



Fluentgrid MDMS™

Product Feature Guide

Version 5.0

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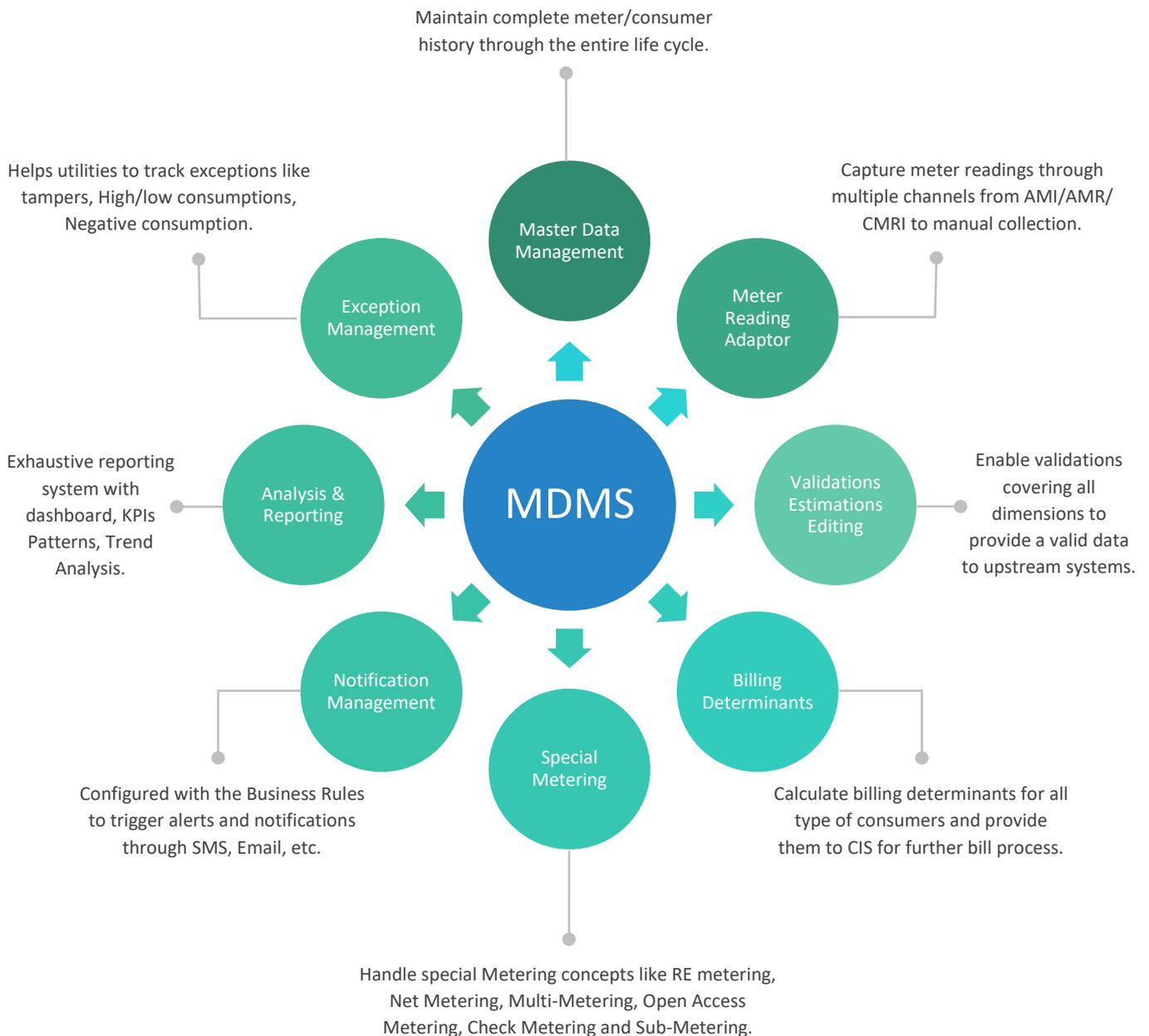
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Fluentgrid MDMS™

Overview

Fluentgrid MDMS is capable to collect and process various types of data (both structured / unstructured) and variety of devices in the smart grid ecosystem. MDMS loads, validates, structures, and stores that data in ways that can be easily accessible for downstream systems, either internal or external, across the utility.

Fluentgrid MDMS supports standard functionality for VEE (Validation, Estimation, and Editing), aggregations (both Administrative and Network levels), event subscriptions, bill determinants, and AMI rollout processes. Exception management function analyses the data and events for any such anomaly and automatically raises notifications to the concerned users while triggering service orders as per the defined SOP (Standard Operating Procedures) if necessary, for investigation and fulfilment.



Master Data Management

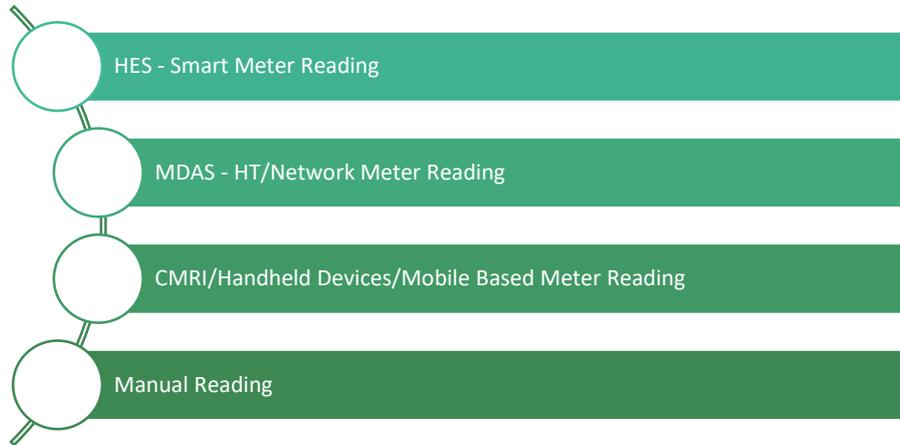
Maintains the Complete life cycle of Consumer-Meter relation form Meter installation/ Replacement to Dismantle/Removal of the meter. The complete process of replacement of the meter, installation of new meters and allocation of meters streamlined with the integration of internal and external systems (Asset Management, CIS, etc.)



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| Meter Make Details | Provision to add new Meter Make Details and update /delete existing configured Meter Make Details. |
| Meter Details | Meter Types along with the required details, their connections, meter capacity, meter stock and supplier details are configurable in the system either with/without the integration. |
| Meter Attributes | Maintain meter attributes which are changeable Ex: LP Capture Period, Demand Integration Period, Billing date, Metering Mode, Payment Mode, Relay Status, Lat-Longs, Meter Seals, etc. |
| Consumer Category | Maintain various Consumer Sub-categories for all category types like Residential, Commercial and Industrial Consumers. |
| Consumer Details | Configuring new Meter Current & Potential Transformer details and updating/Deleting available Meter Current & Potential Transformer details. |
| Meter Replacements | Replacement of a damaged, defective, or tampered meter after proper approval and authorizations. The system also supports replacements of meters from Prepaid to Post-paid and vice versa. |
| Meter Removal | Replacement of a damaged, defective, or tampered meter after proper approval and authorizations. The system also supports replacements of meters from Prepaid to Post-paid and vice versa. |
| Office Hierarchy | Defining the Hierarchy like DISCOM, Circle, Division, Sub-Division, and their parameters required for proper mapping or creation the relation. |
| Network Hierarchy | Defining the Hierarchy for Network elements and their relation such as Sub-station to Feeder to DTR mapping and other details like Element capacity, Element Codes would also be maintained in sync with GIS system. |
| Energy Accounting | Generate Feeder Loss, Transformer Loss / Unbilled Energy Reports and analysis by aggregating the consumer consumption under the element and deriving the loss based on the input and Output Energy on the Network Element Meters. |

Meter Reading Adaptors

Capture meter reads from various sources like HES, MDAS, CRMI, Mobile upload through various methods like on-demand, scheduled, CMRI upload or Manual Entry. Based on No. of HES/AMR systems to be integrated, an Adaptor for each meter reader is placed to interface with.



Advanced Metering Infrastructure (AMI) | Fetch readings and data with the help of an integrated external system like HES/AMI, assist in downloading meter readings monthly or day-wise for display, and pushed for billing after Validation.

Automatic Meter Readings (AMR) | AMR collects the Energy data and transmits data to the utility provider at pre-defined intervals by the utility for visibility of consumer's consumption and appropriate distribution. The predefined XML formats can be uploaded to FTP server for further process

CMRI /Handheld / Mobile Based Reading | Capture meter readings through handheld devices or mobiles integrated with the metering system and can load the captured data offline or online.

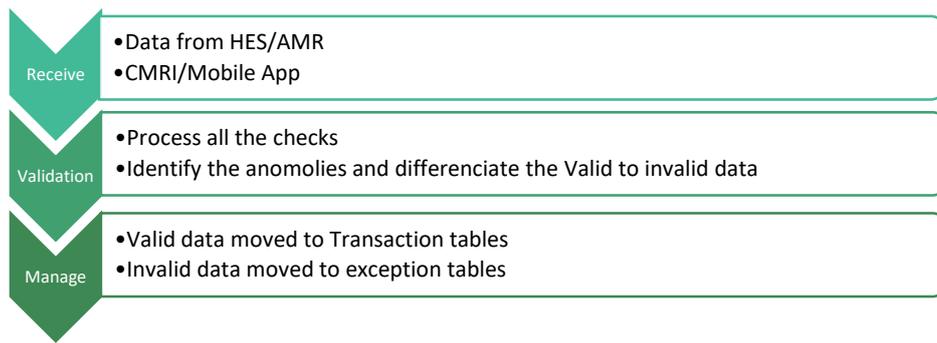
Manual Meter Reading | Authorised user can access the application to upload or manually enter the billing data for the non-reported/communicated meters based on the requirement.

Readings for Special Metering | Support fetching or uploading meter data Special metering like, Pole meter, Net meter, RE Meter, Sub-Meter, Multipoint Single meter, Dual Supply Meter.

Scheduler Configuration | User can configure the schedules to invoke the meter reading process from AMI/AMR integrations.

Validations Estimations Editing (VEE)

Received data flows through Validation engine and will undergo various rules. The validation and estimation of metered data shall be based on standard methods. Some of the checks mentioned below.



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| Meter Identification Check | Performed to verify meter ID is reported correctly for the mapped consumer. |
| Inactive Meter Check | Performed to verify whether the received Meter data is usage of inactive meter/ unauthorized usage. |
| Time Tolerance Check | Performed to verify the time drift of meter clock and Past/Future dates. |
| Active Energy check | performed to validate the Active Energy is always less than Apparent Energy |
| Negative Energy check | Performed to validate both Active Energy and Apparent Energy is greater than '0'. |
| Interval Period check | Performed to validate whether the interval is noted with the time stamp according to LP integration period. |
| Interval Missing check | Performed end of the day to validate whether the received interval count for the meter are as expected when calculated based on LP capture period. |
| Incremental Energy check | Performed to validate whether the Cumulative reading is incremental compared to previous day reading. |
| TOU Sum check | Performed to validate whether the Sum of TOU is less than equal to the Cumulative register value. |
| Max. Demand check | Performed to validate whether the Maximum Demand occurred within the reset date. |
| Demand Violation check | Performed to validate whether the Maximum Demand is too high compared to Contracted Load. |
| High Low Consumption check | Performed to validate whether the Cumulative consumption is within the configurable threshold value. |

Special Metering

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| Prepaid Metering | Gets the daily reading for prepaid meters and send the same to Prepayment system to get the bill calculated for the day. Receives the connection/disconnection commands from the Prepayment system once the consumer reaches zero balance or recharges. |
| Net Metering | Calculates the billing determinants for Net meters on both Import and Export registers. |
| RE metering | Net consumption would be compared with the respective RE meter consumption to understand the consumed units of the consumer through Renewable Energy and the delta exported to the grid. |
| Sub Metering | Can handle and identifying the Sub meters against main meter to verify the total consumption of Sub meters to the Main meter and would raise exceptions for any mismatch. |
| Check Metering | Flags the check meter added against the consumer and compare the data between main meter to check meters for any anomalies and submits report for the same. |
| Dual Supply Metering | Meter is featured with 2 registers for the same parameters where data would be stored in different registers based on the switching over the supply. MDMS can handle the cumulative consumption for a consumer having single meter with dual supply input. |
| Multi-point Metering | Can handle the cumulative consumption for multiple meters assigned to a single consumer in different locations. |

Derived Channel

Processing the transactional data to warehouse tables after some transformation applied.

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| Billing Determinants Calculation | Calculating the Monthly consumption from the received reading of consumers including the TOU/TOD consumption. |
| Tariff Configurations | Determinants are processed based on the tariffs configured at each meter type received from the billing system. Every change in tariff for each meter type will be in Sync with billing system. |
| Channel Configuration | Process the interval data to billing determinant including the TOU determinants based on the configured tariffs. |

Analysis

The data is presented as dash boards in various dimensions like Tariff Category, Administrative or Network hierarchy, Date / Time stamp, Load etc., Simple to use drag / drop analysis function provide drill-through functionality as per the data selected from various readily available cubes and measures.



Validation Status | Provides complete insight of all the checks performed on each data set on day-to-day basis.

Data Availability | Provides the percentage of data available on daily basis on each data sets mainly where SLA would be applicable on those data sets.

Panoramic View | Provides complete 360-degree view of consumer like Meter details, consumer details, Connection status, Monthly consumption trend, daily consumption trend, Event analysis and many more.

Consumer Analysis | Provides the insight on monthly billing data received of all consumers. Identify the consumers with Demand Violated, consumers with High/Low consumptions, Abnormal consumptions, Consumers having low PF.

Network Performance | Provides the analysis on Utilization factor, Load factor, Energy Balance and Energy Losses at Network Level

Peak/Off-Peak Load Patterns | Provide the consumption pattern/ load patterns of Peak time/normal/Off-peak at any network level to consumer level.

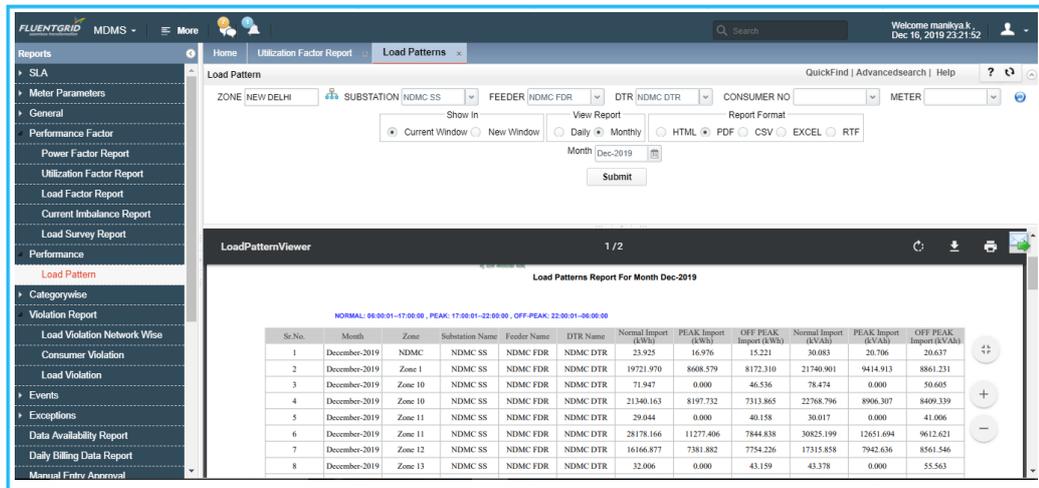
Area/Network Aggregations | Provide cumulative consumption of Network/Area on Hourly/Daily/Monthly trends

Event Analysis | Provide count of each event type at network level to identify what type of event is occurring more at any specific Network level.

Reliability Indices | Based on the received outage data from network meters and each consumer meter, system calculates reliability indices and display (SAIDI, SAIFI, CAIFI, MAIFI, CAIDI etc.) at each network level.

Reporting

Report generation for an optimum and immediate overview of the various metering process through in-built and ad-hoc operations. Reports can be exported in different standard formats like PDF, Excel, HTML, CSV, RTF. Each report links mentioned below have multiple sub link for various reports as per the requirement.



General Reports | Covers the reporting for all meter data at Meter level to Network level.

SLA Reports | Covers all the Service level agreement reports based on the utility requirements.

KPI Reports | Covers Data availability reports, Reliability Indices Reports, Network utilization reports, etc.

Validation Reports | Covers Validation failure reports, Unidentified meters report, Consumer Violation reports, etc.

Exception Reports | Covers, Billing exception reports, Network Overload/under load reports, abnormal consumption reports, etc.

Operational Reports | Covers Daily communication failure reports, Connect/Disconnected Meter reports, Defective meters Report,

Exception Management

Displays the Metering checklist for Entered Readings, Readings to be Entered and Billing Checklist for Billed Services, Unbilled Services by providing Office, Tariff, and other configured details.

Network level Exceptions | Provides insight on the network exception line DTR/Feeder overload, identifying poorly performing areas like having low voltage, low PF, load unbalance, etc.

Demand Violation | Identifies the consumers who exceeds their contracted load on specific month.

Abnormal Consumption patterns | Identifies the consumers with abnormally high/low consumption compared to previous months consumption.

High/low Consumptions | Identifies the consumers with High/low consumption on present month against their contracted load.

Validation exceptions | Provides the insights regularly on validation failures to identify the anomalies in data.

Communication exception | Provides daily non-communication meters reports, non-communication report based on aging of the communication, Report on poor signal strength, etc.

Threshold Configurations | Provision for configuring the thresholds to identify the exceptions and to raise notification via email or SMS.

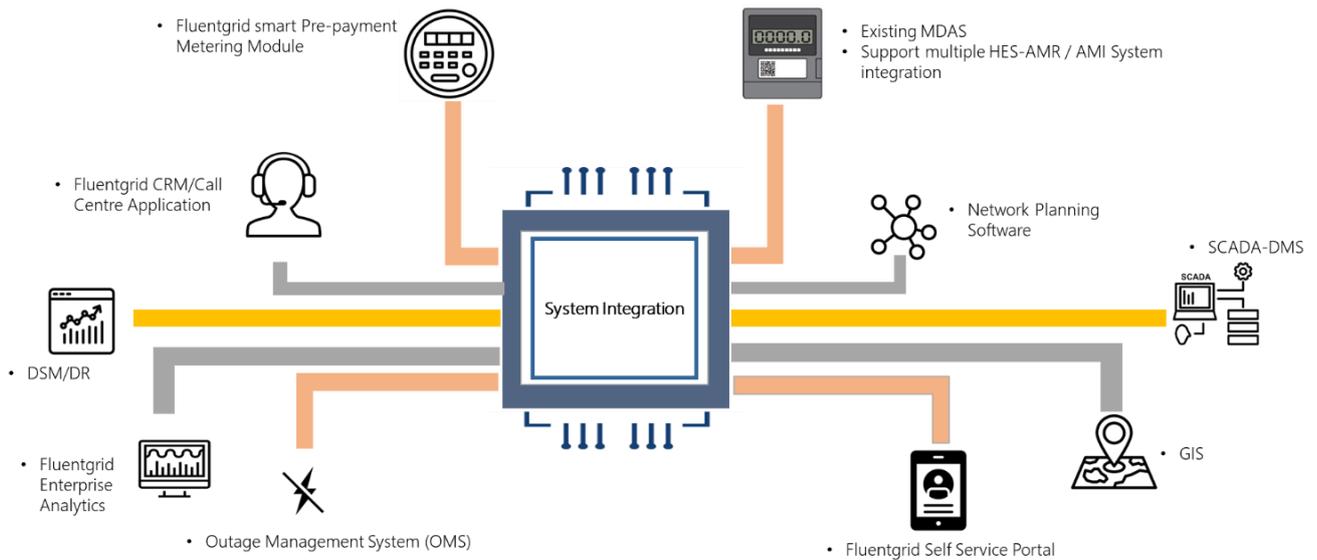
Notification Management

Alerts Notification | The system is pre-defined and configured with the respective Utility Business Rules to trigger alerts and notifications through multiple communication channels like SMS, Email, etc.

Service Order | System generates service orders for various events and alarms such as stop meter, tampers, problem in communication networks.

Integrations

MDMS is well integrated with the internal system such as CIS, CRM, UHES, Analytics and external integration and services such as SMS, E-Mail, GIS, OMS, DSM, DMS etc.



Fluentgrid CIS/CRM | Provide Billing determinants to CIS based on the bill schedule and on-demand basis. Receive defaulter's disconnection requests and connection requests for payment made.

Fluentgrid Self Service Portal | MDMS publish service for Hourly/Daily/Monthly Consumption patterns, Instant data View, estimated consumption for the running month for individual consumer which can be viewed in Self-service portal.

Fluentgrid Enterprise Analytics | All the validated Meter Data along with Events and Alarms will be moved to Enterprise Analytics repository for further detailed analysis from Area/Network to consumer level.

DSM/DR | Support DR module by totalling the actual consumption during DR event for an individual or a group of consumers. Data is shared through services.

SCADA-DMS | Receive the planned outages as well as unplanned outages as and when received at SCADA to verify and analyse outages and events at grid level

OMS | Integrates with OMS to provide outages occurred at meter at any level of network. Correlation of outages received from consumers under a network will analysed to understand it as network outage and sends the summarised outage to OMS.

Network Planning | MDMS supports in providing the consumption data at network level for any network up gradation plan.

AMI/AMR/CMRI | Interfaces are Designed to integrate with multiple HES/AMR systems to have seamless data flow.

Security

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| User and Role Masters | Provision to add Users and their Roles, configuring the necessary user details and permitting the respective access to the user based on RBAC. The system allows the admin to update or modify user details including removal of access. |
| Password Policy | Configurable Password Policy based on Regular Expressions that allows the Utility to define based on the IT Policy of the Organization. We also support limiting the Retries of Password, maximum rotatable passwords and other standard Password Management function. |
| Audit Trail | All actions carried out by the user on the browser are recorded with Time stamp, kind of activity, the values changed, with the Client IP Address. |
| Encryption of data at REST | All confidential data are stored in Database in encrypted form using industry standard encryption algorithms. Data to be encrypted are configurable. |
| Data Dissipation security | All exposed data from MDMS are through standard interfaces governed by industry standard authentication policies like OAuth2/SAML. |
| Forgot password | The system is well integrated with SMS and Email facilities, and so the recovery of password and username is made easier with necessary predefined functionalities by sending and confirming user details to the registered mobile no. Or email id. |

MDMS support for Enterprise Analytics

MDMS is integrated with the Analytics module to provide further deep dive analysis on complete meter/consumer data.



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| AMI Benefit Analysis | Provides complete insight on Comparison between pre smart meter and post smart meter billing and revenue parameters. |
| KPI | Reporting of KPIs based on smart meter data like peak load, reliability indices (SAIDI, SAIFI, CAIDI, CAIFI), Outage Analysis, Billing and Revenue efficiency, Transformer Failure. |

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| Power Quality Analysis | Provides device/area wise power quality related information and Poor performing asset. Plotting of power factor on asset or office level and power outage on network. |
| Behaviour Analysis | Provides Value added services for consumers. Benchmarking of power consumption relative to neighbors Power saving recommendations. |
| Usage pattern Analysis | Provides Peak load optimization, loss & theft detection. Compare usage with past 12-month average and club them into sub-sections, compare monthly usage to see variances in high change categories. |
| Load forecasting | Helps in optimization in power procurement cost considering 24x7 power supply. Demand forecast on short, medium and long-term, taking Weather data, Historical data (at least 3 years) of electricity consumption. |
| Voltage impact Analysis | Provides the insight of Voltage trend at consumer/Network level of every 15 mins interval which helps utility in optimization in delivery voltage and improve the efficiency in billing. |
| Event Analysis | Provides complete insight on Analysing event data correlating with the load profile on the same time to identify it as tamper/theft or just an event. |
| Reporting | Analytics is provided with rich Ad-hoc reporting where complete warehouse data from MDMS is moved to the OLAP data model of analytics to have complete feasibility on user defined reporting. |