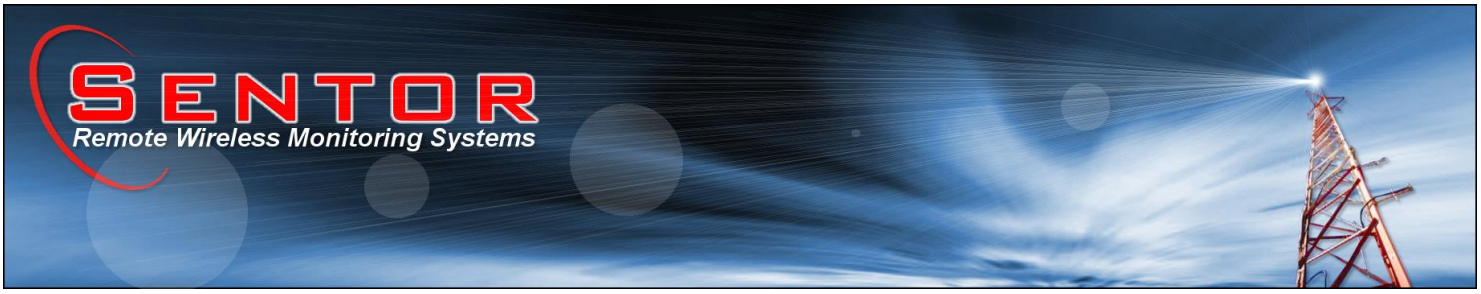



# Remote Communications Base Site Monitoring, Control and Management Automation System


## Sentor System Overview

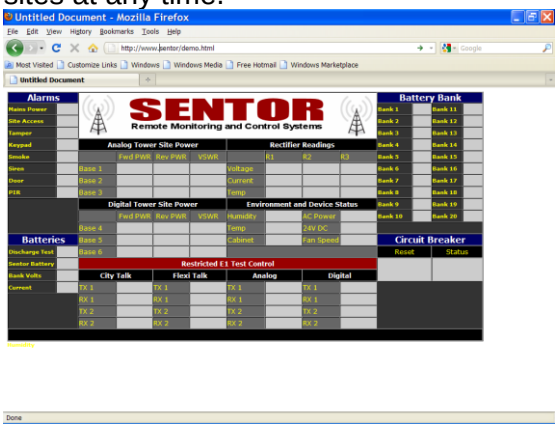
Sentor is a ***Fully Intelligent*** *stand alone* input output controller with its own microprocessor and memory. The concept of the Sentor System is to provide a wide range of monitoring and control processing functions for *ALL types of remote* and *local* Sites.

Although other application notes are available for this wonderfully adaptable product, this application note describes Sentors specialist and unique capabilities in Wireless Tower Site Monitoring, Security and Control functions.

*Communications Base Station Tower Sites are the very core of any Mission Critical Communications Network. Be it for Public Safety, Military and Government Applications, or Commercial, Internet and Cellular usage, these sites are absolutely critical to our normal functioning. With the day to day Voice and Data requirements it's critical to keep these vital sites running continuously.*

*Sentor has developed its own* intuitive controller and by using the Power and graphics of Windows, Sentor manages such needs as Base Station Performance and Control, Building and Site Management, Security & Fire Monitoring Control, Battery Monitoring and Air Conditioning plus Full Remote Security & Access Control. Many other functions and options can be monitored and controlled by Sentor. The system is so flexible that extra programming and interfacing can be done quickly and easily by programming the Copyrighted Fuzzy Logic Scenario Controlled Software© which is performed *over the air* (Wireless/Radio) or via landline or onsite.

With the PC connected to Sentor directly or via the Internet, the Windows Software provides an interface for the user to Control, Monitor and Program most systems and processes occurring on many sites at any time.




***Programmable Screen shots and layouts with Active Icons via the Web or direct connection***

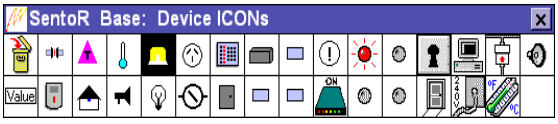
Sentor *operates independently of any computer* at each remote location after programming, with each site connected to the control center (if required) only when necessary via the Internet/Intranet, Cellular Modem or Phone, Satellite Modem, Radio Modem, Microwave, Landline Modem or any other Communications Backbone. This arrangement allows an ideal environment for controlling complex *Remote Networks* or stand-alone installations.

**CDMA – 1xRTT Modem**
**GSM/GPRS and Satellite also available**

By running the Sentor W*indows based application,* the user will feel comfortable with Sentor's *Graphical User Interface* (GUI) software. Sentor uses normal Windows XP, Win 7 or Linux.

The *pictorial backdrop* can be designed for each individual site, showing floor plan, flow charts, or even virtual equipment rack design. The graphics backdrops can be a scanned image or one created from any bit-map drawing program such as Windows Paintbrush, PhotoShop or CorelDraw etc.
**Devices and Sensors** are represented on the backdrop as *icons.*

***ICONS and Animated Gifs***



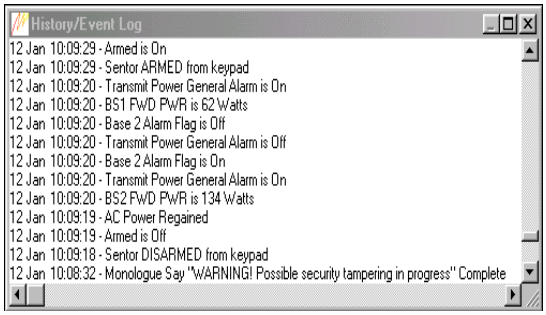

Sentor supplies standard icons and Gifs for sensors & devices. All the icons are just small bit mapped images or active and moving gifs so *new icons are easily created* & added to the display.

These represent the actual processes or device management to be incorporated as the system expands. They can either be active Icons, Values or moving gifs for displaying things like Voltages or Power etc.

**CONTROL & ALARM FUNCTIONS** are downloaded to a Data Base or PC at either regular intervals or when an event dictates. The history data accumulated in the Sentor Controller is transferred to the PC or Central Computer System showing ALL Events occurring at any stage or just regular performance data if required via an Internet browser such as Explorer, Firefox or Google Chrome. All entries listed in the *Event Log* will show the exact time & date to the second and *CANNOT be ALTERED* or edited.

**THE HISTORY LOG:** Records Individual events and are logged only if the scenario instruction is set for that point or device.

***DYNAMIC EVENT LOG***




**PROGRAMMING**
Sentor can come configured for use as a Base Site Monitoring & Control System or can be programmed by the customer or your Distributor for other requirements and applications such as Oil, Gas, Water and any Automation Application.

**HARDWARE**
Sentor is configured with the latest ST7000 processor board (Motherboard), Atom Processor System, a 3G/GSM/GPRS Modem, USB Ports, Serial Ports, RS485 x 2, SD Ram Card, 8 general inputs (analog), 8 digital inputs & 8 digital outputs.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**HOUSINGS**

Sentor is housed in a unique Steel Powder coated Wall mount Unit but with the addition of a front panel, the wall unit converts to a *19-inch, 2 RU* high case, ready to mount into a standard equipment rack. The Rear Panels, Side Panels and Rear Panels come with knockouts for convenient cable entry.

**KRONE or Block 66 CONNECTION**

Krone or Block 66 Blocks can be mounted internally or externally for easy installation & reliable maintenance free attachment.

**Expansion Cards** (ST717) are RS484 Bus and as such can be attached directly to the controller or can be remote for up to 1 Km away. This Card ads more I/O to the system (16 inputs and 8 outputs for each card). Each ST717 comes with 8 Programmable Analog inputs, 8 Digital Inputs & 8 Digital outputs. NOTE: There is almost no restriction as to how many I/O cards can be used.

**Configuration**

Each analog input can be programmed to accurately measure Lineal or non-linear devices such as transmitter power and reflected power etc.

All inputs and outputs can be programmed to react to any condition at any time

**Backup Power**

*An optional backup battery (7.5Ahr lead acid)* can be added to keep Sentor running for up to 48hrs should the mains fail, however the system can be backed up by other power systems available on site such as Solar, Wind, Generator or Battery Banks. All of these backup systems can be monitored and controlled by Sentor. The system also *monitors and charges the Internal lead acid battery.* Even if all power fails the *on board Lithium battery* will maintain the user programs, history log & *real time clock*. Sentor will automatically start up when power is restored & will maintain all of its history and pre programmed functionality.

**COMMUNICATIONS**

Communications with Sentor is achieved by connecting to a PC via a spare COM port. For remote installations contact is made by many Devices and Protocols;

- Standard Land Line Modem (Hayes)
- ADSL Modem for Internet connection
- Cellular Phone (CDMA, GSM, 3G) (onboard as standard)
- GPRS or 1XRTT or WCDMA
- Two Way Radio (PMR)
- Trunking Radio Networks
- Satellite Systems (Iridium etc….)
- Microwave Links (E1, T1, G703 etc)
- SNMP, TCP/IP
- DNP3
- Weigand Access Control Interface
- C-Bus Lighting Control System
- Webcam Interface
- Colour Touch Screens
- Modbus
- Serial RS232
- RS485
- Broadband Wireless
- Java
- Linux
- Windows (XP & Win 7)

The Sentor system can operate in either single controller or multi controller modes. A single PC or PDA Cell phone can easily monitor multiple Base Station Sites from around the world via our Secure Web Server Interface.

Not unlike a Blackberry styled operation the Alarms are pushed to Mobile Phones and Control Centers using this now established SSL styled messaging system.


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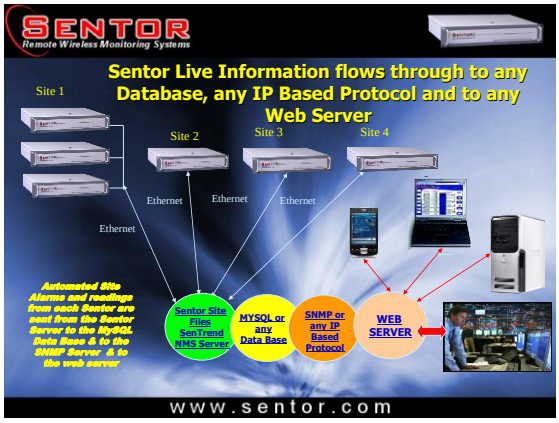


*Please see our PowerPoint for more info.*

Full system networking is achieved with Sentor's SenTrend-NMS Data Base Software. Sentor is also interfaced to most of the commonly used SCADA Protocols and Network Management Software packages such as SNMP (TCP/IP), Modbus, DNP3. Sentor can also look and act just like any SCADA System allowing Sentor to be installed into already existing networks.

## SENTOR INTELLIGENT SITE SYSTEMS

Multiple Sentor Systems can be attached to each other via the RS485 port on the rear panel (optional) allowing full networking via a single cable. Multiple sites can be viewed over a web browser which goes back to the Sentor Data Base Server. Each customer can log into their own section of the server via SSL encryption over the Internet and will see all of the latest site information and alarms. The customer can then get History in graphical Analysis form about the sites and devices they are monitoring and controlling remotely.

## DATA BASE SERVER OPTION

This is a service that only cost a small amount per site per month rather than have the need to set up a full control center at enormous cost. If it is important to the user individual Field personnel can be sent the alarms via their Cell Phones. If these devices are capable of web browsing, they too can log into the server to see the very latest information.

## SENTOR OFFERS FLEXABILITY AND PROGRAMMABILITY

Sentor can be applied to suit almost any Remote or Local Monitoring or Control application required, from Tower Sites to Security Systems to Cool Rooms to Oil and Gas Plants to Agriculture or even complete Building Automation.

## SENTOR SOLVING PROBLEMS (LA TRANSIT AUTHORITY PROJECT)

A good example of Sentor's ability to solve problems was when Motorola USA contracted Sentor to help them with Los Angeles Transit Authority. The situation required a truly intelligent control system to operate at each Tower Site to Control and Monitor a whole host of things including the Forward and Reflected Power of the Transmitters, Antenna Systems, Batteries, Security, Access Control, Air Conditioning, Inverters and even the Wireless Links between each Site. The Network is unmanned with information be transmitted back to a fully automated Computer System, where it pagers the right person at the right time and tells them what has occurred. To our knowledge, Sentor remains the only company in the world that is able to monitor and control all facets of a Tower Sites complex operation.

## TOWER & LIGHTING CONTROL

Sentor has a Tower/Building Lighting option, which will monitor and control the lighting systems. Where necessary, Sentor can switch on and off such things as *backup tower lights*, room and perimeter lights and will warn the operator of a failure of Critical Tower Lights Failure. This can avoid hefty power bills or fines from the Aviation Authorities.


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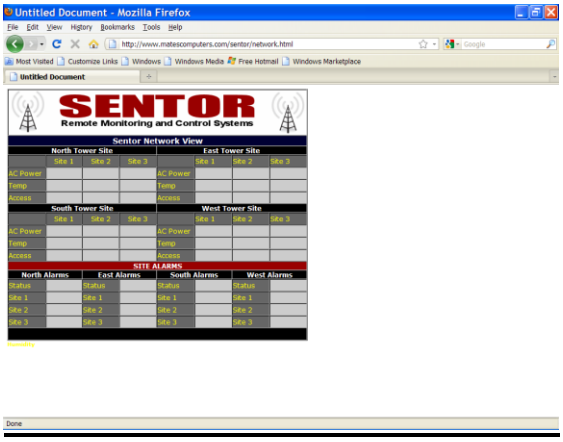


*Multi Site Network View over the web*

## SENSORS & DEVICES

Sentor supports most of the *common devices* capable of supplying a *CONTACT CLOSURE or ANALOG VALUE* and will asssesses its *CONDITION or ALARM* according to pre-set values in software. Security devices can be connected to the General Inputs and configured as 'protected loop' to gain protection from any cable tampering.

Voltages and other Analog requirements are connected to the analog Inputs and are configured quickly and easily in the GUI Software. Some of these devices can be,

- Security Movement Detectors (PIR)
- Temperature Sensors (Room & Equip.)
- Non Linear Power Couplers, for TX/RX Power.
- Tower Lighting (Current measurement)
- Battery Voltages (Backup and internal)
- 240 or 110 Volts
- - 48 Volts via the ST448 Card
- Wind Speed for Tower & Antenna
- Infra-red Air Conditioning Control
- Humidity Sensors
- Barometer Control
- Solar Panels
- Generator Fuel Levels

## RELAY OUTPUTS

As the outputs of Sentor are changeover contacts, 48 VDC or 24 VDC @ 1 Amp most small devices can be switched directly by Sentor. Larger devices like Air Conditioners world require a larger additional relay for automatic control by Sentor.

## BASE STATION INTERFACEING

A comprehensive site checklist called the ***SITE CONFIGERATOR*** (available from our website) tells us what is necessary for the customer's requirements. Most hardware and software can be configured quickly and simply prior to installation according to this list.

Each brand of Base Station Transmitter is unique, however most synthesized transmitters systems are supplied with some rudimentary outputs. Sentor, in most cases can be connected to these as well as all other site connections at the same time.

Where accurate Forward and Reflected Power is required in Watts or dBm a simple bi-directional Coupler can be supplied and calibrated to Sentor before shipping.

## COMBINING EQUIPMENT

One important thing to remember is that in most Base Station Installations there is an Antenna Combiner between the Transmitters and the Antenna System. These Combiners are seen by the Transmitters as a perfect 50 Ohm load thereby telling the transmitter that there is always a GOOD Antenna. Unless the Forward and Reflected power is measured on the Antenna side of the combiner, there will be NO indication that the Antenna system is faulty.

Sentor measures these readings and Alarms for VSWR accurately in either Watts or dBm and can also measure RSSI (Received Signal Strength Indicator) for coverage, performance and analysis.


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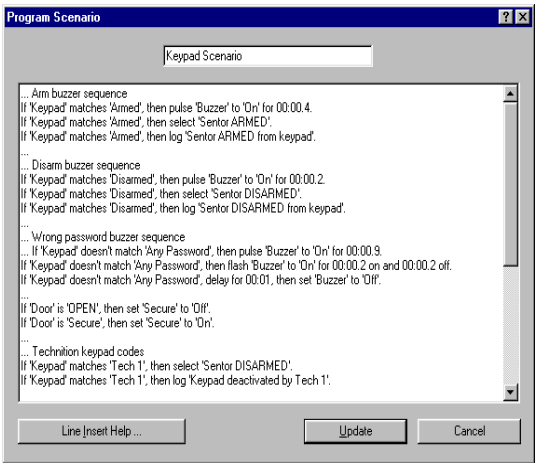
**SENTOR PROGRAMMING SYSTEM** *is not complex* computer programming. Simple English statements are used to define each event. A collection of these statements is called "***Scenario's***".




**A Sample of Scenario Programming**

One scenario could contain all the statements to define a number of operations such as Multiple Base Station Functions and the Site Security System for instance.
The *Sentor Scenario Software* has an *inbuilt line insert function* to help write the programming for your applications in a matter of minutes. When Sentor is configured, all inputs and outputs, plus their possible states are assigned *simple English* names. These names are then used for all of the *scenario programming*. This makes *reading and writing scenarios simple* because ***all inputs and outputs have meaningful names***. With Sentor's standard feature of battery backup and real-time clock, time critical events can be programmed to occur at the correct *Time and Date*. Sentor will of course keep monitoring and controlling sites 24hrs a day. PC's fitted with a sound card can have the controller programmed to send out verbal messages through the computer speakers warning of events taking place. Similarly, a scenario definition can initiate the running of any PC programme under specific conditions or events.

**MINIMUM CONFIGURATION**
Sentor software will run on any PC running Windows® XP/Vista/Win 7 or NT. The PC will require a spare COM port and 2Mb of Disk space. A Hayes type modem for remote landline or Wireless operation is required or an DSL Broadband Internet Connection can be used.
For Wireless or Remote operation a Sentor Radio modem or Cellular Modem can be supplied and configured.

**WARRANTY**
All hardware has 12 months. Warranty from date of purchase.



Please Contact your Authorized Dealer in your Area. If no Distributor location is available please contact Sentor directly on inquiry@sentor.com P
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SENTOR
Mission Critical Control Systems

**Some of Sentors Customers**

- Los Angeles Transit Authority
- City of Corona (CA USA)
- Las Vegas Police
- Lawrence Livermore
- IndoSat Indonesia
- Motorola USA
- Lattice Tower Systems USA
- TransGrid Electricity Australia


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