compression) is 16 Mbps. The attainable limit of fiber optic transmission is 2 trillion bits per second, enough to handle the amount of data handled by all US telecommunication companies put together. Fiber-optic uses less energy, is immune to static (electromagnetic interference), and is almost entirely secure from tempering or wire tapping. The problem of handling a low-level received signal with minimum degradation of signal-to-noise ratio was attacked by two approaches: low –noise parametric amplification and tunnel-diode down-conversion with gain. A study of the various types of par amps was conducted with some experimental verification of theory using the S-band breadboard par amp constructed during Contract NAS 8-1 643. Most of the tunnel-diode down-converter work was experimental and was conducted at both L- and S-band frequencies (Michel E. Marhic, 1973).

1.2 Project Objectives

Objectives of this project are as follows:-

- To improve receiver performance with improved noise performance and bandwidth enhancement.
- To model and simulate the design using MATLAB and OPTIWAVE.

1.3 Scopes

A free-space optical system block diagram is shown in Figure 1.2.The main scope concentrates on the front-end receiver which contains only a detector and of the work preamplifier.

day. A technology that offers a fast is free-space optics (FSO). This line-of-sight technology approach uses invisible beams of light to provide optical bandwidth connections. It's capable of sending up to 1.25 Gbps of data, voice, and video communications simultaneously through the air; enabling fiber-optic connectivity without requiring physical fiber-optic cable. It enables optical communications at the speed of light. And it forms the basis of a new category of products that is optical wireless products such as from Light Pointe, the recognized leader in outdoor wireless bridging communications.

FSO is a line-of-sight technology that uses invisible beams of light to provide optical bandwidth connections that can send and receive voice, video, and data information. Today, FSO technology is the foundation of Light Pointe's optical wireless offerings which has enabled the development of a new category of outdoor wireless products that can transmit voice, data, and video at bandwidths up to 1.25 Gbps. This optical connectivity doesn't require expensive fiber-optic cable or securing spectrum licenses for radio frequency (RF) solutions. FSO technology requires light. The use of light is a simple concept similar to optical transmissions using fiber-optic cables; the only difference is the medium. Light travels through air faster than it does through glass, so it is fair to classify FSO technology as optical communications at the speed of light. For providing high-speed connections, across Enterprises and between cell-site towers, it is the best technology available (Siti Sara Binti Rais, 2006 / 2007).

2.3 What is FSO?

FSO technology is based on connectivity between FSO-based optical wireless units, each consisting of an optical transceiver with a transmitter and a receiver to provide full-duplex (bidirectional) capability. Each optical wireless unit uses an optical source, plus a lens or telescope that transmits light through the atmosphere to another lens receiving the information. At this point, the receiving lens or telescope connects to a high-sensitivity receiver via optical fiber.

This FSO technology approach has a number of advantages:

i. Requires no RF spectrum licensing.

ii. Is easily upgradeable, and its open interfaces support equipment from a variety of vendors, which helps enterprises and service providers protect their investment in embedded telecommunications infrastructures.

iii. Requires no security software upgrades.

iv. Is immune to radio frequency interference or saturation.

v. Can be deployed behind windows, eliminating the need for costly rooftop rights.

2.4 FSO: Optical or Wireless?

Optical wireless, based on FSO-technology, is an outdoor wireless product category that provides the speed of fiber, with the flexibility of wireless. It enables optical transmission at speeds of up to 1.25 Gbps and, in the future, is capable of speeds of 10 Gbps using WDM. This is not possible with any fixed wireless or RF technology. Optical wireless also eliminates the need to buy expensive spectrum (it requires no municipal license approvals worldwide), which further distinguishes it from fixed wireless technologies. Moreover, FSO technology's narrow beam transmission is typically two meters versus 20 meters and more for traditional, even newer radio-based technologies such as millimeter-wave radio. Optical wireless products similarities with conventional wired optical solutions enable the seamless integration of access networks with optical core networks and help to realize the vision of an all-optical network.

Mobility embraces wide area 'roaming' at one end of the spectrum, and users within a room demanding extremely high bandwidths and mobility at the other. In this regime there is an increasing mismatch between fixed and mobile networks: Fiber optic LANs will be carrying traffic at data rates of Gbits/s in the near future whereas data rates of 10s of Mbits/s are difficult to provide to mobile users. We believe that optical channels, offering Terahertz of bandwidth may offer a means to break this bottleneck, allowing in-building wireless connections at upwards of 100Mb/s per channel.