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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY


EX PARTE OR LATE FILED

November 12, 1999

Magalie Roman Salas, Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: ***Ex Parte* Submission of Northpoint Technology, Ltd.**
ET Docket No. 98-206, RM-9147, RM-9245

Dear Ms. Salas:

Enclosed on behalf of Northpoint Technology, Ltd. is an ex parte letter to Thomas Tycz dated November 12, 1999.

In accordance with Section 1.1206 of the Commission's rules (47 CFR § 1.1206), an original and one copy of this letter are submitted for inclusion in the public record for the above-captioned proceedings. Please direct any questions concerning this submission to the undersigned.

Sincerely,

Brian Weimer
Counsel for Northpoint
Technology, Ltd.

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FEDERAL COMMUNICATIONS COMMISSION
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November 12, 1999

**VIA HAND DELIVERY**

Mr. Thomas Tycz
International Bureau
Federal Communications Commission
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Counter TW-A325
Washington, D.C. 20554

Re: ***Ex Parte* Submission of Northpoint Technology, LTD.**
ET Docket No. 98-206, RM-9147, RM-9245

Dear Mr. Tycz:

Enclosed please find the Delayed Contribution to the ITU by France which Sophia Collier of Northpoint Technology, Ltd. ("Northpoint") referred to in a recent meeting with the International Bureau ("IB") and Office of Engineering and Technology ("OET"). France's Delayed Contribution concerns sharing between FS and FSS in the 18.8 - 19.3 GHz band. In this case, the French are advocating on behalf of terrestrial FS and the Teledesic system is the FSS system in question. As was discussed during our meeting, the French proposal is the basis of Northpoint's proposed sharing method with NGSO FSS in the 12 GHz band.

If you have any questions concerning this matter, kindly contact the undersigned.

Respectfully submitted,

Antoinette Cook Bush
Counsel for Northpoint Technology, Ltd.

cc: Chairman William Kennard
Commissioner Harold Furchtgott-Roth
Commissioner Susan Ness
Commissioner Michael K. Powell
Commissioner Gloria Tristani
Donald Abelson (IB)
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INTERNATIONAL TELECOMMUNICATION UNION

**RADIOCOMMUNICATION STUDY GROUPS**

**Delayed Contribution**
**Document 4-9S/126-E**
**14 April 1999**
**Original: English only**

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**France**

# EFFECT OF DYNAMIC CHANNEL ASSIGNMENT MITIGATION TECHNIQUE ON SHARING BETWEEN FS AND FSS IN THE DOWNLINK BAND 18.8 - 19.3 GHz

## 1 Introduction

The aim of this document is to present analysis and simulations of the long-term interference that could be generated by FS transmitters into FSS user terminals that operate co-frequency and in close proximity within hot spot areas, in the 18.8 - 19.3 GHz band. Several ways of implementation Dynamic Channel Assignment for the FSS of are studied and its impact on the interference probability is evaluated.

## 2 Methodology and assumptions

The study is applicable to any GSO and non-GSO FSS system, under the condition that the minimum operational elevation angle is high enough to consider only the minimum FSS user terminal receive gain in the long term interference calculations. Indeed, since the interference from the FS typically arrives at low elevation angles, this analyse assumes the interference is received via the far sidelobes of user terminal antenna.

The FS system considered in this study. is the real 18 GHz fixed service network located in the Paris region (117 km x 117 km). The FSS user terminals are placed randomly in the dense urban zones located in this region, according to a penetration ratio of 18 users/km$^2$. For each user terminal, the aggregate interference from the existing FS microwave links in this area is considered.

The FSS user terminals are placed 1 meter above building roofs. The propagation model takes into account propagation loss and diffraction over terrain as well as man-made obstacles, using a topographical database.

Two FSS systems have been studied:

- **System A**, has a 500 Mhz downlink band 18.8 - 19.3 Ghz and only one channel of 500 Mhz bandwidth per downlink beam. The user terminal receiver parameters assumed for System A network are shown in table 1. Since there is only one channel per downlink beam, **System A doesn't use Dynamic Channel Assignment**.

TABLE 1

**System A Earth Station Receiver Parameters**

| | |
|---|---|
| Antenna Diameter | 0.3 m |
| Antenna Gain | 34 dBi |
| Antenna Pattern | Rec UIT-R 699 |
| Gain toward horizon | -3.2 dBi |
| receiver bandwidth | 500 MHz |
| Noise level | -87 dBm |

- **System B**, has a 500 Mhz downlink band 18.8 - 19.3 GHz and 7 downlink channels of 67.5 MHz bandwidth each. **This system is assumed to use Dynamic Channel Assignment**. For the purpose of this study, two different types of DCA algorithms have been implemented. Since the simulations take into account only long term interference, the results are valid under the assumption that each user terminal always receives at the same frequency, even when it switches from one satellite to another in the case of an non-GSO system. User terminal receiver parameters assumed for system B are shown in Table 2.

TABLE 2

**System B Earth Station Receiver Parameters**

| | |
|---|---|
| Antenna Diameter | 0.3 m |
| Antenna Gain | 34 dBi |
| Antenna Pattern | Rec UIT-R 699 |
| Gain toward horizon | -3.2 dBi |
| receiver bandwidth | 67.5 MHz |
| Noise level | -95 dBm |

## 3. Results

### 3.1 System A

System A user terminal receiver bandwidth is presented in Figure 1. All user terminals use the same 500 MHz channel.

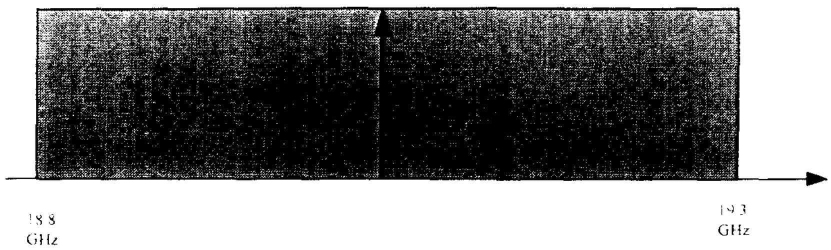


FIGURE 1

**System A Receiver bandwidth**

A penetration ratio of 18 users/km$^2$ in dense urban zones, is used. Therefore, 4218 FSS stations have been randomly distributed in these areas. For each user terminal, the I/N ratio is calculated by aggregating the interference from all the FS transmitting across the full 500 MHz receive bandwidth.

Figure 2 shows the user terminals I/N cumulative distribution. The results are summarised in Table 3

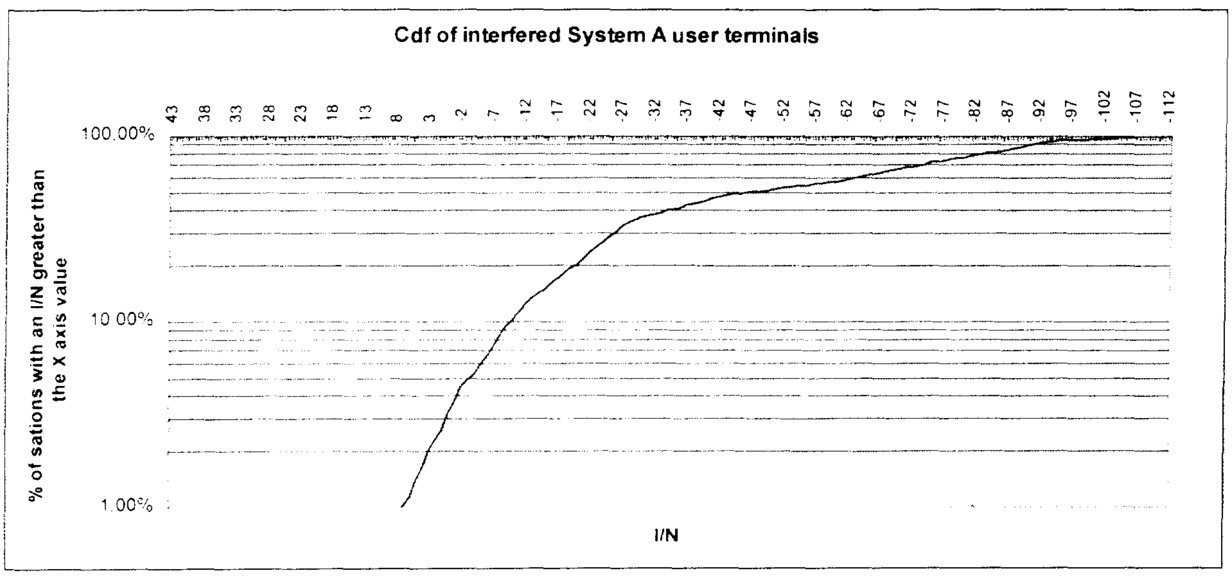


FIGURE 2

TABLE 3

| I/N criteria | % of interfered stations |
|---|---|
| -10 dB | 10 % |
| -12.2 dB | 12 % |

### 3.2 System B

System B has 7 channels per downlink beam (Figure 3). User terminals bandwidth is equal to 67.5 Mhz. These terminals use DCA. A channel is considered free of interference, if the I/N ratio of the FSS receiver is below $(I/N)_{criterion}$ dB. Two different types of DCA algorithms have been implemented:

1. The first Dynamic Channel Assignment algorithm, designated by DCA_1, assumes that the user terminals are able to analyse the electromagnetic environment in order to determine the I/N ratio on each of the 7 channels. In order to avoid any loss in system capacity, the algorithm makes sure that all the 7 frequencies are equally used by FSS terminals. Therefore, one after the other, the user terminals will execute the following sequence:

   ***Step 1***: Search for a channel free of interference and with an I/N ratio as close as possible to $(I/N)_{criterion}$ dB.

   ***Step 2***: If the selected channel has already been assigned to X other users

   (X = total number of FSS users /7), return to step 1 otherwise go to step 3.

   ***Step 3***: The selected channel and the corresponding I/N are assigned to the user terminal.

The choice of an interfered channel by a terminal can be the result of:

- All the channels in the terminal location have an I/N ratio above $(I/N)_{criterion}$ dB.
- all the free of interference channels in the terminal location have already been used by X previous terminals.

2. The second DCA technique , designated by DCA_2, assumes that the DCA intelligence is not on board the user terminals but at the system level. DCA_2 follows two rules:

   - In order to avoid any loss in system B capacity, all the 7 downlink channels should be equally assigned to FSS terminals.
   - Each user terminal provides information to the system about the channels free of interference at its location. Consequently, the system has a global vision of all the user terminals and of the channels that they can use. It can then optimise the repartition of the 7 channels between all these user terminals


FIGURE 3

**System B channelisation**

In order to compare the percentage of interfered stations in System A and system B, the user terminals of the two systems are located at the same positions.

Figure 4 and Figure 5 show the user terminals I/N cumulative distributions for DCA_1 with respectively an $(I/N)_{criterion}$ = -10 dB and $(I/N)_{criterion}$ = -12.2 dB. The results are summarised in Table 4.

TABLE 4

| I/N criteria | % of interfered stations |
|---|---|
| -10 dB | 0.7 % |
| -12.2 dB | 0.9 % |

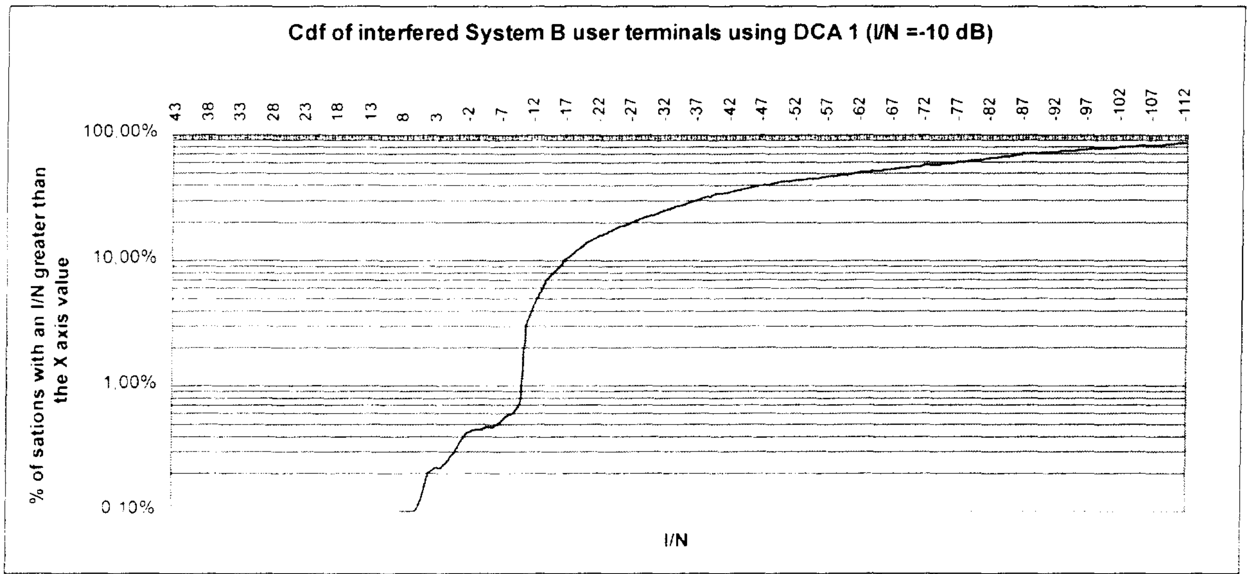


FIGURE 4

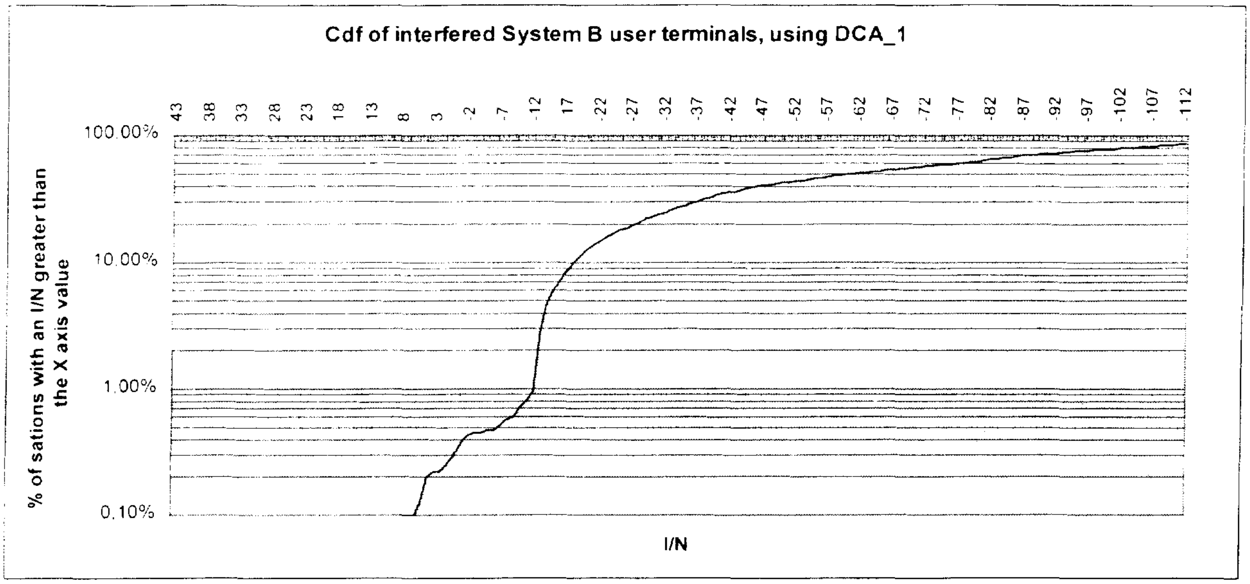


FIGURE 5

Figure 6 shows the user terminals I/N cumulative distribution for DCA_2 algorithm. The results are summarised in Table 5.

TABLE 5

| I/N criteria | % of interfered stations |
|---|---|
| -10 dB | 0.5 % |
| -12.2 dB | 0.7 % |

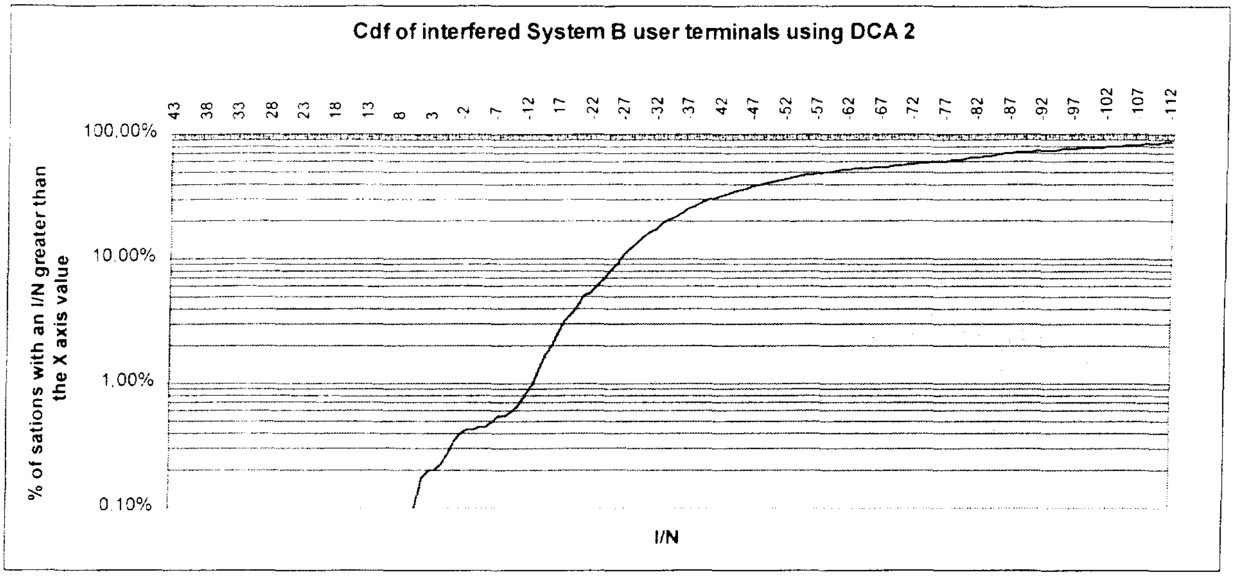


FIGURE 6

## 4 Conclusion

The results presented in this study are based on the situation of the Paris metropolitan area and two particular types of DCA algorithms. The technical feasibility of these Dynamic Channel Assignment techniques hasn't proved. The results show that the use of these DCA algorithms by the FSS system decrease the interference probability of FSS user terminals by a significant factor. Therefore, we can conclude that FSS systems using the 18.8 -19.3 GHz downlink band which are able to implement such Dynamic Channel Assignment mitigation techniques would facilitate FS/FSS sharing in hot spot areas.

Furthermore, the use of ATPC by the FS system is supposed to be another valuable mitigation technique. As the ATPC currently used in the French FS network hasn't been taken into account in this study, the effect of the combined use of ATPC by the FS and DCA by the FSS on the interference probabilities is analysed in a companion contribution to this meeting.