



Advanced Maintenance  
Monitoring Application &  
Services

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## **Introduction:**

The Advanced Maintenance Monitoring Application is offered through the IPsens Certified and Resellers as tool to be used as a part of our mutual Preventative Maintenance Agreement arrangements with our customers. This tool dramatically increases the efficiency with which we can serve our user community and ensure maximum uptime of our sensor systems and related hardware components 24/7.

Monitored systems performance and maintenance monitoring ensures that you data is always accurate and your system performs optimally not only on the day of installation but for the entire period of its service deployment.

## **Summary:**

IPsens has developed its Advanced Maintenance Monitoring Application and services based on decades of experience in providing parking management applications, connecting various field data devices such hand held terminals and parking meters to a centralized database.

Data accuracy is obviously significantly impacted by the on-going operability of the devices connected to it. It has historically been an operational and costly challenge for operators and maintenance providers to implement and support adequate field inspections and maintenance policies to keep connected equipment working, without the ability to access it remotely.

With advent of new technologies such as battery powered parking sensors and other network components developed to be compatible with the Internet of Things "IOT", by being engineered to be accessible and programmable via a centralized cloud server, this has all changed.

These new systems designs allow Product and Application specialists to be included in the on-going support and maintenance and bring substantial efficiencies to the user of the system behind the actual data operations portion of the cloud hosted Application. Thus bringing systems operability and data accuracy to an all-time high.

## **Advanced Maintenance Monitoring Application**

The IPsens Advanced Monitoring Application is comprised of the following key modules:

### Diagnostics Engine

The diagnostics engine has been developed to identify systems and component failures, based in part on the connected devices ability to communicate certain diagnostics codes such as battery status, battery failure, sensing status, battery consumption, loss of communication with system etc. in the case of parking sensors.

Secondly algorithms have been and will continue to be developed based on observed historical systems performance and component behavior, to help anticipate and provide early notification of impending systems problems.

### Alert Notification

Based on the continuous diagnostics monitoring of the system automated first level troubleshooting alerts are generated based on the nature of the diagnosed problem.

The diagnosed problems are sorted by severity of the problem based on its immediate impact on systems data accuracy. For example a lost communication failure to an entire parking site will be prioritized higher than the outage of a single attached device, such as a parking sensor.

Based on the level and type of priority of the issue the system will generate an electronic message (email) to the individual/entity designated as the first level maintenance provider.

### Work Order Issuance \*

Starting with the first notification of a problem, the system generates a first level troubleshooting work order to the designated service provider. First level troubleshooting will be undertaken by the maintenance provider, supported by IPsens technical staff for actual deep level diagnostics and remedial action.

In case first level troubleshooting and remote maintenance actions prove unsuccessful, the system provides the maintenance provider with the ability to generate a field maintenance order identifying the expected problem with a call for specific maintenance action to be undertaken.

Severity status of the problem and requested time for completion in addition to the identification of specific components required on site will be issued as part of the work order.

### Work Order Processing \*

Work orders are issued directly on the Advanced Maintenance Monitoring Application and can be accessed through remote interface using a secure web browser interface.

This allows the field maintenance operator the ability to use a standard mobile device to access the work order and notate completion status and/or a call for further action required. Either in the field on in the back office.

### Work Order History

The system automatically tracks the status of all work orders issued by the system. A historical record is automatically generated which can provide information such as failure types by type of equipment, communication, site, space, frequency etc. It also tracks individual and compiled times for problem resolution by several different levels of detail.

This feature provides a very transparent record to the operator as to the performance of equipment, system and maintenance services.

### Real Time Outage Map

The Maintenance Monitoring Application provides a GIS based map of every deployed field device in every location. When a device and or location report a problem it will automatically be posted as a graphic presentation on a real time map in the application. The posted outage/problem identifier will be continue to be posted on the map until a work order has been closed out and the problem has been resolved.

### Secure Support Interface Layer

The Maintenance Monitoring Application runs as a secured module within the parking availability application. As such the maintenance provider of the system can be completely isolated from all access to operational systems data, should the end user wish to do so.

## **Maintenance Monitoring Services**

IPsens provides several services as part of our Maintenance Monitoring Application offering. These services are key to the systems maintenance-monitoring concept as it allows us to address and monitor problems at a very high level, which can ordinarily not be trained for with an operator of “IOT” devices as it is a constantly changing environment.

Our service offering is built on the following services:

### Application Maintenance and Updates

The Maintenance Monitoring Application requires constant monitoring and updating to harvest the full potential of being constantly monitored and diagnosed.

We undertake the task of monitoring systems behavior and identifying the patterns or events that form the basis for development of new or updated automated monitoring algorithms.

We undertake all first level troubleshooting and remote repair actions. These can include things from a simple reset and device recalibration; to much more complicated actions such as remotely deploying new firmware upgrades to all devices.

### Hardware Support Services

We work closely with all the hardware manufacturers to closely monitor performance and troubleshoot any items that reside outside our ability to address them.

Services include reviewing and addressing the on-going performance of the manufactures devices.

Additional services address the updating and issuance of new firmware, developed to address particular problems observed and/or the release of new firmware to address issues such as prolonging battery life of connected devices or special operator requirements.

Having the hardware manufacturer involved, in cases where this is possible, is a definite advantage to the operator as it allows for problem resolution to include the on-going involvement of the engineers who actually designed the system.

\* Scheduled for release January 2018