UltraTech
Group of Labs

31040/SIT

C-1376

Canada
46390-2049

NVLAP
200093-0

00-034

SL2-IN-E-1119R

Oct. 30, 2003

TIMCO ENGINEERING INC.
P.O. Box 370
849 N.W. State Road 45
Newberry, Florida

Subject: **Type Acceptance Application under FCC 47 CFR, Parts 2 and 90 (Subpart I) - Non-Broadcast Radio Transceivers Operating in the frequency bands 806-821 MHz (25 kHz Channel Spacing) and 821-824 MHz (12.5 kHz Channel Spacing).**

Applicant: **Wavenet Technology PTY. LTD.**
Product: **Boomer II Data TAC Wireless OEM Modem Module**
Model: **BM2-800D**
FCC ID: **PQS-BM2800D**

Dear Sir/Madam,

As appointed agent for **Wavenet Technology PTY. LTD.**, we would like to submit the application for FCC certification of the above product. Please review all necessary files uploaded to TIMCO Upload Site.

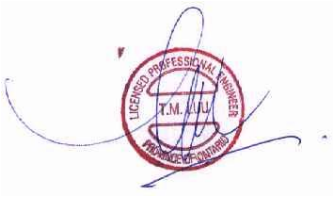
The Boomer II Model BM2-800D was certified by FCC under PQS-BM28001. However, the original FCC Grant was restricted for use with maximum ERP of 1.9 Watts, a specific antenna and duty cycle of 10% which does not allow the manufacturer the flexibility to market their product. Therefore, the manufacturer wish to apply for a new FCC Grant with the following new specifications without any modifications on the original certified product:

(1) Conducted of RF output power of 2.1 watts as measured by Ultratech. Please note that the conducted power measured on the original application was incorrect, we assume the cable loss was added to the power measurement; therefore, it shows unusual low level.
(2) The maximum duty cycle is 30%
(3) The antenna separation is changed according to new antenna gain limits specified in the Uses Manual.

This application is subject to Modular Approval per FCC DA 00-1407 for Mobile and Base application only. A new FCC certification with SAR compliance for a Portable OEM product, which employs this radio, is required.

If you have any queries, please do not hesitate to contact us.

Yours truly,



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SL2-IN-E-1119R

Oct. 30, 2003

Wavenet Technology PTY. LTD.
140 Burswood Road
Burswood,
Western Australia, 6100

Attn.: **Mr. David Shawcross**

Subject: **Certification Testing in accordance with FCC 47 CFR, Parts 2 and 90 (Subpart I) - Non-Broadcast Radio Transceivers Operating in the frequency bands 806-821 MHz (25 kHz Channel Spacing) and 821-824 MHz (12.5 kHz Channel Spacing).**

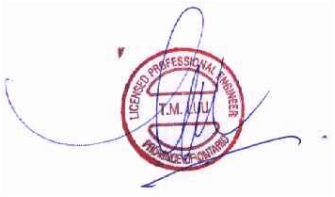
Product: **Boomer II Data TAC Wireless OEM Modem Module**
Model: **BM2-800D**
FCC ID: **PQS-BM2800D**

Dear Mr. Shawcross,

The product sample has been tested in accordance with **FCC 47 CFR, Parts 2 and 90 (Subpart I) - Non-Broadcast Radio Transceivers Operating in the frequency bands 806-821 MHz (25 kHz Channel Spacing) and 821-824 MHz (12.5 kHz Channel Spacing),** and the results and observation were recorded in the engineering report, Our File No.: WTP-017A-FCC90

Enclosed you will find copy of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,



Tri Minh Luu, P.Eng
Vice President - Engineering

Encl.

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ENGINEERING TEST REPORT

Boomer II Data TAC Wireless OEM Modem Module
Model No.: BM2-800D
FCC ID: PQS-BM2800D

Applicant:

Wavenet Technology PTY. LTD.
140 Burswood Road
Burswood,
Western Australia, 6100

Tested in Accordance With

Federal Communications Commission (FCC)
47 CFR, PARTS 2 and 90 (Subpart I)
--- NEW MPE --

UltraTech's File No.: WTP-017A-FCC90

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: Oct. 30, 2003	
Report Prepared by: Tri Luu, P.Eng. Issued Date: Oct. 30, 2003	Tested by: Hung Trinh, RFI Technician Test Dates: Oct. 30, 2003

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*

UltraTech

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Parts 2 and 90
Title:	Telecommunication - Code of Federal Regulations, CFR 47, Parts 2 & 90
Purpose of Test:	To gain FCC Certification Authorization for Radio operating in the frequency bands 806-821 MHz (25 kHz Channel Spacing) and 821-824 MHz (12.5 kHz Channel Spacing).
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

1.2. RELATED SUBMITTAL(S)/GRANT(S)

None

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC CFR Parts 0-19, 80-End	2002	Code of Federal Regulations – Telecommunication
ANSI C63.4	1992	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
CISPR 22 & EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1	1999	Specification for Radio Disturbance and Immunity measuring apparatus and methods

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	Wavenet Technology PTY. LTD.
Address:	140 Burswood Road Burswood, Western Australia, 6100
Contact Person:	Mr. David Shawcross Phone #: +61 8 9262 0239 Fax #: +61 8 9355 5622 Email Address: dshawcross@wavenet.com.au

MANUFACTURER	
Name:	Wavenet Technology PTY. LTD.
Address:	140 Burswood Road Burswood, Western Australia, 6100
Contact Person:	Mr. David Shawcross Phone #: +61 8 9262 0239 Fax #: +61 8 9355 5622 Email Address: dshawcross@wavenet.com.au

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	Wavenet Technology PTY. LTD.
Product Name:	Boomer II Data TAC Wireless OEM Modem Module
Model Name or Number:	BM2-800D
Serial Number:	Pre-production
Type of Equipment:	Non-broadcast Radio Communication Equipment
External Power Supply:	External regulated DC source
Transmitting/Receiving Antenna Type:	Non-integral

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	[x] Mobile [x] Base station (fixed use) **Note**: FCC Re-certification with compliance with SAR is required if the EUT is employed in a Portable OEM device .
Intended Operating Environment:	[x] Commercial [x] Light Industry & Heavy Industry
Power Supply Requirement:	External 3.8 Vdc regulated
RF Output Power Rating:	2.0 Watts
Maximum Duty Cycle:	30%
Operating Frequency Range:	806-821 MHz and 821-824 MHz
RF Output Impedance:	50 Ohms
Channel Spacing:	• 25 kHz for 806-821 MHz Band • 12.5 kHz for 821-824 MHz Band
Data Rate:	• 19.2 kb/s for 806-821 MHz Band • 9.6 kb/s for 821-824 MHz Band
Occupied Bandwidth (99%):	
Modulation:	• 2-Level FSK MDC 4.8 kb/s 2.5 kHz Frequency Deviation (12.5 kHz Channel Spacing) • 4-Level FSK RDLAP 9.6 kb/s 3.9 kHz Frequency Deviation (12.5 kHz Channel Spacing) • 4-Level FSK RDLAP 19.2 kb/s 5.6 kHz Frequency Deviation (25 kHz Channel Spacing)
Emission Designation:	• 20K0F1D for 806-824 MHz • 12K6F1D for 821-824 MHz Band
Antenna Connector Type:	Standard MMCX connector (Professional Installation). Please refer to the User's Manual for detailed instruction of antenna installation and RF Exposure Warning.
Antenna Description:	No specific antenna supply. The maximum antenna gain specified by the manufacturer is 3 dBi, 6 dBd, 9 dBd and 12 dBd.

RECEIVER	
Operating Frequency Range:	851 – 870 MHz
RF Iutput Impedance:	50 Ohms

EXHIBIT 3. SUMMARY OF TEST RESULTS

3.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).

- Radiated Emissions were performed at the Ultratech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario.

  The above sites have been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: Aug. 10, 2002.

3.2. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	APPLICABILITY (YES/NO)
90.205 & 2.1046	RF Power Output	Yes
1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	Yes
90.213 & 2.1055	Frequency Stability	Note (1)
90.242(b)(8) & 2.1047(a)	Audio Frequency Response	Not applicable to new standard. However, tests are conducted under FCC's recommendation.
90.210 & 2.1047(b)	Modulation Limiting	Note (1)
90.210 & 2.1049	Emission Limitation & Emission Mask	Note (1)
90.210, 2.1057 & 2.1051	Emission Limits - Spurious Emissions at Antenna Terminal	Note (1)
90.210, 2.1057 & 2.1053	Emission Limits - Field Strength of Spurious Emissions	Note (1)
Boomer II Data TAC Wireless OEM Modem Module, **Model No.: BM2-800D**, by **Wavenet Technology PTY. LTD.** has also been tested and found to comply with **FCC Part 15, Subpart B - Radio Receivers and Class B Digital Devices**. The engineering test report has been documented and kept in file and it is available anytime upon FCC request.		

Note (1): There are no re-tests required since there is no changes in electrical and mechanical designs. Please refer to original engineering test reports that are re-submitted to TIMCO.

EXHIBIT 4. MEASUREMENT DATA

4.1. RF POWER OUTPUT @ FCC 2.1046 & 90.205

4.1.1. Limits @ FCC 90.205

Please refer to FCC 47 CFR, Part 90, Subpart I, Section 90.205 for specification details.

4.1.2. Method of Measurements

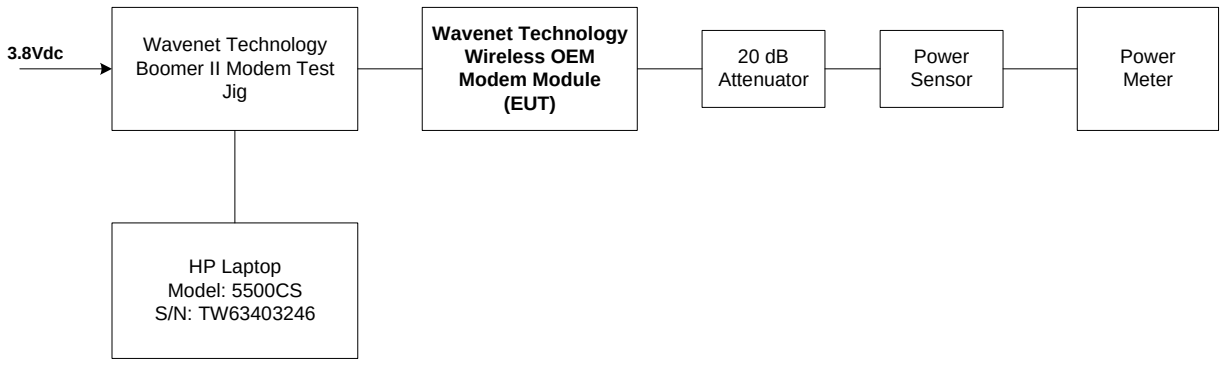
Please refer to Exhibit 7, section 7.1 (Conducted) and section 7.2 (Radiated) for test procedures and test setup.

4.1.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Attenuator	Weinschel Corp	24-20-34	BK-2804	DC – 8.5 GHz
Power Meter	Hewlett Packard	436A	1725A02249	10 kHz – 50 GHz, sensor dependent
Power Sensor	Hewlett Packard	8481A	2702A68983	10 MHz – 18 GHz

4.1.4. Test Arrangement

- **Conducted Output Power at Antenna Terminals**



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

4.1.5. Test Data

4.1.5.1. Conducted Output Power at Antenna Terminals

Fundamental Frequency (MHz)	Measured Power (dBm)	Power Rating (dBm)
806.0	33.00	33.0
815.0	33.13	33.0
821.0	33.16	33.0
822.0	33.00	33.0
824.0	33.00	33.0

4.2. RF EXPOSURE REQUIREMENTS @ 1.1310 & 2.1091

4.2.1. Limits

- **FCC 1.1310:-** The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
300-1500	...	...	F/300	6
(B) Limits for General Population/Uncontrolled Exposure				
300-1500	...	...	F/1500	6

F = Frequency in MHz

4.2.2. Method of Measurements

Refer to FCC @ 1.1310 & 2.1091

In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed:

(1) Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.
(2) Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement
(3) Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits
(4) Any other RF exposure related issues that may affect MPE compliance

Calculation Method of RF Safety Distance:

$S = PG/4\Pi r^2 = EIRP/4\Pi r^2$

Where: P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$r = \sqrt{PG/4\Pi S}$

FCC radio frequency exposure limits may not be exceeded at distances closer than r cm from the antenna of this device

- For portable transmitters (see Section 2.1093), or devices designed to operate next to a person's body, compliance is determined with respect to the SAR limit (define in the body tissues) for near-field exposure conditions. If the maximum average output power, operating condition configurations and exposure conditions are comparable to those of existing cellular and PCS phones., an SAR evaluation may be required in order to determine if such a device complies with SAR limit. When SAR evaluation data is not available, and the additional supporting information cannot assure compliance, the Commission may request that an SAR evaluation be performed, as provided for in Section 1.1307(d)

4.2.3. Test Data

Note:

(1) Refer to Page 23 of the Users manual for RF Exposure Information
(2) The most stringent (lowest) power density is calculated using lowest frequency as below:

RF EXPOSURE DISTANCE LIMITS: $r = (PG/4\Pi S)^{1/2} = (EIRP/4\Pi S)^{1/2}$
$S = F/1500 = \text{lowest-f}/1500 = 806/1500 = 0.537\ mW/cm^2$

4.2.3.1. Antenna Separation for Model BM2-800D with Antenna Gain of 3 dBi or less and maximum duty cycle of 30%

Frequency (MHz)	Measured Maximum Peak RF Conducted Power (Watts)	Calculated Average RF Conducted Power with 30% Duty Cycle (Watts)	Calculated Average EIRP (Watts)	Calculated RF Safety Distance r (cm)	Manufacturer's Specified RF Safety Distance
806	2.1	0.63	1.20	12.6	20.0

4.2.3.2. Antenna Separation for Model BM2-800D with Antenna Gain of 6 dBd (or 8.2 dBi) or less and maximum duty cycle of 30%

Frequency (MHz)	Measured Maximum Peak RF Conducted Power (Watts)	Calculated Average RF Conducted Power with 30% Duty Cycle (Watts)	Calculated Average EIRP (Watts)	Calculated RF Safety Distance r (cm)	Manufacturer's Specified RF Safety Distance
806	2.1	0.63	3.96	23.0	25.0

4.2.3.3. Antenna Separation for Model BM2-800D with Antenna Gain of 9 dBd (11.2 dBi) or less and maximum duty cycle of 30%

Frequency (MHz)	Measured Maximum Peak RF Conducted Power (Watts)	Calculated Average RF Conducted Power with 30% Duty Cycle (Watts)	Calculated Average EIRP (Watts)	Calculated RF Safety Distance r (cm)	Manufacturer's Specified RF Safety Distance
806	2.1	0.63	7.91	32.5	35.0

4.2.3.4. Antenna Separation for Model BM2-800D with Antenna Gain of 12 dBd (14.2 dBi) or less and maximum duty cycle of 30%

Frequency (MHz)	Measured Maximum Peak RF Conducted Power (Watts)	Calculated Average RF Conducted Power with 30% Duty Cycle (Watts)	Calculated Average EIRP (Watts)	Calculated RF Safety Distance r (cm)	Manufacturer's Specified RF Safety Distance
806	2.1	0.63	15.78	45.9	50.0