

Computer Network

Unguided Media

- **Very Small Aperture Terminals (VSATs)**

These tiny terminals have 1-metre wide antennas and can put out about 1 watt of power. The uplink is generally good for 19.2 kbps, but the downlink is more, often 512 kbps. In many VSAT systems, the micro-stations do not have sufficient power to communicate directly with one another. Instead, a special ground station, the hub, with a large high-gain antenna is needed to relay traffic between VSATs.

In this mode of operation, either the sender or the receiver has a large antenna and a powerful amplifier. The trade-off is a longer delay in return for having cheaper end-user stations. The delay time or end-to-end transit time is between 250 to 300 msec (540 msec for a VSAT system with a hub).

A major drawback of satellite communications is the high cost of placing the satellite into its orbit. Moreover, a signal sent to a satellite is broadcasted to all receivers within the satellite's range. Hence, necessary security measures need to be taken to prevent unauthorized tampering of information.

- **Light Wave Transmission**

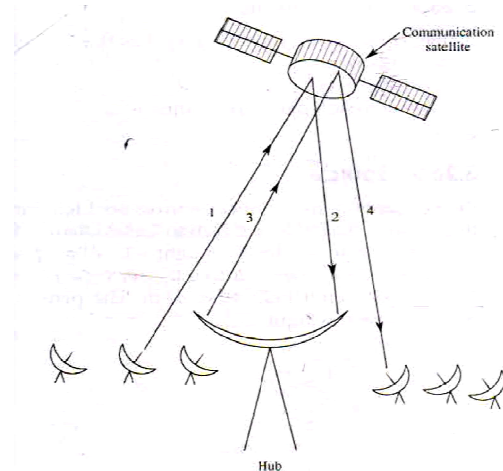
Unguided optical signaling has been in use for a long time. A modern application is to connect the LANs in two buildings via lasers mounted on their roof-tops. Coherent optical signaling using lasers is inherently unidirectional. So, each building needs its own laser and photo detector.

The laser beam transmission method has the following advantages:

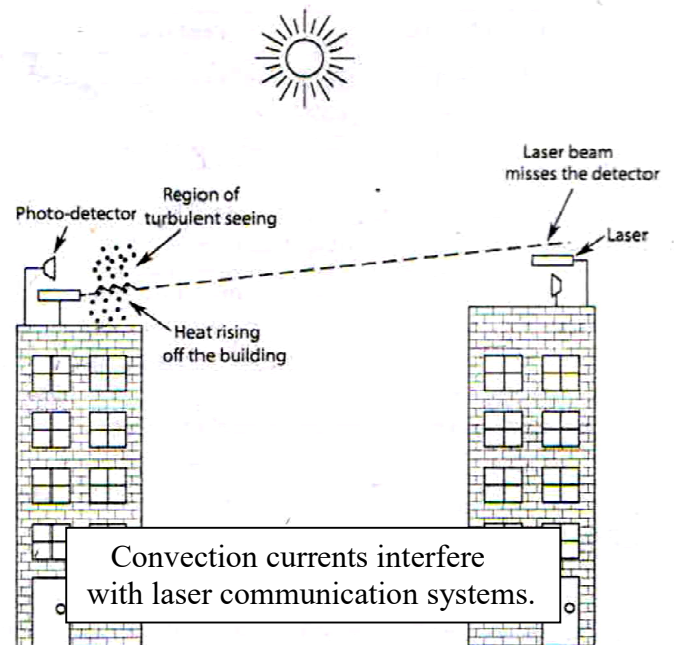
- i. It has a very high bandwidth at very low cost.
- ii. It is relatively easy to install.
- iii. It does not require any license.

The following are the disadvantage of laser beam transmission method:

- i. Laser beams cannot penetrate rain or thick fog, but they normally work well on sunny days.
- ii. Heat from the sun during the daytime causes convection currents to rise up from the roof of the building. This turbulent air diverts the beam and makes it dance around the detector.



VSATs using a hub



- **Infrared and Millimeter Waves**

Unguided infrared and millimeter waves are widely used for short-range communication. The remote controls used for televisions, VCRs, and stereos use infrared communication. They are relatively directional, cheap and easy to build but do not pass through solid objects. An infrared system in one room of a building will not interfere with a similar system in adjacent rooms. Further, security of infrared systems against eaves dropping is better than that of radio systems precisely for this reason. No government license is needed to operate an infrared system in contrast to radio systems, which must be licensed.

Infrared communication is used for indoor wireless LANs. For example, the computers and offices in a building can be equipped with relatively unfocussed infrared transmitters and receivers. In this way, portable computers with infrared capability can be on the local LAN without having to physically connect to it. When several people show up for a meeting with their laptops, they can be fully connected without having to plug in.

Exercise:

1: Write short notes on -

- **VSAT Communication**
- **Light Wave Transmission**
- **Infrared and Millimeter Waves**