

4 MLLN

4.1 LEARNING OBJECTIVE

After reading this unit, you should be able to understand:

- Role of Leased Line in Telecom
- Types of leased lines
- Managed Leased Line network (MLLN) and its Network Elements
- MLLN Network Architecture

4.2 INTRODUCTION

Leased lines are dedicated circuits provided by Basic Service Providers (BSPs), which provide permanent connectivity to the Internet. Leased lines provide the last mile access from the user premises to the ISP. They provide permanent connection as compared to the temporary connectivity through dialup access. The quality of the connection is far superior to what is normally available through dialup, thanks to digital signaling, less noise, fewer exchanges etc.

4.3 ROLE OF LEASED LINE IN TELECOM

When you conduct business on the Internet, your company needs access that is dependable and fast. Time is money, and downtime or slow transfers can cost many times more than what you actually pay for your connections. A leased line is a permanent fiber optic or telephone connection between two points set up by a telecommunications carrier. A leased line is also sometimes referred to as a dedicated line. It is a non switched line, i.e., it is a non-exchange line. They can be used for telephone, data, or Internet services. Oftentimes businesses will use a leased line to connect to geographically distant offices because it guarantees bandwidth for network traffic. For example, a bank may use a leased line in order to easily transfer financial information from one office to another. A leased line can span long or short distances and customers generally pay a flat monthly rate for the service depending on the distance between the two points. Leased lines do not have telephone numbers because each side of the line is always connected to one another, as opposed to telephone lines which reuse the same lines for numerous conversations through a process called "switching." The information sent through the leased line travels along dedicated secure channels, eliminating the congestion that occurs in shared networks.

4.4 SERVICES OFFERED THROUGH LEASED LINE

- **Speech Circuits:** (Hot lines or Private Wire): Between two locations in one city/ different cities for the same applicant. The terminating equipment at both ends is telephone without dialing facility.
- **Data Circuits:** To transmit data between computers or any other type of electronic information devices.

- Local (within city) and long distance (intercity) data circuits at low, medium and high speeds, i.e., from 64 Kbps to nx64 Kbps to 2 Mbps to STM-1 (155 Mbps) and beyond.
- Dedicated path between two points
- Private Data Network – More than one local or long distance leased circuits converging on a location such that data from one leased circuit can be transferred automatically to another leased circuit for the same subscriber.
- Mainly used by banks, other financial institutions, corporate, government, etc to build their own private data network interconnection various offices and their computer systems.

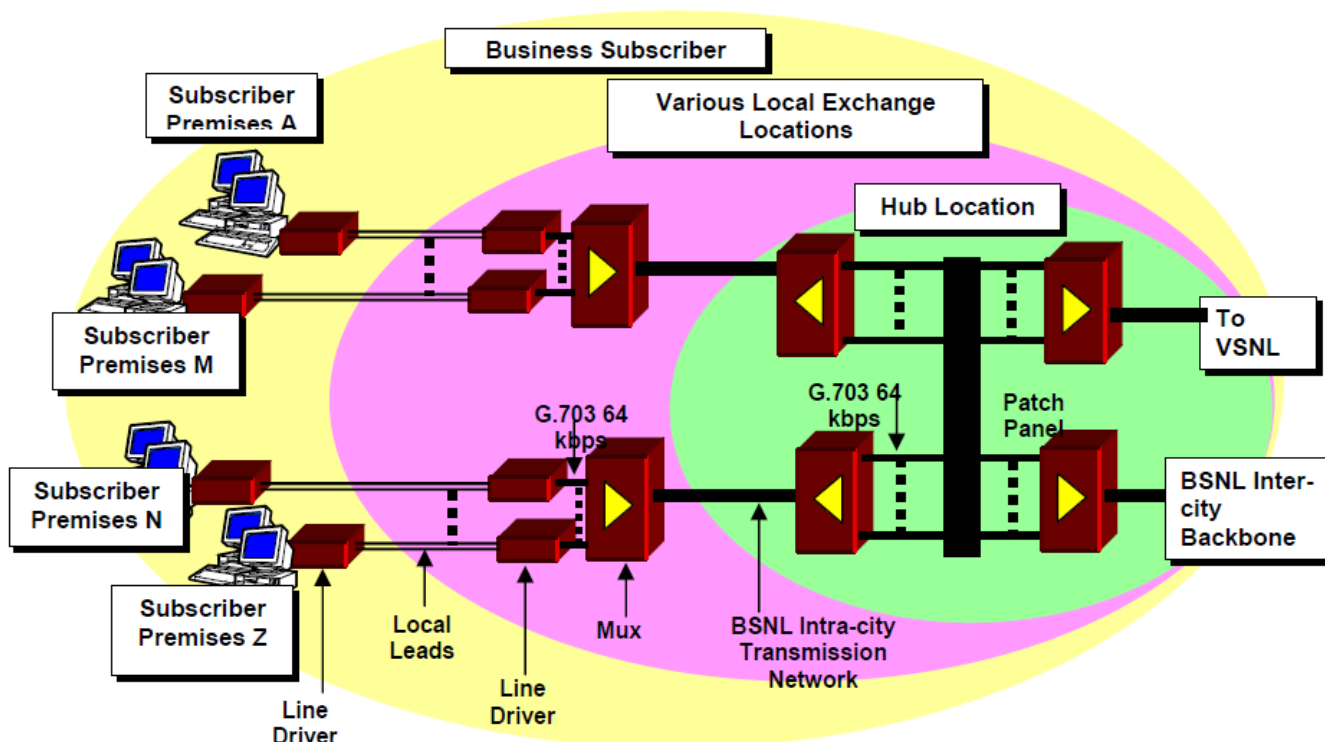


Fig.1 Typical Leased Line Network Set-up

Advantages

It provides permanent, reliable, high-speed connectivity as compared to the temporary connectivity of dial up access. The quality of the connection is far superior to what is normally available through dialup, because of the digital signaling, less noise, fewer exchanges etc.

Disadvantages

Leased bandwidth prices are quite high, compared to dialup bandwidth of comparable size. Entry level annual port prices are also high at present, so that this access method is only feasible beyond a fairly high threshold level. Permanent connectivity to the Net exposes the organization to a variety of threats including hacking, malicious code including active vandals, viruses, Trojan Horses, macros, denial of service attacks etc.

4.5 TYPES OF LEASED LINE

4.5.1 WIRE-LINE LEASE LINE SERVICES

Before year 2000, limited development in computing technology, limited options available with the operators were being offered to customers. Leased line of discrete capacity of 64Kbps, 2Mbps etc. were only made available to the customers due to non-availability of options for providing leased line of intermediate capacity. The subscriber therefore always suffer either by subscribing option with less than the capacity of their requirement or by paying more for subscribing lease line capacity more than their requirement. However, as more and more business introduces computer and its networking for increasing efficiency and ease of operations, demand for such networks increases. This increasing demand of lease line networks in conjunction with the development in computing technology forced the operators to set up a service platform which can provide a reliable, flexible, transparent and secure solution. BSNL launched following solution to meet the requirement of its customers.

4.5.2 MANAGED LEASED LINE NETWORK (MLLN)

MLLN solution uses existing copper access network. It provides subscriber flexible option of choosing lease line capacity in multiple of 64Kbps from 64Kbps to 2Mbps unlike earlier solution. Customer can build a highly secured and reliable network for sharing information between various entities connected through this networking solution.

The network is built up with three elements viz, Digital Cross Connect (DXC), Virtual Multiplexer (VMUX) and Network Terminating Unit (NTU). DXC is at highest level in network element hierarchy and can modularly expanded with the customer demand from 64P to 960P capacity. VMUX provide network connectivity to the customer with NTU at the subscriber premises. The versatile NTU is configurable through software for increasing or decreasing lease line capacity in multiple of 64Kbps and having various interface options for connectivity with subscriber networking equipment. The NTU accepts G703, V.35 and Ethernet inputs. It relieves customers of expenditure required to be incurred for purchase of equipment required of interface conversion. The physical leased lines and all these elements can be provisioned and monitored through a elaborated, highly secured disaster resistance monitoring, provisioning and fault control system at Bangalore with hot standby at Pune. Hot standby system ensures up and running services to the customer in the extreme disaster conditions. It has elaborated performance monitoring and fault identification system. This system also provides easy and flexible service provisioning. Controlled access to this system can be made available to the customer for on line monitoring of networking services provided. Customers can also allow to flexibly change lease line capacity in time domain as per his requirement. The system has rich report generation option by keeping continuous log of network and connected equipments. The system thus enables transparent execution of Service Level Agreement (SLA) of the order 99.999 (five nine).

4.5.3 MULTI PROTOCOL LABEL SWITCHING– VIRTUAL PRIVATE NETWORK (MPLS – VPN)

Application in convergence scenario generating IP based packet traffic from Voice, Data and Video applications. Efficient and secured IP based packet network therefore required to carry such traffic to the different entities in a business spread across wide geographical area. Sales related services demands access to information required by moving

sales representatives too any where and at any time. BSNL to cater such demand in secure but flexible environment created nation wide highly efficient traffic and quality sensitive network based on MPLS technology. A core network of highly efficient, high speed MPLS 110 routers is established with large no edge routers capable of accepting packetized data from almost all type of standard interfaces.

MPLS based VPN can be built up by the customer with different interface equipment at customer premises. This network can carry customer's traffic in highly secured mode with different QoS option. The lease line network is capable of providing lease line of virtually of any capacity which an application demands in present scenario. Point to multipoint connectivity can be provided to the customers to reduce number of physical lease line required in conventional lease line network solution. Connectivity while on move, particularly to sales representatives and customers can also be provided through secure mode.

4.5.4 WIRE-LESS LEASE LINE SERVICES

Offices and entities in far flung, difficult and isolated areas are also required to be connected in a business. Quick connectivity in congested city needs a system very different from present conventional wire-line based lease line solution. Further, new business models are also being evolved which demands connectivity, transfer of information for business strategies and decisions. Wireless networking solution is the only possible option to cater such demands.

4.5.5 SATELLITE BASED LEASE LINE (KU BAND) NETWORK

BSNL has established a wireless Ku-Band VSAT network with Hub earth station at Bangalore. Lease line of different bandwidth capacity from 64 Kbps to 2 Mbps can be provided to the customers. It needs installation of small terminal with out door unit having dish antenna of 0.75 M to 1.8M size and modem like Indoor unit. The subscriber unit can be installed at any far flung, difficult or isolated place. Highly congested areas where wire-line solution is not possible can also be provided connectivity with this option.

4.5.6 CDMA WIRE-LESS BASED LINE NETWORK

CDMA based wire-less data and voice services network has been developed by BSNL. This network is primarily used to provide wireless voice and internet based data services. However, the CDMA wireless network is also being used to build up lease line network in areas to the advantage of customers.

4.6 DRAWBACK OF TRADITIONAL LEASED LINE CIRCUITS

1. Limited range of services - Only Plain Leased Line Service, Data cards support only up to 64 kbps, no support for N x 64 Kbps.
2. From Operator point of view in case of Leased Line Circuit different boxes from different vendors so difficult to manage & control.
3. No Centralized Monitoring or alarm or performance monitoring.

Therefore we should have a control to all this, we are able to identify before the customer know which circuit has gone faulty. The solution to this is **MLLN**

4.7 MLLN – MANAGED LEASED LINE NETWORK

The MLLN service is specially designed mainly for having effective control and monitoring on the leased line so that the down time is minimized and the circuit efficiency is increased. This mainly deals with data circuits ranging from 64 Kbps to 2048 Kbps.

4.7.1 MLLN FEATURES:

1. MLLN is an integrated, fully managed , multi service digital network platform through which service provider can offer a wide range of service at an optimal cost to business subscriber.
2. Using NMS, MLLN can provide high speed Leased Line with improved QoS, high availability & reliability.
3. NMS supports service provisioning, Network optimization, planning & service monitoring.
4. System offers end to end circuit creation and modification, circuit loop testing & fault isolation, automatic rerouting of traffic in case of trunk failure, software programmability of NTU etc.
5. Banking, Financial institution, Stock market, paper industry, broadcasting & Internet service Provider main customers for MLLN.

4.7.2 MLLN ADVANTAGES:

1. 24 hrs Performance Monitoring of the circuit. (how much time circuit time up & down and the reason for down time e.g MODEM switch off or other reason)
2. Circuit fault reports generated proactively.(Before customer know we should detect the fault & rectify it)
3. On Demand the Bandwidth can be increased. (without changing the MODEM recreate the circuit with the same MODEM)
4. Protection against the failure of the circuit (through recovery Management process either automatic or manually)
5. Long drive on single copper pair.(for 64 kbps – 7 kms & for 2mbps – 3.5 kms)
6. Centrally managed from ROT connected to the NMS

4.7.3 APPLICATION OF MLLN:

1. Corporate high speed internet access through Broadband.
2. LAN interconnection.
3. Hotline connectivity for voice.
4. Point to point connection for data circuit.
5. Point to multipoint connection.
6. EPABX Interconnection.
7. VPN on MLLN Network.
8. Extension of VPN (MPLS) to Customer.

4.8 KEY ELEMENTS OF MLLN:

1. MLLN Nodes
2. Servers
3. Workstations
4. Networking Equipment
5. Others (Printers, UPS etc)

4.8.1 MLLN NODES

- DXC (Digital Cross-Connect)
- VMUX (Versatile Multiplexer)
- NTU (Network Terminating Unit)
- NMS (Network Management System)

4.8.2 SERVERS

- Database Server
- NMS Application Servers
- Billing and Accounting Servers
- Web Self Care Servers
- Proxy Servers

4.8.3 WORKSTATIONS

- Local Operator Terminals
- Remote Operator Terminals

4.8.4 NETWORKING EQUIPMENT

- Router
- LAN Switch
- RAS
- Firewall
- Remote Operator Terminal Connectivity Equipment
- Grooming Mux at Main and DR Sites
- Connectivity equipments at Remote Sites
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4.8.5 OTHERS

- Un-interrupted power supply
- Printers
- Messaging System

4.9 MLLN NETWORK ARCHITECTURE:

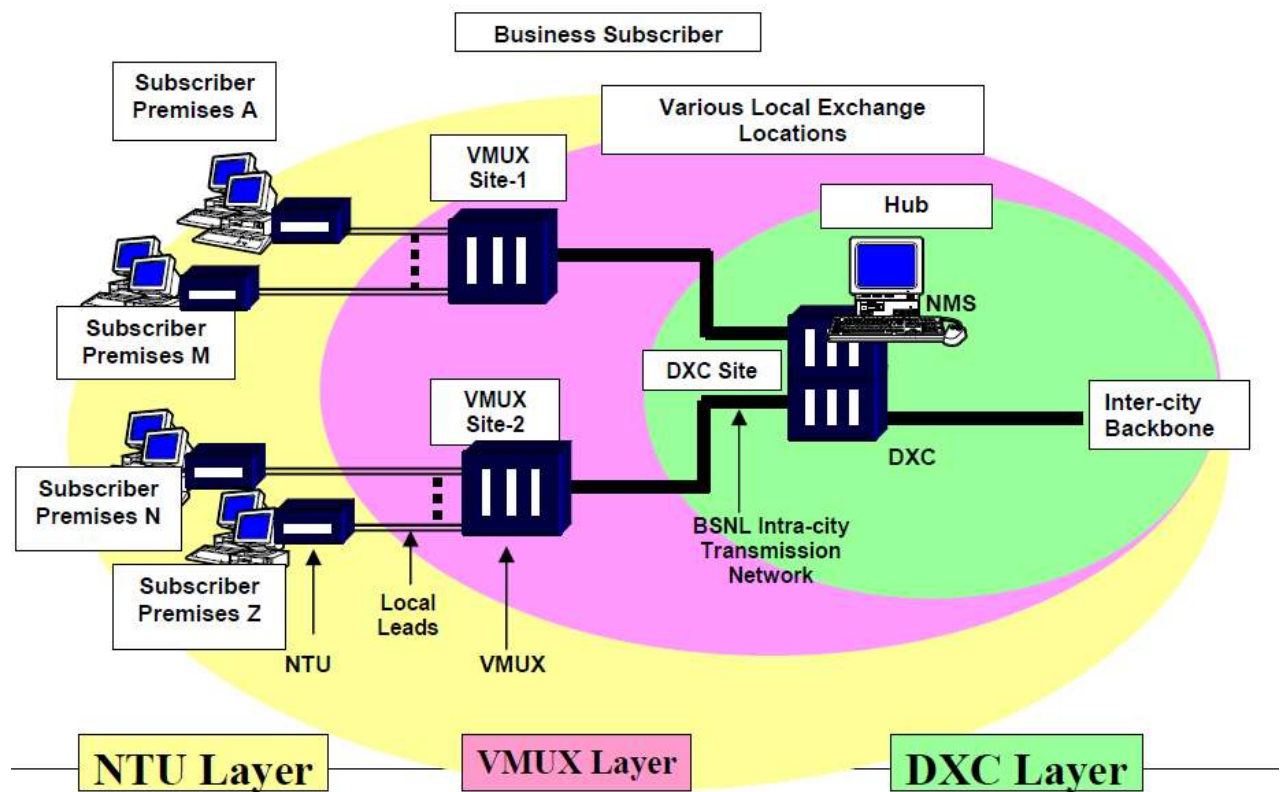


Fig. 2 Functional Block of MLLN

4.9.1 DXC

Capacity

- DXC (64 ports upgradeable to 128 ports)
- DXC (96 ports upgradeable to 128 ports)
- DXC (128 ports upgradeable to 256 ports)
- DXC (256 ports)

1/0 cross-connect capability

Non-Blocking Architecture

Redundancy

- Power Supply
- Switching Matrix
- Cross-connect Memory

Expansion to be made possible by addition of cards only.

Fully Managed from Centralized NMS

4.9.2 VMUX

Type - I, Type - II, Type - III with the configurations given below

	64 kbps	N*64 kbps	E1 Links
VMUX Type I	32	8	12
VMUX Type II	16	4	4
VMUX Type III	8	4	4

Expansion to be made possible on the same chassis by addition of cards

Type III VMUX

- > 230V AC Powered
- > -48V DC Powered

VMUX to be able to extend hotline circuits

- > Point to point and Point to Multi-point circuit routing should be possible

HDSL Driving Distance:

- > 3.5km at 2Mbps
- > 5 km at 1Mbps
- > 7km for 64/128kbps (at 0.5mm dia copper cable)

4.9.3 NTU (NETWORK TERMINATING UNIT)

Capacity

- > 64/128kbps NTU with V.35
- > 64/128kbps NTU with G.703
- > N x 64kbps NTU with V.35
- > N x 64kbps NTU with G.703
- > N x 64kbps NTU with Ethernet Interface

Line Loop Testing as per ITU-T Rec V.54

64kbps NTU to work up to 128kbps

N x 64kbps NTU to work up to 2Mbps

NTU to send power off signal to the NMS at the time of NTU getting switched off.

STU-160 works up to 128kbps

CTU-S and CTU-R works up to 2Mbps on a single pair of copper

All NTU's support V.54 line loop testing and support dying gasp to send power off signal at time of power off condition.

4.9.4 NMS (NETWORK MANAGEMENT SYSTEM)

- MLLN NMS

- Billing and Accounting System
- Web Self-care system
- We have offered Tellabs Network Manager Release 13 to meet the requirements
- MLLN NMS performs all the management functions on the network
- Supports regional partitioning and VPN capabilities
- Offered Performance Monitoring, Recovery, Reporting Packages
- Offered HP Open view and Cisco works which would reside on SNMP server for managing the servers and IT elements

4.10 CONCLUSION

Leased lines provides a scalable access method, important particularly for organizations with large user groups, including corporate, banks and financial institutions, educational and R&D organizations, government, military etc. Starting typically with 64 Kbps, it is possible to deploy a scalable architecture, with multiples of E1 (2 MBPS) pipes, providing the necessary bandwidth. In fact, leased access becomes a must for large organizations in most situations. The lease line networks in BSNL has been developed and groomed over a period of time catering demand of all type of customers. These networks has been integrated together to leverage the advantage of making available both wire-line and wire-less solution to the customers as per their needs and benefit.