STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
Fax: (860) 827-2950

August 13, 2001

Stephen J. Humes
LeBoeuf, Lamb, Greene & MacRae
Goodwin Square
225 Asylum Street
Hartford, CT 06103

RE: **TS-VOICESTREAM-083-010719** - VoiceStream Wireless Corporation request for an order to approve tower sharing at an existing telecommunications facility located at 290 Preston Avenue, Middletown, Connecticut.

Dear Attorney Humes:

At a public meeting held August 8, 2001, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Any additional change to this facility may require an explicit request to this agency pursuant to General Statutes § 16-50aa or notice pursuant to Regulations of Connecticut State Agencies Section 16-50j-73, as applicable. Such request or notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction.

The proposed shared use is to be implemented as specified in your letter dated July 19, 2001, and July 27, 2001.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston
Chairman

MAG/RKE/laf

c: Honorable Domenique S. Thornton, Mayor, City of Middletown
Planning and Zoning Official, City of Middletown
Christopher B. Fisher, Esq., Cuddy & Feder & Worby LLP
Julie M. Donaldson, Esq., Hurwitz & Sagarin LLC
Michele Briggs, SNET Mobility LLC

I:\siting\em\voicestream\middletown\dc080801.doc

LEBOEUF, LAMB, GREENE & MACRAE
L.L.P.
A LIMITED LIABILITY PARTNERSHIP INCLUDING PROFESSIONAL CORPORATIONS

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225 ASYLUM STREET
HARTFORD, CT 06103
(860) 293-3500
FACSIMILE: (860) 293-3555

WRITER'S DIRECT DIAL:
(860) 293-3744

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July 19, 2001

RECEIVED
JUL 19 2001
CONNECTICUT SITING COUNCIL

Mortimer A. Gelston, Chairman
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Request by VoiceStream for an Order to Approve the Shared Use of a Tower Facility <u>290 Preston Avenue, Middletown, Connecticut</u>

Dear Chairman Gelston and Members of the Council:

Please be advised that LeBoeuf, Lamb, Greene & MacRae, L.L.P. represents Omnipoint Communications, Inc. ("VoiceStream"), a subsidiary of VoiceStream Wireless Corporation in the above-referenced matter. Pursuant to Connecticut General Statutes §16-50aa, VoiceStream hereby requests an order from the Connecticut Siting Council ("Council") approving the proposed shared use by the applicant of an existing tower located at 290 Preston Avenue in Middletown, Connecticut. VoiceStream proposes to install antennas on the existing tower, and the equipment associated with this facility would be located near the base of the tower within the existing compound (see "Exhibit A"). VoiceStream requests that the Council find that the proposed shared use of the tower satisfies the criteria stated in §16-50aa and issue an order approving the proposed use.

Background

Effective as of the May 31, 2001 merger between Deutsche Telekom AG and VoiceStream Wireless Corp., the corporate structure of VoiceStream has changed.[1] VoiceStream holds the "A block" "Wideband PCS"

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[1]The corporate structure of VoiceStream is as follows: Omnipoint Communications, Inc. ("Omnipoint") is a 95.4% subsidiary of Omnipoint Finance, LLC (hereinafter, "OF"). OF is a wholly owned subsidiary of Omnipoint Finance Holding, LLC (hereinafter, "OFH"). OFH is a subsidiary of Omnipoint Wireless Corporation (hereinafter "VS"), which owns all of the outstanding common shares of OFH. VS is a wholly owned subsidiary of T-Mobile International AG (hereinafter "T-Mobile"). T-Mobile is a wholly owned subsidiary of Deutsche Telekom AG (American Depositary Receipts traded in U.S. on the NYSE: DT).

license for the 2-GHz PCS frequencies for the greater New York City area, including the entire State of Connecticut. VoiceStream is licensed by the Federal Communications Commission (FCC) to provide PCS wireless telecommunications service in the State of Connecticut, which includes the area to be served by the proposed installation.

The tower at 290 Preston Avenue in Middletown is a Summit 150-foot monopole. The coordinates for the site are **41°-33'-08" N** and **72°-44'-45" W**. The tower is located on the west side of Interstate 91, opposite the rest area between exits 19 and 20. The tower is owned by AT&T and the surrounding land is owned by Brenda and Ernest Trumpold of Wallingford, Connecticut. VoiceStream and the owner have agreed to mutually acceptable terms and conditions for the proposed shared use of this tower, and the owner has authorized VoiceStream to act on its behalf to apply for all necessary local, state and federal permits, approvals and authorizations which may be required for the proposed shared use of this facility.

VoiceStream proposes to install an antenna cluster comprised of three sectors, with 4 antennas per sector. The model number for sectors 1 & 2 is EMS RR65-18-00 DPL2. The model number for sector 3 is EMS RR90-17-02 DPL2. The proposed antennas would be mounted on a fourteen foot low profile platform at the 140-foot elevation above ground level ("AGL"). The radio transmission equipment associated with these antennas, three Nortel S8000 BTS cabinets, would be located near the base of the tower on concrete pads. A cable tray would be added from the cabinets to the existing tower. Exhibit B contains specifications for the proposed antennas and equipment cabinets. A utility backboard would be erected in the compound, just west of the cabinets with telephone and electrical service running from an existing multi meter bank via underground conduits. The coaxial cables and ground wire would be routed up the interior of the monopole to the proposed antennas above. Presently the tower holds existing AT&T antennas on a low profile platform at the 150 foot level AGL. The tower is designed to accommodate future carriers with a similar low profile platform configuration. The existing rolled gravel compound is surrounded by a ten foot high wood stockade fence which in turn is surrounded by Austrian Pine and Euonymus Alata (shrubbery). The compound is accessible from an existing gravel drive. AT&T has existing equipment in the compound and plans call for additional equipment to be added by other carriers.

C.G.S. §16-50aa (c) (1) provides in pertinent part that upon written request for approval of a proposed shared use, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such shared use." The shared use of the tower satisfies those criteria as follows:

A. **Technical Feasibility** - The existing tower and compound were designed to accommodate multiple carriers. A structural analysis of the tower with the proposed VoiceStream installation has been performed and is attached as Exhibit C. The proposed shared use of this tower therefore is technically feasible.

B. **Legal Feasibility** Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the proposed shared use of an existing tower facility such as the facility at 290 Preston Avenue in Middletown. This authority complements the Council's prior-existing authority under C.G.S. § 16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. C.G.S. § 16-50x(a) vests exclusive jurisdiction over these facilities in the Council, which shall "give such consideration to other state laws and municipal regulations as it shall deem appropriate" in ruling on requests for the shared use of existing towers facilities. Under this statutory authority vested in the Council, an order by the Council approving the shared use would permit the applicant to obtain a building permit for the proposed installations.

C. <u>Environmental Feasibility</u> The proposed shared use would have minimal environmental effects, if any, for the following reasons:

1. The proposed installations (i.e., three sectors with four antennas per sector) would have an insignificant incremental visual impact, and would not cause any significant change or alteration in the physical or environmental characteristics of the existing site. In particular, the proposed installations would not increase the height of the existing tower, and would not extend the boundaries of the existing compound area. The tower is designed to accommodate multiple carriers with the same configuration as the antennas presently on the tower.

2. The proposed installations would not increase the noise levels at the existing facility by six decibels or more.

3. Operation of antennas at this site would not exceed the total radio frequency electromagnetic radiation power density level adopted by the American National Standards Institute ("ANSI"). The "worst-case" exposure calculated for operation of this facility (i.e., calculated at the base of the tower, which represents the closest publicly accessible point within the broadcast field of the antennas) will be 0.035932 mW/cm2, which is 3.5932% of the Maximum Permissible Emission (MPE). The total MPE when combined with the other carriers is 3.9662%. These calculations are attached as Exhibit D.

4. The proposed installations would not require any water or sanitary facilities, or generate air emissions or discharges to water or sanitary facilities, or generate air emissions or discharges to water bodies. After construction is complete (approximately two weeks), the proposed installations would not generate any traffic other than periodic maintenance visits.

The proposed use of this facility would therefore have a minimal environmental effect, if any, and is environmentally feasible.

D. <u>Economic Feasibility</u> As previously mentioned, the owner and VoiceStream have entered into a mutual agreement to share the use of the existing tower on terms agreeable to the parties. The proposed tower sharing is therefore economically feasible.

E. <u>Public Safety Concerns</u> As stated above, the existing tower is structurally capable of supporting the proposed VoiceStream antennas. The tower stands on a compound accessible from Preston Avenue via a gravel access drive. VoiceStream is not aware of any other public safety concerns relative to the proposed sharing of the existing tower. In fact, the provision of new or improved phone service through shared use of the existing tower will enhance the safety and welfare of area residents and the public.

Conclusion

For the reasons discussed above, the proposed shared use of the existing tower facility at 290 Preston Avenue in Middletown, Connecticut satisfies the criteria stated in C.G.S. §16-50aa, and advances the General Assembly's and the Council's goal of preventing the proliferation of towers in Connecticut. VoiceStream therefore respectfully requests that the Council issue an order approving the proposed shared use of this tower.

Thank you for your consideration of this matter.

Respectfully submitted,

VOICESTREAM WIRELESS CORPORATION

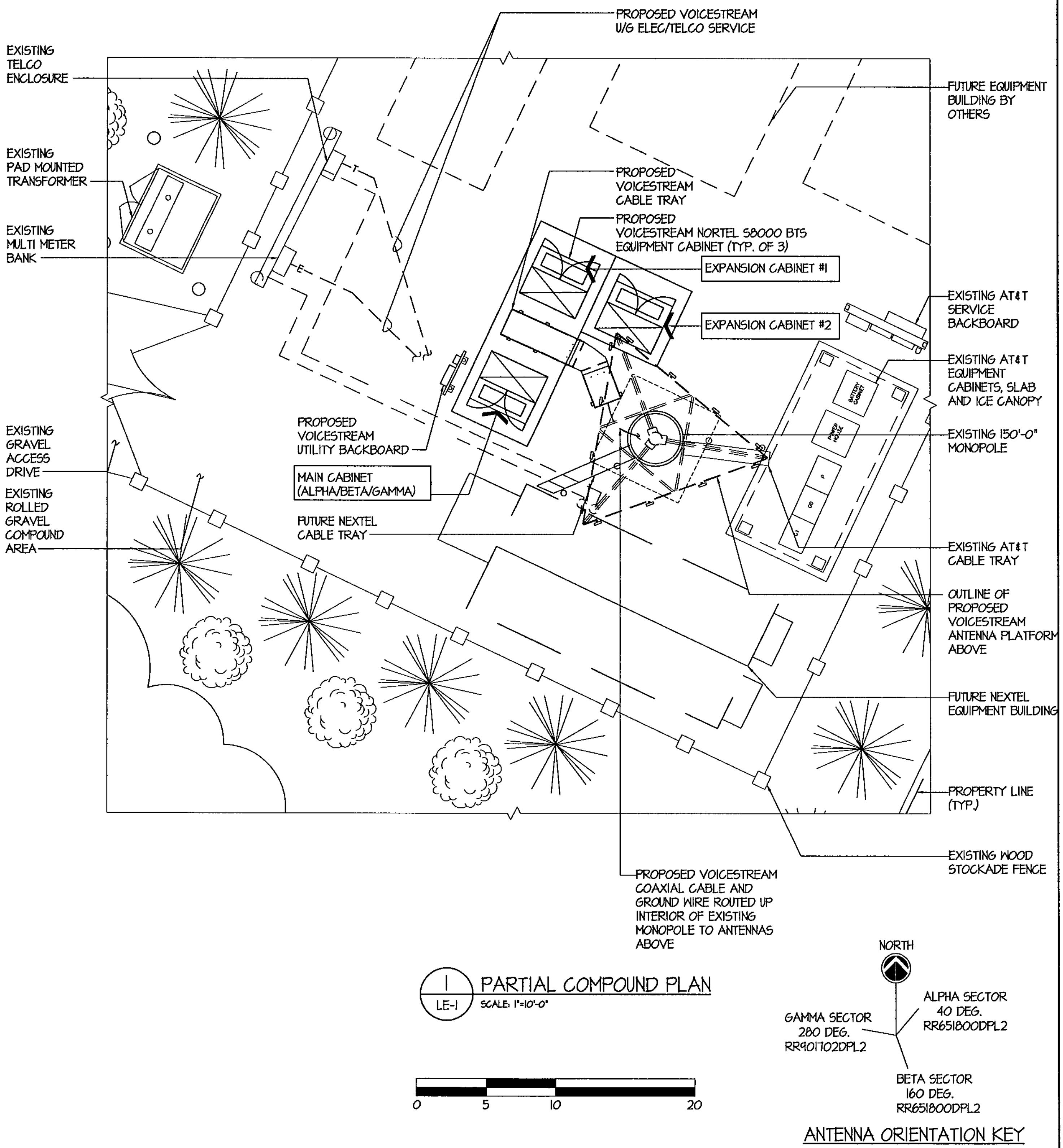
By: ______________________________
Its Counsel
Stephen J. Humes
Diane W. Whitney

Attachments

cc: Domenique S. Thornton, Mayor, City of Middletown

Exhibit A

Design Drawings
290 Preston Avenue
Middletown, CT



SITE I.D. NO.: CT-11-056J
DESIGNED BY:
DRAWN BY: JES
CHECKED BY:

URS

URS CORPORATION AES
500 ENTERPRISE DRIVE
ROCKY HILL, CT. 06067
1-(860)-529-8882

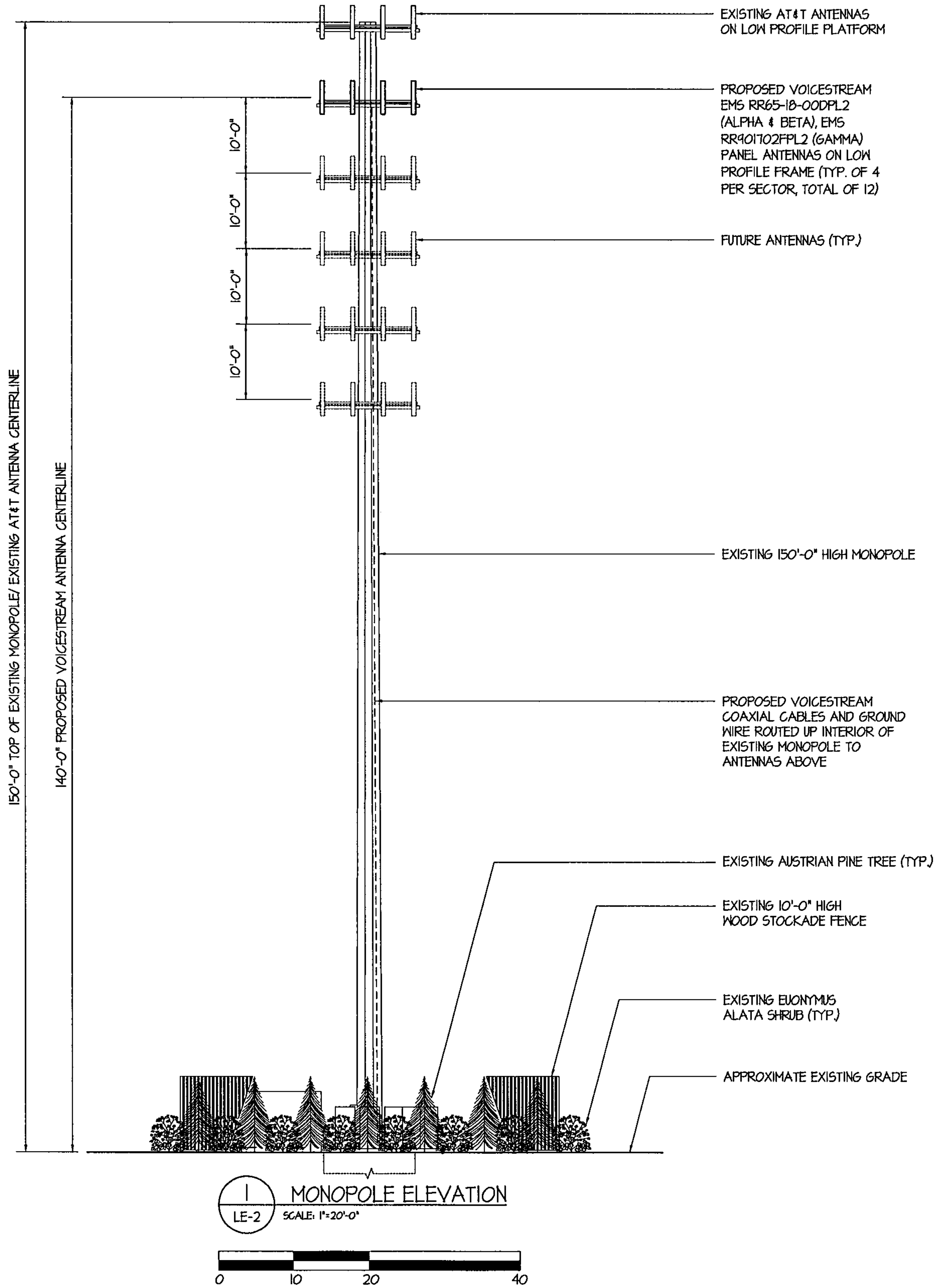
VoiceStream WIRELESS
100 FILLEY STREET, BLOOMFIELD, CT 06002

SITE ADDRESS: MIDDLETOWN
290 PRESTON AVENUE
MIDDLETOWN, CONNECTICUT 06457

REV.	DATE	DESCRIPTION
1	06/08/01	REVISED

SCALE: AS SHOWN | DATE: 05/31/01
JOB NO. F302043.26 | FILE NO. LE-1

DWG. NO. LE-1
DWG. 1 OF 2



MONOPOLE ELEVATION

SCALE: 1"=20'-0"

SITE I.D. NO.: CT-11-056J	**URS**	VoiceStream WIRELESS	REV. △ DATE: 06/08/01 DESCRIPTION: REVISED	DWG. NO. LE-2
DESIGNED BY:	URS CORPORATION AES	100 FILLEY STREET, BLOOMFIELD, CT 06002	SCALE: AS SHOWN	DATE: 05/31/01
DRAWN BY: JES	500 ENTERPRISE DRIVE	SITE ADDRESS: MIDDLETOWN	JOB NO. F30204326	FILE NO. LE-2
CHECKED BY:	ROCKY HILL, CT. 06067	290 PRESTON AVENUE	DWG. 2 OF 2	
	1-(860)-529-8882	MIDDLETOWN, CONNECTICUT 06457		

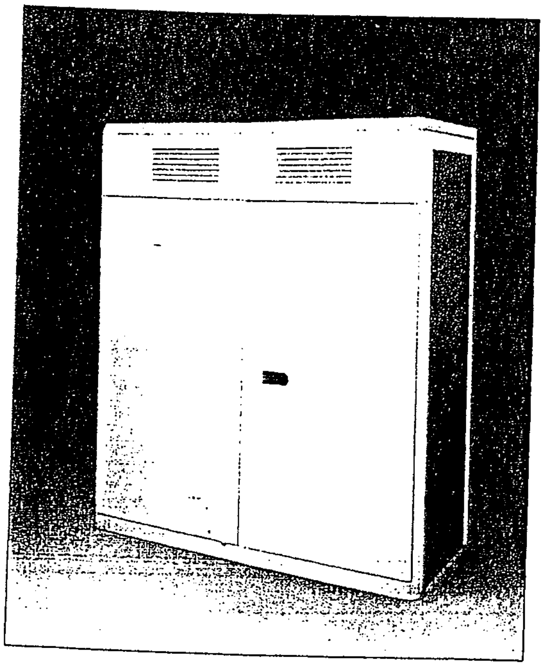
Exhibit B

Equipment Specifications
290 Preston Avenue
Middletown, CT

GSM 900 / DCS 1800 / PCS 1900

NORTEL
NORTHERN TELECOM

S8000 Outdoor Base Transceiver Station



Nortel's S8000 Outdoor Base Transceiver Station has been designed to meet the economic and performance requirements of network operators. Based on a highly integrated RF and digital design, the S8000 Outdoor Base Transceiver Station represents a major technology advancement and delivers all the benefits of a compact, modular, high quality and high performance product.

Nortel's S8000 Outdoor BTS: Radio Performance Leadership - Reduced Site Acquisition and Operating Costs

Installation

- The S8000 Outdoor Base Transceiver Station (BTS) offers compact packaging and requires minimal floor space, only .88 sq m (9.5 sq ft.). Front only access keeps total space required, including maintenance access, to only 1.8 sq m (19.4 sq ft) per cabinet.

Transmission

- Integrated drop and insert connection to the Base Station Controller (BSC) and signaling concentration on the A-bis interface provide significant transmission cost reduction.
- Optional integrated digital microwave radio.

Maintenance

- Highly reliable technology, redundant architecture and integrated battery backup ensure high availability service.
- Front access and interconnections, as well as powerful fault detection, help reduce lifetime maintenance costs.

Industry leading performance

- New RF technology and advanced digital processing techniques provide very high receive sensitivity (-108 dBm guaranteed) and improved diversity gain (up to 6 dB). This provides higher resistance to interference, as well as, improved speech quality and cell coverage.
- Nortel's proven experience in frequency hopping, 1*3 frequency reuse, sophisticated microcellular handover algorithms and support of half-rate vocoders enables the operator to maximize use of available spectrum and deploy fewer cell sites.

Fast network deployment

- The S8000 BTS can be shipped fully equipped and tested, which provides fast network roll out to meet operator time to market requirements.

Modular and flexible configuration

- The S8000 supports eight transceivers (TRX) per cabinet in Omni and sectored configurations. The typical one cabinet S222 configuration may be expanded up to S332 or S422 without an additional cabinet.

Technical Data

• Frequency range		900 MHz GSM
		900 MHz GSM extended
		1800 MHz DCS
		1900 MHz PCS
• Receive sensitivity (guaranteed)		-108 dBm
• Dimensions	Height	1600 mm / 5 ft. 3 in.
	Width	1350 mm / 4 ft. 5 in.
	Depth	650 mm / 2 ft. 1 in.
• Weight	Fully equipped	600 kg / 1300 lbs.
• Capacity		8 TRX per cabinet
		up to 3 cabinets
• Configuration	Trisectorial	up to S888
	Omnidirectional	up to O16
• Amplifier output power		30 W (± 1.5 dB)
• Power control	Static	6 steps of 2 dB
	Dynamic	15 steps of 2 dB
• Frequency hopping		RF synthesized
		baseband
• Supported vocoders		Full rate
		Enhanced full rate
		Half rate
• Encryption algorithms		A5/1 A5/2
• Power supply		230V AC 50/60 Hz
• Power back-up		Integrated battery back-up plus optional battery cabinet allows provisioning up to 8 hours back-up time.
• Operating temperature range		-40°C to +50°C
		-40°F to +122°F

For more information,
please contact your local Nortel account representative.

In the USA:
Northern Telecom
2221 Lakeside Boulevard
Richardson TX 75082
USA
Telephone: 1-800-4 NORTEL
1-800-466-7838 or (214) 684-5935
http://www.nortel.com/wireless

In Canada:
Northern Telecom
2920 Matheson Boulevard East
Mississauga ON L4W 4M7
Canada
Telephone: 1-800-4 NORTEL

In the Caribbean and Latin America:
Northern Telecom (CALA) Corporation
1500 Concord Terrace
Sunrise FL 33323
USA
Telephone: (305) 851-8400

In Asia:
Northern Telecom (Asia) Limited
151 Lorong Chuan
#02-01 New Tech Park
Singapore 1955
Telephone: (65) 287-2877

Nortel China Ltd.
34th Floor, Central Plaza
18 Harbour Road, Wanchai
Hong Kong
Telephone (852) 2585 2888

In Europe:
Nortel Limited
Stafferton Way
Maidenhead
Berkshire SL6 1AY
England
Telephone: (44) (1628) 812000

Nortel Matra Cellular
BP 50
1 place des Frères Montgolfier
78042 Guyancourt Cedex
France
Telephone (33) (1) 34 52 52 52

Nortel Europe
12-12bis rue Jean Jaurès
92807 Puteaux
France
Telephone (33) (1) 46 96 15 15

Publication Reference S8O.INS.0696
Printed in France

NORTEL
NORTHERN TELECOM

3 CABINET DESCRIPTION

3.1 PHYSICAL CHARACTERISTICS

3.1.1 S8000 Outdoor BTS

3.1.1.1 BTS cabinet

Dimensions

The BTS S8000 Outdoor has the following dimensions:

- height: 160 cm (63 in.)
- width: 135 cm (52.8 in.)
- depth: 65 cm (25.6 in.)

Weight

The weight of the cabinet when empty, that is, without its battery, fan units or boards, is 164 kg (361 lb). Depending on the configuration, a fully equipped cabinet weighs approximately 480 kg (1056 lb) with ACU unit or 440 kg (968 lb) with DACS unit.

These weights do not include the plinth.

Operating temperature

To operate correctly, the BTS requires a temperature greater than –40°C (–40°F) and less than +50°C (+122°F).

Consumption

BTS input voltage:

- GSM 900/1800
  - nominal voltage contained between 220V AC and 240V AC
  - minimum voltage: 220 – 10% = 198V AC
  - maximum voltage: 240 + 6% = 254V AC
- GSM 1900 (with DACS)
  - nominal voltage: 208V AC to 240V AC
  - minimum voltage: 208 – 10% = 187V AC
  - maximum voltage: 240 + 6% = 254V AC

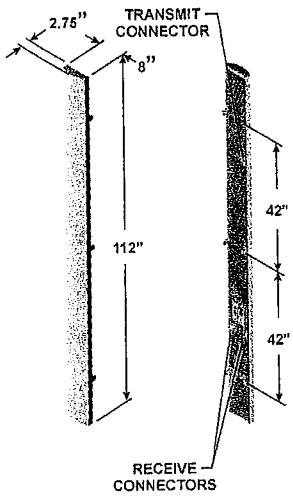
NON - PREMIUM BTS ONLY

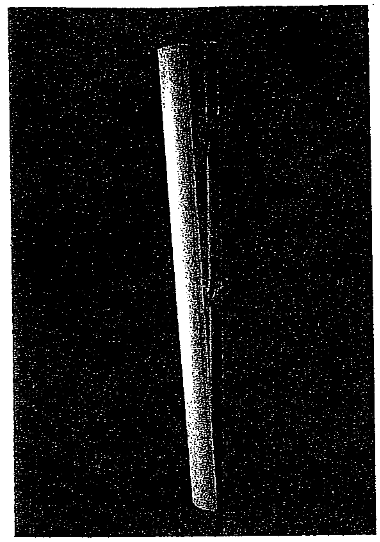
- GSM 1900 (with ACU and/or the power system six–rectifier type)
  - nominal voltage: 240V AC
  - minimum voltage: 240 – 10% = 187V AC
  - maximum voltage: 240 + 6% = 254V AC

EMS WIRELESS

OptiRange™
RS65-18-XXXP

1850 MHz - 1990 MHz (P)





65° beamwidth

17.5 dBi gain

Vertical Tx ±45° Rx

112 inch

SPECIFICATIONS

Electrical

Azimuth Beamwidth	65°
Elevation Beamwidth	6°
Gain	17.5 dBi (15.4 dBd)
Transmit Polarization	Vertical
Receive Polarization	Slant, ± 45°
Transmit Port to Receive Port Isolation	≥ 40 dB
Transmit Port to Receive Port Isolation	≥ 30 dB
Front-to-Back Ratio	≥ 25 dB (≥ 30 dB Typ.)
Electrical Downtilt Options	0°, 2°, 4°, 6°
VSWR	1.35:1 Max
Connectors	3;Type N or 7-16 DIN (female)
Power Handling	250 Watts CW
Passive Intermodulation	<-147 dBc (2 tone @ +43 dBm {20W} ea.)
Lightning Protection	Chassis Ground

Mechanical

Dimensions (L x W x D)	112in x 8in x 2.75in (284.5 cm x 20.3 cm x 7 cm)
Rated Wind Velocity	150 mph (241 km/hr)
Equivalent Flat Plate Area	6.2 ft' (.58 m')
Front Wind Load @ 100 mph (161 kph)	179 lbs (796 N)
Side Wind Load @ 100 mph (161 kph)	61 lbs (274 N)
Weight	34 lbs (154 kg)

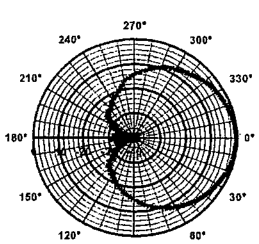
Note: Patent Pending and US Patent number 5, 757, 246.

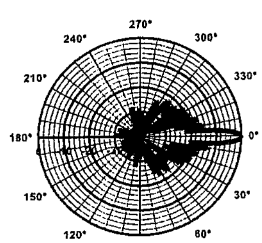
Values and patterns are representative and variations may occur. Specifications may change without notice due to continuous product enhancements. Digitized pattern data is available from the factory or via the web site www.emswireless.com and reflect all updates.

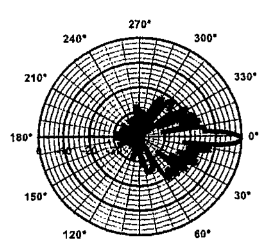
MOUNTING OPTIONS

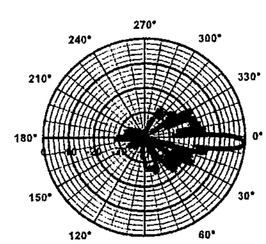
Model Number	Description	Comments
MTG-P00-30	Standard Mount (Supplied with antenna)	Mounts to Wall or 1.5 inch to 5.0 inch O.D. Pole (3.8 cm to 12.7 cm)
MTG-S02-30	Swivel Mount	Mounting kit providing azimuth adjustment.
MTG-DXX-30*	Mechanical Downtilt Kits	0° - 10° or 0° - 15° Mechanical Downtilt
MTG-CXX-30*	Cluster Mount Kits	3 antennas 120° apart or 2 antennas 180° apart
MTG-C02-30	U-Bolt Cluster Mount Kit	3 antennas 120° apart , 4.5" O.D. pole.
MTG-TXX-30*	Steel Band Mount	Pole diameters 7.5" - 45"

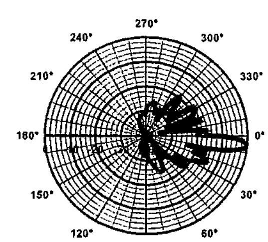
* Model number shown represents a series of products. See mounting options section for specific model number.


Azimuth


Elevation
0° Downtilt


Elevation
2° Downtilt


Elevation
4° Downtilt

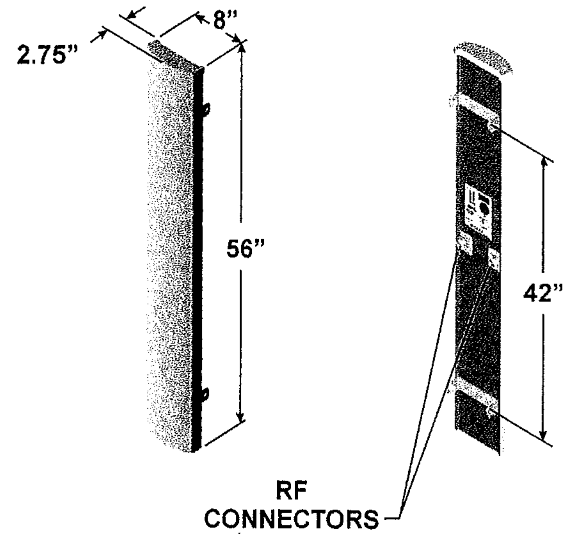

Elevation
6° Downtilt

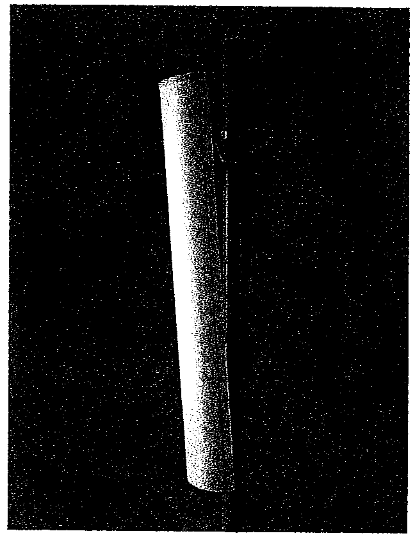
OptiRange™

RR90-17-XXXP

EMS WIRELESS

1850 MHz - 1990 MHz (P)





90° beamwidth

16.5 dBi gain

±45° DualPol™

56 inch

SPECIFICATIONS

Electrical

Azimuth Beamwidth	90°
Elevation Beamwidth	6°
Gain	16.5 dBi (14.4 dBd)
Polarization	Slant, ±45°
Port-to-Port Isolation	≥ 30 dB
Front-to-Back Ratio	≥ 25 dB (≥ 30 dB Typ.)
Electrical Downtilt Options	0°, 2°, 4°, 6°
VSWR	1.35:1 Max
Connectors	2;Type N or 7-16 DIN (female)
Power Handling	250 Watts CW
Passive Intermodulation	<-147 dBc (2 tone @ +43 dBm {20W} ea.)
Lightning Protection	Chassis Ground

Mechanical

Dimensions (L x W x D)	56in x 8in x 2.75in (142 cm x 20.3 cm x 7.0 cm)
Rated Wind Velocity	150 mph (241 km/hr)
Equivalent Flat Plate Area	$3.1ft^2$ ($.29 m^2$)
Front Wind Load @ 100 mph (161 kph)	90 lbs (400 N)
Side Wind Load @ 100 mph (161 kph)	31 lbs (139 N)
Weight	18 lbs (8.2 kg)

Note: Patent Pending and US Patent number 5, 757, 246.

Values and patterns are representative and variations may occur. Specifications may change without notice due to continuous product enhancements. Digitized pattern data is available from the factory or via the web site www.emswireless.com and reflect all updates.

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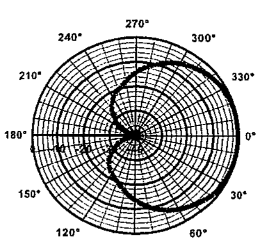
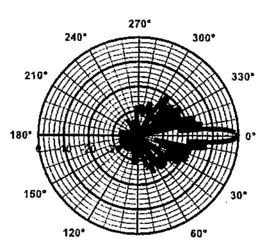
MTG-CXX-10*	Cluster Mount Kits	3 antennas 120° apart or 2 antennas 180° apart
MTG-C02-10	U-Bolt Cluster Mount Kit	3 antennas 120° apart , 4.5" O.D. pole.
MTG-TXX-10*	Steel Band Mount	Pole diameters 7.5" - 45"

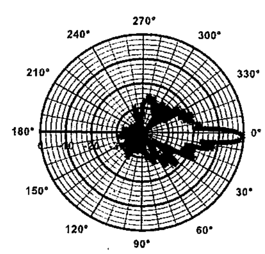
* Model number shown represents a series of products. See mounting options section for specific model number.



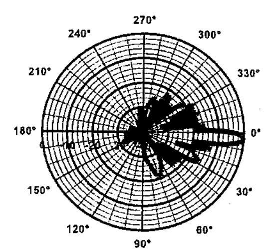
Azimuth



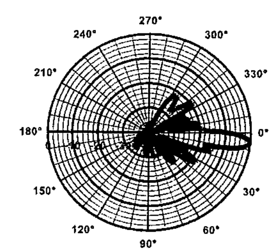
Elevation
0° Downtilt



Elevation
2° Downtilt



Elevation
4° Downtilt



Elevation
6° Downtilt

Exhibit C

Structural Analysis
290 Preston Avenue
Middletown, CT

URS

June 13, 2001

Mortimer A. Gelston
Chairman
Connecticut State Siting Council
10 Franklin Square
New Britain, CT 06051

Reference: **Proposed Telecommunications Facility**
VoiceStream Wireless CT-11-056J
AT&T Monpole
290 Preston Avenue
Middletown, Connecticut
F300002043.26

Dear Mr. Gelston:

URS Corporation AES (URS) has reviewed the Structural Design for the AT&T 148' high monopole structure located at 290 Preston Avenue in Middletown, Connecticut. The 148' monopole was designed by Summit Manufacturing, LLC, Design No.: 13231, Job No.: 29201-0230.

VoiceStream Wireless proposes to install twelve (12) panel antennas as manufactured by EMS Wireless on a 14' low profile platform at the 140'-0" elevation. The antenna platform shall be compatible with the monopole design. Antennas will be fed by (24) coaxial cables not exceeding 1 5/8" diameter.

Based on the proposed VoiceStream loading in comparison to the overall Summit Manufacturing, LLC design loading, the monopole is determined to be structurally adequate. This analysis assumes that the monopole and foundations were installed in accordance with the Summit Manufacturing, LLC, design drawings and in compliance with all local and state building codes.

Please contact me if there are any questions.

Sincerely,
URS Corporation AES

Ignacio C. Artaiz, AIA
Telecommunications Group Manager

ICA/mks

cc: D. Roberts, AIA - URS
J. Mead, PC - URS
A.Abadjian, PM - URS
D. Weinpahl - VoiceStream Wireless

URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Tel: 860.529.8882
Fax: 860.529.3991

Exhibit D

Power Density Calculations
290 Preston Avenue
Middletown, CT

VOICESTREAM WIRELESS CORPORATION
100 Filley St, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Karina Hansen
From: Enrique Ramos, Jr. Radio Engineering Consultant
cc: Mike Fulton
Subject: Power Density Report for CT-11-056J
Date: 3-Jul-01

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the Voicestream Wireless Corporation PCS antenna installation on a Monopole at 290 Preston Avenue, Middletown, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from several locations surrounding the transmitting location.

2. Discussion:

The following assumptions were used in the calculations:

1) The emissions from Voicestream Wireless transmitters are in the 1930-1950 MHz frequency band.
2) The antenna cluster consists of three sectors, with 4 antennas per sector. The model number for each antenna is EMS-RR65-18-00DPL2 for Sectors 1 & 2, and EMS-RR-90-17-02DPL2 for Sector 3.
3) The antenna height is 140 Feet center line.
4) The maximum transmit power from each sector is 3210.11 Watts Effective Isotropic Radiated Power (EiRP) assuming 8 channels per sector.
5) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
6) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
7) The average ground level of the studied area does not significantly change with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

3. Conclusion:

Based on the above worse case assumptions, the power density calculations from the VoiceStream Wireless Corporation PCS antenna installation on a Monopole at 290 Preston Avenue, Middletown, CT, is 0.035932 mw/cm^2. This value represents 3.5932% of the Maximum Permissible Emission (MPE) standard of 1000 microwatts per square centimeter (uw/cm^2) set forth in the FCC/ANSI/IEEE C95.1-1991. The combined Power Density with other carriers will be 3.9662% of the standard. Details are shown in the attachment.

Furthermore, the proposed antenna location for VoiceStream Wireless will not interfere with existing public safety telecommunications, AM band and FM band radio broadcast, TV, Police Communication, HAM Radio communications and other signals in the area.

Worst Case Power Density

Region 11 - Connecticut

Power Density Calculation

Site: CT-11-056J
Site Address: 290 Preston Avenue
Town: Middletown
Pole Height: 150FT
Tower Style: Monopole

Base Station TX output	20 W
Number of channels	8
Antenna Model	EMS-RR65-18-00DPL2
Cable Size	1-5/8 "
Cable Length	160.0 ft
Antenna Height	140.0 ft
Ground Reflection	1.6
Frequency	1930.00 MHz
Jumper & Connector loss	2.62 dB
Antenna Gain	17.5 dBi
Cable Loss per foot	0.0116 Loss per/ft
Total Cable Loss	1.856 dB
Total Attenuation	4.476 dB
Total EIRP per channel	56.03 dB
(In Watts)	401.26 W
Total EIRP per sector	65.07 dB
(In Watts)	3210.11 W
nsg	13.024
Power Density (S) =	**0.035932** mW / cm^2
% MPE =	**3.5932%**

Equation Used :

$$S = \frac{(1000)(grf)^2 (Power) * 10^{(nsg/10)}}{4\pi (R)^2}$$

Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, August 1997

COMBINED POWER DENSITY WITH OTHER CARRIERS
Total % MPE for AT&T Wireless = 0.02%
Total % MPE for SNET = 0.35%
Total % MPE for Voicestream = 3.5932%
Total % MPE = 3.9662%

VOICESTREAM WIRELESS CORPORATION
100 Filley St, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Karina Hansen
From: Enrique Ramos, Jr. Radio Engineering Consultant
cc: Mike Fulton
Subject: Power Density Report for CT-11-086B
Date: 26-Jul-01

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the Voicestream Wireless Corporation PCS antenna installation on an Existing Lattice Tower at 142 Baldwin Drive (West Rock State Park), New Haven, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from several locations surrounding the transmitting location.

2. Discussion:

The following assumptions were used in the calculations:

1) The emissions from Voicestream Wireless transmitters are in the 1930-1950 MHz frequency band.
2) The antenna cluster consists of three sectors, with 4 antennas per sector. The model number for each antenna is EMS FR90-16-04DP.
3) The antenna height is 95 Feet center line.
4) The maximum transmit power from each sector is 2194.42 Watts Effective Isotropic Radiated Power (EiRP) assuming 8 channels per sector.
5) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
6) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
7) The average ground level of the studied area does not significantly change with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

3. Conclusion:

Based on the above worse case assumptions, the power density calculations from the VoiceStream Wireless Corporation PCS antenna installation on an Existing Lattice Tower at 142 Baldwin Drive (West Rock State Park), New Haven, CT, is 0.053345 mw/cm^2. T represents 5.3345% of the Maximum Permissible Emission (MPE) standard of 1000 microwatts per square centimeter (uw/cm^2) set forth in the FCC/ANSI/IEEE C95.1-1991. The combined Power Density with other carriers will be 59.2545% of the standard. Details are shown in the attachment.

Furthermore, the proposed antenna location for VoiceStream Wireless will not interfere with existing public safety telecommunications, AM band and FM band radio broadcast, TV, Police Communication, HAM Radio communications and other signals in the area.

Worst Case Power Density

Region 11 - Connecticut

Power Density Calculation

Site:	CT-11-086B
Site Address:	142 Baldwin Drive (West Rock State Park)
Town:	New Haven
Pole Height:	125FT
Tower Style:	Existing Lattice Tower

Base Station TX output	20 W
Number of channels	8
Antenna Model	EMS FR90-16-04DP
Cable Size	1-5/8 "
Cable Length	130.0 ft
Antenna Height	95.0 ft
Ground Reflection	1.6
Frequency	1930.00 MHz
Jumper & Connector loss	2.62 dB
Antenna Gain	15.5 dBi
Cable Loss per foot	0.0116 Loss per/ft
Total Cable Loss	1.508 dB
Total Attenuation	4.128 dB
Total EIRP per channel	54.38 dB
(In Watts)	274.30 W
Total EIRP per sector	63.41 dB
(In Watts)	2194.42 W
nsg	11.372
Power Density (S) =	**0.053345** mW / cm²
% MPE =	**5.3345%**

Equation Used :

$$S = \frac{(1000)(grf)^2(Power)*10^{(nsg/10)}}{4\pi\,(R)^2}$$

Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, August 1997

COMBINED POWER DENSITY WITH OTHER CARRIERS
Total % MPE for SCLP @ 80' AGL (880-894 MHz) = 21.60%
Total % MPE for Sprint @ 72' AGL (1962 MHz) = 11.27%
Total % MPE for DOT @ 120' AGL (46.8 - 47.8 MHz) = 1.40%
Total % MPE for CTT @ 120' AGL (450-470 MHz) = 0.70%
Total % MPE for CTT @ 100' AGL (450-470 MHz) = 1.03%
Total % MPE for CSP @ 115' AGL (6815 MHz) = 0.01%
Total % MPE for CSP @ 116' AGL (6845 MHz) = 0.01%
Total % MPE for CSP @ 111' AGL (6765 MHz) = 0.01%
Total % MPE for CSP @ 120' AGL (866.1375 MHz) = 0.12%
Total % MPE for CSP @ 120' AGL (866.0125 MHz) = 0.12%
Total % MPE for FBI @ 100' AGL (164-174 MHz) = 2.05%
Total % MPE for IRS @ 80' AGL (164-174 MHz) = 3.35%
Total % MPE for FBI @ 90' AGL (164-174 MHz) = 6.45%
Total % MPE for OEM @ 85' AGL (45.52 MHz) = 2.90%
Total % MPE for CSP @ 85' AGL (42.58 MHz) = 2.90%
Total % MPE for Voicestream = 5.3345%
Total % MPE = 59.2545%

TS-VoiceStream-083-010719

LEBOEUF, LAMB, GREENE & MACRAE, L.L.P.
A LIMITED LIABILITY PARTNERSHIP INCLUDING PROFESSIONAL CORPORATIONS

FAX TRANSMISSION

GOODWIN SQUARE
225 ASYLUM STREET
HARTFORD, CT 06103
TELEPHONE: (860) 293-3500
FAX: (860) 293-3555
IF ANY TRANSMISSION PROBLEMS: (860) 293-3500

RECEIVED JUL 27 2001 CONNECTICUT SITING COUNCIL

From: Kurt Sheatheim, Paralegal

Date: July 27, 2001

ID#: 6150

Page: 1 of 5

If you have any questions regarding this transmission, please contact:
Kurt at 293-3565

To:	Fax Number	Confirming Telephone Number	Client/Matter Number
Bob Curry Connecticut Siting Council	827-2950	827-2966	07687/153

Comments/Message:

Bob - As we discussed, attached are the revised power density calculations for our recent applications in New Haven and Middletown. I will send you the originals in the mail as soon as I receive them. Please call me to let me know if you need 23 copies or if this fax and the mailed originals will be sufficient. Thanks. Kurt

VoiceStream WIRELESS

VOICESTREAM WIRELESS CORPORATION
100 Filley St, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Karina Hansen
From: Enrique Ramos, Jr. Radio Engineering Consultant
cc: Mike Fulton
Subject: Power Density Report for CT-11-086B
Date: 26-Jul-01

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the Voicestream Wireless Corporation PCS antenna installation on an Existing Lattice Tower at 142 Baldwin Drive (West Rock State Park), New Haven, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from several locations surrounding the transmitting location.

2. Discussion:

The following assumptions were used in the calculations:

1) The emissions from Voicestream Wireless transmitters are in the 1930-1950 MHz frequency band.
2) The antenna cluster consists of three sectors, with 4 antennas per sector. The model number for each antenna is EMS FR90-16-04DP.
3) The antenna height is 95 Feet center line.
4) The maximum transmit power from each sector is 2194.42 Watts Effective Isotropic Radiated Power (EiRP) assuming 8 channels per sector.
5) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
6) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
7) The average ground level of the studied area does not significantly change with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

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Furthermore, the proposed antenna location for VoiceStream Wireless will not interfere with existing public safety telecommunications, AM band and FM band radio broadcast, TV, Police Communication, HAM Radio communications and other signals in the area.

Worst Case Power Density

Region 11 - Connecticut
Power Density Calculation

Site: CT-11-086B
Site Address: 142 Baldwin Drive (West Rock State Park)
Town: New Haven
Pole Height: 125FT
Tower Style: Existing Lattice Tower

Base Station TX output	20 W
Number of channels	8
Antenna Model	EMS FR80-16-04DP
Cable Size	1-5/8 "
Cable Length	130.0 ft
Antenna Height	95.0 ft
Ground Reflection	1.6
Frequency	1930.00 MHz
Jumper & Connector loss	2.62 dB
Antenna Gain	15.5 dBi
Cable Loss per foot	0.0116 Loss per/ft
Total Cable Loss	1.508 dB
Total Attenuation	4.128 dB
Total EIRP per channel	54.38 dB
(In Watts)	274.30 W
Total EIRP per sector	63.41 dB
(In Watts)	2194.42 W
nsg	11.372
Power Density (S) =	0.053346 mW / cm²
% MPE =	5.3345%

Equation Used:

$$S = \frac{(1000)(grf)^2 (Power) * 10^{(nsg/10)}}{4\pi (R)^2}$$

Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, August 1997

COMBINED POWER DENSITY WITH OTHER CARRIERS
Total % MPE for SCLP @ 80' AGL (880-894 MHz) = 21.60%
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Total % MPE = 59.2545%

VoiceStream WIRELESS

VOICESTREAM WIRELESS CORPORATION
100 Filley St, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Karina Hansen
From: Enrique Ramos, Jr. Radio Engineering Consultant
cc: Mike Fulton
Subject: Power Density Report for CT-11-056J
Date: 27-Jul-01

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the Voicestream Wireless Corporation PCS antenna installation on a Monopole at 290 Preston Avenue, Middletown, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from several locations surrounding the transmitting location.

2. Discussion:

The following assumptions were used in the calculations:

1) The emissions from Voicestream Wireless transmitters are in the 1930-1950 MHz frequency band.
2) The antenna cluster consists of three sectors, with 4 antennas per sector. The model number for each antenna is EMS-RR65-18-00DPL2 for Sectors 1 & 2, and EMS-RR-90-17-02DPL2 for Sector 3.
3) The antenna height is 140 Feet center line.
4) The maximum transmit power from each sector is 3210.11 Watts Effective Isotropic Radiated Power (EiRP) assuming 8 channels per sector.
5) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
6) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
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Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

3. Conclusion:

Based on the above worse case assumptions, the power density calculations from the VoiceStream Wireless Corporation PCS antenna installation on a Monopole at 290 Preston Avenue, Middletown, CT, is 0.035932 mw/cm^2. This value represents 3.5932% of the Maximum Permissible Emission (MPE) standard of 1000 microwatts per square centimeter (uw/cm^2) set forth in the FCC/ANSI/IEEE C95.1-1991. The combined Power Density with other carriers will be 3.6132% of the standard. Details are shown in the attachment.

Furthermore, the proposed antenna location for VoiceStream Wireless will not interfere with existing public safety telecommunications, AM band and FM band radio broadcast, TV, Police Communication, HAM Radio communications and other signals in the area.

Worst Case Power Density

Region 11 - Connecticut
Power Density Calculation

Site: CT-11-056J
Site Address: 290 Preston Avenue
Town: Middletown
Pole Height: 160FT
Tower Style: Monopole

Base Station TX output	20 W
Number of channels	8
Antenna Model	EMS-RR65-18-00DPL2
Cable Size	1-5/8 "
Cable Length	160.0 ft
Antenna Height	140.0 ft
Ground Reflection	1.6
Frequency	1930.00 MHz
Jumper & Connector loss	2.62 dB
Antenna Gain	17.5 dBi
Cable Loss per foot	0.0116 Loss per/ft
Total Cable Loss	1.856 dB
Total Attenuation	4.476 dB
Total EIRP per channel	56.03 dB
(In Watts)	401.26 W
Total EIRP per sector	65.07 dB
(In Watts)	3210.11 W
nsg	13.024
Power Density (S) =	0.035932 mW / cm²
% MPE =	3.5932%

Equation Used:

$$S = \frac{(1000)(grf)^2 (Power) * 10^{(nsg/10)}}{4\pi (R)^2}$$

Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, August 1997

COMBINED POWER DENSITY WITH OTHER CARRIERS
Total % MPE for AT&T Wireless = 0.02%
Total % MPE for Voicestream = 3.5932%
Total % MPE = 3.6132%

FAX TRANSMISSION

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FAX: (860) 293-3555
IF ANY TRANSMISSION PROBLEMS: (860) 293-3500

TS-VoiceStream-083-010719

From: Kurt Sheathelm, Paralegal
Date: August 7, 2001

ID#: 6150
Page: 1 of 16

If you have any questions regarding this transmission, please contact:
Kurt at **293-3565**

To:	Fax Number	Confirming Telephone Number	Client/Matter Number
Bob Curry Connecticut Siting Council	827-2950	827-2966	07687/153

Comments/Message:

Bob - As we discussed, attached are the AT&T power density calculations for the Middletown tower. Please feel free to contact me should you have any questions. Thanks. Kurt

RECEIVED
AUG 7 2001
CONNECTICUT SITING COUNCIL

Lucent Technologies

An Analysis of the Radiofrequency Environment in the Vicinity of a Proposed Personal Communications Services Installation [illegible] CT-1[illegible]7: 1[illegible]0 Preston Avenue, Middletown, Connecticut

Prepared by

Wireless & Optical Technologies Safety Department
Bell Laboratories
Murray Hill, New Jersey 07974-0636

Prepared for

Michael Murphy
AT&T Wireless Services
149 Water Street
Suite 2C & 2D
Norwalk, CT 06854

April 27, 2000

An Analysis of the Radiofrequency Environment in the Vicinity of a Proposed Personal Communications Services Installation Site CT-117: 290 Preston Avenue, Middletown, Connecticut

Summary

This report is an analysis of the radiofrequency (RF) environment surrounding the AT&T Wireless Services personal communications services (PCS) facility proposed for installation in Middletown, CT. The analysis, which includes contributions from the proposed SNET cellular antennas, utilizes engineering data provided by AT&T Wireless together with well-established analytical techniques for calculating the RF fields associated with PCS and cellular transmitting antennas. Worst-case assumptions were used to ensure safe-side estimates, i.e., the actual values will be significantly lower than the corresponding analytical values. The maximum level of RF energy associated with each transmitting antenna was compared with the appropriate frequency-dependent exposure limit, and these individual comparisons were combined to ensure that the total RF environment is in compliance with safety guidelines.

The results of this analysis indicate that the total maximum level of RF energy in areas normally accessible to the public is below all applicable health and safety limits. Specifically, the maximum level of RF energy associated with *simultaneous and continuous operation of all proposed transmitters* will be less than 0.4% of the safety criteria adopted by the Federal Communications Commission as mandated by the Telecommunications Act of 1996. The Telecommunications Act of 1996 is the applicable Federal law with respect to consideration of the environmental effects of RF emissions in the siting of personal wireless facilities.

The total maximum level of RF energy will also be less than 0.4% of the exposure limits of ANSI, IEEE, NCRP and the limits used by all states that regulate RF exposure.

Table of Contents

1. Introduction

This report was prepared in response to a request from AT&T Wireless Services for an analysis of the radiofrequency (RF) environment in the vicinity of the proposed personal communications services (PCS) facility, and an opinion regarding the concern for public health associated with long-term exposure in this environment. The analysis includes contributions to the RF environment from operation of proposed SNET cellular antennas.

The Telecommunications Act of 1996[1] is the applicable *Federal law* with respect to consideration of environmental effects of RF emissions in the siting of wireless facilities. Regarding personal wireless services, e.g., PCS and cellular radio, Section 704 of the Telecommunications Act of 1996 states the following:

> "No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions."

Therefore, the purpose of this report is to ensure that the total RF environment associated with the proposed facilities complies with Federal Communications Commission (FCC) guidelines as required by the Telecommunications Act of 1996.

2. Technical Data

The proposed AT&T Wireless Services PCS antennas are to be mounted on a monopole located at 290 Preston Avenue in Middletown, CT. Also proposed at the site are co-located SNET cellular antennas. The PCS antennas transmit at frequencies between 1930 and 1990 million-hertz (MHz). The cellular radio antennas transmit at frequencies between 851 and 866 million hertz (MHz). (These frequencies were formerly allocated for UHF television channels 77 through 79).

The actual RF power propagated from a PCS and cellular antenna is usually less than 10 watts per transmitter (channel) and the actual *total* RF power is usually less than 200 watts per sector (assuming the maximum number of transmitters are installed and operate *simultaneously and continuously*). These are extremely low power systems when compared with other familiar radio systems such as AM, FM, and television broadcast, which operate upwards of 50,000 watts. The attached figure, which depicts the electromagnetic spectrum, lists familiar uses of RF energy. Table 1 lists engineering specifications for the proposed installations.

3. Environmental Levels of RF Energy

The antennas used for PCS and cellular radio propagate most of the RF energy in a relatively narrow beam (in the vertical plane) directed toward the horizon. The small amount of energy that is directed along radials below the horizon results in a RF environment directly under the antennas that is not remarkably different from the environment at points more distant.

The methodology used to calculate the exposure levels follows that outlined by the FCC in OET Bulletin No. 65[1] and is explained in detail in the Appendix. For the case at hand, the maximal potential exposure levels associated with *simultaneous and continuous operation* of all proposed

1. Federal Communications Commission Office of Engineering & Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Radiation* OET Bulletin No. 65, Edition 97-01 (August 1997).

transmitters can be readily calculated at any point in a plane at any height above grade. Based on the information shown in Table 1, the maximum power densities associated with the proposed antennas at 6 ft and 16 ft above grade are shown in Table 2A. The values shown for 16 ft above grade are representative of the maximum power density immediately outside the second floor of nearby buildings (assuming level terrain). These levels are also shown in Table 2A as a percentage of the FCC's maximum permissible exposure (MPE) values found in the Telecommunications Act of 1996 (specifically, in the FCC *Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation* [2]).

The power density values shown in Table 2A and 2B are the theoretical maxima that could occur and are not typical values. For example, the calculations include the effect of 100% field reinforcement from in-phase reflections. The assumption was also made that each transmitter operates continuously at maximum power. However, the intermittent nature of the transmission from PCS and cellular radio systems will result in time-weighted-average values that will be lower than those shown in Tables 2A and 2B. Experience has shown that the analytical technique used is extremely conservative. That is, actual power density levels have always been found to be smaller than the corresponding calculated levels [3]. Also, levels inside nearby homes and buildings, particularly this building, will be lower than those immediately outside because of the high attenuation of common building materials at these frequencies and, hence, will not be significantly different from typical ambient levels.

4. Comparison of Environmental Levels with RF Safety Criteria

Tables 2A and 2B show the calculated RF power density levels in the vicinity of the proposed installations; Table 3 shows federal, state and consensus exposure limits for human exposure to RF energy at the frequencies of interest. Because the MPEs vary with frequency, the calculated RF levels for each transmitting antenna must first be compared to the appropriate MPE (the individual percentages are shown in Tables 2A and 2B), and the results of these comparisons combined before compliance with safety guidelines can be shown. With respect to FCC limits for public exposure, comparisons of the weighted combined analytical results indicate that the total maximal level associated with these antennas in areas normally accessible to the public will be less than 0.373% of the MPE.

5. Discussion of Safety Criteria

Publicity given to speculation about possible associations between health effects and exposure to magnetic fields from electric-power distribution lines, electric shavers and from the use of hand-held cellular telephones has heightened concern among some members of the public about the possibility that health effects may be associated with any exposure to electromagnetic energy. Many people feel uneasy about new or unfamiliar technology and often want absolute proof that something is safe. Such absolute guarantees are not possible since it is virtually impossible to prove that something does not exist. However, sound judgments can be made as to the safety of a physical agent based on the weight of the pertinent scientific evidence. This is exactly how safety guidelines are developed.

The overwhelming weight of scientific evidence unequivocally indicates that biological effects associated with exposure to RF energy are threshold effects, i.e., unless the exposure level is sufficiently high the effect will not occur regardless of exposure duration. (Unlike ionizing radiation, e.g., X-rays and nuclear radiation, repeated exposures to low level RF radiation, or nonionizing radiation, are not cumulative.) Thus, it is relatively straightforward to derive safety limits. By adding safety factors to the threshold level at which the most sensitive effect occurs, conservative exposure guidelines have been developed to ensure safety.

At present, there are more than 10,000 reports in the scientific literature which address the subject of RF bioeffects. These reports, most of which describe the results of epidemiology studies, animal and cell-culture studies, have been critically reviewed by leading researchers in the field and all new studies are continuously being reviewed by various groups and organizations whose interest is developing health standards. These include the U.S. Environmental Protection Agency, the National Institute for Occupational Safety and Health, the National Council on Radiation Protection and Measurements, the standards committees sponsored by the Institute of Electrical and Electronics Engineers, the International Radiation Protection Association under the sponsorship of the World Health Organization, and the National Radiological Protection Board of the UK. All of these groups have recently either reaffirmed existing health standards, developed and adopted new health standards, or proposed health standards for exposure to RF energy.

For example, in 1986, the National Council on Radiation Protection and Measurements (NCRP) published recommended limits for occupational and public exposure[4]. These recommendations were based on the results of an extensive critical review of the scientific literature by a committee of the leading researchers in the field of bioelectromagnetics. The literature selected included many controversial studies reporting effects at low levels. The results of all studies were weighed, analyzed and a consensus obtained establishing a conservative threshold upon which safety guidelines should be based. This threshold corresponds to the level at which the most sensitive, reproducible effects that could be related to human health were reported in the scientific literature. Safety factors were incorporated to ensure that the resulting guidelines would be at least ten to fifty times lower than the established threshold, even under worst-case exposure conditions. The NCRP recommended that continuous occupational exposure or exposure of the public should not exceed approximately those values indicated in Table 3. (See Table 3 for a summary of the corresponding safety criteria recommended by various organizations throughout the world.)

In July of 1986, the Environmental Protection Agency published a notice in the Federal Register, calling for public comment on recommended guidance for exposure of the public[5]. Three different limits were proposed. In 1987 the EPA abandoned its efforts and failed to adopt official federal exposure guidelines. However, in 1993 and 1996 the EPA, in its comments on the FCC's Notice of Proposed Rule Making to adopt safety guidelines[6], recommended adoption of the 1986 NCRP limits[4].

In September 1991, the RF safety standard developed by Subcommittee 4 of the Institute of Electrical and Electronics Engineers (IEEE) Standards Coordinating Committee SCC-28 was approved by the IEEE Standards Board[7]. (Until 1988 IEEE SCC-28 was known as the American National Standards Institute (ANSI) C95 Committee—established in 1959.) In November 1992, the ANSI Board of Standards Review approved the IEEE standard for use as an American National Standard. The limits of this standard are identical to the 1982 ANSI RFPGs[8] for occupational exposure and approximately one-fifth of these values for exposure of the general public at the frequencies of interest. Like those of the NCRP, these limits resulted from an extensive critical review of the scientific literature by a large committee of preeminently qualified scientists, most of whom were from academia and from research laboratories of federal public health agencies

The panels of scientists from the World Health Organization's International Commission on Non-Ionizing Radiation Protection (ICNIRP)[9] and the National Radiological Protection Board in the United Kingdom[10] independently developed and in 1993 published guidelines similar to those of ANSI/IEEE. In 1997, after another critical review of the latest scientific evidence, ICNIRP reaffirmed the limits published in 1993[11]. Also, what was formerly the USSR, which traditionally had the lowest exposure guides, twice has revised upward its limits for public exposure. Thus, there is a converging consensus of the world's scientific community as to what constitutes safe levels of exposure.

Finally, in implementing the National Environmental Policy Act regarding potentially hazardous RF radiation from radio services regulated by the FCC, the Commission's Rules require that licensees filing applications after January 1, 1997[2] ensure that their facilities will comply with the 1996 FCC MPE limits outlined in 47 CFR §1.1310[3][3]. (Under the terms of the Telecommunications Act of 1996, no local government may regulate the placement of wireless facilities based on RF emissions to the extent that these emissions comply with the FCC regulations [1].)

With respect to the proposed antennas, be assured that the actual exposure levels in the vicinity of the Middletown, CT installation will be below any health standard used anywhere in the world and literally thousands of times below any level reported to be associated with any verifiable functional change in humans or laboratory animals. This holds true even when all transmitters operate *simultaneously and continuously at their highest power*. Power density levels of this magnitude are not even a subject of speculation with regard to an association with adverse health effects.

6. For Further Information

Anyone interested can obtain additional information about the environmental impact of PCS and cellular radio communications from:

Dr. Robert Cleveland, Jr.
Federal Communications Commission, Office of Engineering and Technology
Room 7002, 2000 M Street NW
Washington, DC 20554
(202) 418-2422

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2. The FCC extended the transition period to October 15, 1997. Second Memorandum Opinion and Order and Notice of Proposed Rulemaking, ET Docket 93-62, FCC 97-303, adopted August 25, 1997. Prior to this date the FCC required most licensees to comply with 1982 ANSI C95.1 limits.

3. Although all FCC licensees will be required to comply with 47 CFR §1.1310 limits, the FCC will continue to exclude certain land mobile services from proving compliance with these limits 47 CFR §1.1307. Previously, although licensees had to comply with the 1982 ANSI C95.1 limits, the FCC categorically excluded land mobile services, including paging, cellular, ESMR and two-way radio, from having to show compliance because "individually or cumulatively they do not have a significant effect on the quality of the human environment"[13]. The FCC pointed out that there was no evidence of excessive exposure to RF radiation during routine normal operation of these radio services.

7. Conclusion

This report is an analysis of the radiofrequency (RF) environment surrounding the AT&T Wireless Services personal communications services (PCS) facility proposed for installation in Middletown, CT. The analysis, which includes contributions from the proposed SNET cellular antennas, utilizes engineering data provided by AT&T Wireless together with well-established analytical techniques for calculating the RF fields associated with PCS and cellular transmitting antennas. Worst-case assumptions were used to ensure safe-side estimates, i.e., the actual values will be significantly lower than the corresponding analytical values. The maximum level of RF energy associated with each transmitting antenna was compared with the appropriate frequency-dependent exposure limit, and these individual comparisons were combined to ensure that the total RF environment is in compliance with safety guidelines.

The results of this analysis indicate that the total maximum level of RF energy in areas normally accessible to the public is below all applicable health and safety limits. Specifically, the maximum level of RF energy associated with *simultaneous and continuous operation of all proposed transmitters* will be less than 0.4% of the safety criteria adopted by the Federal Communications Commission as mandated by the Telecommunications Act of 1996. The Telecommunications Act of 1996 is the applicable Federal law with respect to consideration of the environmental effects of RF emissions in the siting of personal wireless facilities.

The total maximum level of RF energy will also be less than 0.4% of the exposure limits of ANSI, IEEE, NCRP and the limits used by all states that regulate RF exposure.

8. References

[1] Telecommunications Act of 1996, Title VII, Section 704, *Facilities Siting; Radio Frequency Emissions Standards*

[2] Federal Communication Commission 47 CFR Parts 1, 2, 15, 24 and 97. "*Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation.*" (August 6, 1996)

[3] Petersen, R.C., and Testagrossa, P.A., "Radiofrequency Fields Associated with Cellular-Radio Cell-Site Antennas," *Bioelectromagnetics*, Vol. 13, No. 6. (1992)

[4] *Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields*, NCRP Report No. 86, National Council on Radiation Protection and Measurements, Bethesda, MD. (1986)

[5] Federal Register, Vol. 51, No. 146, Wednesday, July 30, 1986.

[6] Notice of Proposed Rule Making *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, August 13, 1993. ET Docket No. 93-62

[7] *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*, ANSI/IEEE C95.1-1992, Institute of Electrical and Electronics Engineers, Piscataway, NJ. (1991)

[8] American National Standard *Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz*, ANSI C95.1-1982, American National Standards Institute, New York, NY. (1982)

[9] *Electromagnetic Fields (300 Hz to 300 GHz)*, Environmental Health Criteria 137, World Health Organization, Geneva, Switzerland. (1993)

[10] *Board Statement on Restrictions on Human Exposure to Static and Time Varying Electromagnetic Fields and Radiation*, Documents of the NRPB, Vol. 4, No. 5, National Radiological Protection Board, Chilton, Didcot, Oxon, United Kingdom. (1993)

[11] "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz) - ICNIRP Guidelines," *Health Physics*, Vol. 74, No. 4, pp. 494-522. (1998)

[12] Action by the Commission February 12, 1987, by Second Report and Order (FCC 87-63), and Third Notice of Proposed Rulemaking (FCC 87-64). General Docket No. 79-144.

Enclosure Figure. Electromagnetic Spectrum

FCS Site CT-317: Middletown, CT - 10

Table 1: Engineering Specifications for the Proposed Radio Systems Middletown, CT

Site Specifications	AT&T Wireless (PCS)	SNET (Cellular)
maximum ERP[1] per channel	100 watts	100 watts
actual radiated power per channel	4 watts	8 watts
actual total radiated power per sector	32 watts	167 watts
number of transmit/receive antennas	N/A	N/A
number of transmit antennas	1 per sector	1 per sector
number of receive antennas	1 per sector	2 per sector
maximum number of transmitters	8 per sector	21 per sector
number of sectors configured	3	3
antenna centerline height above grade	150 ft	100 ft
antenna manufacturer	Allgon	Swedcom
model number	7184.14	ALP 11011
gain	16.15 dBi	13.15 dBi
type	Directional	Directional
downtilt	2°	0°

[1] *Effective Radiated Power* - ERP is a measure of how well an antenna concentrates RF energy; it is not the actual power radiated from the antenna. To illustrate the difference, compare the brightness of an ordinary 100 watt light bulb with that from a 100 watt spot-light. Even though both are 100 watts, the spot-light appears brighter because it concentrates the light in one direction. In this direction, the spot-light effectively appears to be emitting more than 100 watts. In other directions, there is almost no light emitted by the spot-light and it effectively appears to be much less than 100 watts.

* [illegible] specifications are based on typical site configurations for this carrier in this region

PCS Site CT-117: Middletown, CT - II

Table 1A: Calculated Maximum Levels and the Levels as a Percentage of 1996 FCC MPEs*
for the Proposed Antennas, Middletown, CT

Provider	Power Density (mW/cm²)		% of MPEs*	
	6 ft AMGL†	16 ft AMGL†	6 ft AMGL†	16 ft AMGL†
AT&T Wireless	< 0.00017	< 0.00020	0.017%	0.020%
SNET	< 0.00150	< 0.00198	0.282%	0.353%
		TOTAL	0.299%	0.373%

* MPE: The FCC limits for maximum permissible exposure (same as 1986 NCRP limits at the frequencies of interest)
† AMGL: above mean grade level

Table 1B: Calculated Levels at Base of Structure and the Levels as a Percentage of 1996 FCC
MPEs* for the Proposed Antennas, Middletown, CT

Provider	Power Density (mW/cm²)		% of MPEs*	
	6 ft AMGL†	16 ft AMGL†	6 ft AMGL†	16 ft AMGL†
AT&T Wireless	< 0.000063	< 0.000072	0.0063%	0.0072%
SNET	< 0.000575	< 0.000094	0.0115%	0.0171%
		TOTAL	0.0178%	0.0243%

* MPE: The FCC limits for maximum permissible exposure (same as 1986 NCRP limits at the frequencies of interest)
† AMGL: above mean grade level

Table 3: Summary of International, Federal, State and Consensus Safety Criteria for Exposure to Radiofrequency Energy at Frequencies Used for PCS and Cellular Radio Systems

Organization/Government Agency	Exposure Population	Power Density (mW/cm^2)	
		Cellular Radio	PCS
International Safety Criteria/Recommendations			
International Commission on Non-Ionizing Radiation Protection (1997)	Occupational	2.96	4.67
(*Health Physics* 74:4, 494-522, 1998)[1]	Public	0.41	0.98
National Radiological Protection Board	Occupational	5.90	10.00
(NRPB, 1993)	Public	2.79	10.00
Federal Requirements			
Federal Communications Commission	Occupational	2.93	5.00
(47 CFR §1.1310)	Public	0.59	1.00
Consensus Standards and Recommendations			
American National Standards Institute	Occupational	2.93	5.00
(ANSI C95.1 - 1982)	Public	2.93	5.00
Institute of Electrical and Electronics Engineers	Occupational	2.93	6.30
(ANSI/IEEE C95.1-1999 Edition)[2]	Public	0.59	1.30
National Council on Radiation Protection & Measurements	Occupational	2.93	5.00
(NCRP Report 86, 1986)	Public	0.59	1.00
State Codes			
New Jersey (NJAC 7:28-42)	Public	2.93	5.00
Massachusetts (Department of Health 105 CMR 122)	Public	0.59	1.00
New York State[3]	Public	0.59	1.00

NOTES:
1. Reaffirmed in 1993 and published with modification in 1998.
2. Incorporating IEEE Standard C95.1-1991 and IEEE Standard C95.1a-1998.
3. State of New York Department of Health follows NCRP Report 86.

APPENDIX - Analytical Technique

This appendix describes the methodology used to predict the radiofrequency (RF) electromagnetic environment surrounding the proposed AT&T PCS antennas. As a conservative measure, the methodology applies "worst-case" conditions that result in an over-estimate of the RF environment, e.g., the calculations include the effect of field reinforcement from in-phase reflection. Therefore, the predicted values are the theoretical maxima that could occur and not typical values. The actual power density levels have always been found to be smaller than the corresponding predicted levels[4]. The methodology described follows that outlined by the Federal Communications Commission (FCC) in their OET Bulletin No. 65[5].

For each transmitting antenna, the maximum RF power density at 6 ft above grade was estimated by performing a series of power density predictions for depression angles below the horizon from 5° to 90°. This was done using the vertical gain pattern of each antenna provided by the antenna manufacturer and by using the following equation:

$$S = \left(\frac{N \times P_N \times G_\theta \times 1.64}{4\pi R^2} \right)$$

and

$$S_{max} = 4 \times S$$

where:

- S = plane wave equivalent power density
- S_{max} = factor of 4 assumes a 100% ground reflection (resulting in a doubling of the field strength and a four-fold increase in power density)
- N = maximum number of transmitters (channels)
- P_N = actual power per channel input to the antenna
- G_θ = far-field gain (numeric) of the antenna relative to a half-wave dipole in the direction of point of interest
- R = distance (radial or slant) from the antenna center to point of interest
- 1.64 = gain of a half-wave dipole (2.15 dB) over an isotropic radiator

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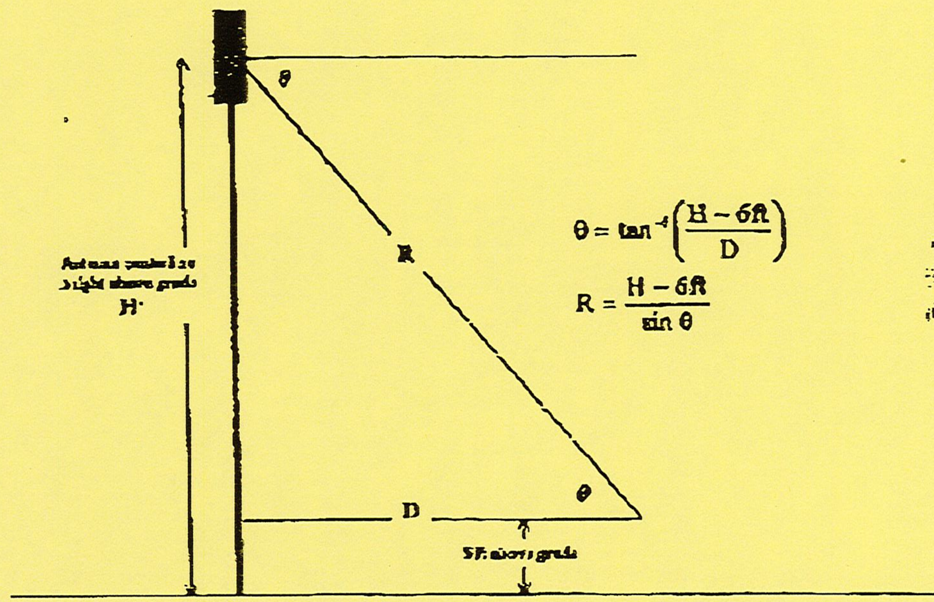
4. Petersen, R.C., and Testagrossa, P.A., Radiofrequency Fields Associated with Cellular-Radio Cell-Site Antennas, *Bioelectromagnetics*, Vol. 13, No. 6 (1992).

5. Federal Communications Commission Office of Engineering & Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Radiation*, OET Bulletin No. 65, Edition 97-01 (August 1997).

PCS Site CT-117: Middletown CT-16



$$\theta = \tan^{-1}\left(\frac{H - 6ft}{D}\right)$$

$$R = \frac{H - 6ft}{\sin \theta}$$

Based on the technical specifications for the site outlined in Table 1, the maximum RF power density (S_{max}) associated with the AT&T PCS antennas occurs at a depression angle of 30° below the horizon and is calculated as follows:

$$R = (H\text{-}6)/\sin\theta = (150\text{-}6)/\sin(30°) = 288\ ft$$

$$G_{30°} = 2.2\ dBd \text{ (from antenna elevation gain pattern)}$$

$$P_N = ERP/G_{ant} = \frac{100}{10^{(14.96dB/10)}} = 4.0 \text{ watts per channel}$$

$$S_{max} = 4x\frac{N x P_N x 10^{(G_\theta/10)} x 1.64}{4\pi R^2}$$

$$= 4x\frac{8ch x 4.0W / ch x 10^{(-1.1dB/10)} x 1.64}{4x3.14x(288 ft x 12in / ft x 2.54cm / in)^2}$$

$$S_{max} = 1.71 \times 10^{-7}\ W/cm^2 = 0.000171\ mW/cm^2$$

$$\text{AND \% of MPE} = \frac{0.000171\ mW/_{cm^2}}{1\ mW/_{cm^2}} \times 100\% = 0.017\%$$

ELECTROMAGNETIC SPECTRUM