TECHNICAL SPECIFICATION

MODEM

* Short message service and GPRS Compatible
* Quad-Band 850/ 900/ 1800/ 1900 MHz
* GPRS multi-slot class 10/8
* GPRS mobile station class B
* Compliant to GSM phase 2/2+
  ➤ Class 4 (2 W @850/ 900 MHz)
  ➤ Class 1 (1 W @ 1800/1900MHz)
* Temperature -40 ℃ to +85 ℃
* In built GSM Antenna
* Reliable data transfer and data control access
* GPRS data transfer rate
  ➤ Uplink speed 42.6 kbps
  ➤ Down Link Speed 85.6 kbps

RELAY

* Polarized latching relay
* Contact Material AgSnO2
* 25000VA of Maximum switching power
* 440VAC of Maximum switching voltage
* 100A of Maximum switching current
* Mechanical life 10^6 switching

TAMPER DETECTION

* Magnet Tamper Occurrence and Restoration
* Cover Tamper Occurrence and Restoration
* Earth Tamper Occurrence and Restoration
* Neutral Tamper Occurrence and Restoration
* Reverse Tamper Occurrence and Restoration

SERVER

* Open Source Platform
  ➤ Linux CentOS 6.0 Server
  ➤ Server Side Language PHP
  ➤ Database on MySQL 5.5.10
  ➤ Apache 2.0 Web Server
  ➤ HTML 5
* Microsoft Platform
  ➤ Windows Server 2008
  ➤ NET framework 4.0
  ➤ Microsoft SQL 2008 Database
  ➤ IIS 7.0 Web Server
  ➤ HTML 5

OPERATIONAL BENEFITS

			Manual	Automatic (Real Time)
1	Meter Reading		Manual	Automatic (Real Time)
2	Accuracy of Reading		Always Doubtful	Always Accurate
3	Realiability Factor Of Meter Reading		Very Poor	Very High
4	Meter Reading Efficiency		Always < desired	Always = Desired
5	Ease of Control Over Bad Debts On Real Time/Remote Disconnection		Not Possible	Possible
6	Ease of Control Over Deferred Payments due to accrual of meter readings		Not Possible	Possible
7	Identification of Menance of Theft / Fraudent practices and Real Time Control		Not Possible	Possible
8	Watch Dog for Event Driven outages and tamper Notyfication through SMS		Not Possible	Possible
9	Billing Information on Demand using Mobile Services by the consumers		Not Possible	Possible
10	Flexibility of using the Meter either as post paid Meter or Pre paid Meter		Not Possible	Possible
11	Regular Monitoring of Connected load & Consumptions abnormalities		Not Possible	Possible
12	Accurate Identification of T&D Loss on line.		Not Possible	Possible
13	Feeder & DT Losses visible on the fly		Not Possible	Possible
14	Consumer Demand Curve Mangement & reducing failure of DTdue to over load		Not Possible	Possible
15	Real Time Entegration of MDM with other Utility Application i.e. CRM / MBC / GIS / EA / AM / MIS etc..		Not Possible	Possible
16	Bidirectional Communication Feature		Not Possible	Possible

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Integrated Automatic Meter Reading (IAMR) Solution:
METRIX™ - A perfect Decision enabling Tool for Utilities.

METRIX –mGPRS (IAMR)

Needs vary throughout the distribution system, solutions needs to vary as well.
No matter what solution is chosen, it is only as good as the information it provides.

Get The Basics Right: Why AMR?
* Identification of T&D Losses Online?
* Technical & Commercial Loss segregated at all times?
* Feeder and DT losses visible on the fly?
* Are there billing error complaints?
* Distribution Transformers overloaded now?
* Consumption Abnormalities captured daily?
* Event driven Outage & Tamper notification?
* Is Meter Data used for Asset Management?
* Is AMR economically viable?
* Can we integrate the software with other applications?
* Is data handling possible for millions of meters?

Bouquet of IAMR Solution we offer:
* Energy Meters and GSM/GPRS Modems integrated into METRIX IAMR devices.
* Integrating Modem and Energy Meter reduces Cost & Complexity significantly
* Energy Meters in High Density Areas connect over LPR/Zigbee to DCU which then connects to the Server over the GSM/GPRS Network.
* In future Substations, Distribution Transformers, Substations, Feeders etc will be connected to IAMR + RMCS (remote Monitoring & Control System) devices for providing RLMS functionality along with the current Basic AMR/IAMR.
* AMR and RMCS devices connect to the Server over TCP/IP via GPRS connection, failing which there is SMS back-up via SMS Gateway/short-code for connecting anyhow.
* Server in the Control Room is connected to the Internet via Hi-Speed Broadband connection and provides AMR Dashboard and other AMR and Power Management GUIs over intranet.
* The database of the data from the field devices is also connected to a web-server hosted in the control room along with an SMS gateway and/or GSM Modems to provide Web/Mobile-SMS interface to Management and staff with Access-Levels defined as per the seniority and functionality of the concerned staff.
* Customer enquiry, complaints, tracking of complaints/payments etc on web & mobile.

System Architecture Overview:
Hybrid (IAMR with LPR) System Architecture Overview:

Salient advantages of GSM/GPRS + Hybrid LPR/DCU :
* The media link between AMR Server and IAMR field Devices and/or DCUs (in case of multiple LPR/Zigbee devices in a dense Flats-Area etc) to be based on GSM-GPRS.

* GPRS based communication being packet-switched, better than data-transfer over GSM/PSTN calls between GSM modem array at Server as
▫ GSM modems in AMR Field devices which hold/hog the regular talk lines/links and operators limit such queries to night time.
▫ The GSM modem working in GSM-DATA mode over regular GSM calls is costly anyways both due the call rates and the extra modem-array to be deployed at the Server.
▫ GPRS based communication better than data-transfer over PLCC under Indian Conditions
▫ The transmission lines in India have jumpers and joints which cause lots of reflections and thus low signal strength.
▫ The Distribution Network in India will have so many Twisted-Wire Joints, Hooks etc for pilferage, loose un-terminated ends etc. that the bridge-taps and impedance mismatches which will lead to heavy reflections making channel Equalization virtually impossible besides the very Low Signal Strength.

Features of the Future System Architecture:

* Separate Servers for AMR, Database and Web + Mobile SMS gateway.
* Dedicated M2M gateway or VPN ser

vices from the Operator via their Gateway to provide encryption for CFW/MIOS Non-Compliant meters with proprietary APIs.
* AMR Field devices have the option to form a secure VPN over TCP/IP & an M2M gateway using the GPRS Connection to the internet. Multiple instances of the manufacturer's APIs called to read multiple meters simultaneously through multiple TCP/IP Sockets over multiple S/w Com-Ports to handle large number of meters.
* Provision for loading e-APIs (Embedded APIs) on the AMR Field devices as envisaged in the future plans of MIOS/CFW.
* Provision for Interfacing the AMR Server to the ERP and GIS Servers of the Utility.

Benefits:
* Single Roof, value-driven Solution covering metering, AMR and Software.
* Local Service Support up to Component Level.
* Subject Matter experts in Distribution & Metering Functions.
* Value Driven AMR ROI Consulting.
* Full Software Customization and Integration to suit all needs.
* Well Researched and Proven In House Developed Solution tailored for Indian Operating Conditions.

Hybrid (IAMR with LPR) System Architecture Overview:
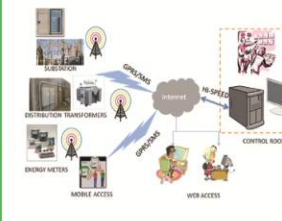
### Salient advantages of GSM/GPRS + Hybrid LPR/DCU :
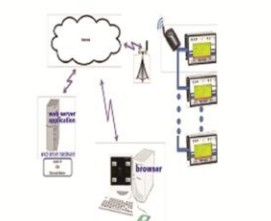
SALIENT FEATURES

METER

* Measured Values and Units
  * Active Energy
  * Maximum Demand (kW)
  * Phase Voltage
  * Line Current
* Inbuilt GSM / GPRS Quadband modem
* Sending data to server on demand
* Sending data to server on scheduled basis
  * 15 Minutes
  * 30 Minutes
  * 1 hour
  * 1 daily
  * 1 Month
* Instant notification of Tamper Event to the server
* Signal Strength on LCD
* Load Survey with kWh/kW 30 minutes for 30 days
* Inbuilt relay for remote connection / disconnection up to 100 Amp load

IAMR Meter Architecture

SERVER

* Complete Online BCS accessible on world wide web
* Meter Management
* User Management
* Read On Demand
  * Current Data
  * History Data
  * Tamper Data
  * Load Survey Data
  * TOD Data
* Load Cutoff Control
* RTC Setup
* Exporting the report
* Graphs
* Scheduling of meter reading
* Remote Configuration of modem parameters from BCS.
* Provides flexibility in design architecture to use leased lines or broadband with fixed IP (Internet Protocol) Address.
* Offers scalability in design for large number of deployments.
* Tamper intimation is sent by SMS of minimum length of 150 characters to any 3 pre-assigned cell numbers with all tamper details
* Integration Framework with ERP & GIS Server.

Server Architecture
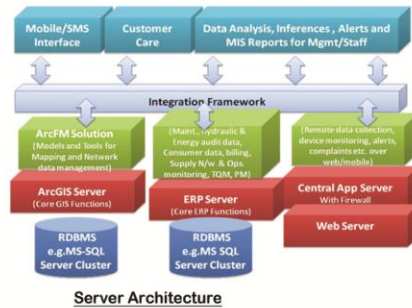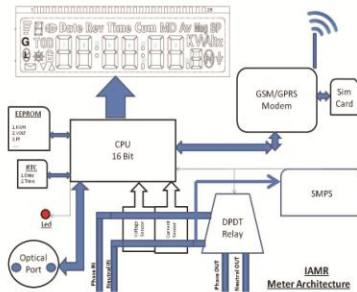
METER

* Rating
  * Class-1 Accuracy
  * Voltage Nominal
    * 240 V (L-N)
    * Operating : -40% to +20%
  * Current
    * 5-30 A
    * 10-60 A
  * 50 Hz ± 5% Frequency
  * 0 lag to Unity to 0 lead Power Factor
  * Minimum saturation current is 200% of Imax
  * Works within accuracy up to 150%Imax
* Continuous current rating is 30A
* No pulse when running on no load condition
* Starting current at which meter shall run & continue to run is 0.2% of Ib, rated voltage and Unity Power Factor
* Power loss at rated frequency & reference temperature
* Galvaninacally isolated optical port hardware compatible to IEC 62056-21available for communication.
* More than 5.5mm of Internal diameter of terminal hole
* More than 13 mm of center to center clearances between adjacent terminals
* Display
  * LCD with backlight
  * 6 digits + 1 digit after decimal
  * 10×5 mm Digit Size
  * Icons for other indications
  * Display on Auto Display Mode and Push Button Mode
* Spring loaded push button is provided on top cover of meter box to read parameters
* Meter reading on power off mode
* 10 years of life time for RTC battery
* Fixing/Sealing arrangement
  * 3 fixing holes (One at top & two at bottom under terminal block)
* Meter Performance in tamper condition
  * Works within specified accuracy when phase and neutral are interchanged
  * Works within specified accuracy when main and load wire are interchanged
  * Works within specified accuracy when load is not terminated back to meter & current is drawn through local earth fully or partially
  * Works within specified accuracy when neutral is disconnected from incoming & outgoing and load drawn through local earth
  * LCD/LED indication for above tamper conditions
  * 100 tampers will be stored on FIFO basis and latest 3 will be displayed on LCD under push button mode
* 60% to 120% of Vref is operating voltage
* Can sustain over voltages i.e. phase to phase voltage injected between phase & neutral
* Relative humidity is as per IS Specification
* 27 °C Reference Temperature
* -10 °C to 60 °C Operating temperature range
* No drift in accuracy of measurement
* Name plate details as per IS Specification
* IS 13779:99 Meter Standard
* 5 years Guarantee Period
* Degree of protection of enclose is as per IS
* In house testing facility available for Insulation Resistance, Running on no load, Starting Current, Limits of error, Range of adjustment, Power loss in voltage and current, Repeatability of error
* 0.5Kg±25% Meter weight
* Meter Box
  * Poly carbonate or equivalent high grade good quality engineering plastic Material
  * 4 push fit lock
  * Rubber gland
  * Clearances from meter as per specification