Technical Justification

Site Details

Nominal	MAN0006	Candidate	MAN0006
Site Name:		111 Piccadilly	
Site Address:		111 Piccadilly Manchester M1 2HY	
Drawing No:		MAN0006-111B 112D To 113D	

Introduction

This document will describe the basic operational characteristics of a WiMAX network and the constraints that affect the placement of sites within. It is hoped that the information provided will enable the reader to have a general understanding of the nature of technology and an appreciation of its operational limitations.

Background

Freedom 4 (formerly Pipex Wireless) was founded in April 2006 as a joint venture between Pipex and Intel Capital. Freedom 4 has obtained a national licence for the use of radio spectrum between 3.6 - 4.2 GHz that allows for a WiMAX network to be deployed.

WiMAX

WiMAX is a broadband wireless data communications technology based around the IEE 802.16 standard providing high speed data. WiMAX is an acronym for Worldwide Interoperability for Microwave Access, and it is a technology for point to multipoint wireless networking. This technology will enable the delivery of wireless broadband access as an alternative to cable and DSL in Metropolitan Areas. WiMAX uses OFDM (Orthogonal Frequency Division Multiplex) as its modulation scheme.

Note on OFDM:

Orthogonal Frequency Division Multiplex (OFDM) is a form of transmission that uses a large number of closely spaced carriers that are modulated with low rate data. Normally these signals would be expected to interfere with each other, but by making the signals orthogonal to each another there is no mutual interference. This is achieved by having the carrier spacing equal to the reciprocal of the symbol period. This means that when the signals are demodulated they will have a whole number of cycles in the symbol period and their contribution will sum to zero - in other words there is no interference contribution. The data to be transmitted is split across all the carriers and this means that by using error correction techniques, if some of the carriers are lost due to multi-path effects, then the data can be reconstructed. Additionally having data carried at a low rate across all the carriers means that the effects of reflections and inter-symbol interference can be overcome.

A commonly held misconception is that WiMAX will deliver both high speed and coverage over a large area. Each of these is true individually, given ideal circumstances, but they are not simultaneously true. In practice this means that in line-of-sight environments you could deliver high speed data at greater ranges, but in urban environments it is more likely that a high percentage of installations may be non-line-of-sight and therefore users may only receive high speeds over limited

distances. WiMAX has some similarities to a conventional wired broadband Digital Subscriber Line (DSL) in that, one can either have high bandwidth or long reach, but not both simultaneously. The other feature to consider with WiMAX is that the available bandwidth is shared between users in a given radio sector, so if there are many active users in a single sector, each will get reduced bandwidth, it is therefore important to maximise the use of the site's capacity by placing sites so that users are distributed as evenly as possible across each of the site's radio sectors.

Uses

WiMAX is suitable for the following potential applications:

- Connecting Wi-Fi hotspots with each other and to other parts of the Internet.
- Providing a wireless alternative to cable and DSL for 'last mile' broadband access (i.e. the bit between the telephone exchange and the customer).
- Providing high-speed data and telecommunications services.
- Providing a diverse source of Internet connectivity (i.e. an alternative to using a fixed 'landline' to connect to the internet).
- Providing Nomadic connectivity (i.e. being able to connect from multiple places rather than being tied to a landline).

Radio Coverage Plots

Three radio coverage plots have been provided. These plots have been prepared using a computer modelling tool in order to predict the service level and quality of coverage by the proposed base station. The software model uses a digital terrain database when calculating the coverage and a generalised set of principles with regard to the surrounding environment and the resultant propagation losses incurred.

Plot 1-Coverage from Surrounding Sites

This plot provides an indication of the radio coverage provided by the sites surrounding the proposal site if they were all operational.

Plot 2-Coverage from the Proposal Site

This plot provides an indication of the radio coverage that the proposed installation is likely to provide.

Plot 3-Coverage from Surrounding Sites and the Proposal Site

This plot provides an indication of the radio coverage that is likely to be provided when the proposal site is operational in addition to the surrounding sites.

FREEDOM4

Declaration of Conformity with ICNIRP Public Exposure Guidelines ("ICNIRP Declaration")

Freedom 4
Economist Building
25 St James Street
London
SW1A 1HA

Certifies that the proposed equipment and installation as detailed in the attached planning / GPDO application at:

111 Piccadilly

111 Piccadilly, Manchester

M1 2HY

Freedom 4 Nominal ID:	**MAN0006**
Freedom 4 Site ID:	**MAN0006**
Drawing No:	**MAN0006 - 111B, 112 To 113**
Issue No:	**D**

is designed to be in full compliance with the requirements of the radio frequency (RF) public exposure guidelines of the International Commission on Non-Ionising Radiation Protection (ICNIRP), as expressed in EU Council recommendation of 12 July 1999 * "on the limitation of exposure of the general public to electromagnetic fields (0Hz to 300 GHz)".

* Reference: 1999/519/EC

Date:	**15-Apr-2008**
Signed By:	
Name:	
Position:	**Senior Network Planner**

Registered Office:
Freedom 4,
Economist Building,
25 St James Street,
London,
SW1A 1HA

Registered Number:
05751878

Coverage Simulation for Planning Application

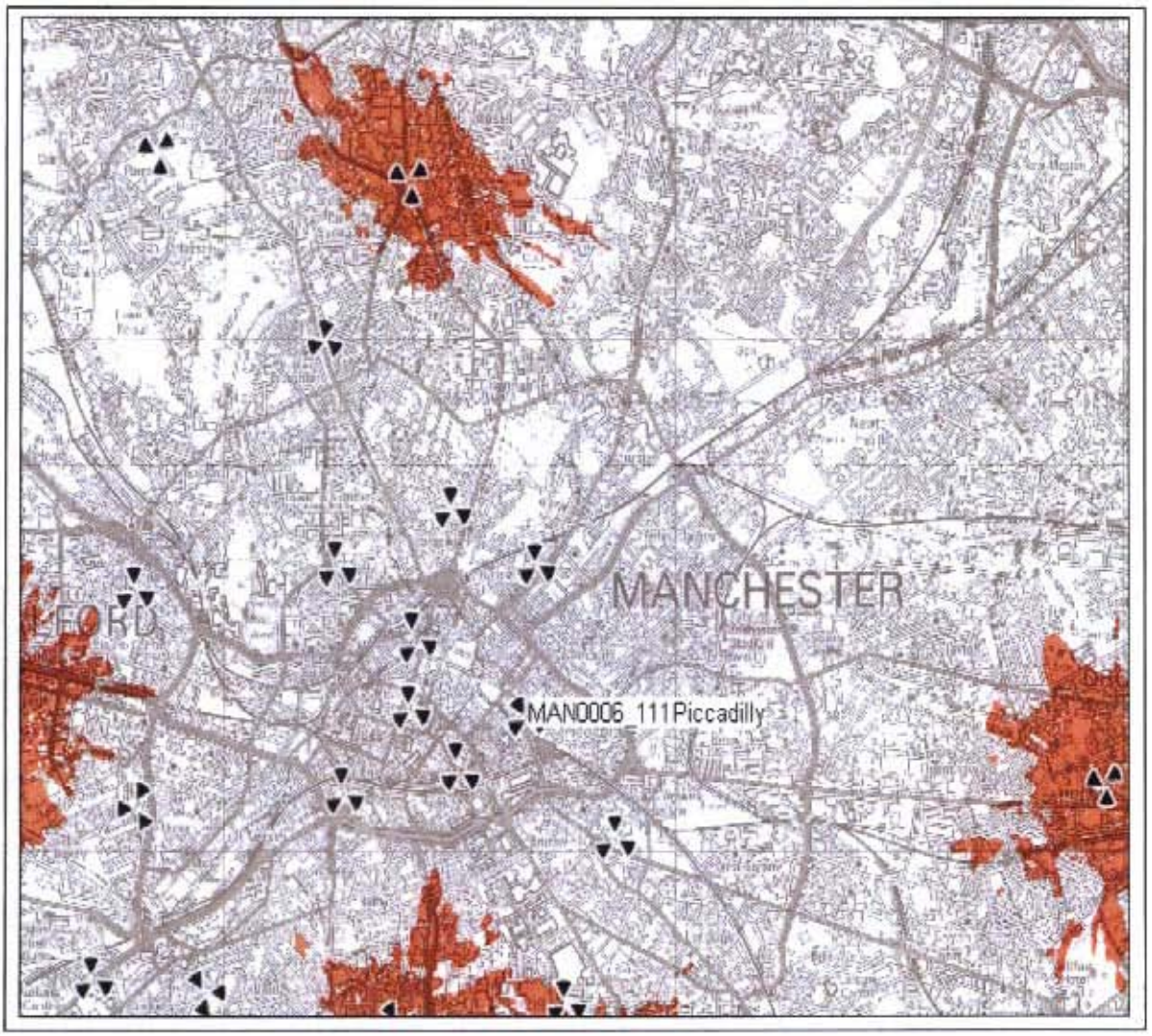
F4 Nominal ID: MAN0006
F4 Site ID : MAN0006
Site Name: 111 Piccadilly
Site Address
111 Piccadilly, Manchester

Post Code M1 2HY

National Grid Coordinates
Easting: 384655
Northing 398085

Height of Antenna: 59m
Frequency: 3.6Ghz

Existing Coverage from surrounding sites



*** The coverage displayed above is a theoretical prediction based on a set of engineering principals and digitised data. The propogation models used to generate these predictions is continually under development and hence the above is an indicative representation only ***

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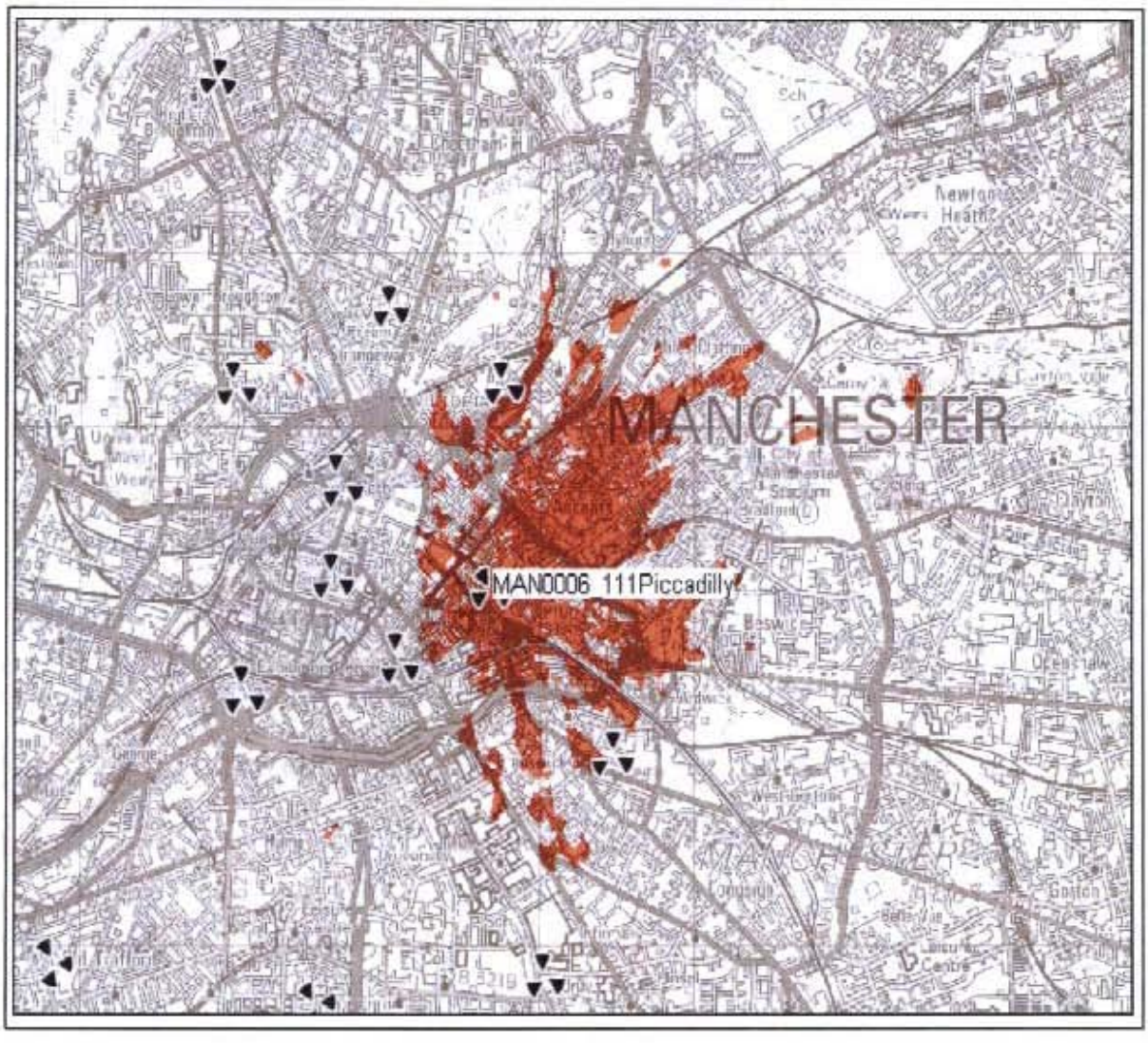
Coverage from Proposed site



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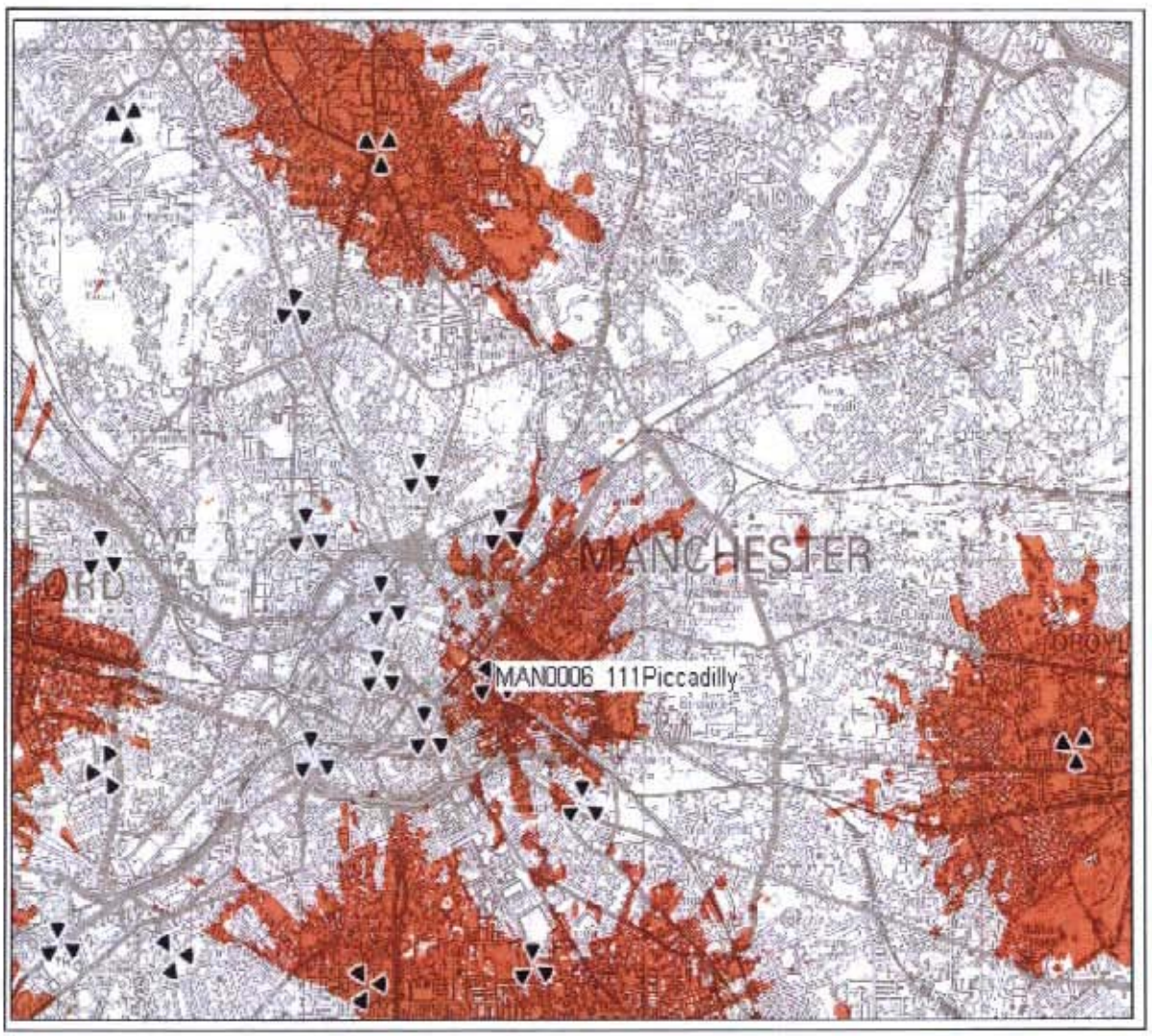

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