



# EXHIBIT 9

## RF Exposure

Applicant: Northern Telecom Ltd.

For Certification on:

AB6INDS12000

**Date** 26 / Jul / 2002  
**To** To Whom It May Concern  
**Copy**  
**From** C. DAL GRANDE

## NORTEL NETWORKS CONFIDENTIAL

**Subject Reference** Health protection and BTS S12000 Radiation hazards  
CDG/0104

### 1. Introduction

This memo provides inputs with regard to the assessments of Health protection and radiation hazards expected from Nortel Networks BTS S12000 indoor (GSM 850 and GSM 1900), compliant to the North American requirements (FCC OET Bulletin 65) through calculation as described below.

### 2. Radiation hazards

#### a. S12000 BTS radiations

The maximum radiated power level authorized by the EMC specifications is :

- -36 dBm (or  $E=2.7$  mV/m) for frequencies between 30 MHz and 1 GHz,
- -30 dBm (or  $E=5.4$  mV/m) for frequencies above 1 GHz.

According to FCC OET bulletin 65, the power density is linked to the E field by the relation  $S=E^2/3770$ .

As a consequence, the maximum power density radiated by the S12000 indoor will be :

- $S=1.9*10^{-9}$  mW/cm<sup>2</sup> for frequencies between 30 MHz and 1 GHz,
- $S=7.9*10^{-9}$  mW/cm<sup>2</sup> for frequencies above 1 GHz.

The North American Maximum Permissible Exposure (MPE) levels for general population (uncontrolled exposure areas) are defined in the table below :

Frequency range (MHz)	MPE (S, mW/cm <sup>2</sup> )
30 – 300	0.2
300 – 1500	f/1500
1500 – 12750	1.0

b. Radiation of a system

Considerations :

- S12000 configured with :
  - H4D diplexer : 4 Power Amplifiers (PA) in a sector, PAs configured to deliver maximum output power 37 dbm
  - Diplexer : 1 Power Amplifiers (PA) in a sector, PA configured to deliver maximum output power 44 dbm
- Feeder losses # 1 dB.
- Antenna gain G=18 dBi # 63.

The power delivered to the antenna (per PA) is given by

$P = S_{12000\_power} - \text{Feeder\_losses}$

H4D : 43 dBm (or 20 Watts)

Diplexer : 36 dBm (or 4 Watts)

As described in FCC OET Bulletin 65, the power density can be estimated by  $S = P \cdot G / 4\pi R^2$  where R is the distance to the source (the antenna).

The Maximum Permissible Exposure (MPE) level for uncontrolled access locations is  $S_{GSM\ 850} = 0.56\ \text{mW/cm}^2$  and  $S_{GSM\ 1900} = 1\ \text{mW/cm}^2$ .

As a consequence, the safe distance approach is with the aforementioned considerations

Diplexer :  $R_{GSM\ 850} = 4.2\ \text{m}$  and  $R_{GSM\ 1900} = 3.2\ \text{m}$ .

H4D :  $R_{GSM\ 850} = 3.8\ \text{m}$  and  $R_{GSM\ 1900} = 2.8\ \text{m}$ .

This distance is the one at which the limit level will be reached in the main beam of the antenna and would usually be achieved by the fact that this antenna is mounted on a pole.

**3. Conclusion**

As demonstrated before, it is deemed that Nortel Networks S12000 BTS complies to the general requirements (FCC OET bulletin 65) for health protection.

It should also be noted that exposures inside a building can be expected to be reduced by at least 10 to 20 dB due to the attenuation caused by building materials in the wall and roof of the building (source : FCC OET Bulletin 65).

Cyrille DAL GRANDE  
Products Approvals  
Nortel

Networks