# Note on

# Alternative of BRI Connection For MAX-NG subscriber

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## Executive Summary

The document describes the alternative of large number of BRI connection presently working with C-DOT DSS MAX Exchange mainly used for the ATMs and banks. These BRI connections are mainly used as a fallback of lease line. The existing C-DOT MAX systems in the BSNL network will be upgraded to a Voice-over-IP (VoIP) based Next Generation MAX (MAX-NG). Migration to MAX-NG is the conversion of all C-DOT RAX/MAX technology exchanges into Multi-Service Access network nodes with integrated VoIP Access Gateway functionality.

As it has been informed that there is no support of BRI in the C-DOT MAX-NG solution, we propose following two option for migration of existing BRI subscriber:-

1. Migration using IP Lease line connection.
2. Migration using CDMA VPN.

All circles should migrate the existing BRI subscriber of MAX exchanges to alternative solution before MAX-NG migration.

## 1. Introduction

C-DOT has developed an IP-MLLN based system which leverages on existing ADSL2+ technology available with BSNL to be used for MLLN services. The system replaced the existing V35-G703/HDSL modems needed to connect to traditional routers at subscriber premises.
Also there is an existing CDMA VPN technology with BSNL for the migration of BRI subscriber.

## 2. Migration Methodology

There are following two methodology of migration of BRI subscriber:

1. Migration using IP-MLLN
2. Migration using CDMA-VPN

## 2.1 Migration using IP-MLLN

### *Present Architecture*

Presently Leased lines are used to connect networks of two locations of an banks / organization using a nailed up dedicated path. This path is thru E1 interfaces or BRL interface routed thru PSTN switches. Components of system include a router, V35 modem and PSTN exchange. Router aggregates the IP links in an organization and puts on a V35 interface of WAN port or the router. Wan port is connected to V.35 modem on a V.35 interface connector.

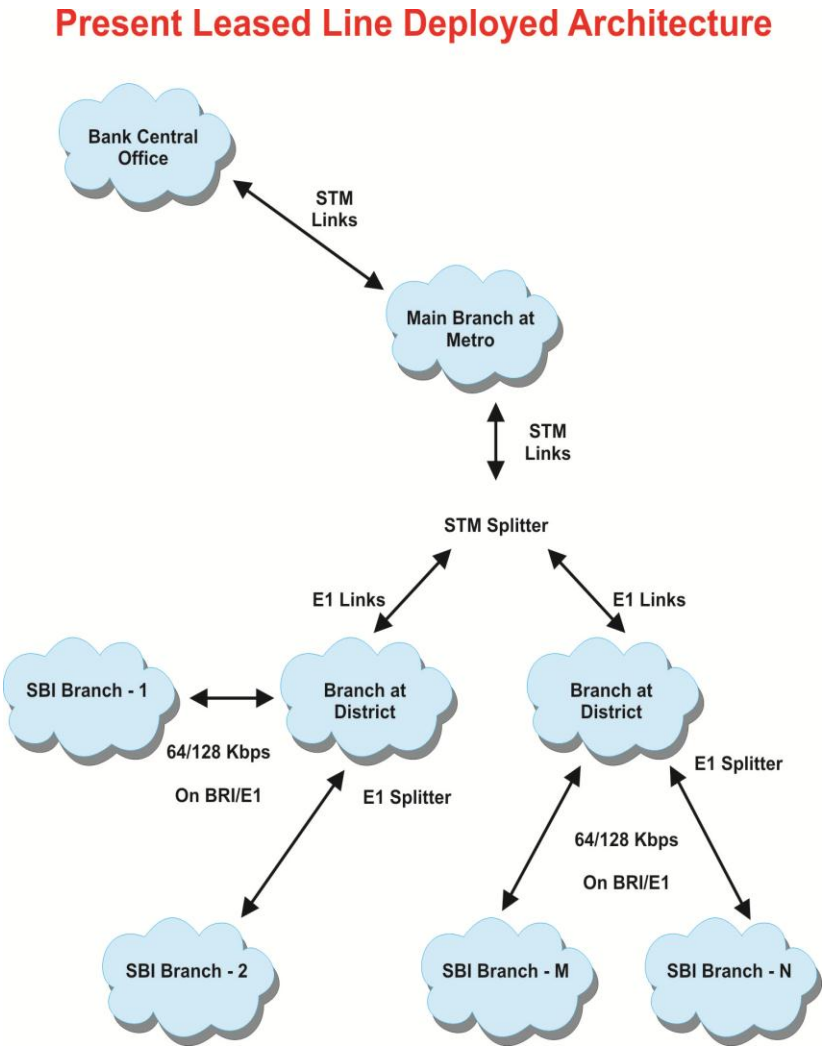



Fig. 1: Present network architecture of managed leased line networks

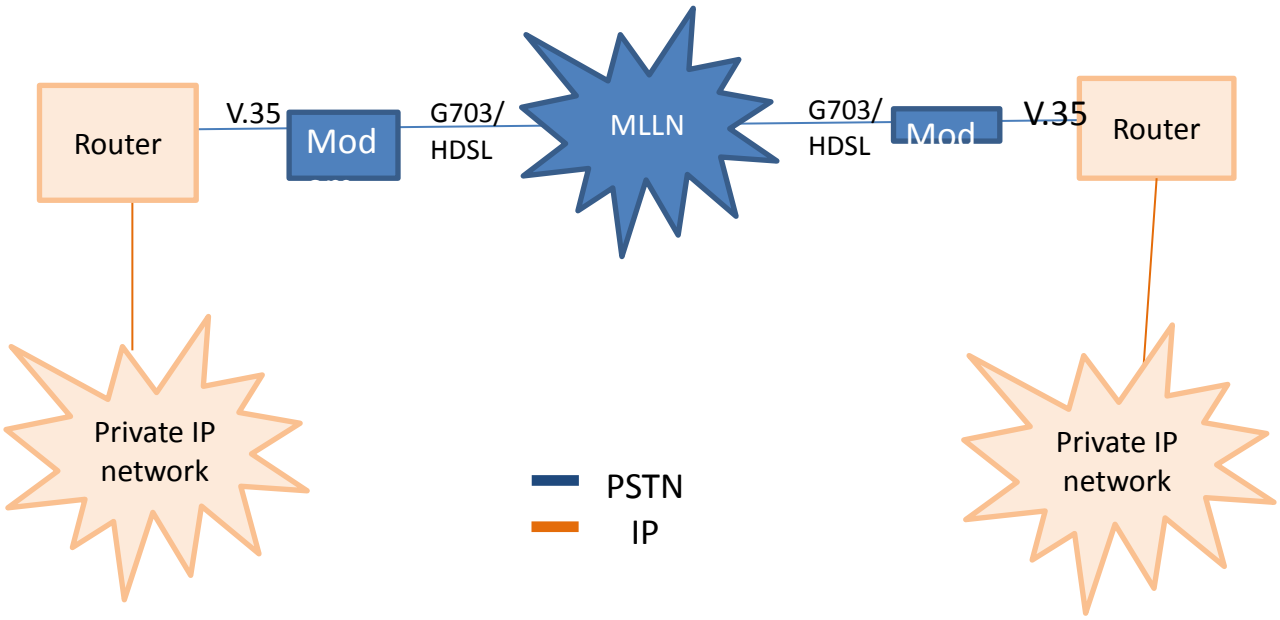



Fig. 2: Alternative depiction of Present network architecture of managed leased line networks

V35 modem takes in the IP data thru V35 interface and sends the same data towards PSTN either on G703 (E1 interface) or HDSL interface. Both G703 and HDSL are E1 interfaces with different line encoding standards. PSTN switch will take this E1 interface and routes to a different location using its own E1 network towards other end of V35 modem and ultimately to router.

The disadvantage with this scenario is as the requirements of leased lines increases, the interconnecting E1 interfaces between PSTN switches in network also should grow. This cannot happen in all scenarios because there may not be E1s available to all locations. The Opex & Capex of such leased line network is huge due to requirement of maintenance of dedicated lines. This cost will ultimately be passed on to the user. This solution is not only expensive but also the equipment required for this solution is expensive due to volumes.

## ***Proposed Architecture***

The proposed system uses IP network instead of PSTN network with a wireless fall back in the event of non-availability of PSTN (ADSL) interface. This solves all the above problems stated above of providing increased connectivity and lower maintenance cost with better reliability. However, there are a lot of routers in network which still has a V35 interface on its WAN port but not an Ethernet interface to connect to IP network. We came up with an idea of converting V35 to IP and connecting to IP network both thru DSL interface and wireless interface as a backup.

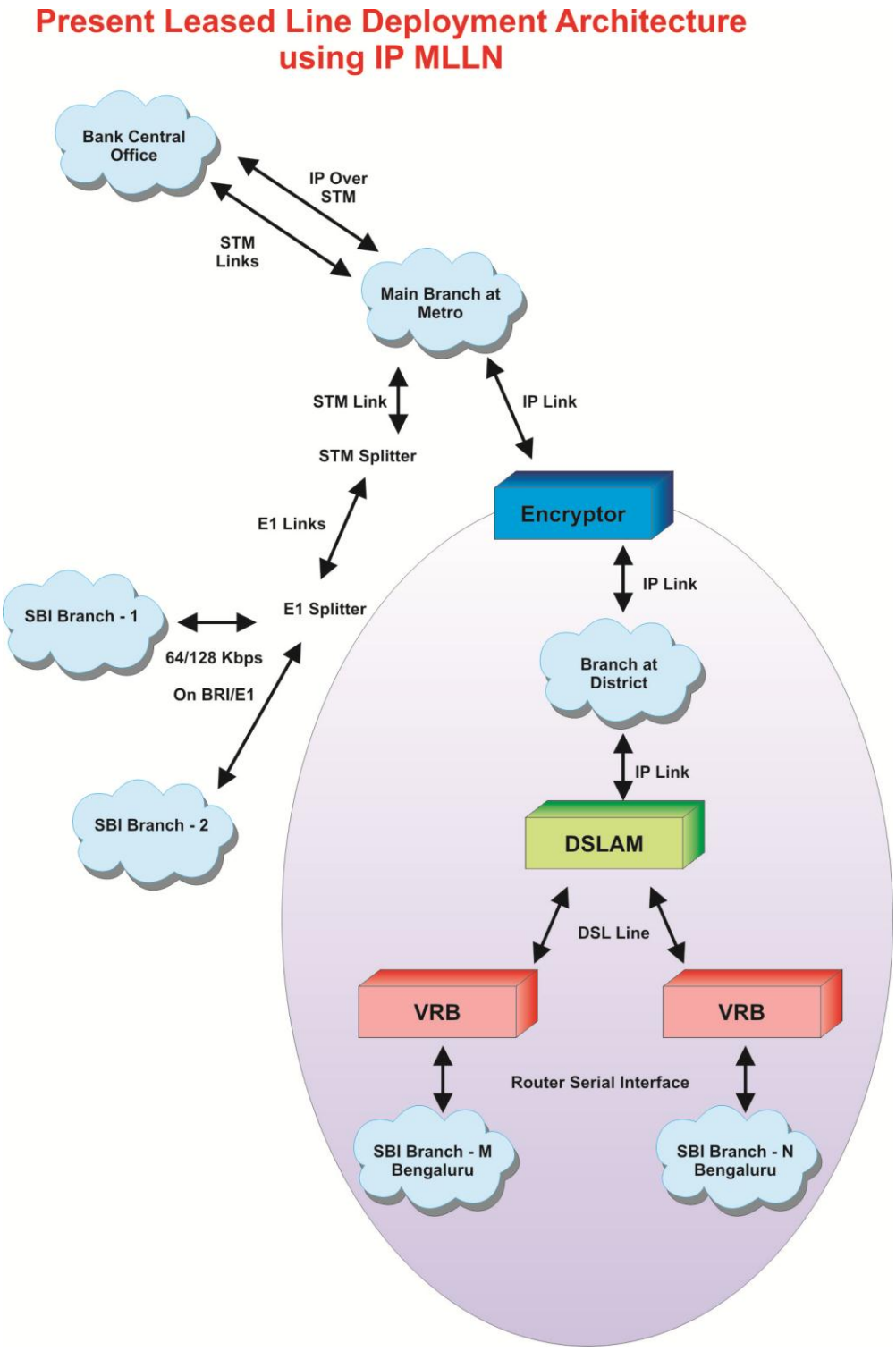



Fig. 3: Proposed network architecture of managed leased line networks

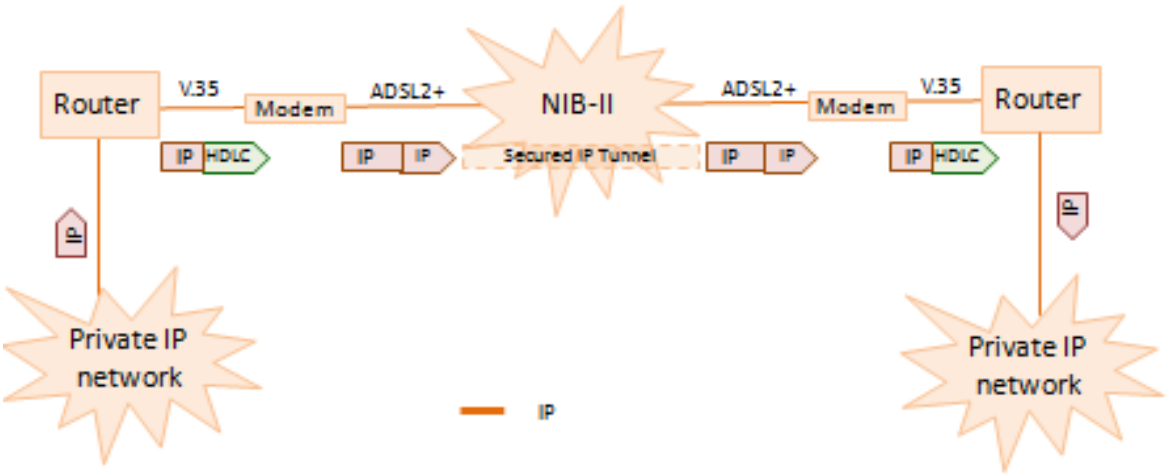



Fig. 4: Alternative depiction of Proposed network architecture of IP managed leased line networks

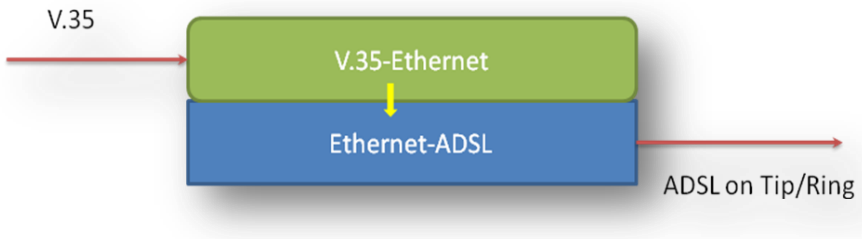



Fig. 5: V.35 Router Box (VRB)

IP network requires an Ethernet interface, which is expensive as it has lot of cable pairs. It will be even more expensive, if the location of router and IP network is far off.

In view of the above, we propose to convert Ethernet to ADSL and also Ethernet to wireless, which make use of existing TIP/RING of telephone lines when ADSL is used or wireless when ADSL interface fails. In addition, the system also supports encryption for mission critical applications. Telephone lines are more common and available at all places. Hence the modem we designed converts V35 to Ethernet and Ethernet to ADSL. In places where even the telephone lines are not available, wireless interface can be used.

## Possible Application

- BSNL's future requirements of leased line circuits as well as BRI migration can be met with IP-MLLN. However, some customers still prefer circuit switched leased lines over IP leased lines due to customer perception of better guaranteed bandwidth and network security of circuit switched MLLN.

- Offering IP-MLLN services that are equivalent in performance and customer satisfaction to circuit switched MLLN services, requires addressing the following aspects:

  - ADSL2+ modems used in IP-MLLN require a V.35 network interface usually present on most customer end routers. ADSL2+ modems presently deployed in BSNL's triple play network do not have the V.35 interface.

  - End-to-End secured IP connectivity needs to be provided between the two end points of an IP leased line. This requires encryption/decryption facility to be built into the ADSL2+ modems used in the IP-MLLN.

  - Leased lines beyond 4 Mbps and upto 30 Mbps can be offered using wireless or optical technologies customized specifically for deployment in the IP-MLLN.

  - Leased lines beyond 30 Mbps can be offered using optical technologies customized specifically for use in IP-MLLNs.

This application is presently under field trial at Bangalore for SBI Banking network.

## 2.2 Migration using CDMA-VPN

CDMA based MPLS VPN system is already in use in lieu of BRL Interface in the BSNL network. Network setup of CDMA based MPLS-VPN is as below:

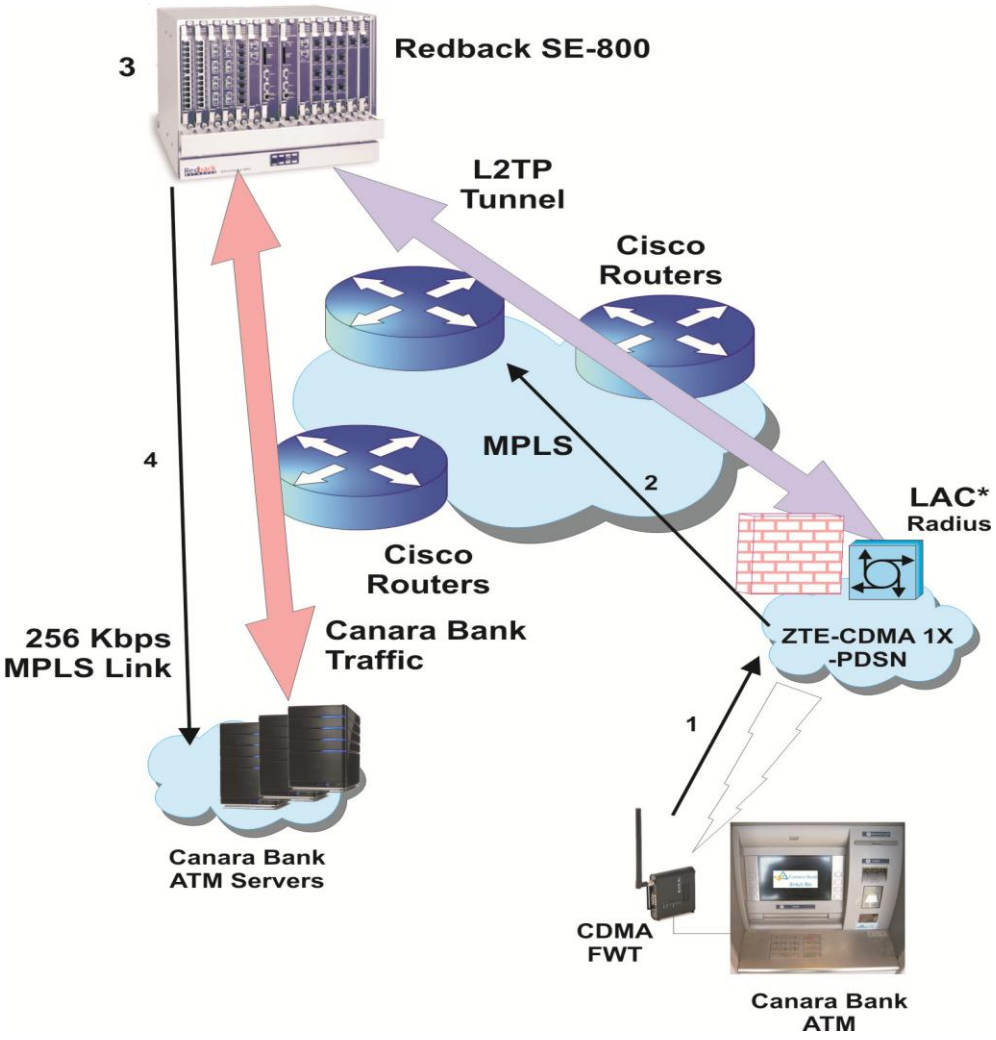
1. CDMA FWT (Data enabled) is connected on COM (RS 232) port to the Computer in ATM or router of Banks.

2. CDMA network is already connected on a 100 Mbps pipe with MPLS network.

3. The BNG server of Multiplay is used for L2TP tunnel formation and authentication of ATM user in MPLS network.

4. A 256 Kbps MPLS link is extended to bank e.g. Canara bank ATM servers in their data center.

The working setup of CDMA based MPLS VPN in the BSNL network is as below:




LAC – Link Access Control (CDMA network)
LNS(Redback SE-800) - L2TP network server (Multiply network)

The ATM machine is connected to CDMA FWT using COM port. The username and password are fed into the dialer from whom a dial up communication can be established. Once the computer dialer dials out, the username and password is sent over the CDMA network to the PDSN network. The PDSN network initiates an L2TP tunnel session with MPLS network.

On successful L2TP protocol handshake with the LNS (Redback SE 800), the L2TP tunnel gets established between the LNS of MPLS and LAC (PDSN). This helps in secure communication between them. Now the username and password is transmitted to the LNS (Redback SE 800). After successful authentication by LNS, the connection is put in a secure VRF (Virtual Router) which is created for Canara Bank. All successfully authenticated connections would be a part of

this VRF. The ATM servers are connected on MPLS VPN with 256 kbps backbone and its VPN is also extended for communication with the secure VRF.

The ATM machine is given an IP address for communication. The IP address can be either statically assigned or dynamic on successful authentication. Using this IP address the ATM machine starts a secure communication with its server. Authentication is through domain name, Username, Password and L2TP tunnel - which are very secure for transactions and also Traffic of respective VPNs are segregated in MPLS network.

This application is successfully tested for Canara bank ATM in Bangalore and also all the Katpadi MAX BRL interface has been migrated to CDMA based MPLS-VPN before MAX-NG migration.

## Possible Application

- Wireless access to ATMs at a cheaper price in non-feasible (no copper cable) areas instead of using VSATs.
- Mobile ATMs – Some banks are planning to deploy Mobile ATMs to enhance coverage in urban and vast rural areas. This application is well suited due to expansive CDMA coverage.
- 64 Kbps leased circuits for bank branches where provision of circuit on copper is not feasible.
- The possible throughput using CDMA FWT is ~ 115 kbps, so this can be used in place of ISDN backup. The banks are expressing the need of such alternate back up as when copper cable is cut both main leased circuit and ISDN are down.

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