DeTect Inc.
detection technologies
RAPTOR RADAR WIND PROFILERS
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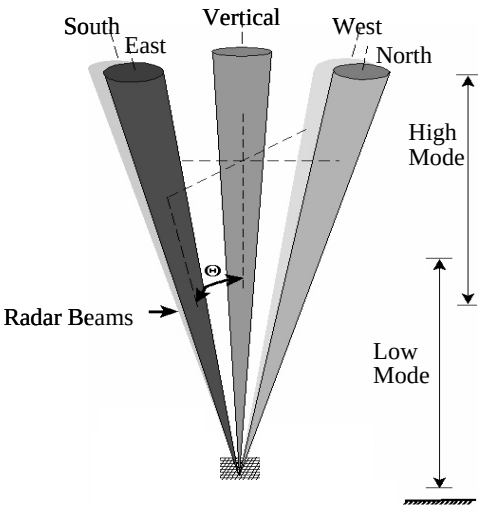
**Narrative to accompany application for experimental license**
**File No: 0472-EX-PL-2007**

## 1. Background

DeTect, Inc has acquired rights to radar wind profiling (RWP) technology originally developed by Applied Technologies, Inc (FCC file number 0223-EX-ST-2002). DeTect has undertaken an effort to make substantial innovative improvements to the technology; and has applied for an experimental license in order to complete development and testing. Our efforts will improve the antenna design and signal processing. Emissions from this improved technology will have similar characteristics.

The radar wind profiling technique depends on backscattering from clear-air turbulence (caused by atmospheric index-of-refraction fluctuations). These small scale small scale turbulent fluctuations drift with the wind.. The vertically pointed pulse radar computes the average Doppler shift (wind speed) on a gate by gate basis. The height range of useful echoes depends on several factors including the product of the transmitted power times the antenna aperture (power-aperture product), the radar frequency, the pulse length and the degree of atmospheric turbulence. Typically, radar uses a phased array antenna to form 3 or more beams that are directed vertically and at 12 to 25 degrees off vertical at orthogonal directions. Often the radars are operated in two modes. The "low" mode is designed to acquire data at frequent vertical intervals, while in the "high" mode, a longer pulse is used to achieve higher altitudes at less frequent intervals. The figure at the left depicts a general operation.




For at least 25 years, radar wind profilers have been in use and manufactured in the United States, at various locations and primarily at four transmit frequencies (50, 404, 449, and 915 MHz). The systems are used for pollution studies, aviation support, basic atmospheric research, and storm forecasting.

## 2. DeTect Radar Wind Profilers

The DeTect wind profiler line consists of modular components with an advanced antenna design, that make enable our systems to be easily tailored and scaled for different applications. The systems discussed here are designed to operate at 449 MHz in compliance with National Telecommunications and Information Administration's Manual of Regulations and Procedures for Federal Radio Frequency Management, Section 5.5.5, Criteria E.

Key components of the system are the antenna, the power amplifier, the transmit/receive system, and radar data system which contains the receiver, controls the radar and performs signal processing. In our architecture these components form the basic building blocks from which all systems can be

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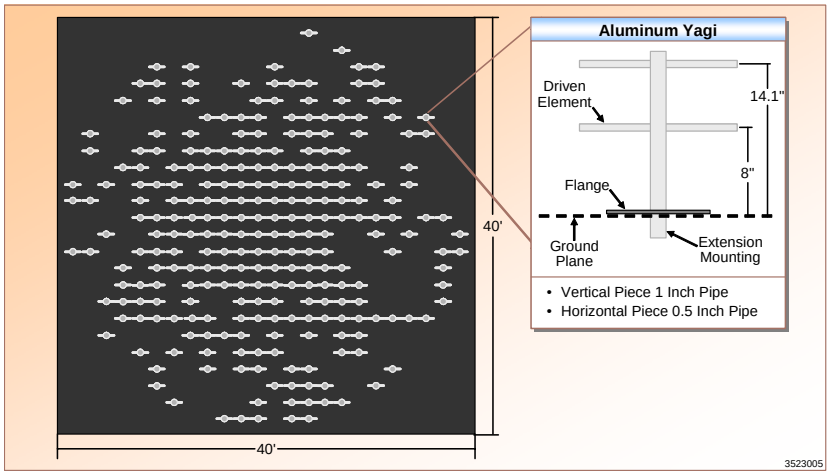
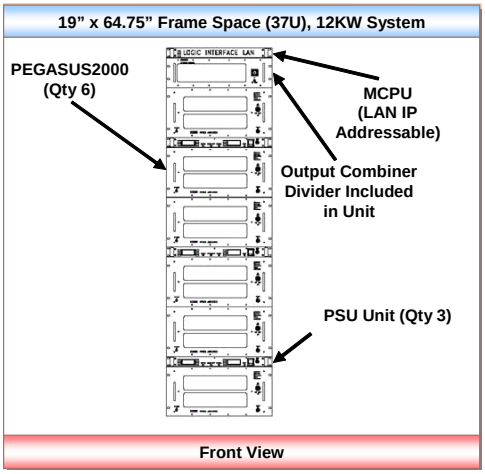
constructed. The antenna size and the size of the power amplifier are the key elements in determining the altitude performance of the system as well as its cost.

The Detect RAPTOR model uses a planar phased-array antenna constructed of 64 or more individual Yagi elements. The phase of each element is controlled to formulate a beam in a specified direction (nominally not more than 20 degrees from vertical). Elements are thinned in a random fashion toward the edges to create a specific amplitude taper to control unwanted sidelobes. The power amplifier can be built in increments of 2kw up to a maximum of 24 kW. For example, the following figure shows the design for a large 256 element antenna and a 12 kW power amplifier.




The systems may be operated in a number of configurations, depending on the system size and power. For example a large system such as that described above could be operated in two modes as shown in the following table.

| | Low Mode | High Mode |
|---|---|---|
| Zenith angle (from vertical) | 16 degrees | 12 degrees |
| Number of sampling gates | 111 | 54 |
| Range Resolution (pulse width) | 60 m (0.40 $\mu$sec) | 900m (6.0 $\mu$sec) |
| Vertical Gate spacing | 28.8 m (2X over sampled) | 293 m (3X over sampled) |
| First gate height | 100 m | 2..6 km |
| Last gate height | 3.2 km | 18 km |
| Inter pulse period | 37.6 $\mu$ sec | 150.0 $\mu$ sec |
| Time per beam | 5 sec | 12 sec |

## 3. Summary

DeTect is developing enhanced radar technology that builds upon the work of Applied Technologies Inc. While these improvements will make enhancements to the antenna and signal processing, the characteristics of the emissions will be similar to the original technology.