

# MESHWORKS™

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## Technical Note

Subject: Environmental Statement for Radiant Networks' MeshWorks™ Outdoor Unit, regarding Human Exposure to Radio-Frequency Electromagnetic Fields (MPE Limits)

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Status: Issue 1  
Date: 5 May 2002

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### History:

Version	Date	Author	Comment
1.0	5 May 2002	A F Hare	First Issue

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## 1 Introduction

The following environmental statement has been prepared in response to OET Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 97-01. Radiant Networks' MeshWorks™ Outdoor Unit (ODU) does not create significant environmental action, and therefore an Environmental Assessment (EA) is not required. This environmental statement presents the justification for this.

OET Bulletin 65, page 13, notes "Within a specific category, conditions are listed in Table 2 of Appendix A to determine which transmitters are subject to routine evaluation." For the Local Multipoint Distribution Service (LMDS) this states that evaluation is required if:

*non-building mounted antennas:* Evaluation not required if lowest point greater than 10m above ground and power less than 1640W EIRP.

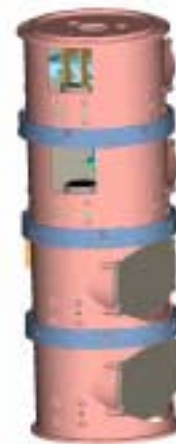
*building-mounted antennas:* power > 1640W EIRP

It is noted that limits are relevant only to locations that are accessible workers or members of the public.

With an EIRP of 26.3 W (see below), an Environmental Assessment is not required for the Radiant Networks' MeshWorks™ Outdoor Unit.

An independent report on electric field strengths is submitted as an exhibit, to both substantiate this and to indicate a safe distance for general public exposure. The report was prepared by the UK company ERA Technology Ltd. Although not a recognized company for FCC test purposes, it should be noted that the recommendations provide a more conservative figure for safe working distance than a simple calculation based on the far-field equation presented in OET 65, generally recognized as providing a "worst case" or conservative prediction.

## 2 Radiant Networks' MeshWorks™ Outdoor Unit



The ODU is approximately 86cm (34 inches) high. The external appearance is as above left. Under the radome are four stacked antennas, as shown in the computer-generated image, above right. The ODU is part of a mesh network in which each antenna forms a link with another ODU. More specifically, when a new node is introduced, the management system re-configures the mesh to link the ODU with two or more other ODUs, according to the paths that must be established through the mesh to ensure path redundancy in the event of node (ODU) failure. The links are permanent in the sense that they may change only when another node is introduced. At any instance, the ODU can only transmit or receive on a single antenna – two antennas on an ODU cannot transmit at the same time, and one cannot be transmitting while another is receiving.

The maximum power at an antenna port is 18 dBm (modulation QPSK, 17.5 Mega-symbols/sec), into an antenna of 26.2 dBi gain.

$$18 \text{ dBm} \equiv 63.10 \text{ mW} \quad \text{and} \quad 26.2 \text{ dBi} \equiv 417 \text{ (numeric gain)}$$

$$\text{EIRP} = \text{Power at antenna port} \times \text{Gain} = 0.0631 \times 417 \text{ W} = \underline{\underline{26.3 \text{ W}}}$$

This figure is substantially within the limits for not requiring an Environmental Assessment.

### 3 MPE and Safe Working Distance

ERA Technology Ltd was contracted by Radiant Networks Plc to carry out antenna emissions measurements and make a recommendation as to safe working distance. The report is titled "Electric Field Strength Measurements as a Function of Distance and Boresight from the Reflector Antenna", ERA Report 2001-0503. It reports on detailed field measurements at the antenna – a standard ODU antenna – with an input power of around 10 mW. Results are extrapolated to 100 mW (20 dBm) and compared with a theoretical near-field calculation.

It should be noted that all measurements were made at 28.5 GHz. In the US the ODU will be restricted to operation within the LMDS band, to channel frequencies from 27.5625 GHz to 28.3185 GHz.

Measurements are on electric field strength, with significant allowance made for uncertainty (typically 30%). The report concludes that the ICNIRP Reference level for General Public exposure of 61 V/m (equivalent to 1 mW/cm<sup>2</sup> required by 47 CFR Sec I.1310) is complied with at distances greater than 80cm (31.48 inches) from the antenna. Note that this is the worse case bore-sight exposure, which would be highly unlikely for a number of reasons:

- The ODU is installed at the highest point of a building, links being line-of-sight. The general public will be below this.
- Links are bi-directional and share capacity. Although 95% transmit power is technically possible, the TDD nature of links is unlikely to see this rise above 50%.
- The declared maximum power is 18dBm, not 20 dBm.

Nevertheless, Radiant Networks will recommend that the unit is not approached to within 80cm, when in a state in which it can transmit (an indicator is provided on the base). The unit will be labeled as required by the FCC Rules.

**END OF DOCUMENT**