

# **EXHIBIT 2**

## **Test Report Summary**

**Applicant: Nortel Networks**

**For Certification on:**

**AB6NT1900MFRM2**



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## Test Report Summary for FCC Equipment Authorization

**FCC ID : AB6NT1900MFRM2 CDMA Metro Cell 1900MHz MFRM2**

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# 1 Introduction

This test report is submitted in accordance with the FCC Rules and Regulations, Part 2, Subpart J, Sections 2.1046 through 2.1057 for equipment authorization of Nortel Networks' CDMA 1900 MHz Multi-carrier Flexible Radio Module 2 (MFRM2). The 1900 MHz MFRM2 is intended for use in the Domestic Public Cellular Radio Telecommunications Service and is designed in accordance with the following standards:

- *CFR 47, Part 24, Subpart E, Broadband Personal Communications Service [1]*
- *CFR 47, Part 2, Subpart J, Equipment Authorization Procedures - Equipment Authorization[2]*

## 1. Test Result Summary

Table 1 summarizes the measurement results for the CDMA 1900 MHz MFRM2.

**Table 1: Test Results Summary**

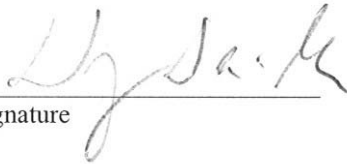
FCC Measurement Specification	FCC Limit Specification	Description	Results	Test(s) Conducted by	Remarks
2.1033(c)(8)		Measurement of DC Power	Not Applicable	Nortel Networks	
2.1046	24.232	RF Output Power	Compliant	Nortel Networks	See Exhibit 2A
2.1047		Modulation Characteristics	Not Applicable		
2.1049		Occupied Bandwidth	OBW = 1.2685 MHz (one carrier) OBW = 2.491 MHz (two carriers) OBW = 3.7355 MHz (three carriers)	Nortel Networks	See Exhibit 2A
2.1051, 2.1057	24.238	Spurious Emission at Antenna Terminals	Compliant	Nortel Networks	See Exhibit 2A
2.1053, 2.1057	24.238	Field Strength of Spurious Radiation	Compliant	C-MAC Engineering Inc.	See Exhibit 2B
2.1055	24.238	Frequency Stability	Compliant	Nortel Networks	See Exhibit 2A

## 2. Engineering Declaration

The CDMA 1900 MHz Multi-carrier Flexible Radio 2 has been tested in accordance with the requirements contained in the Federal Communication Rules and Regulations Part 2 and 24.

To the best of my knowledge, these tests were performed in accordance with good engineering practices using measurement procedures consistent with industry or commission standards or previous Commission correspondence or guidance and demonstrate that this equipment complies with the appropriate standards. All tests (including tests performed by C-MAC Engineering Inc.) were conducted on a representative sample of the equipment for which type acceptance/certification is sought.

Report Prepared by

  
Signature

Thomas Wong  
Regulatory Prime  
Nortel Networks  
Calgary, Alberta

March 13, 2003

### 3. Type Acceptance Application Requirements

#### 3.1 Name of Applicant

The applicant is Nortel Networks Inc.

#### 3.2 Identification of Equipment

The equipment in this application for type acceptance is the Nortel's CDMA 1900 MHz Multi-carrier Flexible Radio Module 2 (MFRM2). The 1900MHz MFRM2 is marketed under the model number NT1900MFRM2. The FCC ID number sought is AB6NT1900MFRM2.

#### 3.3 Quantity Production

The 1900 MHz MFRM2 will be produced in quantity.

#### 3.4 Technical Description

See Exhibit 3.

#### 3.5 Type of Emissions

The 1900 MHz MFRM2 Assembly is designed to operate in digital mode. The emission type is F9W for CDMA mode. The emission designators are 1M25F9W (1 Channel), 2M50F9W (2 Channels) and 3M75F9W (3 Channels). Testing was conducted in single channel, two channel, and 3 channel mode to determine compliance. The emission designators were calculated based on requirements of FCC Rule Part 2, Subpart C - Emissions, section 2.201 and Section 2.202.

#### 3.6 Frequency Range

The 1900 MHz MFRM2 operates in the 1900 MHz cellular band where the operating frequency ranges are 1850 – 1910 MHz for the receiver and 1930 – 1990 MHz for the transmitter. The following table shows the valid CDMA channels within this band. The MFRM2 meets all FCC requirements within the valid (and conditional valid if A/D, B/E, or C/F are under the same operator) channels.

Band	CDMA Channel Number	Transmitter Frequency Assignment for Base Station (MHz)	Valid IS97 CDMA Frequency Assignment
A	0-24	1930.00-1931.20	In-Valid

	25-275	1931.25-1943.75	Valid
	276-299	1943.80-1944.95	Cond. Valid
D	300-324	1945.00-1946.20	In-Valid
	325-375	1946.25-1948.75	Valid
	376-399	1948.80-1949.95	Cond. Valid
B	400-424	1950.00-1951.20	In-Valid
	425-675	1951.25-1963.75	Valid
	676-699	1963.80-1964.95	Cond. Valid
E	700-724	1965.00-1966.20	In-Valid
	725-775	1966.25-1968.75	Valid
	776-799	1968.80-1969.95	Cond. Valid
F	800-824	1970.00-1971.20	In-Valid
	825-875	1971.25-1973.75	Valid
	876-899	1973.80-1974.95	Cond. Valid
C	900-924	1975.00-1976.20	In-Valid
	925-1175	1976.25-1988.75	Valid
	1176-1199	1988.80-1989.95	Cond. Valid

### 3.7 Range of Operating Power

The 1900 MHz MFRM2 range of operating RF power is 0 dBm (1W) to 46.0 dBm (40W). The maximum RF power output is 46.0 dBm (40W).

### 3.8 Complete Circuit Diagrams

The Tx chain of the 1900 MHz MFRM2 radio system for certification is made up of MFRM2 (consists of radio and PA portions) and DPM (an OEM equipment). Exhibit 8 contains the schematics of circuit cards inside the MFRM2 and Exhibit 9 contains the parts lists of the circuit cards inside MFRM2.

### 3.9 Tune-up Procedure

The tune-up tests will be performed as part of the factory testing on the MFRM2. This procedure includes power output levels, spurious emissions, and occupied bandwidth. There are no end-user adjustments that will have any effect on these settings. No tune-up testing is required in the field.

### 3.10 Circuit Description for Frequency Determining and Stabilizing

The Global Positioning Satellite Timing Module (GPSTM) is the primary clock source in the system. It consists of two outputs:

EVEN\_SEC Clock and,  
SYS\_CLK (at 8fc or 9.8304 MHz)

In addition, the GPSTM has a 10 MHz reference output that can be used to synchronize external measurement equipment during system testing.

The GPSTM distributes the primary clock signals directly to the Control Module (CM) and the CORE modules (see Exhibit 3) which in-turn distribute the clock signals to the digital modules and to the MFRM2 via the high speed optical link.

The GPSTM has a frequency stability of better than 1.0 part per billion.

### **3.11 Circuit Description for Suppression of Spurious Radiation**

The Tx band pass filter in the DPM provides out of band emission rejection and permits only signals in the Tx band to the antenna for emission. The close inband spurs are being taken care of by the BBPD (Base-Band Pre-Distortion) circuitry in the MFRM2.

### **3.12 Circuit Description for Limiting Modulation**

This systems employs digital modulation techniques producing CDMA forward and reverse channel air interfaces which are compatible with IS 95A and IS 97A technical standards.

## 4. Measurement of DC Power

### *Section 2.1033(C)(8)*

*The DC voltages applied to and DC currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.*

#### **Response:**

Final Output Transistor: It has four final stage power transistors in parallel. The final state output power transistors each draw 3.2A @ 27Vdc.

## 5. Test Method and Test Result

### 5.1 Tests performed by Nortel Networks

#### **RF Power Output**

The maximum measured RF output power was 45.82 dBm for single carrier.

The maximum measured RF output power was 46.10 dBm for two carriers.

The maximum measured RF output power was 46.17 dBm for three carriers.

#### **Occupied Bandwidth**

The maximum measured occupied bandwidth was 1,268.5 KHz for single carrier.

The maximum measured occupied bandwidth was 2,491.0 KHz for two carriers.

The maximum measured occupied bandwidth was 3,735.5 KHz for three carriers.

#### **Spurious Emissions at Antenna Terminals**

The minimum pass margin for one, two and three carrier(s) is:

1 MHz upper and lower band edge measurements was 8.4 dB

1 MHz to 20 GHz measurements was 1.4 dB.

#### **Frequency Stability**

The frequency stability over temperature -30 deg to 50 deg C and 85% to 115% of the nominal voltages is 0.015 ppm.



Please refer to the Exhibit 2A for all test setups and results in details provided by Nortel Networks.

## **5.2 Tests performed by C-MAC Engineering Inc.**

### **Radiated Emission Test Results from 30MHz to 20 GHz**

The minimum pass margin: 14.2 dB for H-Pol and V-Pol

Please refer to the Exhibit 2B for all test setups and results in details provided by C-MAC Engineering Inc.