

Fujitsu Network Communications proposes a WiMAX test network for its Richardson, TX campus. The purpose of this network would be technical demonstration of WiMAX equipment to potential purchasers, development of radio technique from field testing of equipment, and development of operational and engineering data related to full-scale deployments of WiMAX networks with future products operating in the 2.3GHz and 2.5GHz spectrum.

Capabilities of WiMAX would be demonstrated by the proposed network including several new and burgeoning telecommunications technologies: VoIP, IPTV, streaming video, as well as standard broadband data connectivity. In addition, development of deployment techniques such as equipment installation; development of curriculum for operational training; and collection of engineering data such as field strength and signal to noise ratio, can be satisfied by the proposed network.

The network would consist of a centrally located base station on the Fujitsu campus, with remote subscriber units located at geographically dispersed points. The exact location and number of the subscriber units would change dependent on the particular application being tested at any given time. It is expected that at least two subscriber stations would be permanently located within on-campus buildings and that several nomadic subscriber units would be intermittently employed for field strength test and technical demonstrations.

The centrally located base station would consist of three sectors radiating coverage 360 degrees. Conditions that determine the maximum distance for adequate reception of signal are highly dependent on several factors and thus can vary greatly. It is expected that the maximum range of operation to be approximately 3 km, yielding a coverage area of 28 sq km. Currently, WiMAX profiles consist of multiple channel sizes, with the maximum width being 20 MHz. The expected deployment scenario would be to use channel widths of 3.5MHz. WiMAX profiles also provide for both time division duplexing (TDD) and frequency division duplexing (FDD), with FDD being the currently approved profile. Therefore, the proposed network would require 7 MHz per sector.

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The base technologies employed by WiMAX are well tested and understood: orthogonal frequency division multiplexing (OFDM), adaptive antenna systems (AAS), burst modulation utilizing various levels of quadrature amplitude modulation (QAM) and binary phase shift keying (BPSK), are employed at the physical layer (PHY). Advanced technologies that take advantage of diversity gains, such as space time coding (STC), multiple-in multiple-out (MIMO), and maximal ratio combining (MRC) will be used in future equipment. The medium access control (MAC) layer is based on scheduled access, making the base station a central controlling unit for the network and allowing for quality of service (QoS) and security mechanisms to be used. However, WiMAX, and the IEEE's 802.16 standard, represent a new application of these technologies. This makes transport of modern IP/TCP technologies over a wireless link feasible.

Equipment used would be the WiMAX product line offered by Airspan, Inc, repackaged as OEM equipment by Fujitsu Network Communications. The initial deployment would comprise three MacroMAX base station units (BSU) and four each of EasyST and ProST subscriber terminals.

WiMAX is a growing technology, with new products coming available; it is expected that newer equipment would eventually replace the initial deployment. However, since all equipment must interoperate with existing, and adhere to the IEEE's 802.16 standard as well as the WiMAX's forum defined profiles, there should be no significant difference in the radiating characteristics of new equipment compared to that initially deployed.

By giving potential service providers a way to test and develop deployment techniques and develop expertise relative to operational characteristics, this network would aid in the advancement of a novel technology that promises to help fulfill the promise of ubiquitous and affordable broadband connectivity.