



# **EXHIBIT 2**

## **Test Report Summary**

**Applicant: Nortel Networks**

**For Certification on:**

**AB6NT1900MFRM**



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## Test Report Summary for FCC Equipment Authorization

**FCC ID : AB6NT1900MFRM CDMA Metro Cell 1900MHz MFRM**

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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 (MFRM). The 1900 MHz\_MFRM 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 SFRM.

**Table 1: Test Results Summary**

FCC Measurement Specification	FCC Limit Specification	Description	Results	Test(s) Conducted by	Remarks
2.1046	24.232	RF Output Power	Compliant	Nortel Networks	See Exhibit 2A
2.1047		Modulation Characteristics	Not Applicable		
2.1049		Occupied Bandwidth	OBW = 1.2725 MHz (one carrier) OBW = 2.4949 MHz (two carriers) OBW = 3.7475 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	Sanmina Canada ULC	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 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 Sanmina Canada ULC) were conducted on a representative sample of the equipment for which type acceptance/certification is sought.

Report Prepared by

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Signature

March 14, 2002  
Date

### 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 (MFRM). The 1900MHz MFRM is marketed under the model number NT1900MFRM. The FCC ID number sought is AB6NT1900MFRM.

#### 3.3 Quantity Production

The 1900 MHz MFRM will be produced in quantity.

#### 3.4 Type of Emissions

The 1900 MHz MFRM 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.

#### 3.5 Frequency Range

The 1900 MHz MFRM 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.

Band	CDMA Channel Number	Transmitter Frequency Assignment for Base Station (MHz)	Valid 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	Condo. Valid
D	300-324	1945.00-1946.20	In-Valid
	325-375	1946.25-1948.75	Valid
	376-399	1948.80-1949.95	Condo. Valid
B	400-424	1950.00-1951.20	In-Valid
	425-675	1951.25-1963.75	Valid
	676-699	1963.80-1964.95	Condo. Valid

E	700-724	1965.00-1966.20	In-Valid
	725-775	1966.25-1968.75	Valid
	776-799	1968.80-1969.95	Condo. Valid
F	800-824	1970.00-1971.20	In-Valid
	825-875	1971.25-1973.75	Valid
	876-899	1973.80-1974.95	Condo. Valid
C	900-924	1975.00-1976.20	In-Valid
	925-1175	1976.25-1988.75	Valid
	1176-1199	1988.80-1989.95	Condo. Valid

### 3.6 Range of Operating Power

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

### 3.7 Complete Circuit Diagrams

The RF chain of the 1900 MHz MFRM is made up of Nortel's MTRM (Multi-carrier Transmit/Receive Module) and OEM equipment. Exhibit 8 contains the schematics of the MTRM and Exhibit 9 contains the parts lists of the MTRM.

The OEM MCPA 1900 MHz power amplifier is approved under FCC ID E675JS0046.

### 3.8 Tune-up Procedure

The tune-up tests will be performed as part of the factory testing on the MFRM. 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.

### 3.9 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 MFRM via the high speed optical link.

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

### **3.10 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.

### **3.11 Circuit Description for Limiting Modulation**

This system employs a digital modulation techniques producing CDMA forward and reverse channel air interfaces that are compatible with ANSI J-STD-008, Personal Station – Base Station Compatibility Requirements for 1.8 to 2.0 GHz Code Division Multiple Access (CDMA) Personal Communications Systems.

## **4. Test Method and Test Result**

### **4.1 Tests performed by Nortel Networks**

#### **RF Power Output**

The maximum measured RF output power was 46.0 dBm for single carrier.

The maximum measured RF output power was 45.94 dBm for two carriers.

The maximum measured RF output power was 46.0 dBm for three carriers.

#### **Occupied Bandwidth**

The maximum measured occupied bandwidth was 1272.5 KHz for single carrier.

The maximum measured occupied bandwidth was 2494.9 KHz for two carriers.

The maximum measured occupied bandwidth was 3747.5 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 9.9 dB

1 MHz to 20 GHz measurements was 9.9 dB.

#### **Frequency Stability**

The GPS module has a frequency stability of 0.8 ppb over the range of  $-5^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

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



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## 4.2 Tests performed by Sanmina Canada ULC

### Radiated Emission Test Results from 30 MHz to 1 GHz

The minimum pass margin: 45.73 dB for H-Pol  
45.53 dB for V-Pol

### Radiated Emission Test Results from 1 GHz to 18 GHz

The minimum pass margin: 19.89 dB for H-Pol  
19.19 dB for V-Pol

Please refer to the Exhibit 2B for all test setups and results in details provided by Sanmina Canada ULC.