STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	**PETITION NO. 809**
A PETITION OF EXTENET SYSTEMS, INC. FOR A DECLARATORY RULING ON THE NEED TO OBTAIN CONNECTICUT SITING COUNCIL APPROVAL TO DEVELOP A DISTRIBUTED ATENNA SYSTEMS IN LOWER FAIRFIELD COUNTY, CONNECTICUT	:	**AUGUST 3, 2007**

PRE-FILED TESTIMONY OF TORMOD LARSEN

Q1. Mr. Larsen, please state your name and position.

A. My name is Tormod Larsen. I am a Vice President and the Chief Technology Officer at ExteNet Systems, Inc. ("ExteNet"). ExteNet is located at 1901 South Meyers Road, Suite 190, Oakbrook Terrace, Illinois.

Q2. Please state your qualifications.

A. I received an M.S.E.E. degree from The Norwegian University of Science and Technology in 1995. At ExteNet, I am a senior RF Engineering specialist with extensive expertise in distributed antenna systems ("DAS"). Prior to joining ExteNet, I was the Vice President of Sales and Engineering for LGP Allgon Ltd. At LGP Allgon, I was responsible for building the Coverage Systems Division that deployed large multi-operator systems. Prior to joining Allgon, I was the Global Products Manager for Repeater and Confined Area Communication Systems for Siemens AG.

I have overseen the design of DAS in numerous states/countries including but not limited to: California, Connecticut, Florida, Illinois, Michigan, Nevada, New York, New Jersey, Ohio, Texas, Washington State, Canada, China, Italy, Mexico, Norway, Singapore and Sweden. I have among other been responsible for the design/implementation of DAS for the Chicago Transit Authority, Microsoft, Seattle Tacoma International Airport, The Wynn Hotel in Las Vegas and Mandalay Resorts Group. I have worked in the telecommunications industry for over 12 years and have coordinated the successful deployment of over 100 DAS systems throughout the United States.

Q3. What is your involvement in this Petition?

A. As the Chief Technology Officer of ExteNet, I was responsible for overseeing the design of the proposed DAS network on the Merritt Parkway. I have had insight and supervision on all aspects of the RF testing and design of the proposed system.

Q4. Please describe the design process for the proposed DAS network.

A. ExteNet was approached by several wireless service providers ("WSP") regarding their lack of contiguous coverage on the Merritt Parkways. The WSPs forwarded ExteNet the locations of their existing macro facilities in the area and drive test data. ExteNet then conducted its own independent benchmark drive test to validate the need for coverage for multiple WSPs. I supervised this drive test. The independent drive test confirmed that every licensed WSP in Connecticut had pockets of poor or no coverage and areas of degraded performances in areas along the Merritt Parkway from the Connecticut State line to Westport.

As part of ExteNet's analysis, we reviewed the FCC and Siting Council databases to ensure that we had a complete and accurate representation of all existing macro facilities and infrastructure. ExteNet also conducted a detailed outside plant survey to verify the availability of existing utility infrastructure that could be used in our design Based upon this information and the drive test data, ExteNet developed a preliminary master design based on the metrics provided and data collected. The preliminary design was tested and revised based upon the results of continuous wave testing as well as comments received back from the State Historic Preservation Office ("SHPO"). The revised design was again tested utilizing continuous wave testing in order to validate the predicted RF performance. In addition. ExteNet installed a test setup of the patent-pending antenna configuration. This test not only validated the RF predictions and performance but also validated the proposed installation and mechanical setup of the antenna nodes throughout the proposed system.

Q5. Did you prepare or supervise the preparation of all of the propagation materials contained in Exhibit C of the Application?

A. Yes, my team was responsible for all of the propagation materials. Those propagation materials are the result of preliminary radio frequency modeling that was then tested with continuous wave testing to verify that the model was accurate.

Q6. How was that modeling conducted?

A. The modeling was based upon ExteNet's continuous wave test. Due to the particular challenges, we chose to test all of the 27 node locations.

Q7. How did you determine where there were coverage gaps?

A. Coverage gaps were determined not only by the drive test data provided by the WSPs but also by the independent benchmark drive test conducted by

ExteNet. ExteNet also supervised a second independent benchmark drive test conducted by EnVision Wireless in July, 2007 which produced the coverage materials included as Exhibit 1.

Q8. How do you know this model is accurate?

A. As with any RF prediction tool, the model is a mathematical formula that calculates the anticipated received signal level. ExteNet conducted a continuous wave drive test to verify the results of its RF predictions. We have tested all 27 node locations. The drive test confirmed the model's accuracy to be within typical standard deviations.

Q9. How many users can this system accommodate?

A. The proposed system can accommodate all licensed WSPs in Connecticut as well as potentially provide transport services for various municipal or private networks.

Q10. Does a WSP have the option of locating on select portions of the proposed system?

A. Yes. WSPs will have the option of locating on select nodes or along the entire length of the system. The node locations were selected based upon review of both drive test data provided by the WSPs themselves as well as the results of ExteNet's drive test. Therefore, the locations were selected based upon the WSPs' existing coverage holes and areas of poor performance.

Q11. Does the proposed system comply with FCC standards for RF exposure?

A. Yes. As shown in Exhibit G of ExteNet's petition application, the maximum exposure level is .24% of the FCC's RF exposure limit.

The statements above are true and complete to the best of my knowledge.

08/03/07
Date

/s/ Tormod Larsen
Tormod Larsen

Subscribed and sworn before me this 3rd day of August, 2007.

OFFICIAL SEAL
TERRENCE M RAY
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:09/14/08

By: Terrence M Ray
Notary

EXHIBIT 1

ision
ireless
mobile engineering

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Competitive Network Benchmarking

Merritt Parkway Report

Issued:
July 31, 2007

Prepared for:

extenet

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Executive Summary

EnVision Wireless was contracted by Extenet to conduct a competitive analysis of commercial wireless network performance along Merritt Parkway in Connecticut on July 30th of 2007. This report represents the results of that survey.

EnVision uses the Agilent E6474A measurement system in the execution of these benchmarking surveys. This equipment allows for an accurate, repeatable network evaluation from a perspective that duplicates the discriminating opinion of the subscriber. Results collected in this method are independent of technology and are useful for comparison at the local, regional and national levels.

Carrier network performance is ranked based on accessibility (no-service and blocked calls) and retainability (dropped calls).

In addition to call performance EnVision also measures and compares the following engineering metrics by operator:

- Received signal strength
- Signal quality (FER, RXQual or SQE)

Benchmarking Methodology

This section provides a summary of the test parameters used during the project.

Table 1: Test Parameters

Test Parameter	Value
Networks surveyed	Nextel - iDEN Sprint - CDMA T-Mobile - GSM Verizon - CDMA Cingular - GSM
Hardware used	Agilent E6474A (Version 9.3)
Handsets used	Nextel - Motorola i850 Sprint - Samsung M500 T-Mobile - Nokia 6230 Verizon - Samsung A870 Cingular - Nokia 6230
Software used	Agilent Nitro 9.3 Qualitest Gladiator Microsoft MapPoint Microsoft Excel Microsoft Word
Miles surveyed	Approximately 60
Drive route selection methodology	Provided by Extenet
Data collection window	2:00 p.m. - 4:00 p.m.
Call profile	Mobile originated calls with a 60 second call duration and a 10 second idle between calls
Location of Voice Quality Server	EnVision office in Melbourne, FL
Drive test vehicle	Standard Midsize Sedan
Antenna location	Internal - All handsets
Date of survey	July 30, 2007

Description of Network Parameters

This section provides a description of the call processing used by Agilent's data collection system, definitions of terms used throughout this report and a description of the network ranking methodology.

Call Processing

In the Agilent E6474A system, calls are initiated from the mobile to the fixed dial in number for each network/technology under survey.

Calls are classified by the Agilent system as follows:

- NO SERVICE - If the phone is out of the service area, the call is classified as no service. In other words, the call is not completed due to a lack of synchronization on the control channel.

- BLOCKED - If the mobile is denied access to the system and is unable to establish communication with the fixed Voice Quality Module (VQM), the call is classified as a blocked call. A blocked call attempt has no voice channel assigned within the call setup interval (typically 20 seconds). This includes calls being disconnected at the PSTN.

- DROPPED - If the call ends prematurely after a voice channel has been assigned, the call is classified as a dropped call.

- COMPLETED - If the call ends correctly at the end of the specified call duration it is classified as a completed call.

During post processing, EnVision groups the No-Service and Blocked call classifications into a final classification of Access Failures.

Network Ranking

Network performance is evaluated from the subscriber's perspective. A subscriber is most concerned with coverage (Access Failures) and performance (Dropped Calls) of the network. EnVision uses the following two criteria when ranking network performance:

- Accessibility - Representative of a subscriber's ability to access the system on demand. The Accessibility metric is calculated as follows: Accessibility = (1 - Access Failure %)
- Retainability - Representative of a subscriber's ability to maintain a call for the desired duration. The Retainability metric is calculated as follows: Retainability = (1 - Dropped Call %)

Equal weighting is given to both Accessibility and Retainability. The network with the lowest combination of access failures and dropped calls is therefore ranked as the best network for the market.

Quality Assurance

This section describes the standard operating procedure used by EnVision to ensure delivery of high-quality competitive network benchmarking surveys.

Project Planning

The first step in EnVision's quality assurance process is the creation of the project plan. While a project's scope is typically detailed during the sales process, several actions must take place to ensure a smooth handoff between the customers, EnVision's sales personnel and EnVision's project management team.

In order to ensure the highest level of customer satisfaction, EnVision and its client must agree on a project's test plan prior to the start of work. A typical test plan will outline the following parameters:

- Market(s) to be measured
- Equipment to be used
- Call duration
- Idle time between calls
- Call placement window
- Call type (mobile to land, land to mobile or both)
- Operators to be measured
- Drive route requirements
- Proprietary or non-proprietary results
- Parameters to collect
- Location of Fixed Voice Quality Module
- EnVision project manager contact information
- EnVision field engineer contact information
- Client main point of contact information
- Project schedule requirements

Scheduling for a project is completed based on the availability of equipment and personnel as well as client requirements. All personnel assigned to a project are made aware of which specific equipment will be used for the project as well as the project's test plan requirements.

Spare parts are provided to the field engineer based on the project's requirements. Having these spare parts in the field reduces downtime when failures occur. Typical spare part allocations will include phone cables, batteries, antennas and phones. Should a failure occur in the field for which a spare part is not on hand, EnVision's support engineer will arrange for replacement parts to be shipped to the field.

The equipment is configured based on the requirements of the test plan. Scanners are installed based on the mix of technologies required. All equipment is thoroughly tested and inspected prior to shipment to the field.

In-Market Setup

Once the field engineer and the equipment have arrived in the market, the in-market setup phase can commence. During this phase, the field engineer will register all handsets on the service provider networks to be tested, place manual calls with all phones, setup and program equipment and verify equipment operability.

EnVision's field engineer will verify that each phone can successfully place and receive calls manually. In addition, a manual call will be placed to the VQM with each handset in order to assure proper operation of the VQM. If a handset cannot place or receive calls, EnVision's field engineer will arrange for a replacement from the service provider.

EnVision's field engineer will physically connect all handsets to the equipment and configure the controlling software. The setup of the data collection software is a critical step in the overall quality assurance process. The field engineer will create a Test Plan File in the collection software that specifies the exact measurements to be collected (log mask) along with the call profile information.

EnVision's field engineer will verify that the test equipment is operating correctly, that GPS is configured properly, and that all phones are placing calls as specified in the data collection software.

Drive Test Clearance

Both the field engineer and the support engineer complete the Drive Test Clearance phase. The primary purpose of this step is to obtain authorization to proceed with the data collection. Authorization is given to proceed only upon agreement between the field engineer and the support engineer that all equipment is operating correctly, the parameters of the test plan have been programmed and that all required data is being collected by the equipment.

The field engineer will complete a test file by placing calls on all handsets while the vehicle is stationary as well as while the vehicle is moving along a pre-defined test route. Stationary testing is completed in a location where all networks have sufficient coverage. The drive route used for the mobile testing is defined in a manner to be representative of the entire survey area. Once a sufficient number of calls have been placed on all handsets, the test file is terminated and forwarded to the support engineer assigned to the survey.

The support engineer will examine the test file to verify that all handsets are operating correctly, navigational data is being logged, the call profile has been setup correctly and that all log masks have been setup correctly. Any anomalies are communicated immediately to the field engineer.

Once the field engineer and the support engineer agree that all equipment is operating according to the test plan, clearance to proceed with data collection is given.

Data Collection

The Data Collection phase is a daily feedback loop between the field engineer and the support engineer. After each day of data collection, the support engineer reviews the data to make sure that all equipment is operating correctly. This process ensures that, in the event of an anomaly, a maximum of one day's data is contaminated or lost.

Each day prior to the start of data collection, the field engineer will physically inspect all handsets, cables, antennas, batteries and connections. In the event that a defective part is observed, the field engineer will replace the part using the available inventory of spares. Lastly, software parameters are verified to be consistent with the test plan.

During data collection, the field engineer continuously inspects the system for anomalies. The field engineer is trained to observe the call statistics in real time for abnormally high rates of call failures that could be indicative of equipment failure. The field engineer will also monitor various engineering parameters for each technology so correlations can be drawn between coverage and interference issues in the networks being tested. Finally, the engineer will monitor the navigation system to ensure that positional information is being logged correctly.

For each data file that is recorded, the field engineer will prepare notes that will be used by the support engineer and the post processing team during the analysis of the collected data. The specific information recorded includes file names, start and end times, start and end mileage, consecutive call failures, bad files, equipment failures and other anomalies.

Upon completion of each day's collection activities, the field engineer will analyze the data collected to verify data integrity. All files from the day are merged and call statistics produced. The field engineer is trained on data ranges to expect for various technologies. In addition, the field engineer will verify that all files contain valid navigational information. Upon completion of this step, the field engineer will forward the data to the support engineer for further analysis.

Each day the support engineer will review the data collected on the previous day. The support engineer will examine each file while referring to the notes prepared by the field engineer. Each call failure that is recorded is examined in detail to determine its validity. Various graphs are created for the call failures to determine additional anomalies. All data that is determined to be anomalous is marked for further review by the post-processing engineer. The support engineer will contact the field engineer upon completion of the data review to communicate any issues identified. A copy of each day's call statistics is provided to the customer.

Upon completion of all drive testing, the field engineer will record a test file. The purpose of this file is to verify that the equipment and the handsets display similar performance at both the beginning and the end of testing. Upon completion of this test file, the field engineer forwards the file to the support engineer for review.

Upon confirmation from the support engineer that all data has been collected properly, the field engineer will disassemble the test equipment and prepare for delivery to the next market.

Data Post Processing

The Data Post Processing stage begins upon completion of all drive testing. This phase of the project results in a draft version of the survey's deliverable report.

Each day's data is examined separately along with the test engineers notes. All files are converted and mapped. Preliminary graphs and tables are created to show the results of call statistics and call failures. Any problems identified as equipment failure are removed from the data files before further processing.

Once the data has been cleaned using the data collector's notes, all files for the survey are merged into one master file containing all sets of data for all carriers measured. This master file allows for more efficient processing.

Call statistics are then tabulated and compared to historical data to determine macro level data concerns. Abnormally high percentages of call failures tend to indicate equipment failure. If abnormally high percentages of call failures are determined, further analysis is completed to determine the cause.

Distribution charts are generated for engineering parameters from similar technology service providers. In addition, tables of call statistics are created to display the overall performance of each network. This information is used to create the final network rankings for the survey.

Once all charts, graphs, tables and geographic plots have been created, they are compiled to produce a preliminary draft of the survey report.

Report Review

The draft report created in the Post Processing step is reviewed for quality assurance. All unresolved anomalies are researched to conclusion and documented in the report. The output of this step is the release of the report to the production team.

EnVision's lead engineers review all reports to validate all engineering observations, check formatting, verify reported results and identify any remaining data concerns. Any changes necessary are made and a final review draft is created.

EnVision's lead engineers will review the final draft to verify all changes have been made. Upon verification, the report is released to production.

Report Production

All customer deliverables are prepared in quantity as required according to the terms of the contract.

The final report is burned to CD in Adobe .pdf format along with all geographic plots. Hyperlinks are provided in the .pdf for ease in report review.

All reports are printed and bound professionally. Printed copies are spot checked for printing errors.

Shipment and Data Archival

The final step in EnVision's Quality Assurance Process is the Shipment and Data Archival stage.

All deliverables are packaged and shipped according to the instructions provided in the customer's purchase order.

An internal copy of the CD and deliverable report are produced and maintained in EnVision's library.

All data is archived onto CD and stored in the library along with the internal copies of the deliverables.

Appendix

The following geographic plots are attached to this report.

Merritt Parkway
Drive Route
Call Failures (All Networks)

2007 Drive Route

Drive Route
● Merritt Parkway

Call Failures (All Networks Together)