
Best Practices in Distribution Loss Reduction

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Challenges before Distribution Utilities

- ❑ **Elimination of human intervention in data creation of consumer, metering and billing**
- ❑ **Updation of dynamic data of consumers and assets uniformly throughout utility**
- ❑ **Development of suitable MIS for middle & top management**
- ❑ **Proper planning, energy audit & accounting**
- ❑ **Meet regulatory & statutory requirements**
- ❑ **Provide consumer satisfaction**

Distribution Management Practices

- Distribution automation & efficiency
- Revenue & Commercial efficiency
- Accurate and timely meter reading
- Billing & Collection efficiency
- Consumer relationship management
- Leveraging IT for improving processes and systems

Emergence of IT in Power reforms

Information Technology (IT) can contribute significantly in power reforms processes, such as

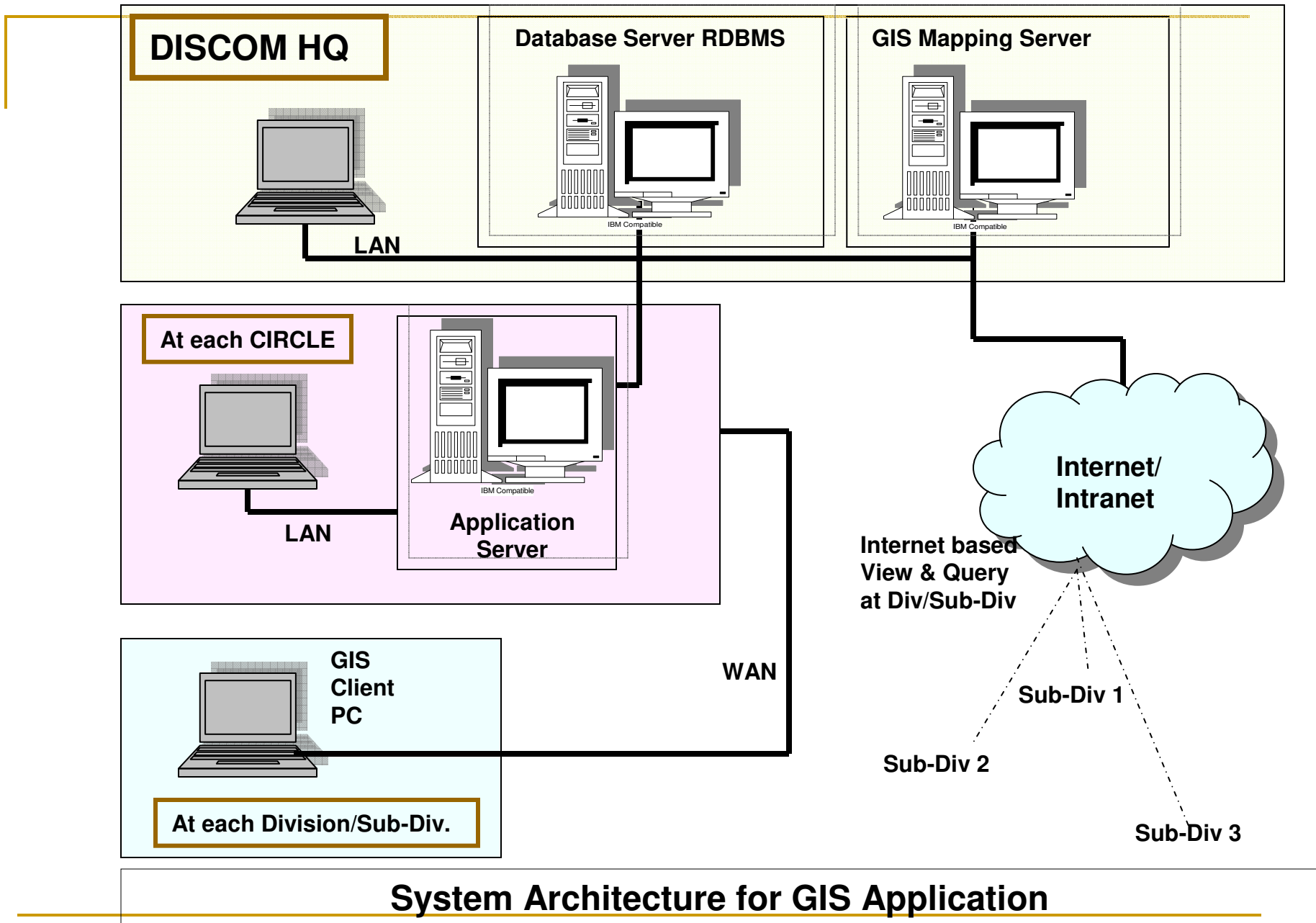
- ❑ Revenue management
- ❑ Operations management
- ❑ Energy management
- ❑ Consumer relationship management
- ❑ Reduction of ATC losses

Best practices in Distribution Loss reduction

- ❑ GIS based Consumer database indexing
- ❑ GIS based Electrical network mapping
- ❑ Metering, Billing & Collection Efficiency
- ❑ Energy audit and accounting practices
- ❑ Supervisory control & Data acquisition (SCADA) system & Distribution Automation
- ❑ Maintenance management System
- ❑ Management Information System (MIS)
- ❑ Load forecasting and load planning

GIS in Power Distribution

- Geographical Information System (GIS) is a digital representation of consumers, network elements & important landmarks on a geo-referenced area map, with their attributes stored in a database with suitable MIS for efficient technical and commercial management of a power distribution utility
- GIS based consumer indexing and electrical network mapping provides a tool for consumer, asset and load management for effective decision making.
- GIS database applications can improve the utility's productivity if properly integrated with other business processes
- Effective GIS can be a handy tool for enhancing operational efficiency and transparency in Distribution system management



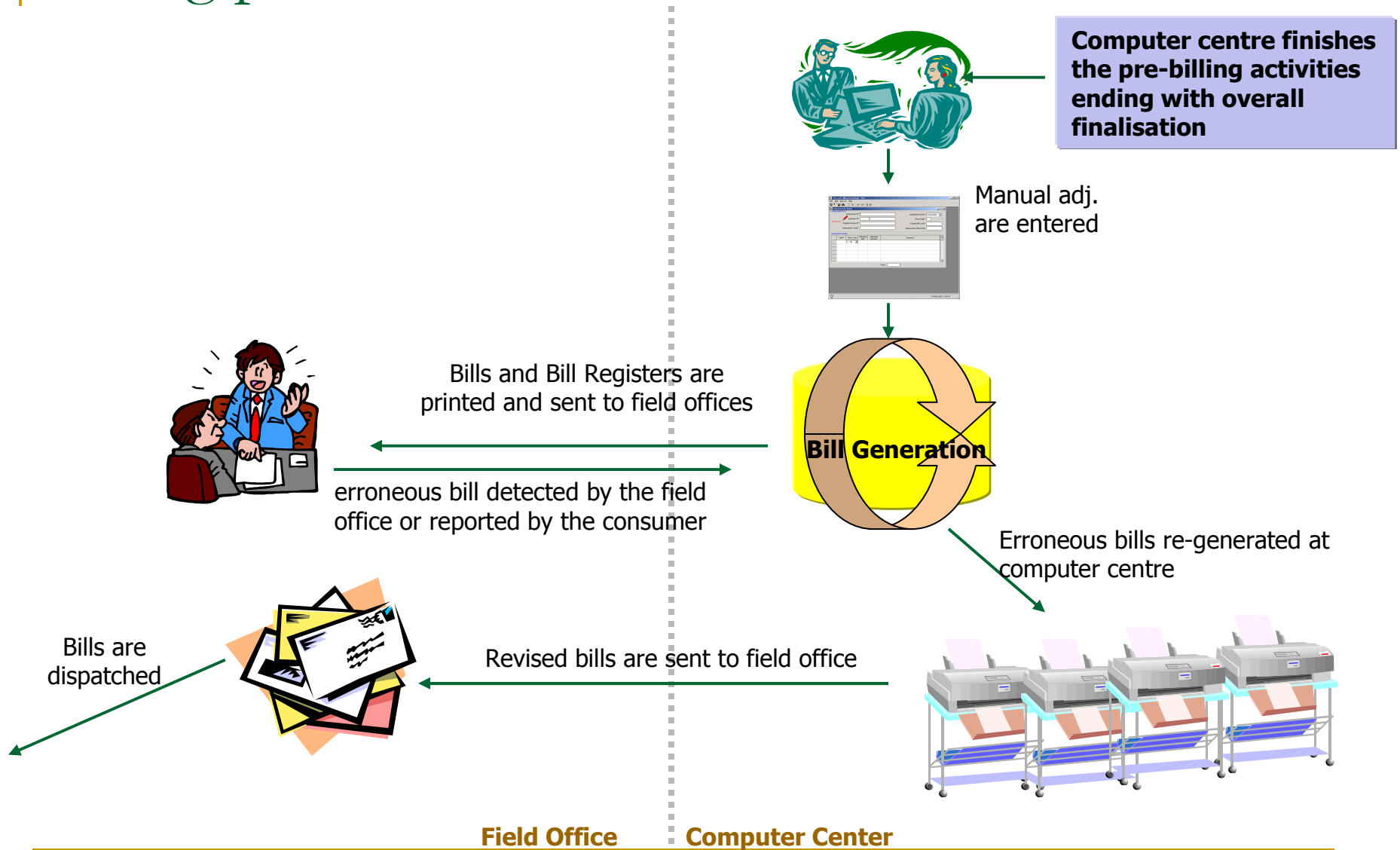
Consumer & Network database indexing

- Creation of customer database linked to DT (for LT customers) and linked to feeder (for HT customers)
- All consumers are given a unique CIN (Consumer Index No.)
- Consumer database is linked to the network database for the purpose of defining electrical connectivity
- All network elements are identified and their technical attributes are recorded in a GIS database.
- The GIS software uses GUI tool where all network components are graphically depicted.
- For network reconfiguration, the child components can be dragged and dropped to the new parent component to show new electrical connectivity

Best practices in Metering

- Automated Meter Reading (AMR) for HT consumers, large LT, Commercial & Industrial customers
- HT feeder meter, DT meter and consumer meter data can be captured directly via a suitable communication interface using CMRI or HHC
- Meter data is then uploaded to a central computer with metering software for billing and analysis

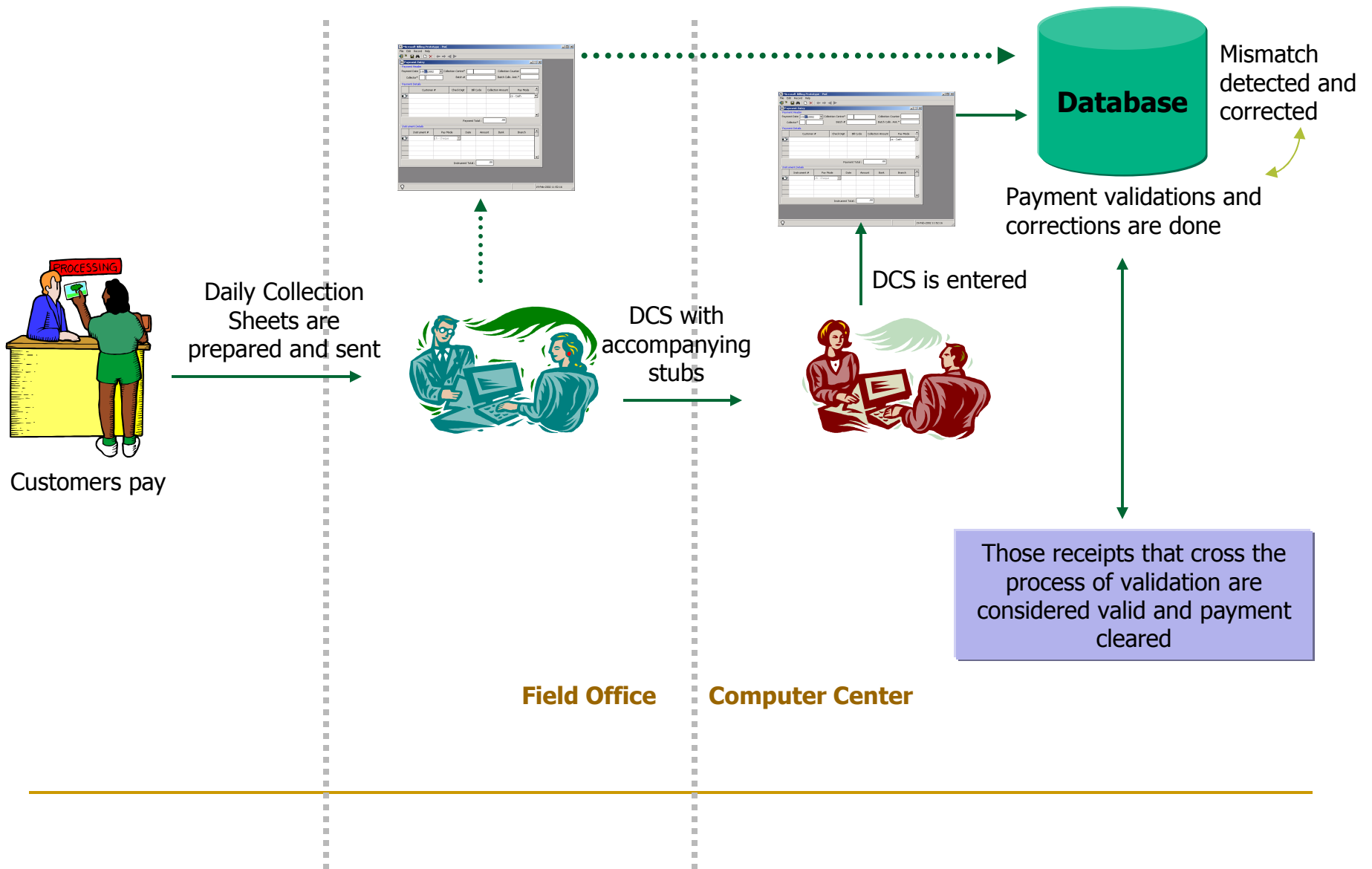
Billing process



Best practices in Billing

- The data entry for billing is planned at source substation/ subdivision connected to the centralized billing server, having consumer database/ billing information.
- The billing system software is designed to suit existing billing practices, with provision to migrate to better practices.
- The software is capable of validating meter data and correct inconsistencies
- The software is capable of generating various MIS reports as required.

Collection process



Best practices in Collection

- The collection software module incorporates various modes of payment by consumers
- Software monitors disconnection of the defaulting consumer and payment status of disconnected consumers
- Software monitors temporary disconnection and dismantling on the request of consumer
- On-line payment gateway can also be introduced for credit card payments
- Another new development is pre-paid metering, particularly for high-value consumers

Energy Audit & Accounting practices

- The energy audit software interacts with billing and collection module, consumer database & SCADA for DT-wise energy auditing & load balancing
- Software is intelligent enough to understand network reconfiguration and accordingly compute ATC losses
- Software has built-in algorithm to calculate estimated technical loss based on network parameters and power flow through feeders & DTs

SCADA & Distribution automation

- ◆ The SCADA system at substation captures all energy/ power flow and other system parameters
- ◆ This information is transmitted to central server through RTU (remote terminal unit) for processing & monitoring
- ◆ The information collected by SCADA can be used for load flow study, reliability index calculation and system planning
- ◆ The load information of DTs/ Feeders can be used for system/ load planning, reducing outages, system reconfiguration and improvement.

Best practices in Maintenance Management System

- Maintenance management system (MMS) should be integrated with SCADA & Distribution automation
- MMS software manages planned/ unplanned outages, while reducing restoration time and safeguarding system equipment
- Common fault affecting a large number of consumers can be prioritized for efficient maintenance
- MMS software tackles issues of work permit, safety clearances & Preventive/ Predictive maintenance schedules
- MMS software manages, coordinates and optimizes field workforce for reducing outage time and cost
- After entering the work completion statistics, MMS software maintains historical data of completed works
- MMS also helps in planning and monitoring of available resources

Load forecasting & planning for loss reduction

- Load forecasting is used for accurate estimation of power demands on a real-time basis
- Accurate forecasts can save considerable resources through correct scheduling of maintenance
- Software-based tools help in advanced statistical analysis & detailed engineering to achieve this
- Software helps in spatial forecasting about future load distribution in the entire area
- Software monitors all factors influencing power generation and consumption.
- Long-term forecasting helps in reconfiguration & load balancing of electrical network

Load flow parameters

VinCom - Report - Instantaneous Values

General Consumer Search Meter MRI Remgte Reports LS Graph Export Data Options Help

Phasor Diagram

Data Read Time (MRI)	Consumer Name	UPCL	CT and PT Ratio as per Consumer Details
Data Read Time (Meter) 08/12/2006 17:34	Unit Code	05332873	CT Ratio External -
Collection Normal	Unit Type	3P 4W 240V	PT Ratio External -
S/W Vincom Version 05.03A Rel.01	Unit Location		CT Ratio Internal -
Anomaly A0000000000000000000	CT Tapping	5	PT Ratio Internal -
			Actual Internal CT Ratio 120
			Actual Internal PT Ratio 1

Instantaneous Values

Phase	volt	ampere	kW	kVAr	PF
R	230.0	335.258	72.442	25.561	0.943
Y	228.9	368.448	87.410	13.561	0.988
B	229.1	324.501	72.900	16.388	0.975
		Total	232.753	55.512	
		Total kVA	239.282	Avg.PF	0.972

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Best MIS practices in Distribution

- A robust MIS software allows distribution data access based on the level, role and responsibility
- Distribution data acquisition should be without human intervention, preferably from single source in standard formats
- In addition to pre-defined queries and reports, MIS software should have a GUI-based query builder for non-standard reports
- MIS should have in-built functionality for data mining & intelligent decision-making

Thank You
