

The logo consists of a vertical black line intersecting a horizontal black line. To the left of the intersection, there are three overlapping squares: a yellow one at the top, a red one in the middle, and a blue one at the bottom. The text "DELHI TRANSCO LIMITED" is written in a blue, sans-serif font to the right of the logo.

DELHI TRANSCO LIMITED

PRESENTATION

ON

Automatic Meter Reading at Delhi Transco Limited

BY
S.R.SETHI
DIRECTOR(Operations)
Delhi transco ltd

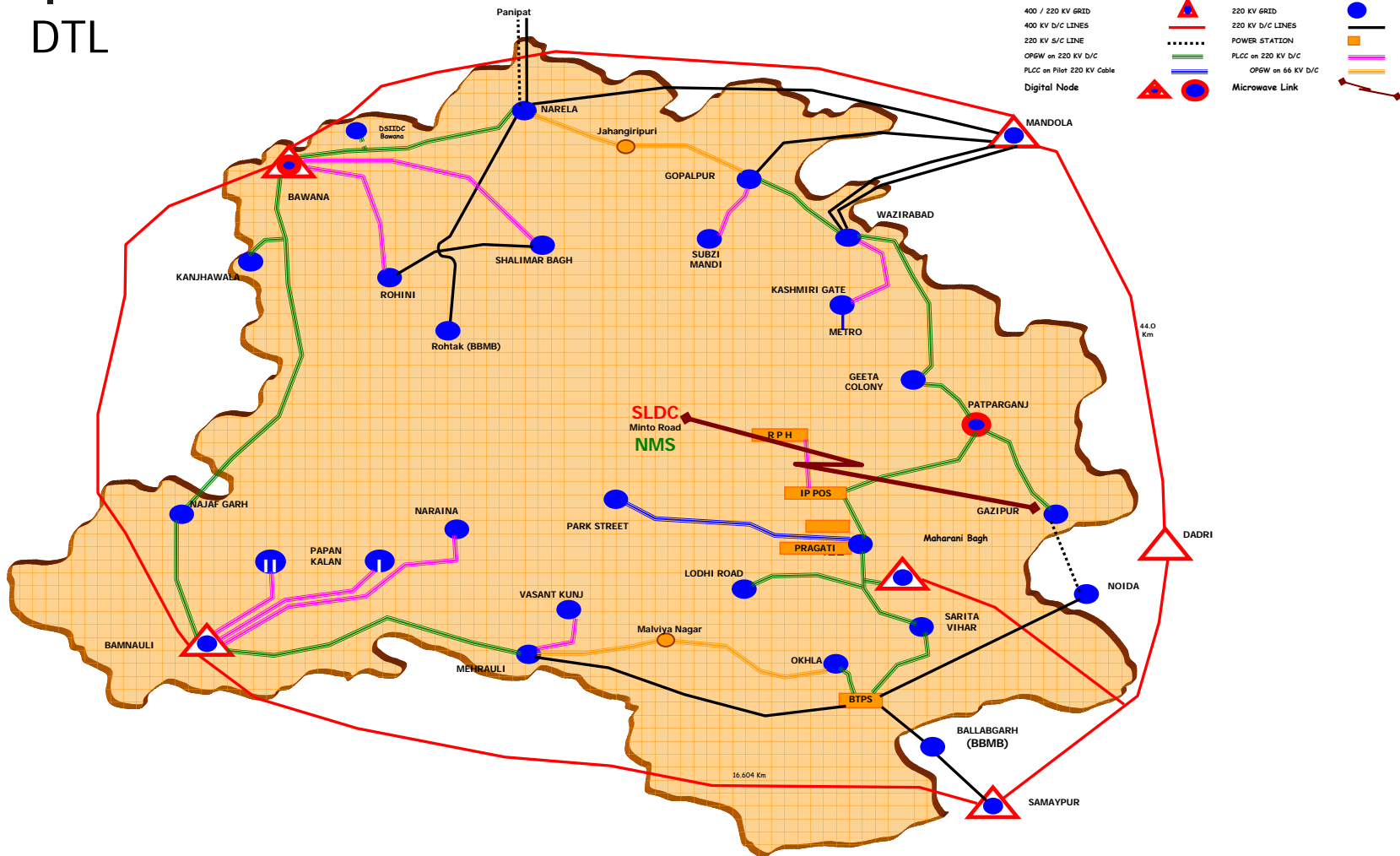


Automatic Meter Reading at Delhi Transco Limited

- Delhi Transco Limited is the State Transmission Utility for the National Capital Territory of Delhi. It is responsible for Transmission of Power at 220 KV and 400 KV level besides up-gradation, operation and maintenance of EHV network as per the system requirements.
- After the enactment of Electricity Act 2003, State Load Dispatch Center (SLDC) under Delhi Transco Limited was created, as an Apex body to ensure integrated operation of the power system in Delhi. SLDC is responsible for the real time Load Dispatch function, O&M of SCADA System and Energy Accounting. SLDC is also doing Scheduling/Re-scheduling of available power for optimum and economic operation of the power system.

Existing Communication Network

DTL



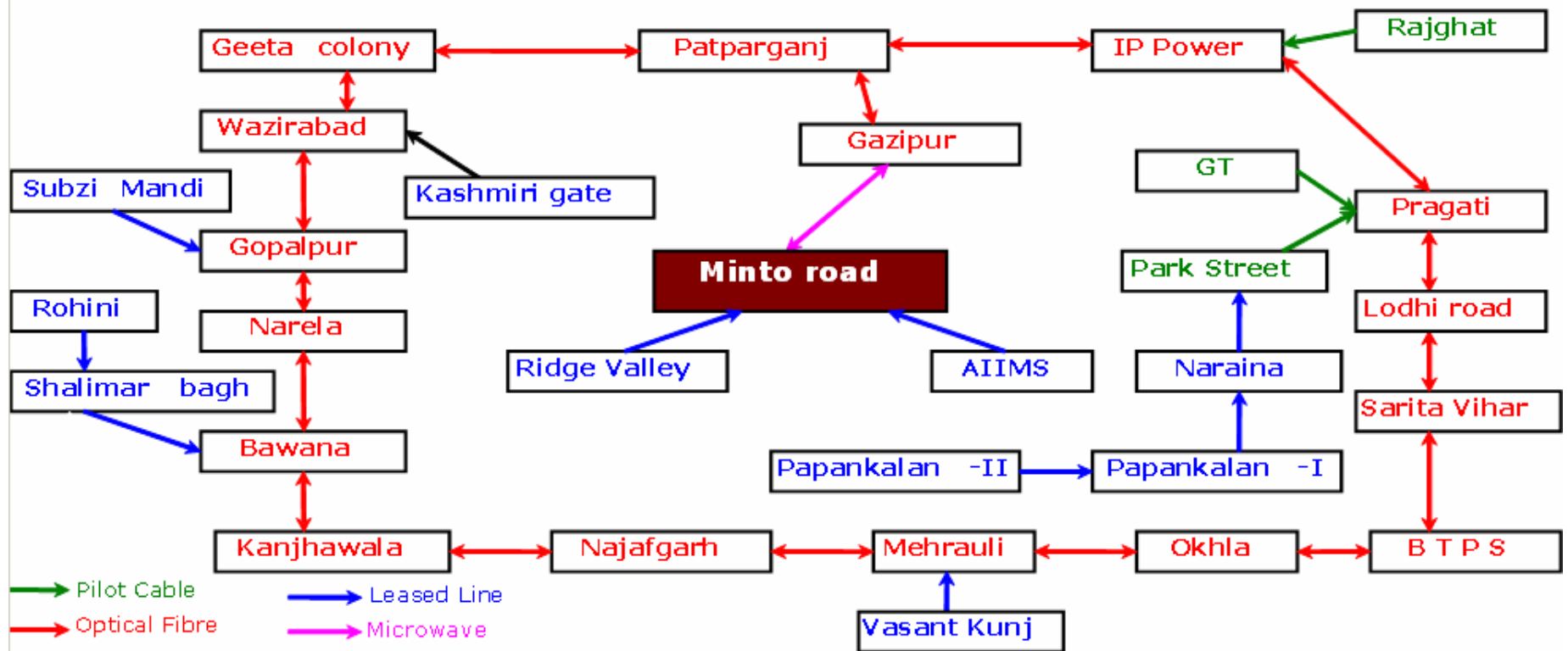


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- The real time Grid data from all the 220kV and 400kV grid substations of DTL are received at State Load Dispatch Center through various communication channels. The communication through optical fiber (OPGW) is from 16 nos. substation, through MTNL leased line from 2 nos. substations, by using hard metallic pilot wire from 3 substations, by using Power Line Carrier Communication at 8 substations.
- In the month of April 2007, Availability Based Tariff (ABT) was introduced in the State of Delhi, accordingly, ABT Mod Bus compliance energy meters having Baud rate of 9600 were commissioned at the exchange points of Discoms at different voltages levels of 220kV, 66kV, 33kV & 11kV. There are 49 substations on which 443 meters were provided including the pilot meters out of which 175 nos. of meters are installed at 16 nos. substations with OPGW connectivity, 62 nos. of meters at 3 substations with pilot wire connectivity, 100 meters on 10 substations which are proposed to be connected through MTNL leased line, and 106 meters on 20 substations to be communicated on GSM mode. The weekly provisional bills are being issued to discoms on the basis of the meter reading from these meters in the 15 minutes block time.

Proposed connectivity for meter reading

16 OPGW, 3 Pilot cable, 10 Leased line connected substations



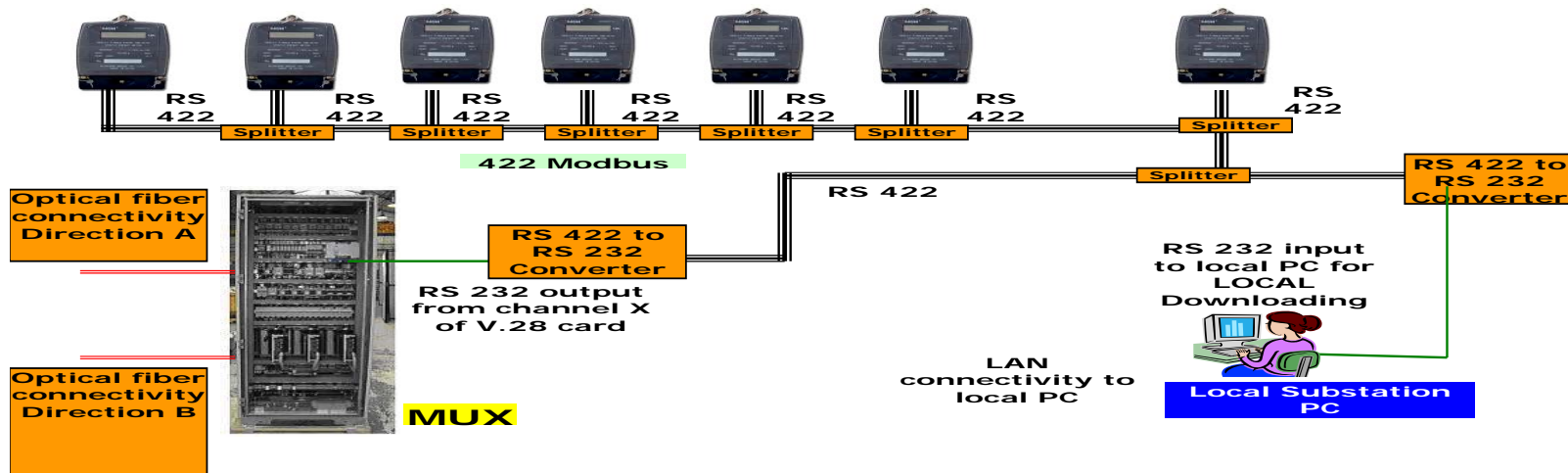


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- Presently all these 443 meters are being read manually at sites. It takes about three to four days to read these meters and another 10 days or so to raise the bills and thereafter the billed amount is realized in another seven days.
- **Communication technology**
- The communication medium for all these sites is presently through OPGW, pilot wire and PLCC. The PLCC connected stations are to be provided with leased line connectivity as Installed PLCC communication does not support the bandwidth required for meter downloading.
- Meters installed at Discom substations are to be communicated on GSM mode. All these meters are to be read at the centralized place (SLDC Minto Road) where most of the communication channels are culminating.
- To begin with, twelve numbers energy meters installed at 220 kV Lodhi Road Grid substation were read at remote centralized location at SLDC Minto Road. Meters are equipped with RS422 communication rear ports.
- Interconnections between all energy meters are achieved through MODBUS (Modbus communication is for a multidrop network based on master/client architecture). Splitters are used to make the network ready for modifications. In this present scenario, the MODBUS has four wires (Tx +, Tx -, Rx +, Rx -). At the end of MODBUS, the signal is converted from Rs 422 to Rs 232 so as to interface with the MUX (multiplexer) (V.28 interface on MUX, which is equivalent to RS232) for further transmission through optical fiber network.

The network architecture at Lodhi Road substation

- The communication path from Lodhi Road grid to the centralized location at SLDC Minto Road is optical fiber from LODHI ROAD - PRAGATI - IP POWER - PATPARGANJ - GAZIPUR and micro wave from GAZIPUR to MINTO ROAD. The meter reading from these 12 meters is received at the centralized remote location at SLDC Minto Road, from the output of the multiplexer on RS 232, which is directly interfaced to the COM-port of Laptop/PC.



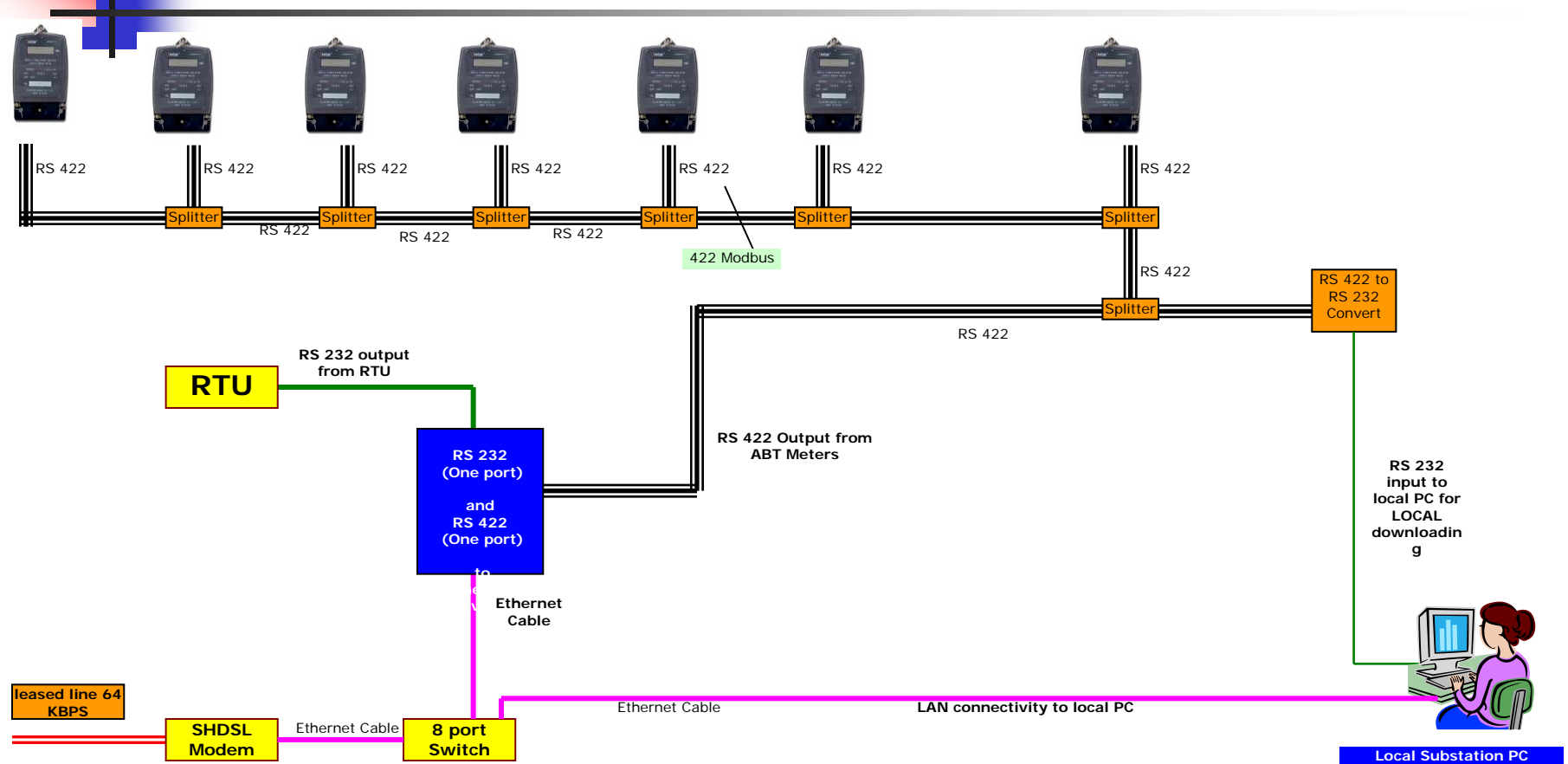
Communication architecture inside substation connected through *Optical Fiber*



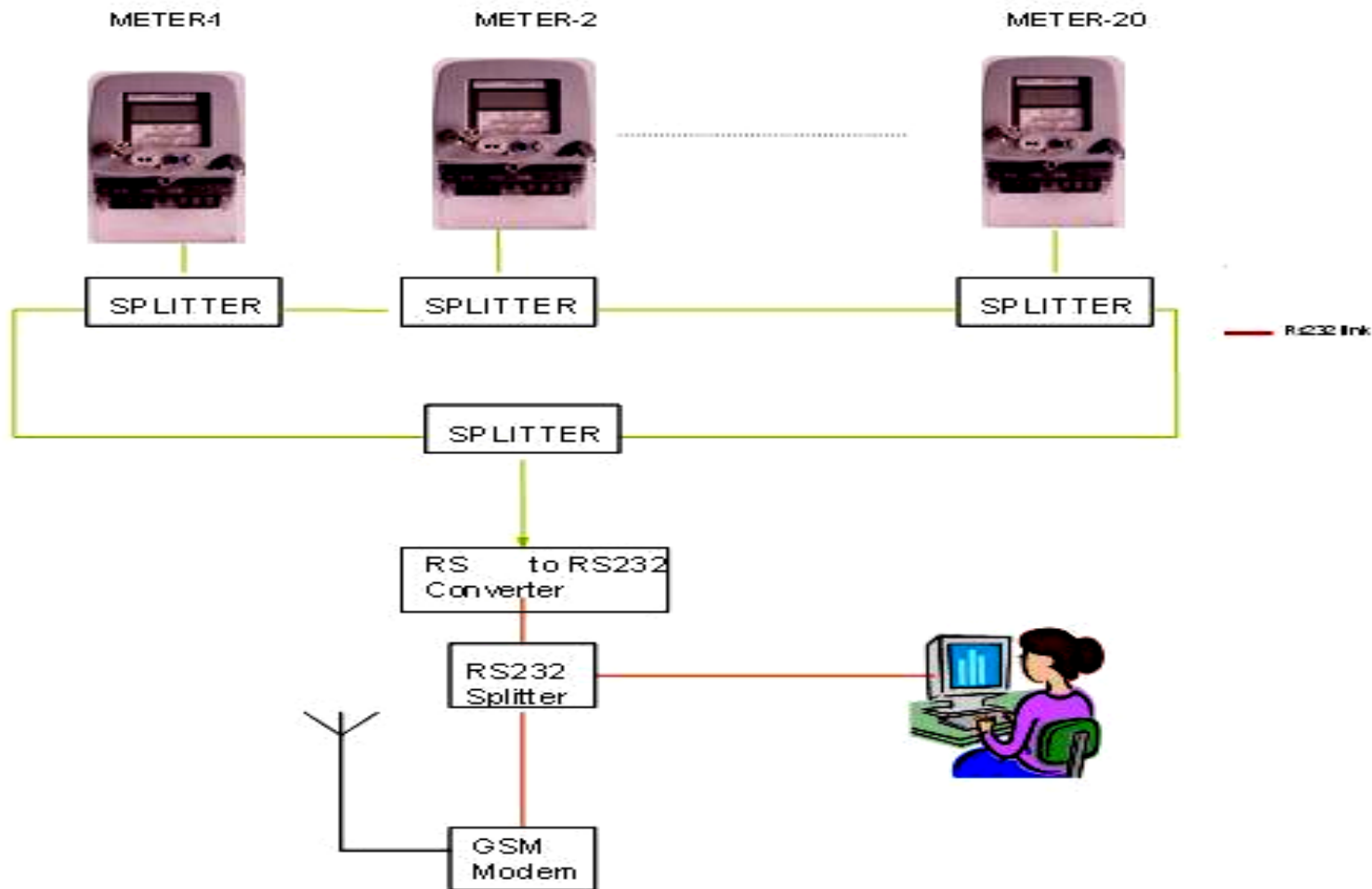
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- Similarly, the energy meters at other optical fiber connected substations are to be networked and data to be concentrated through MODBUS, which after conversion to RS232 will be interfaced to Multiplexer, so as to transmit to control centre and downloaded over there.
- There are three Pilot wire connected substations and 08 PLCC (Analog)connected substations (PLCC connected substations will be connected through Leased lines as PLCC can't support required bandwidth of meter downloading). In both cases of Pilot wire and Leased line, the network will be same.
- The MODBUS data is be converted to RS 232 with the help of RS 422 to RS232 converter. This RS232 data is again converted to Ethernet through Serial servers. Ethernet data is then transmitted to the control centre through Modems, which basically convert G.703 communication interface to Ethernet interface at both ends

Communication Architecture inside substation connected through Lease line

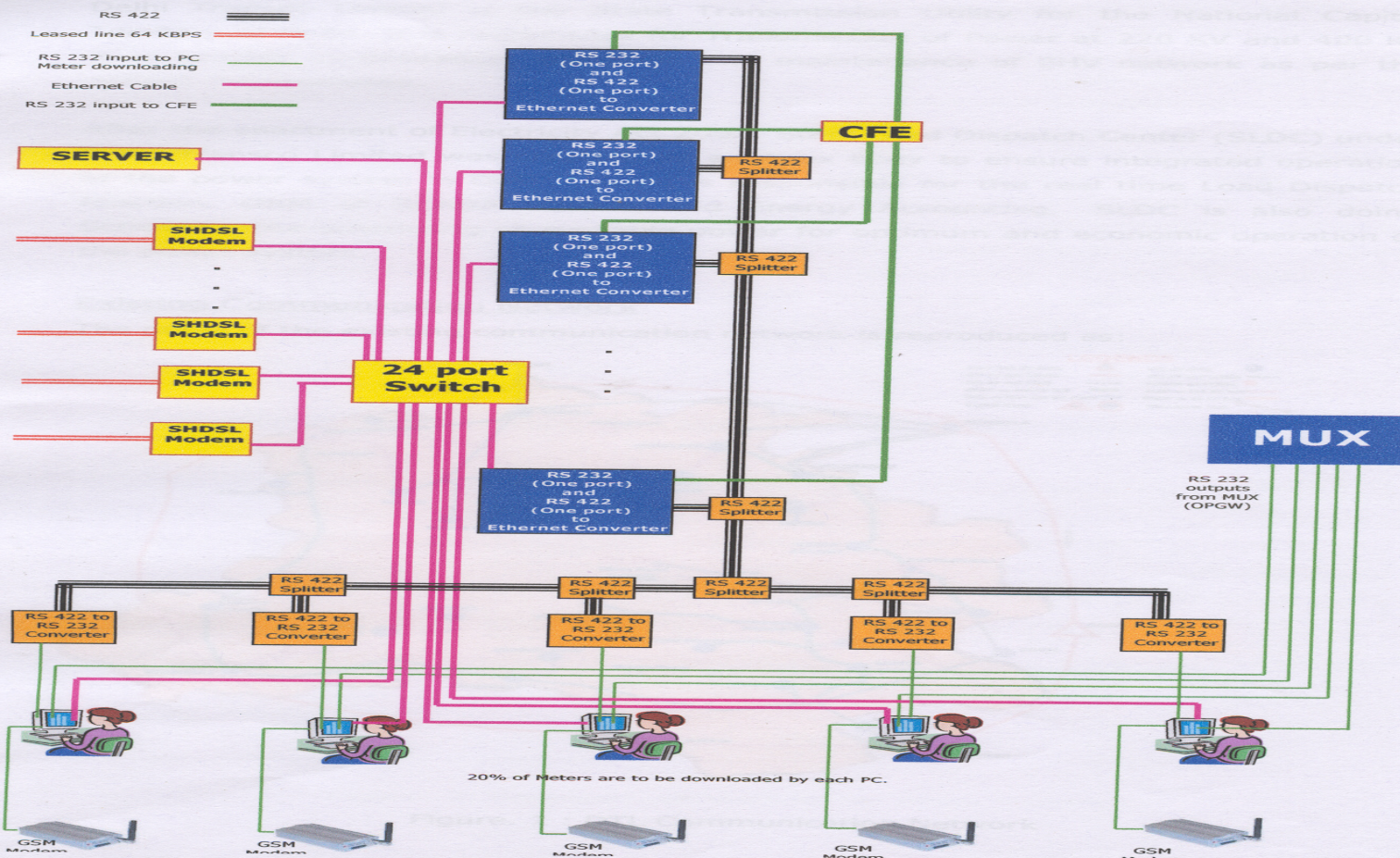


Communication architecture inside substation for *GSM*



The connectivity at the centralized control center at Minto Road for receiving the energy metered data on various communication mode of Optical Fiber, Leased Lines and GSM mode

Figure 6: Control Centre, Minto road connectivity





Cost savings and other benefits

	EXISTING SYSTEM	PROPOSED
METER READING, GENERATION AND DELIVERY OF BILL	The Meter Reading manually taken by the staff by physically visiting the meter site and is fed into computer. Bill is Generated and delivered to the consumer. The total time taken for billing and collection of payment is about one month	After implementation of Automatic Meter reading in the system the bill can be generated immediately and emailed to the consumer or downloaded by the consumer at its end and payment can be the online payment system
BILLING ERROR AND MONITORING OF METERS	Chances of billing error No facility of monitoring the meters	Here the human interface is minimized which results into increased billing accuracy and corresponding revenue. The metering reading can be done anytime or any day any period/any cycle (from days to months). More Customer convenience. Data can be retrieved from the central server by consumer and utility and can be used for past and future metering data analysis for power planning and management. Defective meters can be detected on time thereby actual billing rather than provisional/assessed billing resulting in more revenue realization. AMR real time data can be used for actual load assessment for effective power scheduling and demand side management
COST BENEFIT	Actual annual expenses =Rs 18.10 Lac per year.	In the case of Delhi Transco Limited, one time Material and installation cost is Rs 18.80 lac . Expected annual expenses is Rs 2.52 Lacs Fixed Cost of AMR project is paid back in approx one year. Thereafter it is the variable expense of Rs. 2.52 lacks per year as against the present annual expense of Rs. 18.10 lac. So there is a huge cost savings besides other advantage of having the past meter data for collation and analysis for the purpose power system studies and above all the consumer convenience and accurate billing thereby more recovery and less commercial losses.



THANK YOU