967/7, Gujarat Industrial Development Corporation, Makarpura Vadodara Gujarat, 390010 India.
Contact us: mahesh.karki@shiventerprise.co :

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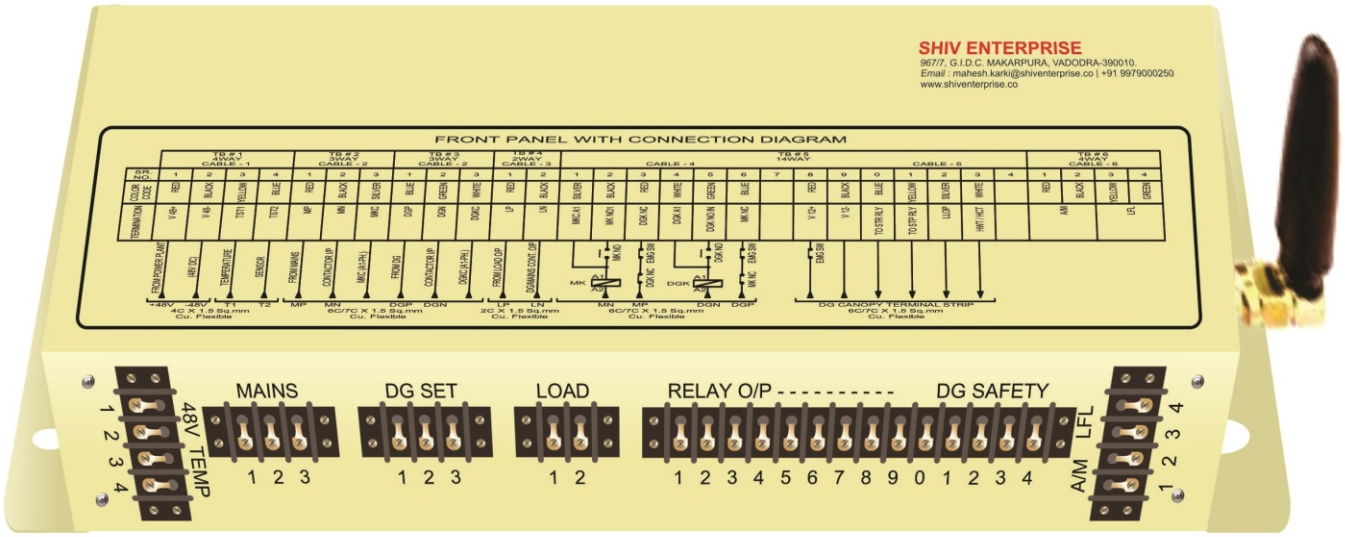
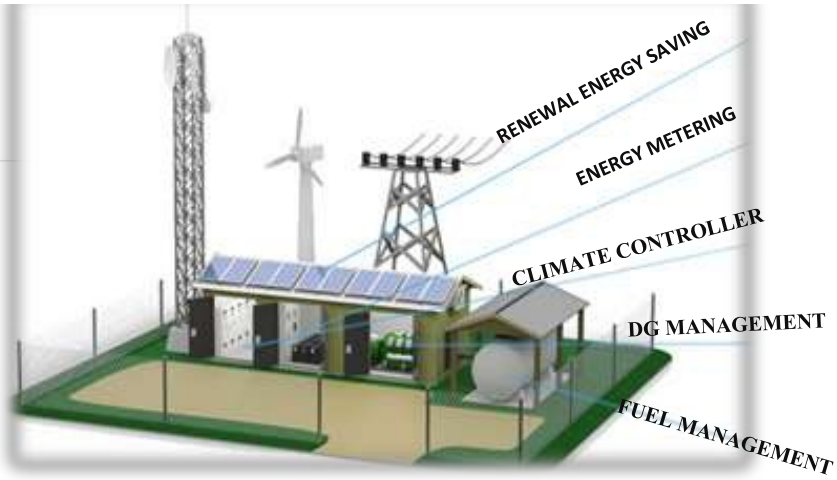
Reducing operating costs of Power Generators with cloud -based Remote Management Solution



White Document

How remote management can be used to cut costs and improve maintanance



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SHIV ENTERPRISE is pioneers in the industry, we offer Power Management System for Telecom Passive Infra **Remote Management Solution (RMS).**

Base transceiver stations (BTS) are key infrastructures on any telecommunication network as they make the interface with the mobile terminals and represent 70-80% of its total energy consumption. BTS remote monitoring and control is essential to leading carriers to ensure undisrupted communication services and to achieve operational optimization.

Remote Management Solution (RMS) system designed & developed a cost effective and easy to set up solution for monitoring, controlling & auto reporting all equipment activities especially, DG, BB, Room Temperature, & Power frailer alert to technician & Event logs through sms within 2 minutes & mail to Manager once a day.

POWER MANAGEMENT SYSTEM

Remote Management Solution (RMS) system aggregates cell level voltages for multiple battery banks, along with environment parameters such as ambient temperature, battery temperature and Mains & DG Voltage etc. It also collects charging & discharging current and load current values. Multiple sites can be monitored by a user. The system also tracks the state of the battery helping in estimation of charge and life of the battery. The salient features are -

1. Room Temperature Monitoring.
2. Mains & DG voltage monitoring.
3. DG & Battery Run hours
4. Fuel Refueling alert well in advance
5. KWH / AH / Depth of discharge monitoring.
6. High / low voltage management
7. Auto Phase Selection
8. Show Exact Site location on Google Map.
9. Status & Event logs.
10. Tempering Alert & report along with snapshot
11. Motion light on

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1 INTRODUCTION

Backup power generators may not run often, but when they're needed, it is critical that they can perform. But how can you make sure that your power generators in the field are ready to start without physically visiting them all the time?

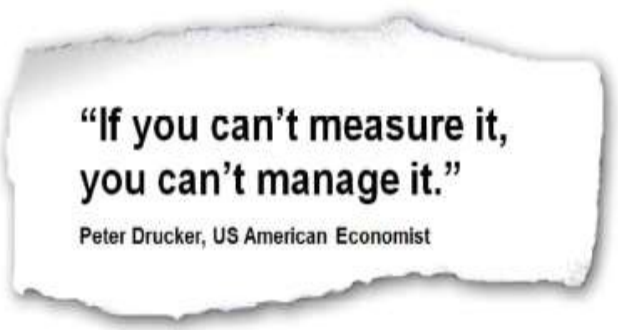
This has been an inherent problem for power generator-owners for some time keeping the generators operational while reducing expensive service visits to a minimum.

With a cloud-based remote management solution, you can have immediate online access to generator parameters via a regular web browser. In this whitepaper, we propose ways in which remote management can be used to reduce operating costs and improve control.

2 THREE WAYS TO CUT OPERATING EXPENSES FOR POWER GENERATORS

There are many things that can be done to improve the operation of existing Gensets, but the key factor to successfully be able to reduce operational costs in information. By understanding when how and if equipment is operating, we are able to make better decisions regarding site maintenance and take actions when necessary.

Below are some examples of how access to information helps us make better decisions and reduce operating cost.



PERFORM SERVICE ONLY WHEN NEEDED

Power generators are often serviced according to a pre-determined service schedule. By understanding how the generator has been operated, it is possible to plan service more dynamically. As site visits are costly, you are able to optimize the service costs by only sending service teams to generators that actually need service

The challenge is to know when service is needed to each individual site. With a remote management solution, you can check operating hours, oil pressure, battery status, coolant temperatures, generated power output, fuel level, GPS position etc. A notification ay also be generated whenever a critical level has been reached, for example if the generator has been running more than expected. We may then send a notification when the running hours exceed the service interval.

By being able to analyze the operation of each generator remotely, you will be able to understand their health and more efficiently schedule service visits in the field.

Certain advance remote management solutions also offer remote access functionality. This means that you can open up a secure tunnel to your power generator in the field and do configuration using your regular software tools. Just like if you connect to the control panel on site.

TEST START GENERATORS REMOTELY TO REDUCE START-UP PROBLEMS

Just like a car that has been parked for an extended period, a generator engine that has not run in a long time is likely to have start-up problems. For back-up power generators that are not operated very often, is important to regularly perform operational test. Remote test starts can be made with a remote management solution that has control capabilities and is connected to the generator controller. With a simple action such as a remote operational test, u may increase the likelihood of the generator working the day there is a power outage and the generator needs to perform.

A well-maintained generator operators better and has lower operating cost since unplanned service visits often mean substantial expenses.

MINIMIZE AND REDUCE THE EFFECTS OF FUEL THEFT

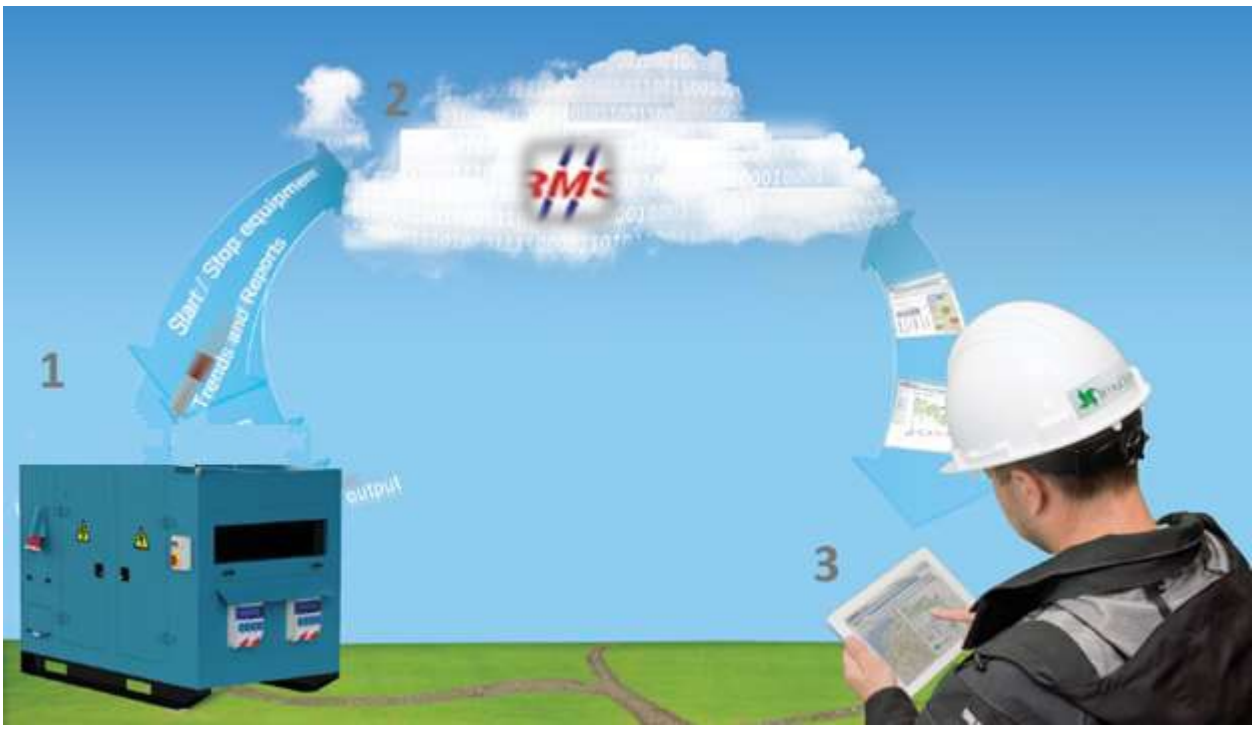
Fuel theft can be a significant problem. In certain regions, as much as 40% of Genset fuel is reported to be stolen. Avoiding fuel theft completely might be difficult since it is often stolen a bit at a time; during transportation, at fill-up, or at the power generator in the field. However, a remote monitoring system that connects to a fuel sensor can be used to ensure that the right amount of fuel is delivered at a refill. By using an intelligent level sensor, it is possible to track the fuel level of the tank. The fuel sensor can be calibrated to sense a full tank and by knowing this we can verify that the tank is properly refilled. A good fuel level sensor is able to detect variations down to 3.5 liters.

An abnormal decrease in content may be detected and indicate that the fuel is being stolen. With a remote monitoring system that supports alarms, a notification is sent immediately when the theft occurs. Even if it might be hard to catch the thieves, we are at least aware that the fuel has been stolen and we can schedule a refill to ensure the generators have the fuel needed to operate.

Tracking the level of fuel in a tank increases the awareness of what happens to the fuel on site and helps users understand when theft occurs. In some cases, where organized theft is common, this may help detect patterns and take action.

RMS (REMOTE MONITORING SOLUTION) PUTS YOU AHEAD OF THE GAME

Shiv monitoring technology enables instant access to data from equipment in the field while we are able to use this technology to reduce operating expenses as described above, it also brings us other benefits. By being able to have full control 24/7 and be instantly notified of any operational issues, the end-user also receives improved service quality.



TO GET THIS INFORMATION, WE NEED TO GATHER IT FROM THE FIELD EQUIPMENT TO A DATA CENTER WHERE IT CAN BE STORED AND ACCESSED AND NEXT CHAPTER DESCRIBES HOW THIS PROCESS WORKS.

3 HOW REMOTE MANAGEMENT SOLUTION WORKS

There are three main elements to a modern remote monitoring solution. The first is the physical layer that comprises of a communication gateway that links to your equipment, acquires the data, and communicates it to the remote server. The second is the remote server that collects and stores the data, and the third is software services that provide secure access to the data through a user interface.

COMMUNICATION GATEWAYS

Communication gateways are devices that handle the connection to the device or equipment being monitored through dedicated communicate with the server via gateway either quad-band GSM/GPRS, 3G or Ethernet based communication using TCP/IP based protocols.

A common challenge to solve is access to the remote sites as many solutions require open ports in firewalls of VPN based connections to the field installations. We avoid such solutions as open ports in a firewall reduces the protection of the site and VPN based access may give access to other components that what the connection may be intended for. A more secure method & solution adopted where the communication gateway initiates the communication to the remote server (only outgoing TCP/IP connections opened) and also uses communication protocols that only selected data from selected devices to the emote server instead of open transparent access to the field site.

We have also considered to use a solution which allows communication gateways pre-configured for the intended application, whereas solutions make installation simple and require no programming or IT expertise at the time of installation and make it easier to deploy in the field.

CENTRAL SERVER

Acquired data as well as information regarding events occurring in the field are sent to the management serve by the communication gateway at selected logging intervals as demanded by the application. To communicate with the server, gateways generally use either quad-band GSM/GPRS, 3G or Ethernet based communication using TCP/IP based protocols.

GRAPHICAL DASHBOARDS

Information stored on the remote server can be presented using a standard web browser or integrated with other applications used for monitoring the field sites or applications handling logistics.

There are normally several different tools and functions available at the server to simplify configuration of a graphical display, customize reports or functions to provide access to the data stored on the server. A configuration can be packaged as a re-configured profile that can be deployed to sites in the field and present a common user interface with information presented in the same way for each site.

4 WHAT INFORMATION CAN YOU GET FROM YOUR RMS CONTROLLER?

Remote management solution (RMS) can be used to monitor and control all parameters of your power generators in the field for example:

- Check fuel levels – see when its's time to refuel
- Check oil pressure
- Check battery status
- Check water temperature
- See the current and generated power output
- Direct alarms to go to the correct service staff
- Track your correct site location via GPS
- Detect perimeter breach or fuel theft
- Test start your generator remotely

Example of a typical web-based dashboard.

But Modern remote management can also offer remote access to your DG, you can to do Start /Stop remotely using the dedicated Mobile No or configuration software, just like being on site.

WHAT TO GAIN WITH REMOTE MONITORING

- Improve service to customers, enabling you to charge more
- Reduce on-site scheduled and emergency service visit.
- Receive and direct alarms to service personnel whenever certain thresholds are reached.
- Generate report on how different equipment is performing and analyze over time

5 WHAT ABOUT SECURITY?

Establishing a secure communication path with a remote management solution (RMS) requires solving a number of technical challenges (such as secure access through firewalls). Moving data off-site raises concerns over both its security and availability. By using solutions dedicated cell No and restrict communication of only the intended data, amount of information that can be access and reduces the possibilities of misusing the remote access. Considered security is top priority for present world we have chosen method to ensure the security of wireless communications over GPRS or 3G dedicated SIM cards with private APN. This means that it is not possible to ping or try to access the remote site except through authenticated GSM cell No.

A secure and reliable remote management solution requires encryption both between the power generator in the field and the data center as well as between the data center and the web interface.

Data storage at the remote server also protected. It is common practice to regularly perform so called penetration tests of the remote server to make ensure the security protection and any loophole.

Access to the remote monitoring system is centrally controlled through authentication method, Multi-level password layers are used to provide permissions to access different functions, and the server authenticates users and ensures their correct access level. The server also record all user access as well as attempted access.

6 FINDING YOUR SOLUTION FOR OPTIMAL ROI

RMS is custom-made remote monitoring systems with guarantee to give you the exact functionality what you need, with reasonable prices easy to deploy. A ready-made remote solution also available in market but easily but 90% such solution are not secured, which is unsafe for cellular network.

RMS (Remote management solution) can be deployed within a couple of hours. This helps make a quick return on investment (ROI). The cost of a communication gateway is normally less than the average cost of a service visit and by cutting down on travelling, it is also possible to reduce a company's carbon footprint and only do service visits when really needed.

A very important factor to consider is that the solution is a good fit with the Genset control panels that you are using. Some remote management solutions, like the **RMS** (remote management solution) from "**SHIV"**, have specialized solutions for power generators including pre-defined configurations for a range of control panels from different manufacturers as well as built in features for fuel level management etc.

WHAT ARE THE COSTS INVOLVED?

You pay for the RMS which connects to the passive Infra & RMS remote management solutions offer difference service levels for cloud access. Free versions with basic functionality are often available, offering a very quick return-on-investment with order.

No matter which solution you choose, the ROI will most likely be quick. A service visit is usually the same cost as a single RMS, meaning that you may have a payback time of only a few months.

Sr. No	QUERIES	INPUTS FROM SHIV ENTERPRISE
1	Data sheet of AMF panel	Its retrofit controller, Supports all make AMF panel, PMS, IPMS,
2	Logic of RMS in terms of RH, KW & KWH for EB, DG & BB	Yes can be measured and communicated as per customer requirement as add on features.
3	Protection for over voltage & under voltage	Yes, inbuilt features
4	AMF panel logic for single phase/2 phase / three phase availability	Yes can be measured and communicated as per customer requirement as add on features.
5	Integration with exiting system & BIL NOC.	Easy integration with existing system, communicate through SMS
6	Battery health monitoring in terms of SOC, DOD	Real time monitoring & analysis life and quality of BB
7	All sensors are connected with wire, so chances for tempering	Tempering proof. System generate alert & send SMS as per escalation matrix defined.
8	Challenge of week signal strength and solution of data loss on SMS mode.	In case of network coverages failed, & critical incident happened, System continuously generate the SMS with date: time stamp & keep records in memory chip and released once get GSM single.
9	RMS cannot differentiate between DG running and EB running - contact or swapping issue - being addressed in IPMS	System calculate DG (for the incident + Cumulative) and BB Run hours eventually as well as commutative since date of installation. RMS is the only device in India having following facilities:- • DG start validation • Detect Main contactors failures • Detect DG contactors failures • Detect swapping issue • Send validation & failure alert