



EXHIBIT 9

RF Exposure

Applicant: Northern Telecom Ltd.

For Certification on:

AB6S12000

Date 29/01/03

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NORTEL NETWORKS CONFIDENTIAL

Subject Health protection and Radiation hazards evaluation for S12000 and S8000 BTS 1900MHz PCS Configuration/Modes with HePA.

Reference JLC/12K8K-01

1. Introduction - References

This memo provides inputs with regard to the assessments of Health protection and radiation hazards expected from Nortel Networks BTS S12000 and S8000 equipped with high power amplifier HePA reference **NTQA50RA**, operating in the 1900 MHz band, compliant to the US FCC requirements in sections 1.1307 and 1.1310 (Radiofrequency radiation exposure limits.) of CFR 47.

Calculation as described below is done with predicting method of FCC's OST/OET Bulletin Number 65.

Note: HePA may be configured with Diplexer or 2 ways combiner H2D or 4 ways combiner H4D in the same configuration of S12000 and S8000 BTS. Therefore, the same evaluation may be used for these equipments.

2. Radiation hazards

a. Maximum Permissible Exposure (MPE) Limits

Table 1 of CFR 47 Section 1.1310 :

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

The HePA amplifier is used in 1900 MHz band. The MPE limit for evaluation is :

5 mW/cm ²	for controlled exposure area
1 mW/cm ²	for uncoltrrolled exposure area

b. Radiation of the system

Formulas and explanation for calculation :

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

$$P_{(antenna)} \text{ (in Watts)} = (P_{(power)} - \text{losses}) \times G_{(antenna)}$$

$G_{(antenna)}$ dimension versus an isotropic radiator

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

The distance R between antenna and the area on which this level is reached is calculated with $S = \text{MPE limit}$:

$$R = (P_{(antenna)} \cdot G_{(antenna)} / \pi \cdot S)^{1/2}$$

The calculation method is a **worst case** of the main beam of antenna radiation with a total reflection of radiation on metallic surface, composed with direct radiation at the distance R (power is multiplied by 4).

Two values of R calculation in direct sight of antenna (rooftop position)

System parameters :

- Different power amplifier(s) and coupling configuration :
 - Diplexer : 1 Power Amplifiers (PA) in a sector, PA configured to deliver maximum output power 47.8 dbm (60 W) with GMSK modulation, Diplexer loss is 0dB.
Therefore power output is : 47,8 dBm
 - H2D diplexer : 2 Power Amplifiers (PA) in a sector, PAs configured to deliver maximum output power 47.8 dbm (60 W) with GMSK modulation. H2D power loss is 3dB.
Therefore power output is :
 $47,8 \text{ dBm} + 3\text{dB} (2 \text{ Pas}) - 3\text{dB} (\text{loss}) = 47,8\text{dBm}$
 - H4D diplexer : 4 Power Amplifiers (PA) in a sector, PAs configured to deliver maximum output power 47.8 dbm (60 W) with GMSK modulation. H4D power loss is 7dB.
Therefore power output is :
 $47,8\text{dBm} + 6\text{dB} (4 \text{ Pas}) - 7\text{dB} (\text{loss}) = 46,8\text{dBm}$
- Feeder and jumper losses # 1 dB.
- Antenna gain $G=18 \text{ dBi}$ # 63.

Calculation table and results :

Note: Calculation is done in the worst case of maximum power radiated. Therefore, the calculation is done in Diplexer or H2D configuration (47,8dBm radiated) with GMSK modulation.

BTS PA config.	Modulation	PA power dBm	Antenna gain dBi	Losses dB	Emitted power (e.i.r.p)		S = MPE limit mW/cm ²	(*) Main beam, 1 antenna Distance R (m)	Worst case (**) prediction assuming 100% reflection of incoming radiation Distance R (m)
					dBm	W			
UNCONTROLLED EXPOSURE AREA									
Diplexer or	GMSK	47,8	18	1	65,1	3019,95	1	4,9	9,8
H2D	EDGE	46,5	18	1	63,5	2238,72	1	4,2	8,4
CONTROLLED EXPOSURE AREA									
Diplexer or	GMSK	47,8	18	1	65,1	3019,95	5	2,2	4,4
H2D	EDGE	46,5	18	1	63,5	2238,72	5	1,9	3,8

(*) calculation in the main beam of antenna

(**) worst case calculation of main beam composed with total reflection

3. Conclusion

1) The distance R is the one at which the limit level will be reached at distance R of antenna and would not be usually achieved by the fact that this antenna is mounted on a pole (higher or equal to 10 m as required in section 1.1307 of FCC rules) for installation on ground, or on rooftop of a building which has enough a ttenuation of radiation to reduce R.

2) The power limit 3280 W eirp is overloaded with antenna gain greater than 18,3 dBi with HePA and Diplexer configuration.

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