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# Cablefree Solutions Limited

*Secure High Performance Wireless Connectivity*

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## Point-to-Multipoint Deployment - LMDS Applications

### What is LMDS ?

Local Multipoint Distribution Service (LMDS) is a wireless, bi-directional broadband technology designed to allow network operators and communication service providers to rapidly and cost-effectively deliver a wide range of high-value, quality services to homes and businesses. Uses for LMDS technology include high-speed Internet access, real-time multimedia file transfer, corporate local area network extensions, interactive video, video-on-demand, video conferencing, and telephony along with many other applications.

In the United States, LMDS was seen by the FCC as a way of bringing increased competition to the telecommunication marketplace, where it has allocated over 1 GHz of RF spectrum to transmit voice, video and high-speed data to and from homes and businesses. With current microwave technology, this implies approximately 1 Gbps of digital data capacity. Many other developing countries see this technology as a way around the high-cost and disruptive deployment of optical fibre or cable in urban environments to create instant high-capacity network infrastructure.

### Conventional LMDS Technology

Traditionally, wireless operators have chosen frequencies lower in the RF spectrum because low frequency signals with enough power can be sent long distances and penetrate buildings – examples are television and radio. Conventional LMDS, however, uses low power, high frequency (24 - 40 GHz) microwave signals over a short distance.

LMDS systems use a cellular architecture to send very high frequency signals over short line-of-sight distances. These cells are typically spaced 4-5 kilometres apart. The layout of the LMDS cells determines the cost of building a network of base sites and the number of subscribers covered.

Direct line-of-sight between the transmitter and receiver is required. For areas of shadowed coverage, reflectors or repeaters can be used to allow connection. Various isolation techniques can be used to prevent interference between signals.

Research and field trials have shown that in urban areas, a single transmitter would typically reach only 60% of potential subscribers in a cell. By using overlapping cells and repeaters, however, that number increases to almost 85% of subscribers.

Cell size is also influenced by weather conditions. Conventionally, for microwave LMDS, this is limited by the amount of local rainfall – the microwave signals are attenuated by water and lose strength. To correct this, LMDS operators can either increase the power of their transmissions during heavy rainfall to try and ensure an adequate signal reaches its destination, or to deploy networks with reduced cell size. For microwave signals, leaves, trees and branches can also cause signal loss, but overlapping cells and roof-mounted antennas generally overcome this problem.

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## LMDS Applications

The original concept for LMDS was centred about the transmission of video to residential customers. However, the recent explosion of Internet usage has created a demand for digital bandwidth, which now appears as the greatest application for LMDS technology.

With over 1 GHz of microwave spectrum, LMDS can provide connectivity for a great deal of data. Compared to domestic television subscribers who pay about \$30 per month for video, businesses regularly pay over \$1,000/month for high-speed T1 (1.544 Mbps) lines from fixed-line telecom operators. Using simple microwave LMDS technology, over 100 T1 equivalent lines can be provided in a cell even without splitting cells into separate sectors. Even allowing for 50% of the price charged by a phone company, 100 leased T1 lines would generate \$50,000 in revenue per month in a cell. By using microwave polarization techniques, LMDS providers can re-use bandwidth and increase the number of T1 equivalents available. Typically, a commercial LMDS application using microwave technology can potentially provide downlink throughput of 34 - 155 Mbps and a return link of 1.544 Mbps (T1). This capacity translates into the ability to provide complete packages of integrated voice, video and high-speed data services. With LMDS technology, Metropolitan data networks, Internet access, PCS backhaul, local loop bypass, digital video, digital radio, home working and telemedicine are all possible, even within the same cell.

The initial implementation costs for LMDS are in creating hubs and cell sites. Once they are on-line, new costs are incurred only as additional customers are connected. The largest fixed cost associated with building out LMDS cells will probably be the cost of subscriber equipment, rather than the transmission infrastructure equipment. By contrast, when installing fixed-line networks, the greatest costs are incurred before the first paying subscriber is turned on. LMDS can be viable with a low penetration rate. Fixed-line systems require far high penetration to offset the initial capital costs required to build them.

## Cablefree – Optical Wireless LMDS

CableFree Solutions believes that optical wireless technology offers a perfect alternative to microwave in LMDS applications. The use of optical rather than microwave technology adds many key benefits, including:

- License-free operation
- Non-shared bandwidth for each subscriber
- High speed symmetric bandwidths up to 1.5Gbps per subscriber
- Rapid network deployment and fast new-user connection
- Low cost of start-up
- No frequency planning
- Data Security against interference and interception
- Redundant 1+1 connection options including equipment and path diversity

For more information about license-free LMDS using CableFree's Optical Wireless technology, please contact us.

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