS.....	7
4.2 STEPS TO DEFINE THE COURSE OF ACTION .....	8
4.3 CONSEQUENCES: EFFECTS ON EXISTING AND NEW ENTRIES IN THE PLAN .....	9
<b>5 NATIONAL CASE STUDIES .....</b>	<b>10</b>
<b>6 CONCLUSIONS .....</b>	<b>10</b>
<b>ANNEX A: EXAMPLE OF ONGOING COORDINATION BETWEEN GERMANY AND FRANCE....</b>	<b>12</b>

**LIST OF ABBREVIATIONS**

CEPT	European Conference of Postal and Telecommunications Administrations
e.r.p	Effective radiated power
GE06 Agreement	Regional agreement relating to the planning of the digital terrestrial broadcasting service in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territory of Mongolia) and in the Islamic Republic of Iran, in the frequency bands 174 - 230 MHz and 470 - 862 MHz (Geneva 2006)
GE06 Plan	The digital Plan of the GE06 Agreement (as referred to in this report)
ITU-R	ITU Radiocommunication Sector
RRC-06	The Regional Radiocommunication Conference 2006 for the planning of the digital terrestrial broadcasting service in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territories of Mongolia) and in the Islamic Republic of Iran, in the frequency bands 174 - 230 MHz and 470 - 862 MHz (Geneva, 2006)
SFN	Single Frequency Network
UHF	Ultra High Frequency

## **Rearrangement activities for broadcasting services in order to free the sub-band 790 - 862 MHz**

### **1 INTRODUCTION**

The GE06 Agreement and Plan are the result of frequency planning process which was carried out under specific assumptions and conditions. The agreed GE06 Plan contains Plan entries for broadcasting services across the entire band from 470 - 862 MHz. The need to utilize Plan entries in the sub-band 790 - 862 MHz for the future implementation of networks may be different in different countries. So is the need to use additional resources for broadcasting in the UHF band. Furthermore, the GE06 Agreement contains procedures which allow modifications to the Plan and to implement Plan entries in conformity with the rights stemming from these entries.

It is up to Administrations to decide whether to continue to use UHF channels 61 – 69 for broadcasting or to use them for mobile/fixed communications networks in the future.

For some administrations no further actions seem to be required because the remaining Plan entries in the lower band 470 - 790 MHz are sufficient to satisfy their demands for broadcasting services. Others may wish to look for alternative new Plan entries for the allotments or assignments originally allocated by the GE06 Plan in one of the channels 61 – 69.

According to the GE06 Agreement, application of the procedure of Article 4 of this Agreement is required in order to introduce additional entries in the GE06 Plan. To this end, an appropriate channel is needed. However, such an attempt will usually not be successful on a large scale by strictly following the standardized GE06 planning network structures. Regionally and locally there may be limited possibilities, but most likely not based on the existing shapes of allotments or coverage areas of assignments as of GE06.

In principle, there are three different scenarios between two neighbouring administrations in the band 470 - 790 MHz:

1. Both administrations require additional broadcasting Plan entries;
2. one administration requires additional Plan entries while the other administration does not and
3. both administrations do not require additional Plan entries.

Cases 1 and 2 will lead to coordination requests between the administrations concerned according to the GE06 rules whereas no coordination activity is necessary for case 3. In case 1 the incentives to initiate the coordination process are comparable while in case 2 this does not hold.

In any case, an Article 4 procedure will result in a list of administrations with which coordination is required. The details of this bi- or multilateral coordination process are not governed by the GE06 Agreement. It is up to the administrations to decide themselves which methodologies they would like to employ in order to resolve the issue.

Strictly applying the standardized GE06 planning network structures during the coordination process will most likely not lead to a successful coordination result. In order to facilitate coordination, methods need to be developed and applied which allow the identification of new additional frequency resources for broadcasting which may be used whilst:

- guaranteeing the rights of the GE06 Agreement and Plan,
- also guaranteeing the ease of implementation of Plan entries based on existing rights,
- not causing unacceptable interference to existing network's coverage areas, operated in accordance with GE06 and bi- and multilateral side agreements and
- preserving the rights of equitable access to the spectrum for all parties involved.

One option to find solutions could be to apply the GE06 framework on networks that, show different technical characteristics than those being part of the GE06 Plan.

Any such activities have to be based on the principle of equitable access to the spectrum. This is in particular important because there may be different aspirations of neighbouring administrations regarding the overall usage of UHF spectrum.

This report summarizes the background information setting the stage to deal with this issue and provides different strategies and methodologies that could be applied by administrations during their bi- or multilateral negotiations in order to satisfy the spectrum demand in an equitable manner.

## **2 CONCEIVABLE SCENARIOS**

The GE06 Agreement established a state of equilibrium in terms of equitable access to the spectrum. Equitable access to the spectrum has to be understood as a limited area concept whose implementation may differ from area to area rather than imposing detailed rules for spectrum usage. The terms “equitable access” and “equilibrium” correspond to obtaining an accepted state of rights for all administrations involved.

Spectrum usage is subject to satisfying demands that are likely to change and evolve in the course of time. As a matter of principle, any evolution of spectrum usage has to proceed from one state of equilibrium to another. This can only be reached by explicit agreement of all administrations concerned in the respective area under consideration.

Different administrations will have different aspirations with respect to spectrum usage. Consequently, the final state of implementation of transmitter networks may be different for different administrations. This is not in contradiction with the principle of equitable access to the spectrum. Rather, it is the role of administrations to balance their requirements such that all administrations concerned can finally agree.

The introduction of a sub-band for mobile/fixed communications networks in the UHF spectrum range is certainly a significant evolution of spectrum usage. Any implementation of this has to be in conformity with the GE06 Agreement, in particular, which constitutes, together with the Radio regulations, the framework for spectrum usage in the frequency band 470 - 862 MHz.

In case coordination is required administrations need to decide between themselves on which principles and methods their coordination activities should be based in order to resolve the issue. This report discusses relevant elements thereto and presents different approaches to satisfy the spectrum requirements of administrations in an equitable and balanced manner.

## **3 GENERAL PRINCIPLES FOR THE IDENTIFICATION OF ADDITIONAL FREQUENCY RESOURCES**

The GE06 Agreement is the result of frequency planning process carried out under given assumptions and conditions. It establishes an equilibrium state in terms of equitable access, where equitable access is understood as a limited area concept. Any evolution of the equilibrium state can only be achieved by explicit agreements of all administrations concerned in the respective area under consideration. Evolution in that respect covers exclusively cases which are understood as equilibrium by all administrations concerned. “Equilibrium” as well as “equitable access” correspond to obtaining an accepted state on the level of rights for all administrations involved, while the final state of implementation of networks may be different for different administrations.

To this end, the GE06 Agreement contains procedures which allow to modify the Plan and to implement Plan entries in conformity with the principles adopted for the planning process. Article 4 of the GE06 Agreement contains “trigger mechanisms” to identify those administrations with which coordination is required if a Plan modification is intended by an administration. The details of the coordination process between administrations are not governed by GE06 and have to be defined and agreed between the administrations concerned.

The GE06 trigger mechanisms are based on noise limited frequency planning. In the real world in Europe all planning is on an interference limited basis. Therefore, the attempt to introduce new allotment or high power assignment Plan entries in channels 21 – 60 by following the GE06 principles will not be successful on a large scale, although regionally and locally, there may be limited possibilities.

Application of GE06, i.e. the implementation of the GE06 Plan, corresponds to design broadcasting networks that on one hand do not violate the rights given by GE06 but on the other hand comply with the coverage needs of administrations.

The generation of the GE06 Plan was based on simplified assumptions concerning the technical characteristics of transmitter networks as well as the wave propagation model employed. Any modification of the GE06 Plan is

governed by Article 4 of the Agreement which uses the same simplified technical characteristics. The implementation of a Plan entry is subject to Article 5, i.e. the process of bringing into operation one or several transmitters under a given Plan entry is formally also bound to the same technical principles. However, making use of planning techniques and tools which more closely reflect conditions in a given area like topography and morphology provide an additional degree of freedom from which administrations coordinating can take advantage when trying to find additional frequency resources in the band 470 - 790 MHz.

If an administration requires additional frequency resources in the band 470 - 790 MHz for broadcasting services the following regulatory elements will have to be adhered to:

- All or a portion of the sub-band consisting of UHF channels 61 – 69 may be used for broadcasting or mobile/fixed communications networks.
- The regulatory framework given by the GE06 Agreement applies for all conceivable scenarios.
- The rights associated to the GE06 Agreement shall be retained unless otherwise agreed by the concerned administrations.
- In the GE06 Agreement at least one of the services involved in coordination is terrestrial broadcasting. The GE06 Agreement does not cover coordination situations involving only services other than terrestrial broadcasting. The GE06 Agreement covers the requirement to ensure that any entries for other services are compatible with the broadcasting Plan. Therefore coordination of services other than broadcasting may proceed on a bi- or multilateral basis.

In identifying channels in the band 470 - 790 MHz for broadcasting services, the following general principles may be used on the basis of equitable access to the spectrum by the countries involved, i.e.

- to maximize the possibilities for the future exploitation of the UHF band by all administrations,
- to minimize interference to and constraints on existing and planned assignments/allotments in the Plan,
- to enable where feasible, the use of existing networks, in terms of transmitting sites and receiving antennas,
- to ensure that the solutions found can be implemented in practice.

## **4 TECHNICAL MEASURES FOR THE IDENTIFICATION OF FREQUENCY RESOURCES IN CHANNELS 21 – 60**

### **4.1 Basic Considerations**

One of the main results of the Regional Radiocommunication Conference (RRC-06) was the distribution of the spectrum according to the principle of equitable access. This was achieved by distributing and describing frequency positions in terms of nationwide coverage for the same number of so-called layers, thus proving for a comparable amount of spectrum being “consumed” by each administration. On the other hand, this may not be compliant with the detailed demands within a nation. There may be a need for a certain number of (quasi) nationwide layers, but there may also be an additional interest for the provision of additional content and/or services in densely populated areas. By that, the networks to be set up and operated in reality may differ significantly from the maps of theoretical frequency positions. Following the Geneva Agreement, this discrepancy is acceptable as long as the rights made use of by the networks are a subset of the rights given by the Plan (i. e. administrations can demonstrate conformity). Therefore, in many cases it may not be necessary to re-establish the original (theoretical) “Geneva-layer” completely, but to fulfill the updated concrete demands by making use of frequency rights from resources of the 470 to 790 MHz band.

Considering the different situations and demands in different countries, it was clear from the very beginning, that any course of action was supposed to take into account the following considerations:

- a) The GE06-distribution of resources is taken as a situation representing an equitable access solution for administrations concerned. The result of any course of action taken once again has to represent a situation of the same extent of satisfaction for administrations concerned. This also addresses the fact that some administrations have got a comparably high percentage of their GE06 frequency positions in the upper part of the UHF band. Depending on their future use of these frequencies, a situation regarded as an equitable access has to be achieved again.

- b) In many countries, lots of GE06-frequency positions are already in use or will be in use shortly for networks. Any course of action taken should leave these investments and these detailed intentions untouched if not otherwise agreed on bi- or multilateral basis.
- c) The GE06 Plan is based on planning assumptions as for broadcasting systems. By that the description of the set of rights for each administration is made on the same basis, but it is not binding for administrations to follow this description with their real networks. The only binding restriction is that administrations have to prove for the conformity of the real networks within their formal rights. But it is very likely that the main use of the frequencies in 470 MHz to 790 MHz will be for broadcasting. This should be reflected in the way to choose and distribute additional capacities among administrations, i. e. it should be possible and feasible to make use of the additional capacities for broadcasting in a reasonable manner.
- d) In the context of feasibility, additional capacities might have a different “value”. Some of them will be comparably easy to be implemented in networks; some of them could be very hard. The way of distribution has to be designed to take this into account.
- e) Administrations are certainly not willing to have something like a re-planning conference.

## **4.2 Steps to Define the Course of Action**

In order to assess the possibilities of extensions in terms of potential networks, it is necessary to consider the assignments/allotments currently recorded in the GE06 Plan, as complemented by additions which have been agreed by the administrations concerned since RRC-06. It has to be understood that, as a first attempt, the current entries in the Plan have to be kept stable.

Different approaches may be used to extend a broadcasting network:

- a) by making use of existing high power sites,
- b) by using additional low power transmitters and
- c) by combining both approaches, in particular in areas where the reception from the main sites is affected by interference or by restrictions intended to ensure compatibility.

In case a) potential extensions may be considered by the addition of assignments/allotments, on the basis of the main broadcasting sites. Good progress is made by considering the “best server” areas around main sites independently from their up to now-relationships to GE06-allotments for these new capacities. Thus, the new capacities can be assessed by their feasibility to be used for broadcasting from the very beginning, reflecting consideration c) from section 4.1 above. Complementary sites may be considered where appropriate.

In case b) the envisaged new coverage area is served by several new low power transmitters, operated as a SFN. Approach b) will cause lower interference towards neighbouring co-channel allocations than approach a).

In order to ensure compatibility between potential extensions and existing entries in the Plan, some restrictions may have to be used on some assignments, e.g. reduction in the e.r.p., antenna pattern restrictions in some sectors, selection of one type of polarization (V or H). The restrictions applicable to current entries in the Plan may be implemented through application of Article 5 only. The restrictions applicable to extensions may be recorded in the GE06 Plan together with the corresponding new entry through the application of Article 4. Restrictions on existing networks should be avoided. This reflects the considerations a), b) and d) from section 4.1 above.

It is understood that new bilateral and/or multilateral agreements would be developed, containing:

- the new entries to be included in the Plan through the application of Article 4 and the associated restrictions,
- the restrictions to be applied to existing entries in the Plan at the stage of Article 5 only.

### 4.3 Consequences: Effects on existing and new entries in the Plan

There is no unique practice for finding additional frequencies. The reasons for this are multiple. Different countries pursue different interests. The broadcasting implementation is at a different advancement stage in different countries. The GE06 requirements of different administrations are formulated under different political, economical and cultural assumptions. However, some common considerations with respect to identification of new frequencies can still be given.

In particular, the GE06 Plan is an (nearly) optimized trade-off between the number and characteristics of requirements and interference accepted by these requirements. Therefore, in most cases identifying additional frequencies to be inserted into the Plan will only be possible by accepting some of the following conditions:

- **For intended new frequency positions/entries in the Plan:**
  - Size modifications of initial requirements formulated by administrations for the establishment of the Plan

Within its own territory an administration may decide to extend the usage for a certain channel by closing gaps of coverage areas between co-channel allotments or assignments. Alternatively, the size of a given allotment may be increased without closing gaps when there is not any intended or possible use of this channel in neighbouring co-channel allotments or assignments.

This will in most instances involve increased interference on co-channel GE06 Plan entries including those of neighbouring administrations. Moreover, although large countries may still use this approach for internal (i. e. domestic) frequency rearrangements, for small countries it might not be feasible.
  - Planning additional coverage using low power transmitters

To minimize the interference potential on neighbouring co-channel GE06 Plan entries it might be necessary to plan the new additional coverage with low power transmitters instead of planning with one single high power site. Finding additional frequency resources along border areas may be easier with a low power approach. However, this may also involve additional investment costs and may cause the need for re-direction of directional roof-top antennas of households.
  - Changes in transmitter characteristics (e.r.p., antenna diagram, tilt, etc.) of planned and implemented broadcasting networks interfering towards new requirements

By restricting transmit power in certain directions for broadcasting networks implemented in conformity with the GE06 Plan entries, one may effectively allow deployment of new requirements, which otherwise would suffer from interference incoming from these entries. However, this may also involve additional investment costs.
- **For existing entries in the Plan:**
  - Additional constraints, in terms of accepted interference

In order to accept additional incoming interference certain mitigation techniques will need to be implemented. Adding of secondary sites in affected areas or planning of low power dense network may ensure the required field strength level at the broadcasting receiver input and provide an efficient way to cope with additional incoming interference. However, this would inevitably involve increased capital and operation investments.

Acceptance of these or other conditions is to be discussed and agreed in the course of bi- and multilateral coordination, Annex A provides an example of measures established by two administrations in attempt to identify additional frequencies for their broadcasting requirements. The example given is based on new additional allotments or high power assignments.

Annex A is for information purpose and the example is not necessarily applicable to situations involving other countries.

## 5 NATIONAL CASE STUDIES

On a national basis the identification of additional frequency resources by administrations is to be based on the same thorough review of their spectrum utilisation and compatibility analysis between requirements as in a cross border situation.

The national compatibility is between the allocations spectrum uses within the territory of a single administration, while taking into account the allocations uses of neighbouring countries in border areas.

Where no cross border coordination is triggered by GE06 the identification of additional frequency resources is a private matter only involving merely the administrations concerned. This is in contrast to cross border coordination activities where more than one national administration is concerned and the agreement of neighbour(s) is required.

An example concerning both national case studies as well as employed methodologies can be found in Annex A of this report.

## 6 CONCLUSIONS

In this report, the CEPT addressed issues in relation to identifying additional frequency resources for broadcasting networks in the band 470 - 790 MHz. The search for such additional resources may be undertaken by administrations, which decided for the mobile/fixed communications networks deployment in the band 790 - 862 MHz and/or have needs for increased broadcasting opportunities in the band 470 - 790 MHz.

Under certain constraints, it appears feasible to identify additional resources for broadcasting networks in the band 470 - 790 MHz. Dependant on a case by case situation, these constraints could include that for additional resources:

- increased interference levels would have to be accepted,
- requirements would have different shapes and/or sizes compared with those taken to the Plan for the same regions, and
- implementation characteristics would be different from those of the existing resources in the same region.

In some cases, based on agreements of all administrations concerned, some of these constraints could apply for existing Plan entries as well. The gain in extra capacity may involve a reduction of flexibility for the implementation of broadcasting and/or other services/technologies in this band.

This process of identifying additional frequencies and establishing them as entries in the Plan may have an impact also on the future position of an administration, even if there is no concrete demand for identifying additional capacities. Hence, such administrations, too, may wish to find appropriate measures for identifying and establishing additional frequency options.

The report cites some practical examples of measures used by administrations in their activities concerning this matter. The measures mentioned are not compulsory and are subject to bi- and multilateral agreements.

It may be feasible to identify suitable additional frequencies in the band 470 - 790 MHz,

- to be used as replacements for channels of the existing assignments/allotments in the GE06 Plan in the band 790 - 862 MHz or
- to satisfy new broadcasting requirements
- to reach a commonly agreed level of equitable access to the spectrum even in cases of different roll-out plans and levels for broadcasting and/or mobile/fixed communications networks.

Administrations need to assess in detail the possibility to extend GE06 capacity on the basis of new and modified assignments/allotments. This assessment may comprise the feasibility to implement the additional frequencies to roll out broadcasting networks, taking into account the results and constraints of cross-border co-ordinations.

Current entries in the GE06 Plan as well as networks operated on the basis of such entries should not be affected to an unacceptable extent, neither by additional capacities for broadcasting nor by the implementation of the sub-band 790 - 862 MHz for mobile/fixed communications networks.

**ANNEX A: EXAMPLE OF ONGOING COORDINATION BETWEEN GERMANY AND FRANCE****A.1 Introductory Remarks: Compatibility Analysis and Channel Allocation**

From Section 4.3 above, it can be seen that the key factor in identifying additional opportunities in the GE06 Plan, is to determine the areas that may be able to share the same channels and agree on the measures that could be acceptable on each side to ensure that this sharing is possible. This may require carrying out on-site measurements in the areas where interference is predicted by the calculations, in addition to using terrain model interference predictions.

Once these areas of mutual compatibility have been identified, it is possible to develop a compatibility matrix between all the assignments/allotments that currently exist in the GE06 Plan, and those that may be considered as the replacement frequencies.

Once this compatibility matrix has been agreed, it may be used on a channel per channel basis to determine which channel may be possibly used in a given area/site:

- If this channel is incompatible with one or more existing assignments/allotments in the Plan, it cannot be used in the given area/site.
- Otherwise, it may be used at potential areas/sites, provided that another area/site which is incompatible with it does not request the same channel, in which case two or more scenarios may have to be considered, depending on which of the competing sites/areas is selected for this channel.
- Various scenarios may then be combined and the most promising combinations of them be assessed with respect to meeting the requirements of each country involved and satisfying the principle of equitable access.

**A.2 Detailed Description of the Method**

The following course of action was used in order to determine potential additional capacities.

Step 1 – Elaboration of a compatibility matrix between the relevant areas, with an indication of the calculated excess levels for both directions of interference, with respect to the 49 dB $\mu$ V/m interfering field strength limit corresponding to channel 43 and/or with respect to a C/I threshold where applicable. Based on this compatibility matrix, elaboration of a table listing the potential candidate extension channels for each assignment/allotment was considered. An initial version of such a table between Germany and France is given in Table 1 for example sites (Strasbourg and Freiburg) in an area of common interest for France, Germany and depending on the border situation, also for other countries. The availability of the candidate extension should also take into account the internal compatibility issues i.e. compatibility between the candidate extension channels and the current entries within the country.

Step 2 – A selection of a given distribution of channels amongst the interested assignments/allotments for candidate extensions, taking into account, as far as possible and necessary, other countries.

Step 3 – An assessment of the technical conditions required to ensure possible compatibility of use of the channels selected in step 2 for the relevant assignments/allotments, including constraints on transmit sites and acceptance of interference on service areas, taking into account the possibility of using other sites to serve the affected area, and the basic principles listed in Section c) above.

Step 4 – If not satisfied at the end of the assessment in step 3, go back to step 2 and select another distribution of channels.

It is important to note that this course of action represents an iterative process and that any conclusions regarding the number of additional channels that may be obtained at the end of this process on each of the geographic areas of interest would be premature until all the ramifications in terms of internal and external constraints have been studied. At this stage, the constraints mentioned are indicative and have not been formally agreed by any party.

site	ch	status	Constraints to protect F or D existing entries	internal compatibility
Freiburg	22	Extension (to be studied)	133 000 people affected/825 km <sup>2</sup> due to interference from Sarrebourg le Donon 53 dBW. 95 000 still affected with 35 dBW towards Freiburg	to be studied with Frankfurt-Hessen
Freiburg	23	Extension (to be studied)	compatibility with Franche-Comté-Nord GE06 to be checked	to be studied with Stuttgart
Freiburg	25	Extension (to be studied)	133 000 people affected/825 km <sup>2</sup> due to interference from Sarrebourg le Donon 53 dBW. 95 000 still affected with 35 dBW towards Freiburg	to be studied with Rheinhessen
Freiburg	26	Extension (to be studied)	compatibility with Franche-Comté-Nord GE06 to be checked	to be studied with Stuttgart
Freiburg	29	Extension (to be studied)	compatibility with Franche-Comté-Nord GE06 to be checked	to be studied with Stuttgart
Freiburg	30	Extension (to be studied)	no restriction needed to protect F GE06 entries	to be studied with Trier
Freiburg	32	Extension (to be studied)	50 dBW, GE-06 pattern as on channel 39, - 3 dB	to be studied with Saarland
Freiburg	35	Extension (to be studied)	no restriction needed to protect F GE06 entries	to be studied with Trier
Freiburg	41	Extension (to be studied)	compatibility with Franche-Comté-Nord GE06 to be checked	to be studied with Rhein-Neckar
Freiburg	44	Extension (to be studied)	compatibility with Franche-Comté-Nord GE06 to be checked	to be studied with Westpfalz
Freiburg	45	Extension (to be studied)	50 dBW, GE-06 pattern as on channel 39, - 3 dB	to be studied with Saarland
Freiburg	59	Extension (to be studied)	50 dBW, GE-06 pattern as on channel 39, - 3 dB	to be studied with Hessen-Sud
Freiburg	60	Extension (to be studied)	50 dBW, GE-06 pattern as on channel 39, - 3 dB	to be studied with Karlsruhe

site	ch	status	Constraints to protect F or D existing entries	internal compatibility
Strasbourg Nordheim	22	Extension (to be studied)	3 dB restriction from 50 dBW omni to protect Frankfurt Hessen GE06 no restriction required to protect Tübingen	SFN with Sarrebourg OK
Strasbourg Nordheim	23	Extension (to be studied)	on the basis of C/I calculations into Heilbronn, there may be no need for restrictions on Strasbourg Nordheim no restriction required to protect Stuttgart	compatibility with Nancy to be checked
Strasbourg Nordheim	25	Extension (to be studied)	on the basis of C/I calculations into Donnersberg (Rheinhessen), there may be no need for restrictions on Strasbourg Nordheim no restriction required to protect Stuttgart	SFN with Sarrebourg OK
Strasbourg Nordheim	26	Extension (to be studied)	on the basis of C/I calculations into Heilbronn, there may be no need for restrictions on Strasbourg Nordheim GE06	compatibility with Nancy to be checked
Strasbourg Nordheim	29	Extension (to be studied)	no restriction needed to protect Stuttgart GE06	compatibility with Nancy to be checked
Strasbourg Nordheim	32	Extension (to be studied)	based on a preliminary study, the compatibility between Strasbourg and Saarland (Saarbrücken-Schocksberg+Goettelborner Hoehe) using a tilted antenna in Strasbourg may be achieved.	compatibility with Vosges to be studied
Strasbourg Nordheim	34	Extension (to be studied)	C/I calculations indicate that a 7 dB restriction relative to 50 dBW ERP omni on Strasbourg- Nordheim would be required to protect Hessen-S GE06.	SFN with Sarrebourg OK
Strasbourg Nordheim	37	Extension (to be studied)	C/I calculations indicate that a 7 dB restriction relative to 50 dBW ERP omni on Strasbourg- Nordheim would be required to protect hessen-S GE06 no restriction required to protect Tübingen	SFN with Mulhouse NOK
Strasbourg Nordheim	45	Extension (to be studied)	based on a preliminary study, the compatibility between Strasbourg and Saarland (Saarbrücken-Schocksberg+Goettelborner Hoehe) using a tilted antenna in Strasbourg may be achieved.	compatibility with Vosges to be studied
Strasbourg Nordheim	42	Extension (to be studied)	based on a preliminary study, the compatibility between Strasbourg and Saarland (Saarbrücken-Schocksberg+Goettelborner Hoehe) using a tilted antenna in Strasbourg may be achieved.	OK
Strasbourg Nordheim	50	Extension (to be studied)	on the basis of C/I calculations into Heilbronn, there may be no need for restrictions on Strasbourg Nordheim	SFN with Mulhouse NOK
Strasbourg Nordheim	53	Extension (to be studied)	on the basis of C/I calculations into Donnersberg (Rheinhessen), there may be no need for restrictions on Strasbourg Nordheim	SFN with Mulhouse NOK
Strasbourg Nordheim	54	Extension (to be studied)	C/I calculations indicate that a 7 dB restriction relative to 50 dBW ERP omni on Strasbourg- Nordheim would be required to protect hessen-S GE06.	SFN with Mulhouse NOK
Strasbourg Nordheim	59	Extension (to be studied)	C/I calculations indicate that a 7 dB restriction relative to 50 dBW ERP omni on Strasbourg- Nordheim would be required to protect Hessen-S GE06.	compatibility with Vosges to be studied
Strasbourg Nordheim	40	GE06	no restriction needed to protect Hochrhein extension	
Strasbourg Nordheim	43	GE06	no restriction needed to protect Hochrhein extension	
Strasbourg Nordheim	48	GE06	no restriction needed to protect Hochrhein extension	
Strasbourg Nordheim	51	GE06	no restriction needed to protect Hochrhein extension	

Table A.1: Examples of investigation of the constraints on candidate extension channels in Freiburg and Strasbourg-Nordheim (step 1)

In order to streamline the discussions based on the four step process mentioned above, the following method, consisting of an assessment of interference against two criteria, was used to evaluate the necessary constraints:

- a) compliance of interference into the GE06 entries with the criterion of the side agreement (i.e. a threshold for the interfering field strength  $E_{\text{maxInt}}$  corresponding to the maximum of  $49 \text{ dB}\mu\text{V/m} + f_{\text{corr}}$  and the level produced by existing assignments in the Plan),
- b) when the constraints resulting from meeting the above criterion are not practicable, and when the network to be protected is known, compliance of interference into the GE06 entries with a C/I threshold.

When the constraints arising from the application of criterion a) are practicable, there is no need to know the actual implementation of the network to be protected. Otherwise, a more detailed assessment is necessary on the basis of the actual implementation of the network, using the C/I method (criterion b)).

Unless otherwise stated, the restrictions mentioned in this attachment are based on field strength assessment (criterion a)) for interference into German GE06 entries, and on both field strength (criterion a)) C/I assessment (criterion b)) for interference into French GE06 entries (criterion b)).

The next step (step 2) should select a given distribution of channels amongst the interested assignments for candidate extensions, taking into account, as far as possible and necessary, other countries.

It was also recalled that the finalization of all technical parameters would take place in the following step (step 3), based on the indicative characteristics from step 1.