

List of Exhibits

Exhibit 1 Label Identification

Exhibit 2 Test Report

Exhibit 3 User Documentation

Exhibit 4 System Photographs

EXHIBIT 2

Test Report

Applicant: Northern Telecom Ltd.

For Type Acceptance/Certification on:

AB6NTGS09AA

1 Introduction

This information is submitted in accordance with the FCC rules and regulations, Part 2, Subpart J, §2.1033 through §2.1057 and Industry Canada RSS 129 radio standard for Type Acceptance/Certification of the Northern Telecom's (Nortel Networks) FCC approved CDMA 800 MHz Flexible Radio Module (FRM) adjunct with external multi channel amplifier(MCPA) configured in a TDMA rack.

This adjunct system is intended for use in the Domestic Public Cellular Radio Telecommunications Service and is designed in accordance with the following standards:

- *CFR 47, Part 22, Subpart H, Domestic Public Cellular Radio Telecommunications Service*
- *TIA/EIA/IS-95-A, Mobile Station - Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System, May 1995*

1.1 Test Result Summary

Table 1 summarizes the measurement results for the CDMA 800 MHz adjunct system.

Table 1: Test Results Summary

| FCC Measurement Specification | FCC Limit Specification | Description | Result |
|--------------------------------------|--------------------------------|---|-----------------|
| 2.1046 | 22.913 | RF Output Power | Compliant |
| 2.1047 | 22.901 | Modulation Characteristics | Not Applicable |
| 2.1049 | 22.917 | Occupied Bandwidth | OBW = 1.266 MHz |
| 2.1051, 2.1057 | 22.917 | Spurious Emissions at Antenna Terminals | Compliant |
| 2.1053, 2.1057 | 22.917 | Field Strength of Spurious Emissions | Compliant |
| 2.1055 | | Frequency Stability | Compliant |

2 Engineering Declaration

The CDMA 800 MHz adjunct with external MCPA rack system has been tested in accordance with the requirements contained in the Federal Communications Commission Rules and Regulations Parts 2 and 22 and Industry Canada Radio Standard Specification 129, issue 1. 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 and demonstrate that this equipment complies with the appropriate standards. All tests were conducted on a representative sample of the equipment for which type acceptance/certification is sought.

Signed Official copy kept on file by Nortel Networks

May 20, 1998

Rupinder Randhawa
Technical Manager
Wireless Systems Integrity
Nortel Networks
Calgary, Alberta

Date

3 Type Acceptance Application Requirements

3.1 Name of Applicant

The applicant is Northern Telecom (Nortel Networks) Limited.

3.2 Identification of Equipment

The equipment in this application for type acceptance is the Northern Telecom's (Nortel's) CDMA 800 MHz adjunct with external MCPA. The adjunct kit consists of a 20 dB fixed attenuator, and a 20 dB variable attenuator. The output power of this product be tuned by Nortel site crew to make sure the output power will not be violating the FCC approval. The FRM and MCPA are regulatory approved by FCC under AB6NT800FRM and E675JS0025 respectively. The FCC ID number sought for this product is AB6NTGS09AA.

The initial feasibility and verification process examined to ensure that TDMA MCPA shelf can be used with the CDMA Metrocell to deliver higher output power than is currently available with the CDMA Metrocell 25W SCPA.

A single MCPA shelf with 3x50W MCPA units was tested to ensure that it could support 2 CDMA carriers delivering 100 W of RF power at the duplexer output of the MCPA shelf. The test results demonstrated that at room temperature single MCPA shelf could deliver, on average, 100 W of RF power while meeting IS-97A specifications of antenna terminal Conducted Spurious Emissions.

3.3 Technical Description

The output power of the CDMA Metrocell PAM not be changed in any way. In addition, all global parameters of the CDMA Metrocell not be altered in any way to support MCPA shelf in conjunction with the CDMA Metrocell PAM.

The TDMA radio frame supports maximum 2 MCPA shelves. Although there is room available to position an additional MCPA shelf with 3x50W MCPA units, a single RIP is designed to power up maximum 2 MCPA shelves.

In order to support 2 carrier 3 sector CDMA Metrocell with 50W per carrier two TDMA radio frames are required. One TDMA radio frame should have 2 MCPA shelves whereas the second TDMA radio frame should have 1 MCPA shelf. Three sector two carrier TDMA radio frames are given in Exhibit 3.

A single MCPA shelf with 3x50W MCPA units is expected to meet the following power requirements that are given in Table 5.

| Description | Specification | Units |
|---------------------------------|---------------|-------|
| Minimum Input Power per Carrier | 10 | dBm |
| Minimum Total Input Power | 13 | dBm |
| Maximum Input Power per Carrier | 20 | dBm |
| Maximum Total Input Power | 23 | dBm |
| Maximum Output Power per | 47 | dBm |

| | | |
|---------------------------------------|----------|-----|
| Carrier | | |
| Maximum Total Output Power per sector | 50 | dBm |
| Typical Output Power Accuracy | +/- 0.75 | dB |

MCPA Power Requirements

3.4 Types of Emissions

The 800 MHz FRM Assembly is designed to operate in digital mode. The emission type is FXW for CDMA mode. The emission designator is **1M25FXW**.

3.5 Frequency Range

The 800 MHz CDMA operates in the 800 MHz cellular band where the operating frequency ranges are 824 – 849 MHz for the Receiver and 869 – 894 MHz for the Transmitter. The following table shows the valid CDMA channels within this band.

| Band | CDMA Channel Number | Transmitter Frequency Assignment (MHz) | | Valid CDMA Frequency Assignment |
|------|---------------------|--|-----------------|---------------------------------|
| | | Mobile | Base | |
| A'' | 991 – 1012 | 824.04 – 824.67 | 869.04 – 869.67 | In-Valid |
| | 1013 – 1023 | 824.70 – 825.00 | 869.70 – 870.00 | Valid |
| A | 1 – 311 | 825.03 – 834.33 | 870.03 – 879.33 | Valid |
| | 312 – 333 | 834.36 – 834.99 | 879.36 – 879.99 | In-Valid |
| B | 334 – 355 | 835.02 – 835.65 | 880.02 – 880.65 | In-Valid |
| | 356 – 644 | 835.68 – 844.32 | 880.68 – 889.32 | Valid |
| | 645 – 666 | 844.35 – 844.98 | 889.35 – 889.98 | In-Valid |
| A' | 667 – 688 | 845.01 – 845.64 | 890.01 – 890.64 | In-Valid |
| | 689 – 694 | 845.67 – 845.82 | 890.67 – 890.82 | Valid |
| | 695 – 716 | 845.85 – 846.48 | 890.85 – 891.48 | In-Valid |
| B' | 717 – 738 | 846.51 – 847.14 | 891.51 – 892.14 | In-Valid |
| | 739 – 777 | 847.17 – 848.31 | 892.17 – 893.31 | Valid |
| | 778 – 799 | 848.34 – 848.97 | 893.34 – 893.97 | In-Valid |

3.6 Range of Operating Power

The 800 MHz adjunct MCPA range of operating RF power is 30.0 dBm (1W) to 47.0dBm (50 W).

3.7 Maximum Power Rating

The maximum RF power output of the CDMA 800 MHz adjunct with external MCPA is 50 W (47.0 dBm).

3.8 Function of Each Active Circuit Device

See Exhibit 5 for the listing of devices incorporated in the FRM FCC filing number AB6NT800FRM.

3.9 Complete Circuit Diagrams

FRM FCC filing (AB6NT800FRM) Exhibit 4 contains schematics of devices incorporated in the Transmit/Receive module. The rest of the RF chain is made up of OEM equipment that has been submitted separately for FCC approvals.

The 800 MHz FRM is approved by FCC by ID AB6NT800FRM and the Multi Channel Power Amplifier, an OEM product, is also FCC self approved by FCC ID E675JS0025.

3.10 User Document

See Exhibit 3.

3.11 Tune-Up Procedure

The tune-up tests will be performed as part of the factory testing on the FRM. This procedure includes power output levels, spurious emissions, and occupied bandwidth. There are no user adjustments that will have any effect on these settings to the FRMs. However, there will be a new requirement to perform field calibration of the MCPA shelf in order to guarantee the output power of the MCPA shelf within some degree of accuracy. It is expected that after calibration has been performed using the software and the power levels have been verified the MCPA shelf could be powered down without the need to recalibrate the MCPA shelf when they are powered back up. Once the site has been calibrated for maximum of 50 Watts per carrier the MCPA will be locked into a mode that guaranteed output of 50 Watts. The customer can not change the input to increase the output power. In any case, if the input power has level changed from the calibrated setting the MCPA will shut down the operation automatically. Then the site has to recalibrate to the set power level of 50 Watts per carrier.

The MCPA field detail calibration procedure is documented to ensure that the MCPAs input and output power levels are maintained during it operation. It is s also attached in the Exhibit 3 in this report.

3.12 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 FRM via the high speed optical link.

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

3.13 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. However, the receiver band noise was found to be some 10 dB higher than the specified level for the 800 MHz CDMA Metrocell 25W SCPA. When used with the CDMA Metrocell DPM. The receiver sensitivity is expected to decrease by approximately 1.0 dB due to excess of spurious noise in the receiver band.

3.14 Circuit Description for Limiting Modulation

This systems employs digital modulation techniques producing CDMA forward and reverse channel air interfaces which 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.

3.15 Circuit Description for Limiting Power

A power detector is located in the FRM. This circuit will accurately measure the RMS power of the composite CDMA waveform. The system will step down the output power if the detected signal exceed the maximum power setting of the system. The MCPAs also have their own built in power control circuit. Once the tuning procedure completed at the field with the proper input levels then the MCPAs will be locked in to that set output power. If the out put power exceed the tolerance level due to any other variance the cell site will be shut down by the MCPAs.

3.16 Photographs

See Exhibit 4 for system level photograph.

3.17 Standard Test Conditions and Test Equipment

The FRM was tested under the following standard test conditions unless otherwise noted:

Ambient temperature: 20 to 35 degrees C

Ambient humidity: 20 to 40%

DC supply voltage: -48 Vdc (nominal)

3.18 EUT Identification List

The following table shows the identification of the components tested in this report.

TDMA RF Frame Equipment List

| Equipment Description | Model /Part Number | Release Number | Serial Number |
|---|--------------------|----------------|---------------|
| Multi Channel Power Amplifier (shelf#1) | NTFC07BA | P1 | NNTM74PA0008 |
| Multi Channel Power Amplifier (shelf#1) | NTFC07BA | P1 | NNTM74PA0200 |
| Multi Channel Power Amplifier (shelf#1) | NTFC07BA | P1 | NNTM74PA0196 |
| Multi Channel Power Amplifier (shelf#2) | NTFC07BA | P1 | NNTM74PA0534 |
| Multi Channel Power Amplifier (shelf#2) | NTFC07BA | P1 | NNTM74PA0199 |
| Multi Channel Power Amplifier (shelf#2) | NTFC07BA | P1 | 194419 |
| Weinschel Attenuator | 40-20-34 | 93459 | LL495 |
| Weinschel Attenuator | 40-20-34 | 93459 | LL494 |
| Weinschel Attenuator | 40-20-34 | 93459 | LK744 |
| Weinschel Attenuator | 40-20-34 | 93459 | LL500 |
| ARRA Variable Attenuator | N/A | N2853-10 | 116 |
| ARRA Variable Attenuator | N/A | N2853-10 | 117 |
| ARRA Variable Attenuator | N/A | N2853-10 | 122 |
| ARRA Variable Attenuator | N/A | N2853-10 | 119 |
| Times Microwave Cable(Qty -10) | NTGR3310 | TMS68999 | N/A |
| Filtronic Duplexer | NTPCO4DB | 190-CM201-F1V1 | EUD073 |
| Filtronic Duplexer | NTPCO4DB | 190-CM201-F1V1 | EUD056 |

CDMA FRM Equipment List

| Equipment Description | Model /Part Number | Release Number | Serial Number |
|---|---------------------------|-----------------------|----------------------|
| 800 MHz Flexible Radio Module (comprised of main modules below): | NT800FRM | 0D | NA |
| a) DPM | NTGS89BB | P5 | |
| b) TRM | NTGS81AA | N6 | NNTM532VJ4J6 |
| c) EOM | NTGS54BA | P1 | NNTM53608EM3 |
| d) Processor Board | NTGS82AA | N2 | NNTM532XBRMR |
| e) PA | NTGS86AA | N4 | NNTM74P00030 |
| | | | |

3.19 Test Equipment List

| Description | Manufacturer | Model | Serial Number | Cal. Due Date |
|---|-----------------|----------|---------------|---------------------|
| 20 Hz to 26.5 GHz, Spectrum Analyzer | Rohde & Schwarz | ESMI | DE22471 | Mar. 10/1999 |
| 20 Hz to 26 GHz, Spectrum Analyzer | HP | 8593E | 3710A03172 | June 10/1999 |
| 9 kHz to 2.9 GHz, RF Filter/Preselector | HP | 85420E | 3705A00184 | Mar. 19/2000 |
| 9 kHz to 2.9 GHz, EMI Receiver | HP | 8542E | 3710A00202 | Mar. 19/2000 |
| RF Power Meter | HP | 438A | 3518405267 | July 16/2000 |
| RF Power Head | HP | 8482A | 2652A16289 | May 28/1999 |
| 30 dB Attenuator | Weinschel | 66-30-34 | BE5716 | Verified before use |
| 20 dB Attenuator | Narda | 269-20 | 04007 | Verified before use |
| Splitter | Weinschel | 1506A | LG891 | Verified before use |
| Biconolog Antenna 20 MHz to 2 GHz | EMCO | 3141 | 9707-1067 | July 13/99 |
| Log Periodic Antenna 1 GHz to 26.5 GHz | Rohde & Schwarz | HL025 | 355618/010 | Oct. 06/99 |
| High Pass Filter | Narda West | NHP-3006 | P114 | Verified before use |
| 1 – 18 GHz Low Noise Amplifier | Miteq | N/A | 513159 | Lab Calibrated |

3.20 Support Equipment List

CDMA Metrocell Common Equipment List

| Support Equipment Description | Model /Part Number | Release Number | Serial Number |
|--------------------------------------|---------------------------|-----------------------|----------------------|
| CEM-48 | NTGS60BA | 16 | NNTM532X0279 |
| CEM-48 | NTGS60BA | 16 | NNTM532WYX40 |
| CEM-48 | NTGS60BA | 06 | NNTM5350AD95 |
| CEM-48 | NTGS60BA | 03 | NNTM5350AD2X |
| CM | NTGS40AA | 11 | NNTM531YAR03 |
| CORE | NTGS30AA | 10 | NNTM53507YN1 |
| GPSTM | NTGS50AA | N5 | NNTM74TM0051 |
| TRM | NTGS85AA | 01 | NNTM531DYELJ |
| TRM | NTGS85AA | 01 | NNTM5350B84V |
| TRM | NTGS85AA | 06 | NNTM531DYFPN |
| TRM | NTGS85AA | 06 | NNTM532YJ1H5 |
| PAM | NTGS8660 | 03 | NNTM5350AT2B |
| PAM | NTGS8660 | 03 | NNTM532YHXCV |
| PAM | NTGS8660 | 05 | NNTM5350AWXA |
| PAM | NTGS8660 | 03 | NNTM532YHY4M |

4 Transmitter Test and Measurement Results

4.1 RF Power Output

4.1.1 RF Power Output Requirements

FCC Part 2.1046 / IC RSS129 Sec. 9.2.3

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.983(d)(5). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

FCC Limit (Part 22.913)

The maximum effective radiated power (ERP) of base transmitters and cellular transmitters must not exceed 500 Watts.

IC Limit (RSS129 Sec. 9.2.3)

The output power shall be capable of being adjusted to within +/-1.0 dB of the manufacturer's rated power.

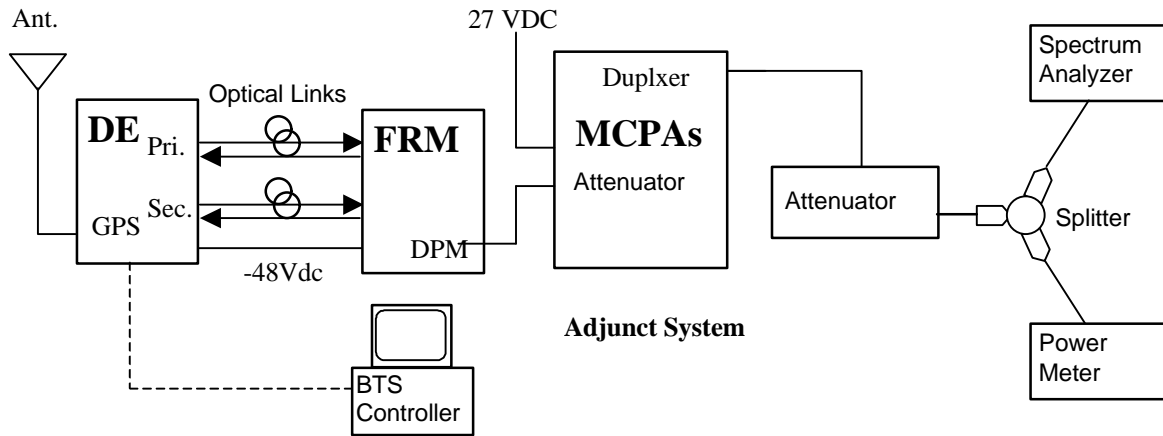
4.1.2 Test Method

The DE was setup via the BTS controller to enable the FRM to transmit at maximum power. The output of the FRM was calibrated using the NT tune-up procedure and fed into the MCPA shelf. The measurements were made at the output of the duplexer port for one RF carrier. Measurements were also made on channels at the bottom, middle and top of the licensed bands. The RF output power was measured using the power meter.

4.1.3 Test Setup

The set-up used for the 800 MHz Adjunct system RF output power test is illustrated in Figure 1.

Figure 1: Test Setup for RF Power Output Measurement



4.1.4 Test Result

The 800 MHz Adjunct system complies with the requirement. The maximum measured RF output power from the FRM was +47.31 dBm. The RF power output measured on different channels is shown in Table 2.

Table 2: RF Output Power of 800 MHz Adjunct System

| Channel Number (Band) | Frequency (MHz) | Measured RF Output Power (dBm) | Maximum Rated Power (dBm) | FCC Limit (dBm) |
|-----------------------|-----------------|--------------------------------|---------------------------|-----------------|
| 8 (A) | 870.24 | 46.90 | 47.0 | 50 |
| 283 (A) | 878.49 | 47.23 | 47.0 | 50 |
| 293 (A) | 878.79 | 47.30 | 47.0 | 50 |
| 374 (B) | 881.22 | 47.07 | 47.0 | 50 |
| 384 (B) | 881.52 | 47.09 | 47.0 | 50 |
| 616 (B) | 888.78 | 47.04 | 47.0 | 50 |
| 758 (B') | 892.74 | 47.31 | 47.0 | 50 |

4.2 Occupied Bandwidth (Digital)

4.2.1 Occupied Bandwidth Requirements

FCC Part 2.1049

The OBW, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(g) Transmitter in which the modulating baseband comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

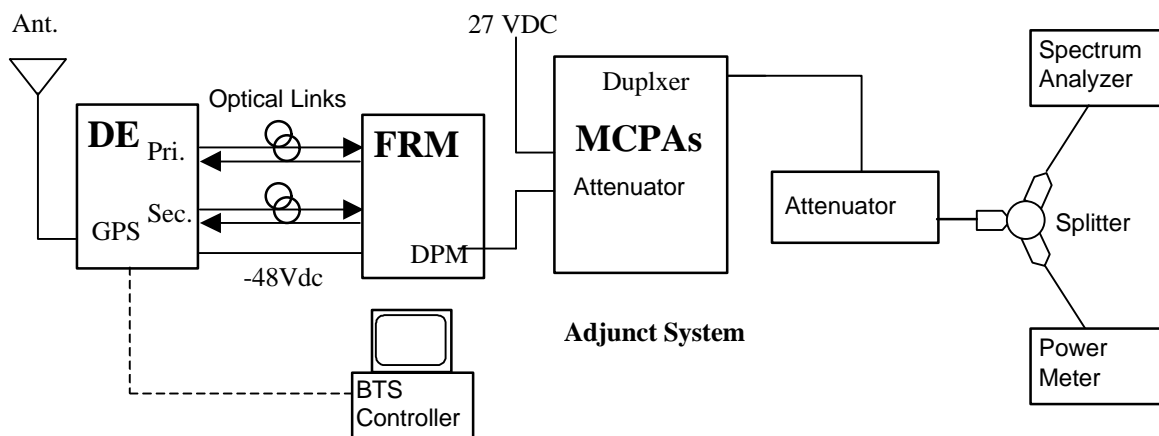
4.2.2 Test Method

The DE was setup via the BTS controller to enable the FRM to transmit at maximum power. The output of the FRM was calibrated using the NT tune-up procedure and fed into the MCPA shelf. The measurements were made at the output of the duplexer port for one RF carrier. Measurements were also made on channels at the bottom, middle and top of the licensed bands. The occupied bandwidth was measured using the 99% channel power feature of the spectrum analyzer.

4.2.3 Test Setup

The set-up used for the Adjunct 800 MHz Occupied bandwidth test is illustrated in Figure 2.

Figure 2: Test Setup for Occupied BW Measurement



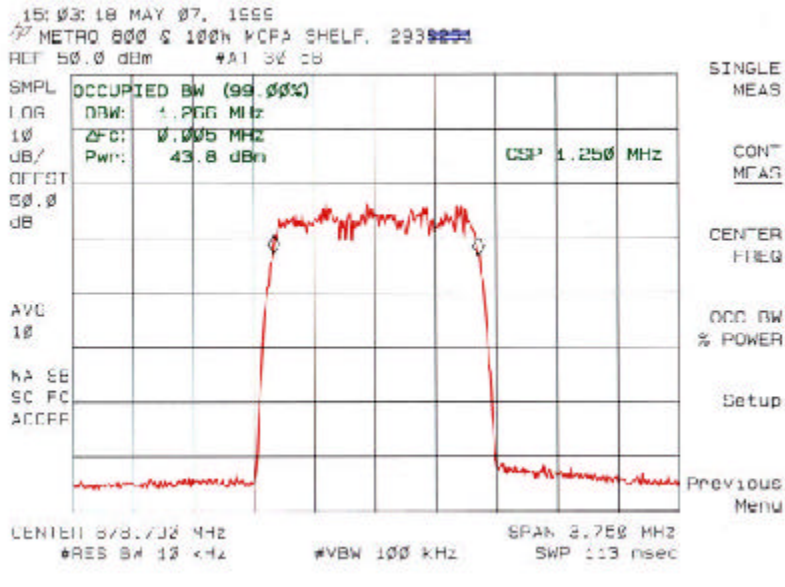
4.2.4 Test Results

The measured occupied BW from the Base Station was 1.266 MHz. The Base Station complies with the requirement. Table 3 shows the measured occupied bandwidth at the different channels. Figure 3 shows a plot of the maximum measured occupied bandwidth of 1.266 MHz.

Table 3: Occupied Bandwidth of 800 MHz Adjunct System

| Channel Number (Band) | Frequency (MHz) | Measured Occupied Bandwidth (kHz) |
|------------------------------|------------------------|--|
| 8 (A) | 870.24 | 1266 |
| 283 (A) | 878.49 | 1266 |
| 293 (A) | 878.79 | 1266 |
| 374 (B) | 881.22 | 1266 |
| 384 (B) | 881.52 | 1266 |
| 616 (B) | 888.78 | 1266 |
| 758 (B') | 892.74 | 1260 |

Figure 3: Plot of Occupied Bandwidth (Channel 293)



4.3 Spurious Emissions at Antenna Terminals (Digital Mode)

4.3.1 Spurious Emissions Requirements

FCC Part 2.1051

Conducted spurious emissions shall be attenuated below the level of emissions of the carrier frequency by at least $43 + 10[\log(\text{mean output power in watts})]$ or must not exceed a level of -13 dBm.

FCC Part 2.1057 - Frequency spectrum to be investigated

The spectrum should be investigated from the lowest radio generated in the equipment up to at least the 10th harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

4.3.2 Test Method

The DE was setup via the BTS controller to enable the FRM to transmit at maximum power. The output of the FRM was calibrated using the NT tune-up procedure and then fed into the MCPA shelf. The measurements were made at the output of the duplexer port for one RF carrier. Measurements were also made on channels at the bottom, middle and top of the licensed bands.

The following spectrum analyzer settings were used for the measurement of the antenna port (DPM output) spurious emissions:

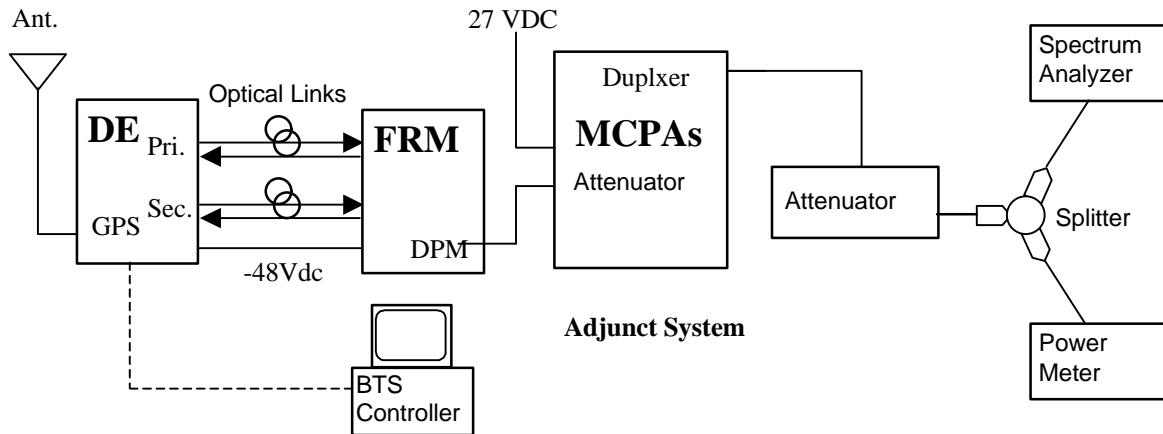
| | |
|-----------------------|-------------|
| Resolution Bandwidth: | 30 kHz |
| Video Bandwidth: | 30 kHz |
| Video Average: | 10 averages |
| Span: | 5 MHz |
| Attenuation: | 50 dB |
| Ref. Level: | 50 dBm |
| Ref. Level Offset: | 50 dB |
| Sweep Time: | Coupled |

The emissions were investigated up to 10 GHz (the 10th harmonic of the fundamental emission).

4.3.3 Test Setup

The set-up used for the Adjunct 800 MHz MCPA Antenna Port Spurious Emission test is illustrated in Figure 4.

Figure 4: Test Setup for Antenna Port Spurious Emission Measurement



4.3.4 Test Results

The frequency spectrum from 10 MHz to 10 GHz was scanned for emissions using a 30 kHz resolution bandwidth. The FRM complies with the limit of -13 dBm. A minimum margin of 5.51 dB to the band edge was achieved. Table 4 shows the spurious emissions at the antenna port of the FRM. Figures 5 – 9 show the band edge emissions at the adjacent valid CDMA channel. No other out of band emissions were detected from 10 MHz to 10 GHz.

Table 4: Spurious Emissions at the 800 FRM Antenna Port

| Frequency (MHz) | Spurious Emissions Level (dBm) | FCC Limit (dBm) | Margin (dB) |
|--------------------------------|--------------------------------|-----------------|-------------|
| 869.04 (lower edge of Ch. 8) | -21.98 | -13 | 8.98 |
| 879.99 (upper edge of Ch. 293) | -18.51 | -13 | 5.51 |
| 881.19 (lower edge of Ch. 384) | -19.18 | -13 | 6.18 |
| 887.28 (lower edge of Ch. 616) | -20.20 | -13 | 7.2 |
| 893.94 (upper edge of Ch. 758) | -18.60 | -13 | 5.6 |

Figure 4: Spurious Emissions (Channels 283 & 241)

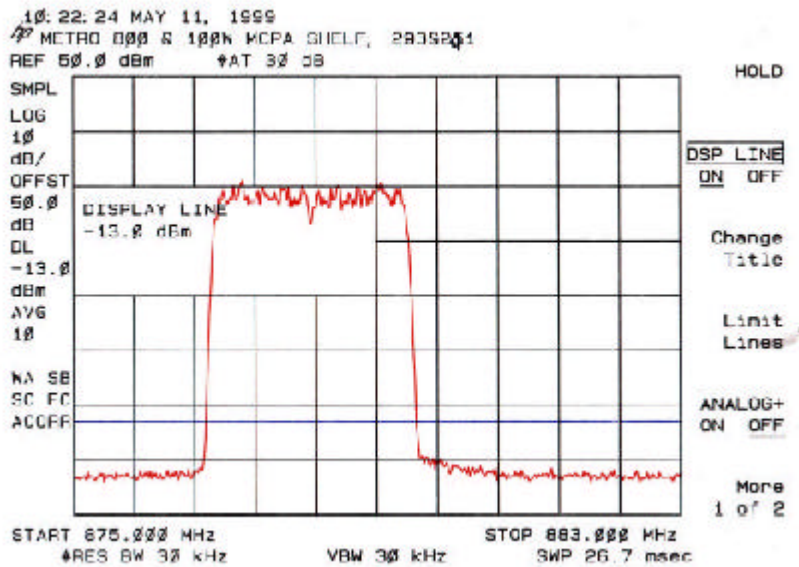


Figure 5: Spurious Emissions (Channels 293 & 251)

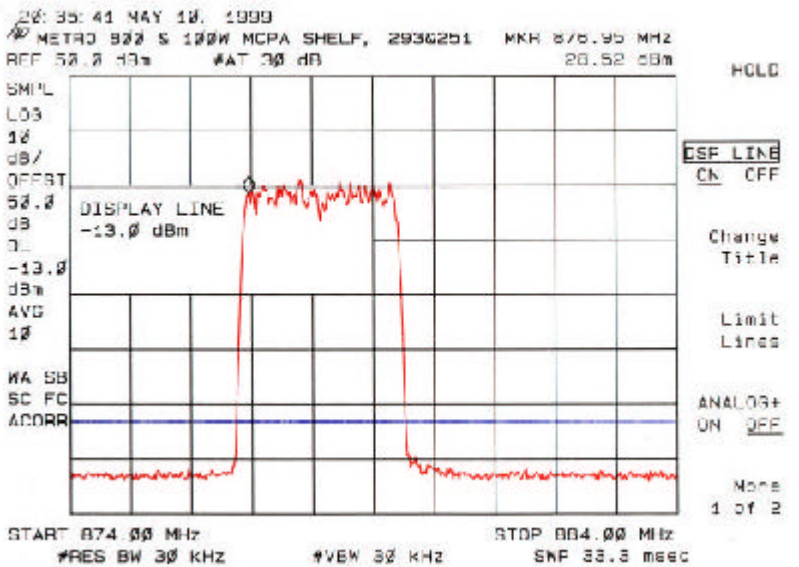
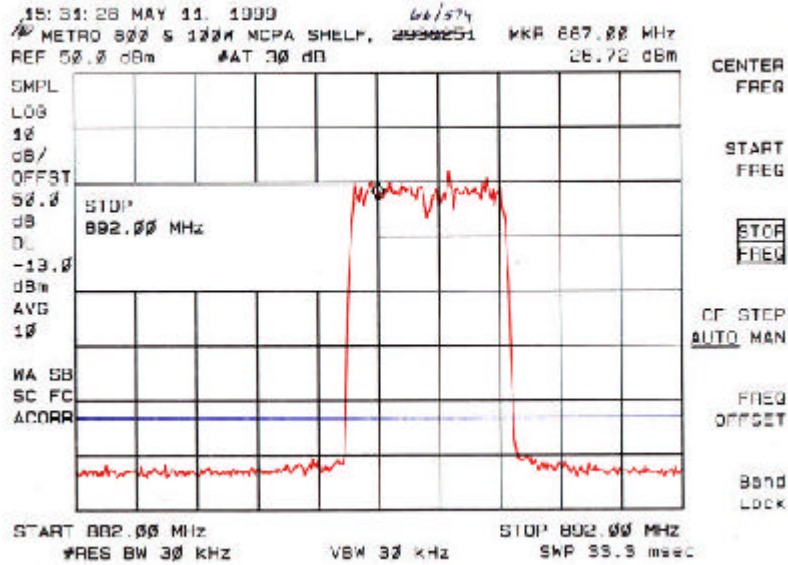


Figure 6: Spurious Emissions (Channels 616 & 574)



4.4 Frequency Stability

4.4.1 Frequency Stability Requirements

FCC Part 2.1055

(a) *The frequency stability shall be measured with variation of ambient temperature as follows:*

- (1) *From -30° to $+50^{\circ}$ centigrade for all equipment except that specified in subparagraphs (2) and (3) of this paragraph.*

(b) *Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.*

(d) *The frequency stability shall be measured with variation of primary supply voltage as follows:*

- (1) *Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.*

- (2) *For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.*

- (3) *The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.*

(e) *When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)*

FCC Limit (Part 22.913)

The frequency stability shall be better than ± 2.5 ppm over a temperature range of -30 to $+50$ degrees C.

4.4.2 Results

The DE incorporates a GPS module from Trimble Navigation. This 10MHz GPS reference is used to synchronize the entire Base Station. The GPS module has a frequency stability of 0.8 ppb over the range of -5° C to 70° C. The Base Station complies with the requirement.

4.5 RF Radiation Exposure

An internal Nortel document, "RF Exposure Guidelines for Cellular and PCS Antenna Sites" (Document no: SI-EMR-R01.4), is used for the deployment and installation of Nortel's wireless base station equipment with respect to the control of Electromagnetic Radiation (EMR) exposure. The objective of this document is to provide guidance on where antennas can be deployed, how to calculate power densities and safe distances, and how to protect users from excessive exposure to electromagnetic radiation.

4.6 Field Strength of Spurious and Harmonic Radiation

4.6.1 Radiated Emissions Requirements

FCC Part 2.1053

(a) Measurements was made to detect spurious emissions radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data were supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph 2.989(c) as appropriate. For equipment operating on frequencies below 890 MHz, an Open Field Test is normally required, with the measuring instrument antenna located in the far field at all test frequencies. In event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurement will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with the reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.*
- (2) All equipment operating on frequencies higher than 25 MHz.*
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.*
- (4) Other types of equipment as required, when deemed necessary by the Commission.*

FCC Part 2.1057 - Frequency spectrum to be investigated

The spectrum was investigated from the lowest radio generated in the equipment up to at least the 10th harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

4.6.2 Test Method

4.6.2.1 Test Site

Radiated emissions testing was performed at Nortel's Wireless Systems Integrity Laboratory in the 10 meter Ambient Free Chamber located at 5111 47th Street NE, Calgary, Alberta Canada.

4.6.2.2 Test Procedure

Radiated emission measurements were performed according to the procedures outlined in Section 8 of the ANSI C63.4 standard.

The measurement distance between the center of the measurement antenna and the periphery of equipment under test was 10 meters.

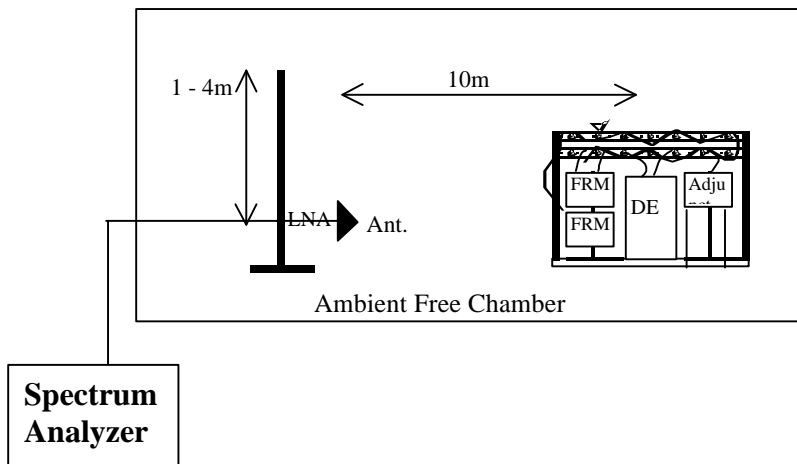
In order to maximize all emission levels from the equipment, the emissions were searched with the receive antenna at varied height levels. The equipment was rotated a full 360 degrees on the turntable with the receive antenna at varying height levels (1 to 4 meters). Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization.

The DE was setup with four FRMs transmitting on channels 8, 50, 283 & 241 at maximum power. The output from the FRMs were properly calibrated and fed into the MCPA shelves for amplification. The MCPAs were mounted in the TDMA rack and configured next to the CDMA DE rack. The each MCPA shelf was configured with 2 carrier per sector. And each shelf transmitting at 50Watts power per carrier.

A complete scan of the emissions from 30MHz to 10 GHz was completed. Quasi-peak detector was used for measurements up to 1GHz. For emissions above 1 GHz the peak detector function was used with an RBW of 1 MHz.

The FRMs and MCPAs powered by DC supplies. Since the system required DC power there were no conducted emission requirement by FCC.

4.6.3 Test Setup



4.6.4 Test Results

There were no radiated emissions present within 12 dB of the FCC limit of 73.9 dB μ V/m at 10 meters from the FRM system with adjunct to the external MCPA shelf.

There were no conducted emission requirements for DC powered systems; testing was not performed.