



# ITMS

Intelligent Transformer  
Monitoring System





# INTELLIGENT TRANSFORMER MONITORING SYSTEM

## Description



ITMS is a Smart IOT device which is designed to provide energy efficient solution to power Distribution companies by monitoring the distribution Transformers

ITMS is device provides a unique way to increase efficiency of distribution companies with minimal investment

ITMS provides Real time Monitoring & tracking of all health parameters of the deployed assets (TD's) . Also it gives predictive data analytics in Area or Zonal level for future resource and asset allocation to accommodate future needs



# PAIN POINTS



## PERSISTENT PROBLEM

- No active health monitoring
- No early detection for reason
- No Real-time tracking of load

## ACCOUNTING AND DISPATCH ISSUES

- Time delay in identifying the supplier
- No efficient planning causing increased capital expenditure or over stacking
- Unable to track the DT's efficiently

## MAINTENANCE & INVENTORY TRACKING

- No Real Time tracking and services scheduling
- High downtime & Power Outages
- No predictive maintenance
- Cost Overruns for maintenance long downtime

## ADVANTAGES OF ITMS



### COST SAVINGS

by limiting the no. of Distribution

### IMPROVE OVERALL

energy efficiency & health of Distribution



### AREA WISE

Tracking & usage of Metrics Energy Statics



### FORECAST

servicing intervals & Warranty tracking



### REAL TIME

Data from Transformer Analytics



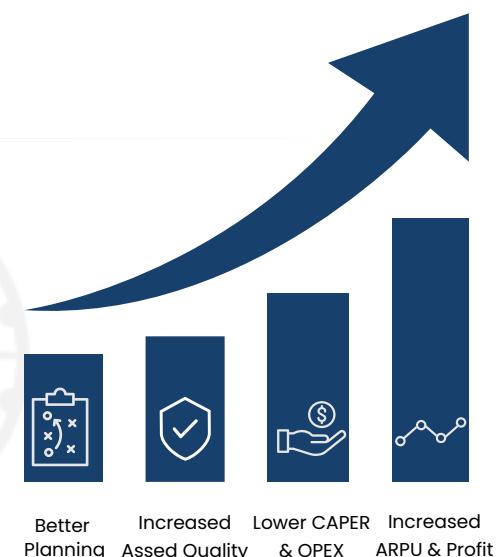
## Technical Benefits



## Social Benefits



## Financial Benefits



# ITMS

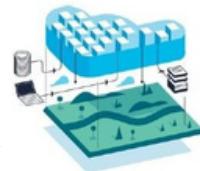
## Solutions Analytics – Revenue Rate Example

No of Hours in a 30 days month	24Hrs * 30 days	720 hrs
Total Transformer uptime in hours	23Hrs * 30 days	690 hrs
Total Transformer Mandatory downtime in summer hours	1Hour * 30 days	30 hrs
Considered Average No of Units per Month including Downtime	Estimated Potential Amount in Units	10000
Estimated Potential Units without Downtime Estimated	Estimated Potential Amount in Units	11000
Potential Revenue @Rs 6.5 per unit = $11000 \times 6.5$	Estimated Potential Amount in Rupees	71500.00
Total uptime Revenue unit @Rs 6.5 per unit= $10000 \times 6.5$	Estimated Potential Amount in Rupees	65000.00
Estimated Downtime Revenue Loss @ Rs 6.5 per unit	Estimated Potential Amount in Rupees	6150.00

ITMS HELPS IN REDUCING DTC OUTAGES THERE BY INCREASING THE REVENUE OF THE DISCOM's



## ITMS: PRODUCT USP RECAP



Provides **real-time information** on parameters like load on each phase, winding temperatures, power factor, etc.

Increase **profitability** of distribution companies by reducing the **CapEx** and **OpEx**. Also, helps inventory planning.

Updates and informs distribution companies of the **load metrics** parameters and **health statistics**.

Updates list of manufacturers and customers on **servicing** and **warranty** in real-time.

Supports Govt's energy efficiency policy and future outlook on **carbon emissions**.

Information on **power theft** based on load reading in commercial areas.

Analytic tools **help plan** future capacity and **load utilization** in a given area. Increases overall efficiency and **saves energy**.

Updates and gathers information on load patterns at a **zonal level** for future distribution **grid optimization**.

## ITMS: PROPOSED TRANSFORMER INSTALLATION SITES



Shopping Malls



National and Residential Parks



Hotels, Tourist Attractions, Sports & Event Halls



Schools and Educational Institutions



Residential Estates



Office and Industrial Hubs



# ITMS

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## GIS DASHBOARD



# ITMS: USER GIS DASHBOARD

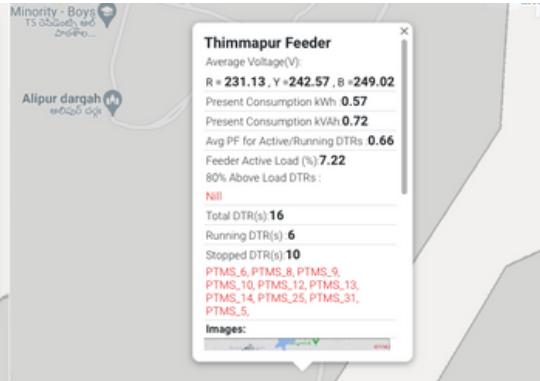
**DTR Info**

Device ID: TAGL\_7(PTMS\_11)  
 Updated On: 16:49:54 28-12-2021  
 Voltage(V): R = 254.8, Y = 258.6, B = 256.9  
 Current(A): R = 143.2, Y = 9.7, B = 8.5  
 Rated KVA : 100  
 Load Factor: 7 %  
 Energy(Units): KWH = 56543.3, KVAH = 80209.7  
 Power Factor: 0.875



**Thimmapur Feeder**

Average Voltage(V): R = 231.13, Y = 242.57, B = 249.02  
 Present Consumption kWh: 0.57  
 Present Consumption kVAh: 0.72  
 Avg PF for Active/Running DTRs: 0.66  
 Feeder Active Load (%): 7.22  
 80% Above Load DTRs: N/A  
 Total DTR(s): 16  
 Running DTR(s): 6  
 Stopped DTR(s): 10  
 PTMS\_6, PTMS\_8, PTMS\_9, PTMS\_10, PTMS\_12, PTMS\_13, PTMS\_14, PTMS\_25, PTMS\_31, PTMS\_5.  
 Images:



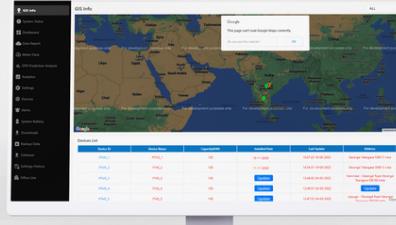
**DTR Info**

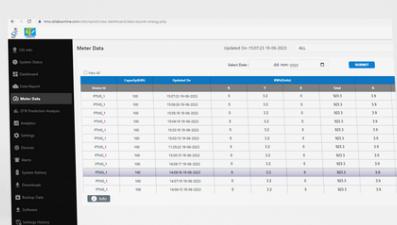
Device ID: TAGL\_7(PTMS\_11)  
 Updated On: 19:07:23 04-01-2022  
 Voltage(V): R = 125.5, Y = 32.5, B = 109.3  
 Current(A): R = 1, Y = 0, B = 0  
 Rated KVA : 100  
 Load Factor: 0 %  
 Energy(Units): KWH = 58891.7, KVAH = 83070.8  
 Power Factor: 0













### Dashboard

Updated On :08:56:04 27-06-2023 ALL PTMS\_1\_100 kVA

**0.05**  
Instantaneous KW

**0.15**  
Instantaneous KVA

**0.1**  
Load(%)

**0.333**  
PF

**0.205**  
Max KVA

Voltage(v)

122.3 Phase R

250.7 Phase Y

129.5 Phase B

Total Energy (Units)

930.4 kWh

5318 kWh

Current(A)

0.1 Phase R

0.2 Phase Y

0.1 Phase B

0.2 Phase B

Temperatures(°C)

R 37 °C

Y 37.5 °C

B 37 °C

Oil 33 °C

Phases Power & PF

Phase R 0 kW 0.05 kVA 0 VA

Phase Y 0.05 kW 0.05 kVA 1 VA

Phase B 0 kW 0.05 kVA 0 VA

\* The above parameters are the latest updated sample values of the selected device.

### Data Report

Updated On :08:56:04 27-06-2023 ALL PTMS\_1\_100 kVA

View All
Select Date : dd-mm-yyyy 
**SUBMIT**

Device Id	Capacity(kVA)	Updated On	Phase Voltages (Volts)			Phase Currents (Amps)			Load Factor(%)			Phases Load Factor(%)			Power Factor
			R	Y	B	R	Y	B	NC	Total	R	Y	B	R	
PTMS_1	100	08:56:04 27-06-2023	122.3	250.7	129.5	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:55:02 27-06-2023	122.4	250.9	129.5	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:53:57 27-06-2023	122.5	251	129.6	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:53:04 27-06-2023	122.4	250.9	129.6	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:52:02 27-06-2023	122.6	251.2	129.7	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:51:03 27-06-2023	122.6	251.2	129.7	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:50:03 27-06-2023	122.3	250.7	129.4	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:49:02 27-06-2023	122.1	250.2	129.2	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:48:05 27-06-2023	122.2	250.5	129.3	0.1	0.2	0.1	0.2	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:47:03 27-06-2023	122.4	251	129.6	0.1	0.2	0.1	0.18	0.1	0.04	0.15	0.04	0	
PTMS_1	100	08:46:05 27-06-2023	122.6	251.2	129.7	0.1	0.2	0.1	0.18	0.1	0.04	0.15	0.04	0	

**Info** Add More

### Load & Temp Graph

Updated On :08:56:04 27-06-2023 ALL PTMS\_1\_100 kVA

YEAR
2023
MONTH
Jun
DAY
27
LIVE

**Latest**



### DTR Analysis

Updated On :15:13:55 29-06-2023 ALL PTMS\_161\_200 kVA

**Report**

V<sub>t</sub>: 270 V I<sub>t</sub>: 20 A Load: 80 % PF: 0.80

From: dd-mm-yy To: dd-mm-yy Submit

Voltage-R

Voltage-Y

Voltage-B

Current-R

Current-Y

Current-B

Load

PF

Down Time

Consumed KWH

Consumed KVAH

\* Displaying the Voltage, current, load, PF, downtime in MINUTES and energy(KWH & KVAH) in UNITS  
 \* Displaying voltage, current and load values are recorded above the selected voltage, current and load values between dates.  
 \* The displaying PF value is recorded below values of the selected pf value between dates.  
 \* The displaying consumed energy(KWH & KVAH) between dates in unites

### Current Graph

Updated On :15:13:55 29-06-2023 ALL PTMS\_161\_200 kVA

**Current(A)**

Phase R: 131.83 Phase Y: 86.81 Phase B: 45.25

**Current Graph**

YEAR 2023 MONTH Jun DAY 29 LIVE

**Day:LATEST**

The graph displays the real time color waveforms of each phases Current wrt data-time.

### PF Analysis

Updated On :15:13:55 29-06-2023 ALL PTMS\_161\_200 kVA

**PF (Inductive) Minutes**

Today This Week This Month

Last 3 Months Last 6 Months Last 1 Year

\* Recorded PF(Inductive) Minutes

**PF (Capacitive) Minutes**

Today This Week This Month

Last 3 Months Last 6 Months Last 1 Year

\* Recorded PF(Capacitive) Minutes



# ITMS

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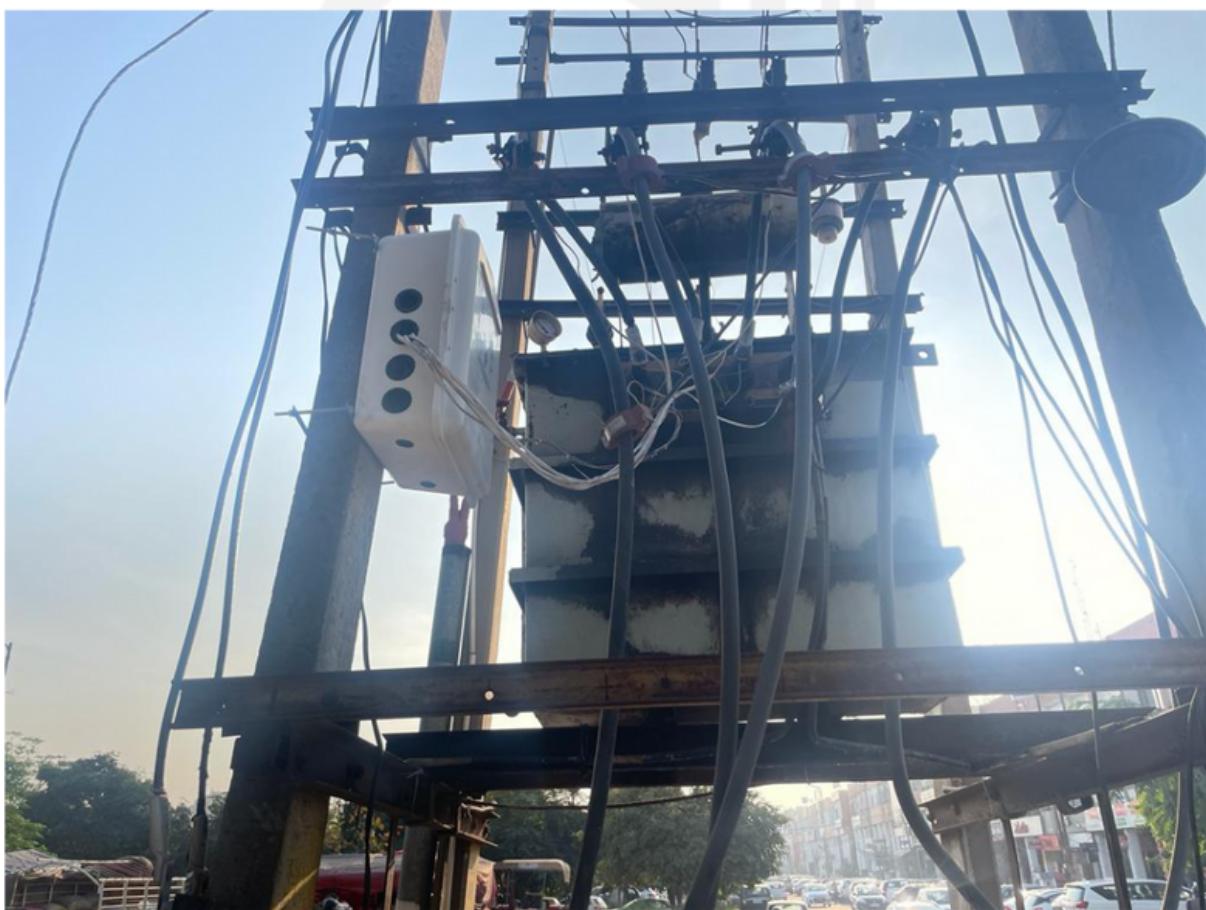
## PRODUCT IMAGES













# ITMS

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## GRIEVANCE REDRESSAL



**User calls to Toll Free Number  
1800-xxx-xxxx**



Interactive Voice Response Service (IVRS) starts with mentioning it as a complaint redressal service and asks user to select language of choice by pressing predefined keys for language selection from options given.

## LAYER 1

### **Language Selection**

**Press 1 for Telugu  
Press 2 for English  
Press 3 for Hindi**



After user selects language of their choice from options given, it asks user to enter device ID for which complaint needs to be registered.

Device ID will be self-understandable code to understand district where device is installed.

The first digit will be cluster ID, the second digit will be district numbering according to alphabetical order. The next five digits will be serial number on device box. In this way, device ID will be 7-digit code.





## LAYER 2

Enter Device ID and press '#' after it

Device ID will be composed of

- 1st Digit will be cluster ID
- 2nd digit will be district number according to alphabetical order
- Next 5 digits will be serial number on device ID



After user enters Device-ID and presses '#', the inputs are sent to servers for verification of the device ID.

If the entered device ID is found wrong, user is asked to enter it again. This process is repeated only once.

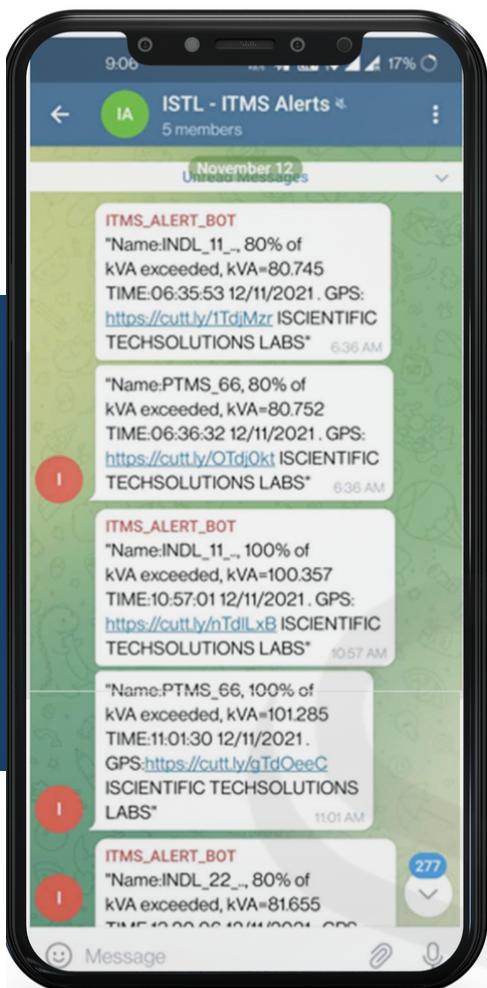
If the entered device ID is verified true from server, user is asked to select one of the pre-feed issues they are facing or record the complaint in their voice, which will be stored in the server.

## LAYER 3

Select issue you are facing with device or press 4 to record complaint in your voice

- Press 1 if device is "Switched off"
- Press 2 if device is "Missing"
- Press 3 if device is "Damaged"
- Press 4 to "Record a complaint"





Alerts and Notifications from the DTR on Realtime basis along with google navigation to the source of the problem for active and immediate resolution.

#### Using Programmable **Telegram BOTs**



# ITMS

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## PILOT PROJECT DETAILS



Sl.	ITMS Specification and Pilot Project Objectives	Pilot Development Goals		
		Yes	No	
	Access to monitoring and screen developed for the live demonstration (User ID and Password)	Yes		Fully Complied. Additional Second level like Admin & Users.
	Module for Alerts via SMS Control at user level	Yes		Are available and deployed
	Controller and Metering Unit			
	NABL TESTED CLASS 1 accuracy 3-Phase built in meter. pre-programmed.	Yes		
	ON/OFF Indication Via Led indicator for on field Identification.	Yes		Achieved .
	Capture the energy usage and other parameters at pre-determined interval and store data for 30 days	Yes		Complied. Built-in storage in unit will be for 45 days @1minute intervals, 15Months @10 minute interval.
	Ability to connect with a communication device Via Wifi App for safe operating environment	Yes		Mobile with Android App can communicate with the unit directly through WiFi and request for all parameters without touching the transformer.
	Ability to download data in field	Yes		Mobile with Android App loaded can download the data from the unit directly through WiFi.
	System protection against surges	Yes		Built-in protection



	Ability to upgrade firmware on field using a communication device	Yes	Mobile with Android App loaded can be used to update the firmware of the unit directly through wifi.
4	Enclosure	Yes	Complied
	Enclosure should be made of fire retardant SMC complying with impact resistance of IP 65.		
	Dimensions of the SMC enclosure box 45cmx37 cm with be adequate space to access components of the box.	Yes	Complied
	The enclosure box must have a standard lock which cannot be opened by commonly available tools.	Yes	Yes
	Front of the box has Client Logo for representation	Yes	Client logo us placed on the right side top
		Yes	Complied
5	Communication Module		
	Ability to communicate securely with via cellular networks (GSM/GPRS) and or RF networks	Yes	Complied



	Communication technology between ITMS unit and central server should be 3G hardware device which should be capable to run 2G/3G/4G as per availability in the site.	Yes		Complied
	Two-way communicator	Yes Yes		Complied
	Ability to send data regarding energy usage, ON/OFF status etc from controller.			Complied. Data sent at predefined intervals.
	Ability to give command from a central level for switching ON/OFF scheduling.	Yes		Complied
	Ability to remotely upgrade the DTRs device firmware from central server	Yes		
6	Software	Yes		Mobile with Android App loaded can be used with built in dashboard for detailed information.
	A web-based / mobile based software package with a detailed information dashboard	Yes		Mobile with Android App loaded can be used with built in dashboard for controller status information.
	Inter-operability of all support service related to ITMS units.	Yes		All devices supplied will be supported
	Reports in form of matrix as well as graphical representation	Yes		Complied
	Incorporate logics to determine fault detection at switching point level and power thefts and execute a user defined Standard Operating procedure to aid in issue remediation.	Yes		Complied
7	Hardware			
	System box with corrosion resistant	Yes		SMC
	Energy meter (Class 1.0 accuracy or better energy meter)	Yes		Inbuilt meter with in the controller complies with Class
	IP 65 for complete DTRs system	Yes		1.0 accuracy. NABL Tested
	Emergency ON/OFF switch	Yes		Yes
8	Specifications			
	The controller should be type tested in a NABL certified lab	Yes		Complied



9	Input / Output Data			
	Cumulative Active Energy	Yes		Complied
	Average Power Factor Power on hours	Yes		Complied
	Active Energy	Yes		Complied
	Monthly Load On/Off			
	Controller has the provision to store last 30 days data at one hour interval. All these data is accessible for reading recording by downloading through HHT (Handle Held Unit ) through optical port or USB/Bluetooth given on controller fronts. For HHT, a smartphone-based solution for collecting/accessing data is also acceptable.	Yes		Complied. Built-in storage in the unit is for 45 days @1minute interval, 15Months @10 minute interval.  All data can be accessed through Android Mobile App.
	RTC			
	The controller has a built-in-calendar & clock having an accuracy of +/-1 minute per year or better	Yes		All built in the controller
	Tampers			
	Low Load	Yes		Complied
	Overload	Yes		Complied
	Low Power Factor	Yes		Complied
	Under Voltage	Yes		Complied
	Over Voltage	Yes		Complied
	In case of any emergency or for maintenance purpose, switching can be done using keypad. For maintenance, the interface for data access should be available.	Yes		Complied, Wifi on power on condition.
	Switch Weld & Switch Fail Events			
	When Switch "ON" operation failed condition is logged as switch fail event and when Switch "off" operation fails condition is logged as switch weld event.	Yes		Complied only for Load disconnect systems
	Power On-Off events			
	Last 20 power on-off events with power off duration will be logged.	Yes		Complied



<b>Switching on Overload/ Over current</b>			
Controller will continue monitor over current & overload condition against the threshold defined in controller and if condition persist or predefined time period (default 5 minutes) then disconnection of switch will occurred.	Yes		Complied
Controller will reconnect with the switch after some predefined time interval (default 10 minutes) and will check again for the event condition , if condition persist again , switch will disconnected against else will run normally.	Yes		Complied
In case of disconnection , controller will try for defined trial count (default 5 count) and after that will disconnect the switch for long defined sleep period(default 30 minutes).			
After sleep period switch reconnect activity will restart in same described manner. Every switching operation will be logged in meter.			
<b>LED</b>			
Flashing RED LED is provided on controller front.	Yes		Complied
<b>Communication</b>			
Controller store data can be downloaded through its optical port or USB using HHT (Hand Held Unit) or directly by Laptop using base computer software.	Yes		Wifi based android app to view data and Download data.
Controller should be able to interface with the communication module through a serial port.			
<b>Surge Protection</b>			
Standard CAT B 6000 V protection (IEC 61000-4-5).	Yes		Complied
Programmable Scheduling	Yes		Complied
The schedule for light operations can be programmed on field or during installation overriding the astro-clock.			
<b>Operating Temperature</b>			



	0°C to 70°C Storage temperature : -20degreeC to 80degreeC	Yes		Complied
	Humidity: 95% non-condensing	Yes		Complied
10	Features			
	Communication should be encrypted by 128 bit encryption	Yes		Complied
	Alert message in pre-defined abnormal system conditions through SMS to concern site supervisor/in-charge, relevant authorities and mobile/web based application through GSM/GPRS/RF for;			
	• Phase-wise currents on crossing threshold values*	Yes		Complied
	• Phase-wise voltages on crossing threshold values*	Yes		Complied
11	Web based software			
	Central Monitoring System functionalities:			
	It shall have a Cloud server to receive and record all data from the Transformers.	Yes		Complied
	Should be able to connect to a Govt of India Unified Software. The software of the vendor should be able to feed-in data & should be inter-operable to the PAN India unified software so that all necessary monitoring and operation can be done from the PAN India unified single software as well.	Yes		Complied
	The DTRs online web based software shall merely comprise of the following pages:			
	1. Login Page			
	2. Summary Page			
	Panel data of individual Transformer monitoring should be linked to the cloud server.			
	5. List of all Transformers having provision of viewing by zone/division/substation /Feeder level.			
	6. Live feed of all DTRs having provision of viewing by zone/division/ward etc.			
	7. Map view			



	8. Transformer details		
	9. Data and parameters Reports		
	The Main page of software to shows real-time information about the cumulative load, number of faulty Transformers ,total number of Transformers on/off (uptime %)	Yes	Complied
	A separate tab in the software to show the list of DTRs units installed in the project area along with the meter parameter being showcased against each Transformer monitoring Unit.	Yes	Complied
	Alert in case of fault- describing the fault. Along with the colour coding for unresolved faults based on time. Eg. One colour for fault which resolved since 0-12 hours, different colour for 1224 hours and so on and so forth.	Yes	Complied
	A separate tab in the software for monitoring &controlling ,Alerts, Maps, Configuration page, Reports- uptime, fault penalty, history, energy saving, power failure, operational hour, lamp failure.	Yes	Complied
	It should be able to display the power failure details of a particular switching point.	Yes	Complied
	It should register all fault conditions like excess voltage/current drawn, PF ,Max KVA no-power supply, etc. through the instantaneous alert messages sent by the DTRs unit.	Yes	Complied
	It can generates MIS reports in Matrix as well as in Graphical format based on Power supply status, Energy Consumption, Over/Under Voltage/Load, System parameter/ controllers  i.e. voltage, current, power factor, cumulative kWh/kVAh	Yes	Complied
	Different user authorization levels should be settable and the central server should be capable of handling high traffic.	Yes	Complied
	GIS Mapping should be done covering all switching points and the detail of each switch point shall be viewable in the web application software through a Google map interface or a web based digital map.		Complied



All the DTRs units should be remotely configured from the Central Control Unit:

• Setting new ON/OFF timings	Yes		Complied
• Knowing the current status of any particular switching point.	Yes		Complied
• Reset the unit	Yes		Complied
• The minimum interval for the update of data should be 15 minute but programmable up to 1 minute.	Yes		Complied- Settable as per user requirement
• Auto synchronization of controller with server timing to be further synchronized with standard GPS clock timing.	Yes		Complied

Further system is able to indicate various faults:

• Status of the incoming supply (Power failure)	Yes		Complied
• High/Low Voltage	Yes		Complied
• Overload on the phases	Yes		Complied
• System to report unauthorized logins attempts.	Yes		Complied
• Software to have asset management features for tracking of each DTR , unique asset tag no., make, Rating, date of installation, date of replacement, reason for replacement	Yes		Complied, under Development
• Ability to remotely upgrade the DTRs device firmware from central server	Yes		Complied
• Latitude/longitude precise to the minute with the time zone	Yes		Complied
• Battery reserve for IOT Yes	Yes		Complied- 2000 Mah



# ITMS

TEST REPORTS AND  
CERTIFICATES



## TEST REPORT



Report No: EMTR/E&amp;E/EL30004E/122

Date of Issue: 01/11/2019

Page 1 of 5

1	<b>Sample Registration No.</b>	EL30004E
2	<b>Date of Registration</b>	21/10/2019
3	<b>Name &amp; Address of The Customer</b>	iScientific Techsolutions Labs 133/1/B, 1 <sup>st</sup> Floor Phase II, IDA Cherlapally, Hyderabad, India-500051
4	<b>Sample Identification</b>	<b>Product</b> TMS & ITMS <b>Manufacturer</b> iScientific Techsolutions Labs <b>Model</b> ITMS/MU001/2019 ITMS/CT001/2019 ITMS/TS001/2019 TMS/MU001/2019 TMS/CT001/2019 TMS/TS001/2019 <b>Serial Number</b> -- <b>Quantity</b> 01
5	<b>Condition When Received</b>	Good working condition
6	<b>Standard Reference</b>	Customer Specification
7	<b>Scope of Testing</b>	Voltage, Current, Power, Power Factor, Energy & Temperature
8	<b>Sample Flow Data</b>	<b>Received on</b> 21/10/2019 <b>Test Started on</b> 21/10/2019 <b>Test Completed</b> 21/10/2019
9	<b>Tested At</b>	EMTAC LABORATORIES PVT LTD Plot no-11/6, Road no-9, IDA Nacharam, Hyderabad- 500076, Telangana, India

TESTED BY	AUTHORISED BY	ISSUED BY
Bhavana A (Jr. Engineer)	G Satyam Reddy (HOD)	G Satyam Reddy (HOD)
Date: 01/11/2019	Date: 01/11/2019	Date: 01/11/2019

# TEST REPORT



Report No: EMTR/E&amp;E/EL30004E/122

Date of Issue: 01/11/2019

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**TESTING ENVIRONMENTAL CONDITIONS:**

Ambient Temperature .....	15°C to 35°C
Ambient Humidity .....	25% to 75%

**TEST SUMMARY:**

SI. No	Test severity	Compliance Criteria	Verdict
1	Voltage, Current, Power, Power Factor, Energy & Temperature	±1% of the reading	Pass

**PRODUCT DESCRIPTION:**

Intelligent Transformer Monitoring System (ITMS) is an automated monitoring and diagnosis tool for distributed transformers based on temperature, oil condition & level and load analysis. In addition to these functionalities it has an engine with automated data acquisition, display, archiving and alarm notification functions. ITMS is a three-phase system.

**TESTING DATA:****Table: Load Verification**

S. No.	Set value/Reference value			Observed reading in TMS/ITMS		
	Voltage (Vac)	Current (A)	Power Factor	Voltage (Vac)	Current (A)	Power Factor
1	229.4	1.96	0.99	229.2	1.95	0.99
2	239.2	3.08	0.99	239.5	3.07	0.99
3	250.2	4.12	0.99	250.3	4.11	0.99
4	270.2	5.29	0.99	270.5	5.28	0.99

**Supplementary Information:** Resistive load provided to the ITMS**Table: Power Verification**

S. No.	Set value/Reference value			Observed reading in TMS/ITMS		
	Voltage (Vac)	Current (A)	Power (KVA)	Voltage (Vac)	Current (A)	Power (KVA)
1	266.0	11.2	3.0	265.6	11.3	3.0
2	265.4	22.5	6.0	265.8	22.7	6.0
3	262.6	33.7	8.8	263.0	33.5	8.8
4	266.0	101.1	27.2	266.2	101.6	27.2

**Supplementary Information:**

- Resistive load provided to the ITMS
- The power verification is verified by external connected CT 100A/5A.
- All the parameters such as current, active power, apparent power and reactive power are fully tested with 5Amps internal CT. And the product ITMS/TMS is compatible with any External CT which has bar 5 ratio.

**Table: Temperature Verification**

S. No.	Set value/Reference value Temperature (°C)	Observed reading in TMS/ITMS Temperature (°C)				
		R	Y	B	Oil	Ambient
1	30	29.5	29.5	29.5	29.5	29.5
2	50	49.0	49.0	48.5	49.0	49.0
3	125	124.5	124.5	124.5	124.5	124.5

**Supplementary Information:** Sensors were placed in the conditioning chamber

**TEST REPORT**

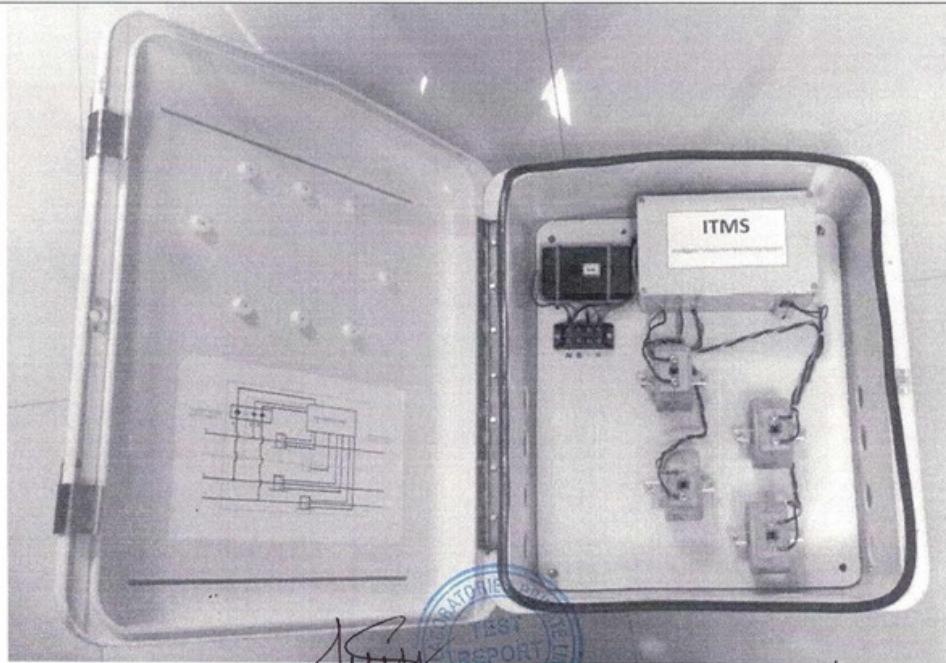
Report No: EMTR/E&amp;E/EL30004E/122

Date of Issue: 01/11/2019

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**Product Under Test Pictures**

Over View



STANDART  
TEST REPORT  
No. 122

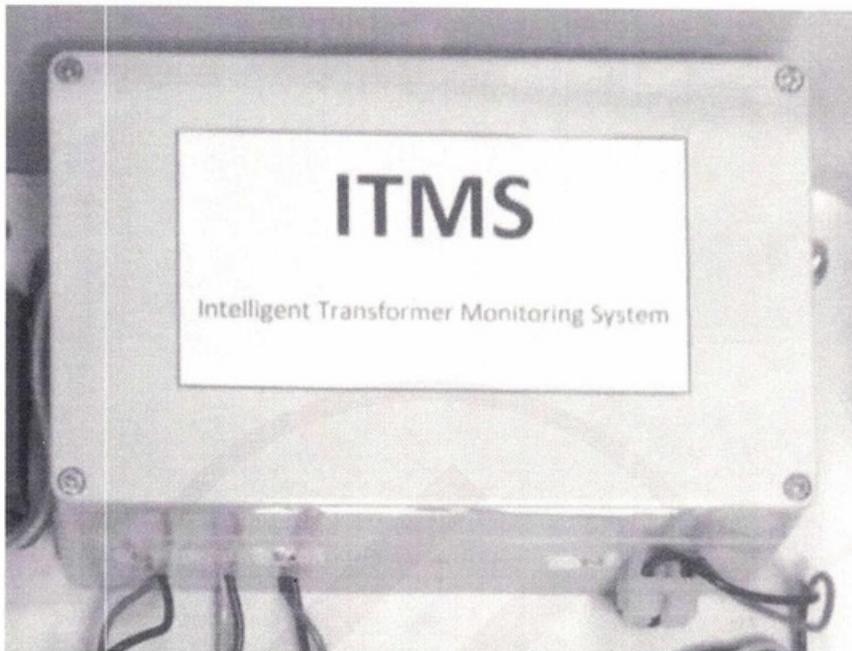
# TEST REPORT



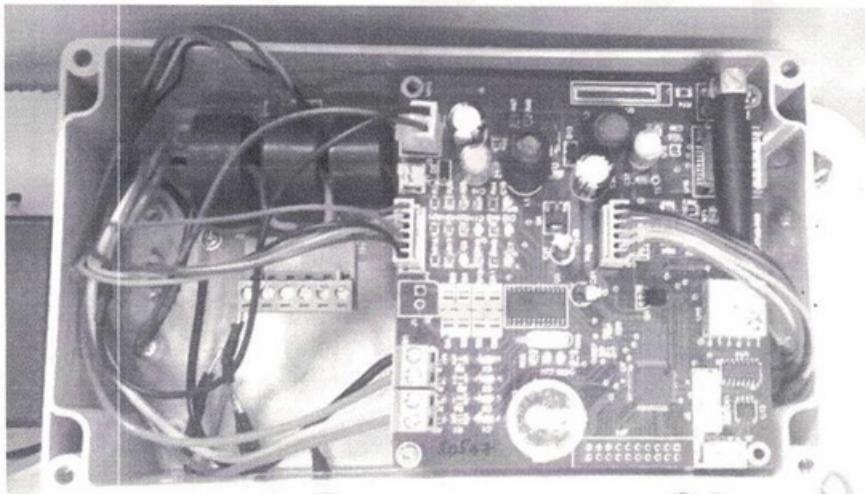
Report No: EMTR/E&E/EL30004E/122

Date of Issue: 01/11/2019

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ITMS Over view



ITMS Internal View

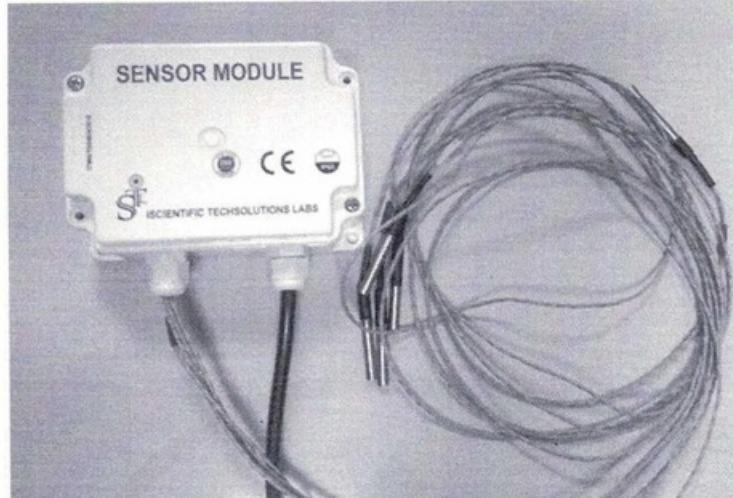


**TEST REPORT**

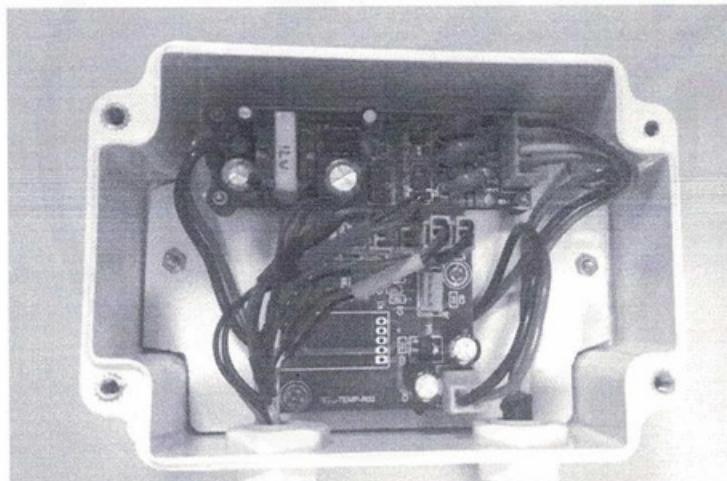
Report No: EMTR/E&amp;E/EL30004E/122

Date of Issue: 01/11/2019

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Sensor Module



Sensor Module(Internal View)

**Terms and conditions governing this test report**

1. This test report relates only to the products tendered for testing.
2. This test report shall not be reproduced except in full without the written approval of the issuing authority.
3. In case any clarification on the issued test report, it must be raised within one month from the date of receipt of the test report.
4. The Specified ambient conditions were maintained during the test.
5. In case any dispute, the decision of the HOD (E&E), Shall be final and binding

PLACE: Hyderabad  
DATE: 01/11/2019





# ITMS

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PRIOR EXPERIENCE & PATENT  
GRANT CERTIFICATE



NORTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED  
CORPORATE OFFICE :: VIDYUTH BHAVAN :: WARANGAL - 01.



From  
Chief General Manager (Projects),  
H.No. 2-5-31/2, Vidyuth Bhavan,  
Corporate Office,  
Nakkalagutta, TSNPDCL  
Warangal – 506 001,

To  
M/s. iScientific Techsolutions Labs  
133/1/B, 1<sup>st</sup> Floor Phase II,  
IDA Cherlapally,  
Hyderabad - 51

Lr.No.CGM(Proj)/GM(IT)/TSNPDCL/F No IDTMS /D.No. 184 /20, Dt: 28.07.2020.

Sir,

**Sub:-** TSNPDCL – Intelligent ( Distribution) Transformer Monitoring System ( I(D)TMS )  
–Letter of approval & implementation of pilot project – Issued -Reg

- Ref :-** 1) eMail from iScientific Techsolutions Labs dated:22/07/2020  
2) Approved office note Dt: 26.07.2020

\* \* \*

With reference to the email cited (1), approval for implementation of Intelligent ( Distribution) Transformer Monitoring System ( I(D)TMS ) in TSNPDCL is accepted with the following terms and conditions

- a) The pilot project shall be carried out at free of cost.
- b) Minimum 50 units shall be installed
- c) Pilot area - DTRs under Mamnoor and Gorrekunta substations
- d) Implementation and installation time : within 60 days
- e) Pilot timeline : 6 months from the date of commission.
- f) The firm has to take all safety measures during installation and commissioning of the equipment. The above activity should be carried out in the presence of TSNPDCL field staff only.
- g) The firm is responsible for any damage to TSNPDCL equipment due to IDTMS equipment and expenditure of the loss will be recovered from the firm.

Yours faithfully,

Chief General Manager/Projects  
NPDCL/Warangal.

Copy to Superintending Engineer/Op/Warangal(U) : For information.



**INTELLECTUAL  
PROPERTY INDIA**  
PATENTS | DESIGNS | TRADE MARKS  
GEOGRAPHICAL INDICATIONS



क्रमांक : 044132052  
SL No :



भारत सरकार  
GOVERNMENT OF INDIA

पेटेंट कार्यालय  
THE PATENT OFFICE

पेटेंट प्रमाणपत्र  
PATENT CERTIFICATE  
(Rule 74 Of The Patents Rules)

पेटेंट सं. / Patent No.

आवेदन सं. / Application No.

फाइल करने की तारीख / Date of Filing

पेटेंटी / Patentee

372316

201841038912

12/10/2018

ISCIENTIFIC TECHSOLUTIONS LABS

प्रमाणित किया जाता है कि पेटेंटी को उपरोक्त आवेदन में व्याप्रकृति INTELLIGENT TRANSFORMER MONITORING SYSTEM नामक आविष्कार के लिए, पेटेंट अधिनियम, १९७० के उपबंधों के अनुसार आज तारीख 12th day of October 2018 से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled INTELLIGENT TRANSFORMER MONITORING SYSTEM as disclosed in the above mentioned application for the term of 20 years from the 12th day of October 2018 in accordance with the provisions of the Patents Act, 1970.



**INTELLECTUAL  
PROPERTY INDIA**  
PATENTS | DESIGNS | TRADE MARKS  
GEOGRAPHICAL INDICATIONS

पेटेंट नियंत्रक  
Controller of Patent

अनुदान की तारीख : 20/07/2021  
Date of Grant :

टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, 12th day of October 2020 को और उसके पश्चात प्रत्येक वर्ष में उसी दिन देय होगी।

Note. - The fees for renewal of this patent, if it is to be maintained will fall / has fallen due on 12th day of October 2020 and on the same day in every year thereafter.



## Pilot Project ITMS – Cost Benefits with Effective Implementations.

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**Brief:** - Key objectives are broadly outlined for ITMS implementation at DISCOM:

- To Monitor DTR health parameters including meter reading.
- To Monitor connection/disconnection of electricity supply (remote connect/ disconnect).
- To enable real time energy auditing.
- To identify phase imbalance.
- To identify Phase wise Load.
- To have visibility of loading on the power system which enables better prevention of failure/avoid under-utilization of equipment's.
- To enable load management in real time.
- To introduce/implement Time of Use (ToU) tariffs for different categories of customers based on the Study.
- To enable real time monitoring of distribution transformers/feeders.
- To analyze all events & alarms captured by the ITMS at Transformer.
- To use the ITMS and ITMS communications for other smart grid applications.

Work on ITMS includes the following:

- Survey for ITMS rollout in entire designated area under the DISCOM. Project
- Area Profile on As-Is, detailing all present Transformer Installation in Designated area.
- Implementation Strategy and Implementation Schedule.
- Key Performance Indicators (KPI). As listed (Pilot Objectives for Scaling)
- Providing inputs and assisting in obtaining necessary regulatory approvals, if any.

**Global Trends** To follow and keep up with global trends of ITMS implementation aimed at increasing customer satisfaction, reducing carbon footprint etc.

- a) Revenue Enhancement: To reduce losses by improving billing and collection efficiency
- b) through implementation of ITMS features such as pre-Paid.

Customer Satisfaction: To gain better insights into consumer behavior, usage pattern and segment customers to offer better services through customized Demand response

- c) programs etc.

Efficiency Improvement: Implementing Strategic & IT/OT measures to improve efficiency of both business operations and field operations.

- d) Enterprise Robustness: Improving inherent business operations and enterprise foundational readiness for implementation of developed digital initiatives.



- e) Cost Reduction: Cost reduction can be achieved through automation of mundane processes (such as Meter reading, disconnection/reconnection, data entry, call center footfalls etc.), improvement of asset lifecycle and improved monitoring capabilities.
- f) Asset Optimization: – ITMS system will help BCCL – Energy/ DISCOM in identification of overloaded or under loaded network segments for system planning and upgrades to be done in an optimum manner. This system will provide detailed information across the distribution network that can be used to optimize investments in infrastructure improvements. Data available by ITMS like Interval (time-based) consumption data at the customer level (and ability to aggregate up to transformer and circuit levels), voltage information collected at each premise, momentary outage information etc. shall help in better management of system. Interval consumption data can be aggregated at the transformer level to help identify under-used and overloaded transformers, as well as to replacement transformers as per required capacity.  
Society welfare: – Reduced Carbon footprints (patrolling for breakdown maintenance, meter reading, fault identification, reduced power cut/downtime enables quick response, re- connection, and disconnection).
- g)

Detailed cost Benefit analysis detailing all costs qualitative and quantitative.

Table Provides Benefit Description and Expected Outcomes



<b>Benefit</b>	<b>Description</b>	<b>Outcomes</b>
Consumer	Better Quality of power and improved safety of the household electronics and appliances.	Enhanced Customer Satisfaction
	Timely Supply of power.	Enhanced Customer Satisfaction
	Less Downtime and power shutdowns.	Enhanced Customer Service
	Faster Turnaround time for Complaint's resolution	Enhanced Customer Service
Utility	Overall Reduction in AT&C Losses	Efficiency Improvement
	Overall Reduction in Unaccounted energy	Efficiency Improvement
	Accurate and Timely Transformer Maintenance scheduling	Efficiency Improvement
	Real Time Energy Accounting	Efficiency Improvement
	Reduction in servicing costs and human intervention at site.	Cost Reduction
	Increased Billing Efficiency	Revenue Enhancement
	Energy Department/ DISCOM Peak Load Management	Revenue Enhancement
	Real Time identification of Tampers	Revenue Enhancement
	Remote Firmware Upgrade	Enterprise Robustness
	Business Intelligence and Analytics on ITMS Data	Enterprise Robustness
		Society Welfare
Society	Reduced Carbon Footprints	Society Welfare
	Improved Morale	



At ISTLABS believe that  
At the end of the day we are accountable to ourselves,  
our success is a result of what we do!

For Full Product Presentation feel free to Contact us  
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