

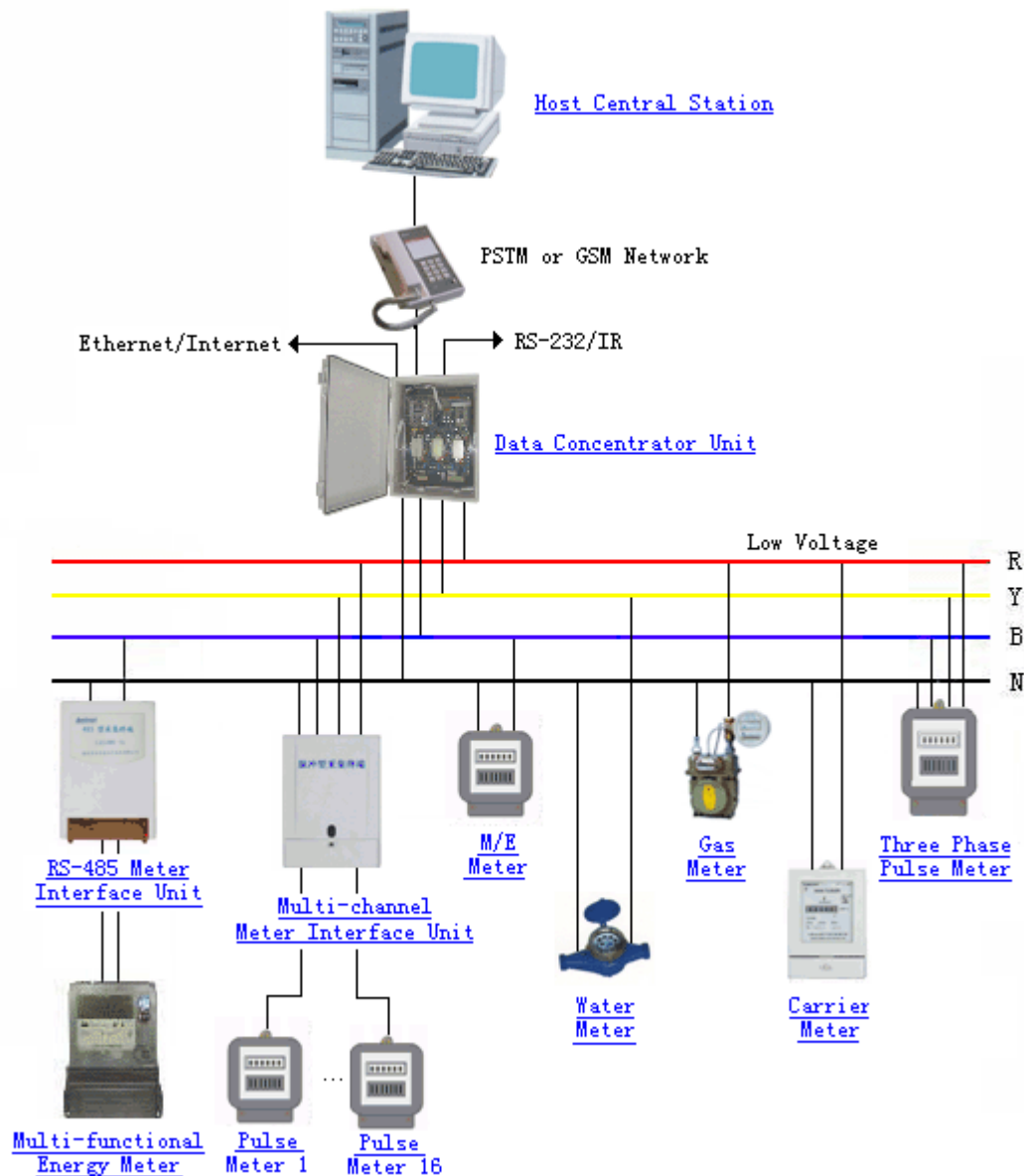
Power Line Carrier Communication

Automatic Meter Reading (AMR) System Overview:

The remote Automatic Meter Reading (AMR) System is a host driven, multi-level network system consisting of a Host Central Station (HCS), Data Concentrator Units (DCU) and Meter Interfacing Units (MIU), with built-in flexibility and expandability. Each HCS, while working independently, can also be integrated with an existing corporate information management system through software interface. With additional hardware and software support, the HCS can function as a workstation in an existing Local Area Network (LAN) and becomes a member of the entire system, or several HCS can be connected together to form a network of their own.

Automatic Meter Reading (AMR) system can be connected to any Electricity, Gas, Water and flow Meters with pulse output for Meter Readings.

Automatic Meter Reading (AMR) System Block Diagram:



The DCU and all the MIUs and meters connected to it can be considered as a sub-system of the HCS. The sub-

Power Line Carrier Communication

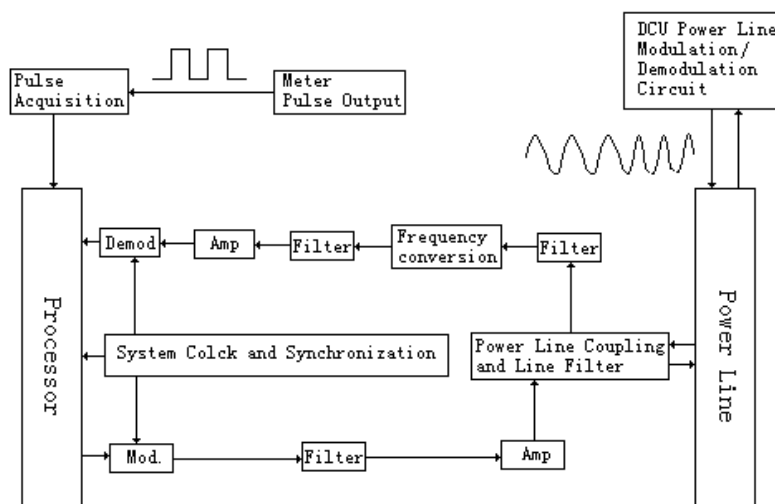
system is set up with a DCU monitoring the low voltage power zone downstream of a Distribution Transformer. The DCU can be viewed as the front end of the sub-system, collecting meter readings from all the MIUs connected to it through the low voltage power line carrier (PLC) and communicating with the HCS through the communication channel. There are two types of MIUs, a single-channel type connected to a single meter only, and a multi-channel type, which can be connected up to 16 meters. In projects where meters are scattered around in an open area, single-channel MIUs are usually used for individual meters. But for projects where meters are grouped together in a meter room or cabinet, Multi-channel Meter Interface Units (MMIU) are more cost effective. There are basically two stages of communication in the system, namely, that between the MIUs and the DCU, and that between the DCUs and the HCS. The communication channel or medium used between MIU and DCU is the Power Line; and the channel used between DCU and HCS can be the Public Switched Telephone Network (PSTN), GSM network, radio network, or directly with handheld terminals and notebook computers with a standard RS-232 interface or through a modem.

Operating Principle:

The communication device for the PLC communication system is a built-in Power Line Modem (PLM), which transmits and receives data over the power line. Both the MIU and the DCU contain the PLM device. The binary data stream is keyed onto a carrier signal by means of the Frequency Shift Keying (FSK) technique. The central frequency is shifted +0.3KHz to represent 1 or 0 of the binary data stream. This signal is then coupled onto the power line by the PLM. At the receiving end, an identical PLM will detect the signal and convert it back to a binary data stream. The PLMs operate in a Half Duplex, two-way, Time Division Multiplex communication mode. Two-way communication between DCU and MIU is essential in establishing a proper communication channel, for system synchronization and status reporting.

In AMRS, transmission speed is not a great concern but reliability is important. The data rate of the PLC channel is set at 600 bps, to ensure communication over a longer distance and reduced transmission error. Every MIU is also equipped with repeater function. If required, the DCU can designate any MIU in the sub-system as a repeater to enhance communication with a particular MIU. With the sensitive signal detection and sophisticated digital filtering technique, this PLC communication is highly immune to electrical noise and interference.

PLC Schematics:



Signal, Data and Information Flow:

Power Line Carrier Communication

The MIU is an intelligent device, which can collect, process, and record power consumption data from the electric meter. It picks up the pulse output of the meter and converts the measurement of the meter into a digital format suitable for data processing. Thus it is possible to monitor the electrical load in real time. The MIU saves the data collected in non-volatile memory, and all data and settings are protected against power failure. It will automatically resume normal operation when power returns after a power failure. After receiving a Multi-rate Tariff command and loading the time-of-use table from the DCU, the MIU will process energy consumption data according to pre-set time intervals. It will update the peak values and their time of occurrence at each tariff rate providing real time information of electrical consumption for the information management system.

Data stored in the MIU are transmitted to the DCU via the power line through the built-in Power Line Modems (PLM). Communication is initiated by the DCU, which polls the MIU by calling its address. Data received from different MIUs are stored in the corresponding Load Data Records in the Flash memory of the DCU. The DCU supports communication with any upward equipment in conformity with RS-232 standard, e.g. a handheld computer. In most cases, the DCU communicates with the remote Host Central Station through standard modem via the existing telephone line or the GSM network.

The Host Central Station (HCS) is the control center of the system, where all the functions of the system are controlled and monitored. The HCS passes instructions and information requests onto the Data Concentrator Units (DCU) by calling their addresses (or the telephone numbers in case of a public switched network), and the DCU will respond accordingly. The address codes (telephone number) of the DCUs are stored in the HCS. With sufficient mass storage, theoretically all DCUs can be covered by the HCS, in actual fact the maximum number of DCUs can be connected to a HCS is about 1000 as it will be limited by the required response time and efficiency of data management. In case of failures in self-diagnostics or any abnormal behavior of the MIUs, the DCU can also make requests to report by dialing to the HCS. The HCS will convert the data received into a text file compatible with the corporation's existing Meter Reading Management System, and store it in the Hard Disk Drive. File transfer between the HCS and the Corporation's MIS system can be done through standard input/output ports, such as RS-232.

Product Line

SI	Item Code	Description	Rate (Rs.)
1	ATL90115-1	Embedded PLC Modem - 1 Phase	1670
2	ATL90115-3	Embedded PLC Modem - 3 Phase	2750
3	PLC101s-12	Embedded PLC Modem - 1 Phase (1200bps)	2310
4	PLC103s-12	Embedded PLC Modem - 3 Phase (1200bps)	3250
5	ATL60142E	Broadband Power Line Carrier Modem	4000
6	MIU 101	Single Phase Meter Interface Unit	2300
7	MMIU-16	Multi-channel Meter Interface Unit (16 channel)	18000
8	LXSG-15Y	Water Meter with pulse output	3250
9	DCU220	Data Concentrator Unit	87700
10	HHU	Handheld Programming Unit	36950
11	PSS100-12	Switching Power Supply (+/-12VDC)	1500
12	PMIU	Meter Interface Unit with power cut-off function	4160
13	EM-1-A	Single-phase AMR Electronic Watt-hr Meter	4160
14	EM-3-A	3-phase 4-wire AMR Electronic Watt-hr Meter	9700
15	ATL57001	Public Lighting Control Unit	7400

Terms:

Power Line Carrier Communication

- a) Sales Tax : Extra
- b) Freight & Forwarding : Extra
- c) Delivery : 2-3 weeks subjected to ready stock.
- d) Payment terms : 50 % Advance, 50 % on D.O.D. Basis
- e) Warranty : 1 year from date of delivery
- f) Excise Duty : N.A.
- g) AMR Software : Demo version available FOC against purchase.