STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

RE: APPLICATION BY T-MOBILE NORTHEAST LLC FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR A TELECOMMUNICATIONS FACILITY AT 387 SHORE ROAD IN THE TOWN OF OLD LYME, CONNECTICUT

DOCKET NO. 392

Date: April 12, 2010

SUPPLEMENTAL PRE-FILED TESTIMONY OF SCOTT HEFFERNAN

The following pre-filed testimony supplements my pre-filed testimony filed on January 28, 2010, regarding the Application for a Certificate of Environmental Compatibility and Public Need for a telecommunications facility at 387 Shore Road, Old Lyme, Connecticut ("Facility") submitted by T-Mobile Northeast LLC ("T-Mobile"). This supplemental testimony is responsive to the Connecticut Siting Council's request for general information on Outdoor Distributed Antenna Systems ("DAS") and their suitability for rural areas, such as the Town of Old Lyme. After consulting with counsel, I understand that T-Mobile has a number of legal objections to the questions below based on federal law and preemption; I understand that counsel intends to state more fully the nature of these objections separately. Notwithstanding and without waiving these objections, I provide my supplemental testimony below in an effort to expeditiously resolve the pending application.

Q12. When is a Distributed Antenna System a feasible deployment technology?

A12. DAS is a distinct and different technology from macro cell architecture. DAS is a different deployment technology that T-Mobile will utilize when its network's particular coverage or capacity needs are best served by a DAS solution. DAS may resolve a particular coverage or capacity issue when that issue involves a very discrete area.

Common applications for a DAS solution include coverage for malls, airports, hotels, casinos, jails, prison barges, tunnels or canyons. The common application is that DAS solutions are typically deployed in confined areas and are utilized in a limited basis for outdoor supplementation to macro coverage.

Q13. What is the general process to implement DAS?

A13. There are numerous logistics and constraints that are involved when considering a DAS solution. Attempting to implement DAS creates additional variables that the designer has little control over. Several constraints and logistical items include, but are not limited to, antenna height, effective radiated power, antenna location(s), existence of fiber, existence of conduits and pole attachment agreements. The following describes the limitation and considerations of each.

Height: In a DAS system, height is limited typically to less than 25 feet. This significantly reduces the area of coverage requiring a large number of pole attachments to achieve coverage. This is due to the fact that T-Mobile's service is line of sight dependent and, therefore, negatively affected by changing terrain, trees and foliage. In a DAS system, small Omni directional antennas are typically mounted to existing light or utility poles. Since the height of these poles is typically below the tree line, the coverage obtained is thereby limited to the immediate roadways only. The coverage shape is typically oblong and travels along the roadway within the confines of the surrounding trees.

Effective Radiated Power: Power in a DAS system is a function of the number of channels being distributed. In order to meet the demanding capacity requirements of a network various channels must be deployed per sector. The high population density

in the Town of Old Lyme ("Town") will demand a high capacity design requiring numerous RF channels per node. The power from a DAS solution is reduced 50 percent for each additional channel required. For example, a four frequency DAS system operates at a power level nearly 1000 to 2000 times less than a traditional cell site. This equates to an even greater reduction in coverage when coupled with the reduced antenna height and varying terrain prevalent in the Town.

Antenna Location: The location of the available pole attachments is a critical design factor when considering a DAS solution. Often the existence of poles that can be readily attached to may not fall in the desired location requiring the addition of new utility poles or loss of coverage in specified areas due to the impracticality of placing poles anywhere. The issue of logistics with pole locations becomes an even greater variable when considering coverage several square miles including connecting roads, parks, golf courses and inside buildings. Therefore, it is typical for a DAS solution to be designed in confined areas or in a limited area to augment existing Macro coverage. This way the amount of variables and logistics can be managed within a smaller or controllable area.

Existing Fiber: In order to support the DAS solution, the existence of single mode fiber is required. This type of fiber typically does not exist and must be pulled or trenched to the pole locations. The cost for this effort must be evaluated to determine the financial feasibility. In addition, conduits or runs may not be feasible to certain locations. Pulling new conduits may require trenching and breaking up curbs or running aerial fiber cable to route new fiber. These logistical items must be detailed during the design phase in order to determine the ability of the DAS system once operational.

Pole Attachment Agreements: Pole attachment agreements are critical to the design of a DAS network. In addition to obtaining a pole attachment agreement, understanding the specifics requirements of each is a necessity. For instance, utility pole attachments often require devices to be connected in order of preference starting with from the top with electric, telephone next, and then cable and all other attachments below. Adding a fiber box and antenna to existing utility poles may not be feasible. In some circumstances this may require the addition of utility poles adjacent to existing poles to support the additional equipment, attachments and cabling. In short, T-Mobile would have to obtain permission from the utility company and/or the municipality to use the utility company or municipality's infrastructure. Similarly, T-Mobile would need proper agreements in place for each potential DAS node.

Proprietary and Infrastructure Requirements: T-Mobile would also have to obtain any necessary access easements for each potential DAS node, which may include utility providers, state and local governments and related agencies. The infrastructure would have to possess sufficient space for antennas, radio equipment and fiber optic equipment for each potential DAS site. As noted above, T-Mobile would also have to determine whether there is sufficient existing, un-used fiber optics ("dark fiber") to support each potential DAS site. Without existing dark fiber, T-Mobile would have to install its own fiber. T-Mobile would then have to determine if DAS nodes placed at all of the available locations would provide coverage sufficient to achieve the existing coverage objective. If one particular DAS site becomes unavailable, T-Mobile might have to find one or more replacement DAS sites to ensure coverage to the entire coverage objective.

Q14. Why is DAS problematic in rural areas, such as the Town?

A14. It is problematic implementing DAS technology in rural areas such as the Town for several reasons:

(1) The unavailability of utility poles, which would host the DAS nodes;

(2) The general, relatively low height of the utility poles hosting the DAS nodes;

(3) The existing, uneven terrain and mature vegetation, which prevents the DAS nodes from providing a uniform signal to the coverage objective;

(4) The availability of dark fiber, which would serve as the backbone for the DAS network; and

(5) The need for access easements, agreements to use the various utility poles; conduit agreements – the complexity of which is compounded by the large number of DAS sites needed to cover a coverage objective the size of the objectives for the proposed Facility.

In designing a DAS system, these "logistical" items, and others, must be identified and detailed before a technical design can be performed. Failure of any one component can cause a major flaw in the DAS network design relative to coverage and capacity. It is for these reasons that DAS networks are typically deployed in controlled environments where the variables can be minimized. Today's wireless systems provide enhanced communications beyond just voice along the roadways. The demand to provide in-building communications for voice and data communications as well as to provide for enhanced 911 access is a paramount requirement in today's wireless environment.

As a general overview, in a DAS system, the base station equipment is located at the end of the fiber run(s). The radio signal is then transferred from pole to pole via miles of fiber optic cable from a base station hotel to each of the pole attachments. In essence, the wireless system becomes a mesh of wires connecting all the end points or "nodes". Ultimately what started out as a wireless system becomes a "wired" wireless

network. This type of design (DAS) makes it very difficult for a carrier to maintain control over their design and optimization of their network since the signal is coming from one location up to 10 miles away from the source. Traditional macro sites allow the choice of directional antennas, specific antenna patterns, and customized orientation or down tilt to allow for optimum coverage and minimal interference.

A DAS system is limited to mostly Omni directional or lower gain panel antennas with limited choices for patterns. In an Omni directional antenna the signal is sent equally in all directions which is in direct conflict with the macro design that focuses energy in one direction through "sectorization" and minimizes it in others. Therefore, the ability to manage and optimize a DAS network over a large geographic open area is impractical and that is the reason why most DAS networks are deployed in controlled / confined environments.

Q15. Is DAS a feasible deployment technology for the existing coverage gap in the area of the Town surrounding the proposed Facility?

A15. No. The use of DAS micro cells and/or repeaters is not a viable alternative or comparable to the proposed Facility. The coverage objective for the Facility, and those of the two other proposed telecommunications facilities in the Town (Docket Numbers 391 and 393), encompasses primary and secondary throughways, the Amtrak rail line, residences, businesses and other areas along the shoreline. T-Mobile would have to acquire and construct a significant number of DAS sites, perhaps more than forty DAS nodes per site, to cover the total coverage objective. This number may grow taking into account the uneven terrain and mature vegetation and the addition of additional frequencies or other carriers.

Scott Heffernan

Sworn and subscribed to before me this
12th day of April, 2010.

Notary Public
My Commission expires

My Commission Expires April 11, 2014