



Functional Overview of the RSM System

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1 Glossary

Term / Acronym	Description
AC	Alternating Current
DC	Direct Current
DMS	Document Management System
ECT	Equipment Craft Terminal
GUI	Graphical User Interface
IP	Internet Protocol
KSES	Keystone Electronic Solutions
LAN	Local Area Network
MIB	Managed Information Base
NAT	Network Address Translation
NMS	Network Management System
OS	Operating System
PLC	Programmable Logic Controller
RSM	Remote Site Monitor
SD	Secure Digital
SNMP	Simple Network Management Protocol
SQL	Structured Query Language
TCP	Transmission Control Protocol
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
VDC	Volts DC

Term / Acronym	Description
WAN	Wide Area Network
XML	Extensible Markup Language
CIP	Common Industrial Protocol
MIPS	Million Instructions Per Second
RTC	Real Time Clock
CPU	Central Processing Unit

2 Overview

- Design Goals
- Scalability
- Ease of Installation and Maintenance
- Interoperability
- Cost of ownership

3 System Overview

- Free Open Source Linux based NMS
- Powerful Linux based controller with modules
- SNMP NMS interface decoupling equipment from NMS
- 4 Power fed multi-drop serial buses
- RJ connectors for all wiring
- Web based ECT on board the controller – accessible through Local USB LAN WAN and NMS GUI
- Auto discovered devices

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5 Monitoring Features

- Concept of monitoring points rather than specific parameters
 - Input / Output
 - Analogue Input
- Hardware Monitoring Points
 - Power fed, Optically Isolated Digital Inputs
 - Relay Outputs
 - Analogue Inputs
 - Show possible cards and configurations
- Modbus Interface
 - Mapping of Modbus registers to RSM device model through XML device templates

- Modbus over TCP
- Serial through Isolated Modbus Gateway Multiplexer
- Exiting mapping for generator, easily expandable to PLC controllers, legacy SCADA equipment etc.
- SNMP Device Monitoring
 - On-board SNMP manager
 - Equipment MIBs mapped to RSM device model through XML device templates
 - SNMP Enabled UPSs Delta Eaton rectifier
- Possible to implement many more standard monitoring and control Protocols such as JSON or DeviceNet/CIP, with the same RSM device model

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7 Control Applications

- Customized Control Applications can be deployed over the monitoring core, providing a wide range of deployment specific control or notification functionality.
- Control Applications are deployed as standalone applications through the use of the on-board application manager and are configured through web modules deployed as add-ons to the core configuration/ECT web interface.
- Control Applications have access to all the core monitoring inputs and outputs regardless of underlying protocol and have access to all the OS resources and interfaces provided by the controller. Possible to add FTP, Mail, GSM SMS/USSD messaging to applications.
- Current applications include:
 - Simple output logic engine. Drive any output with a three term logic equation.
 - Simple Multi-unit air conditioner controller with optional load sharing
 - GSM SMS/USSD messaging interface
 - Advanced full functional air conditioner controller
 - Genset Controller with load sharing.
- Application development turn around time usually between 4-8 weeks depending on the complexity of the required functionality.

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9 Additional Controller Features

- WAN + LAN switch NAT Gateway
 - Single Management IP with port forwarding through on board firewall to all LAN based equipment on site. Site and LAN configuration uniformity.
 - Support IP based surveillance equipment such as cameras through IP Gateway.
 - Control IP access to site through on site firewall.
 - NAT based port forwarding to any IP based equipment behind the firewall.
- Flexible Power Supply options
 - Single or dual 48/24/12 VDC and AC options

- Separate supply for each serial bus.
- Quadruple Redundancy for controller power.
- Linux based OS with application update manager.
 - All functionality deployed as packaged applications.
 - Central package repository hosted on NMS server.
 - All packages are version controlled.
 - Remote software upgrade does not re-flash card. No danger of card becoming inaccessible or dead because of software up date.
 - Export of card software configuration and versions for easy configuration management record keeping.
- SD card based storage
 - Proper journalised file system for data protection.
 - Size of storage selectable depending on SD card size.
 - Proper transactional SQL database used for internal event logging and configuration storage.
- Easy Web based Configuration
 - Configuration site accessible from WAN, LAN or USB port. Minimal equipment necessary to access the controller configuration interface.
 - User management with roles to ensure security.

10 NMS functionality

- Web based application framework. No client side deployment.
- Self discovering sites
- GIS overlay of sites and alarm statuses.
- Standard alarm management procedure. Acknowledged alarm can only be cleared when the fault is cleared.
- Historic trending logs of all monitoring points digital and analogue
- On board ECT website accessible through NMS GUI
- IP surveillance equipment accessible through configurable buttons on GUI
- Equipment operational / Maintenance states
- Any logical grouping of sites is possible
- Any Grouping of monitoring points per site
- Configurable alarm severities per monitoring point
- Configurable colour scheme indicating alarm severities.
- Configurable escalation time frame
- User and user group management
- Alarm escalation based on severity location and user or group

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12 Suite of Equipment

12.1 *Full Controller Card*

- 1 x WAN port, 4 x LAN ports in LAN switch configuration.
- 1 X USB Host port, 1x USB Device port
- Flexible Power Supply options
 - Single or dual 48/24/12 VDC and AC options
 - Separate supply for each serial bus.
 - Quadruple Redundancy for controller power.
- 4 x RS485 Power fed, multi drop, monitoring buses
- uSD based Non Volatile storage, 4GB shipped as standard but larger sizes available.
- Non Volatile RTC.
- ARM9 based 180MIPS CPU, running Guinnux v2.0 distribution with Linux kernel version 2.6.38. with
- 64 MB SDRAM
- 32 MB Boot flash with fully functional Guinnux v2.0 rescue system.
- 19 inch 1U rack mount form factor.

12.2 *Lite Controller Card*

- 1 x WAN port, 1 x LAN port in LAN switch configuration.
- GPRS capable GSM modem.
- 1 X USB Host port, 1x USB Device port
- Single 48VDC or 12VDC power supply
- 1 x RS485 Power fed, multi drop, monitoring buses
- 8 x Optically Isolated, power fed, digital inputs
- 2 x Relay Outputs

- uSD based Non Volatile storage, 4GB shipped as standard but larger sizes available.
- Non Volatile RTC.
- ARM9 based 180MIPS CPU, running Guinnux v2.0 distribution with Linux kernel version 2.6.38. with
- 64 MB SDRAM
- 32 MB Boot flash with fully functional Guinnux v2.0 rescue system.
- Rack mountable, desktop or wall mount options available.

12.3 Digital Monitoring Module

- 8 x Optically Isolated, power fed, digital inputs
- 2 x Relay Outputs
- Power fed from Monitoring bus
- 72 MIPS Cortex-M3 CPU

12.4 AC Power Monitoring Module

- 3 x Isolated AC Power inputs, 3 Independent AC sources or 1 three phase source.
- Power fed from Monitoring bus
- 72 MIPS Cortex-M3 CPU

12.5 Environmental Monitoring Module

- 1 x Digital Temperature Sensor
- 1 x Digital Humidity Sensor
- 4 x Optically Isolated, power fed, digital inputs
- 1 x Relay Output
- Power fed from Monitoring bus
- 72 MIPS Cortex-M3 CPU

12.6

12.7 Modbus Gateway Module

- 3 x Isolated RS485 Modbus interfaces
- RS485 Baud rates configurable independently
- Modbus Slave Routing Table configured remotely from RSM controller
- Support for Modbus RTU and ASCII protocols
- Power fed from Monitoring bus
- 72 MIPS Cortex-M3 CPU

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