

Remote Communications Base Site Monitoring, Control and Management Systems



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*.

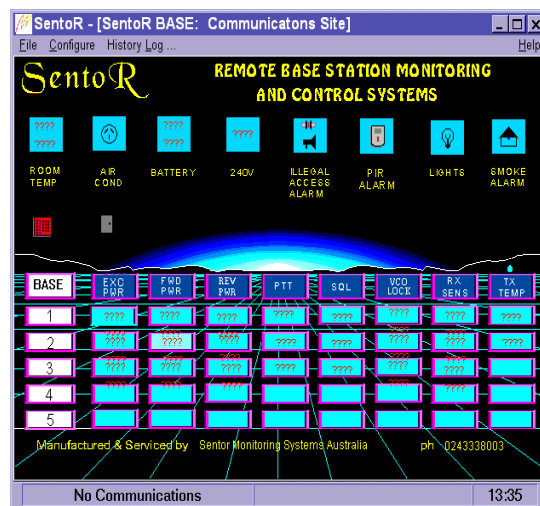
Although other application notes are available for this wonderfully adaptable product, this application note describes Sentors specialist and uniquely *Stealth* capabilities in Wireless Tower Site Monitoring, Security and Control functions.

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 Software 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, 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 LAYOUTS

STAND ALONE SITE CONTROLLER

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.

By running the Sentor Windows based application, the user will feel comfortable with Sentor's *Graphical User Interface* (GUI) software. Sentor uses normal Windows 95/98/XP & NT.

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*.

PROGRAMMABLE ICONS



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

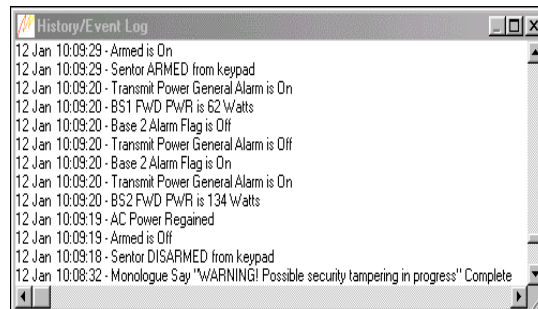
These represent the actual processes or device management to be incorporated as the system expands. They can either be active Icons or Values for such as Voltages or Power etc.

CONTROL & ALARM FUNCTIONS

The Controller downloads to the Central Computer 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. 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



HARDWARE

Sentor can come configured for use as a Base Site Monitoring & Control System or can be programmed by the customer for other requirements. In the standard form, Sentor is configured with the ST300 processor board (Motherboard), lithium battery backup, 8 general inputs (analog), 8 digital inputs & 8 digital outputs.

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

THE ST317 EXPANSION CARD

This Card adds more I/O to the system. Each analog input can be programmed to accurately measure non-linear readings such as transmitter power and reflected power etc. This is achieved by using a Math curve calculated through a special software package called, *Sentor Genius*. The computations are inserted into an A, B, and C setup window for that point. Genius calculates simultaneous equations instantly saving technical personnel from tedious math calculations. Each input, which can be unique to each brand of base station, can be pre-programmed in the work shop or on site to suit a standard through line Bi Directional Coupler or output voltages at the rear of individual brands of Base Stations. Each ST317 comes with 8 Programmable Analog inputs, 8 Digital Inputs & 8 Digital outputs. NOTE: A maximum of 6 expansion cards of any type can only be used.

Backup Power

An optional backup battery (6.5Ahr lead acid) can be added to keep Sentor running for up to 24hrs 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;

- ◆ Standard Land Line Modem (Hayes)
- ◆ Cellular Phone (CDMA, GSM, 3G)
- ◆ GPRS or 1XRTT or WCDMA (2006)
- ◆ Two Way Radio (PMR)
- ◆ Trunking Radio Networks
- ◆ Satellite Systems (Iridium etc....)
- ◆ Microwave Links (E1, T1, G703 etc)
- ◆ ADSL- Internet/Intranet
- ◆ SNMP, TCP/IP
- ◆ Serial RS232
- ◆ RS485
- ◆ Broadband Wireless

MODEMS

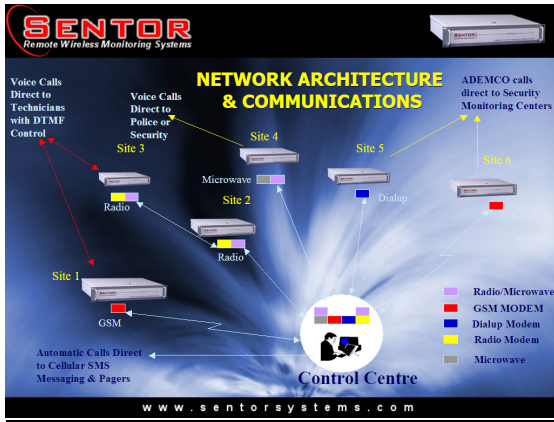
The ST330 option card includes a land line modem enabling features such as Auto Alarm dialing with *REAL VOICE* and DTMF keypad control. Our Range of Wireless Modems will operate over any RF network on any frequency. Data can be stored and forwarded via other sites where no Wireless link is possible to the Control Center.



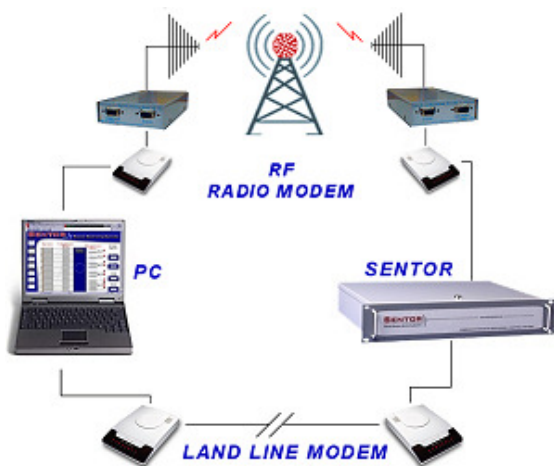
CDMA – 1xRTT Modem
GSM/GPRS and Satellite also available

SYSTEM NETWORKING

The Sentor system can operate in either single controller or multi controller modes. A single PC can easily monitor multiple Base Station Sites from around the world.



Full system networking is achieved with Sentor's SenTrend-NMS Software. Sentor can also be interfaced to most of the commonly used Network Management Software packages such as Netcool® and including SNMP, TCP/IP, and DNP3.



ONE EXAMPLE OF SENTOR'S COMMUNICATION DESIGNS FOR MONITORING AND CONTROLLING REMOTE BASE STATION SITES

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. Fiber optic networks can be used or the optional C-Bus*, CE-Bus* systems. The C-Bus option allows analog output, which can control lighting or air conditioning.

When the Sentor Software is in multiple controller mode, all open windows can be tiled, cascaded or maximized, and individual controllers can be opened and closed as required.

The Sentor ST3000 Controller can be fully expanded to accommodate up to 80 inputs & 40 outputs, which is more than adequate for most site operations. Many options are also available such as infrared control systems and X10 power line carrier, and Weigand Proximity Access Control Interface systems plus many others.

SENTOR OFFERS FLEXIBILITY 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. Sentor remains the only company in the world that is able to monitor and control all facets of a Tower Sites complex operation.

TOWER and BUILDING 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.

SENSORS & DEVICES

Sentor supports *all common devices* capable of supplying a *CONTACT CLOSURE* or *ANALOG VALUE* then assesses 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 would require a larger additional relay for automatic control by Sentor. A maximum of 40 Digital outputs can be fitted to each Sentor Unit.

BASE STATION INTERFACING

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 connect to these as well as all other site connections at the same time.

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

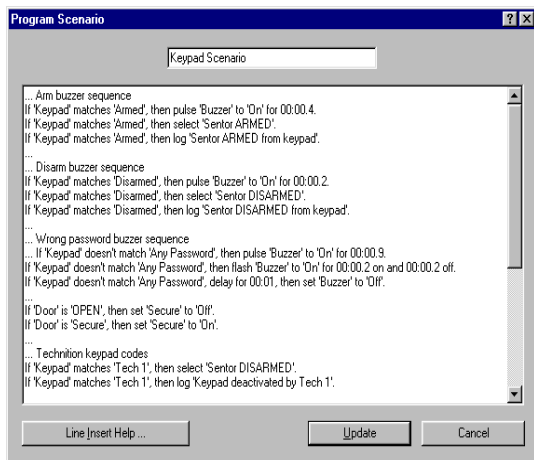
COMBINING EQUIPMENT

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.

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

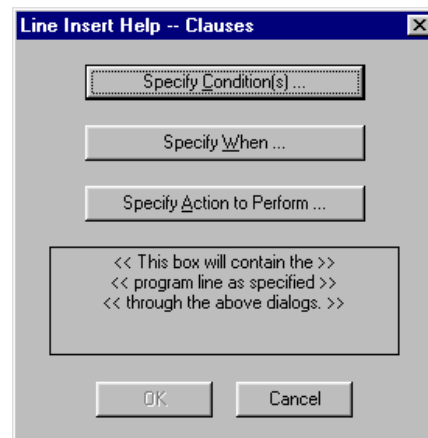
One scenario could contain all the statements to define a number of operations such as Multiple Base Station Functions and the Site Security System for instance.

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 programme 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® 95/98/XP 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 a DSL Broadband Internet Connection can be used.

For Wireless or Remote operation a Sentor Radio modem or Cellular Modem can be supplied and configured.

WARRANTIES

Hardware

All hardware has a 12 month Conditional back to base Warranty from the date of purchase. Please see conditions regarding transportation upon the warranty return slip enclosed in the item of purchase.

Software

All Software is tested prior to shipping. Sentor cannot warrant that the software or firmware is free of bugs however we will endeavour to address any problems or enquiries should they arise.

Specifications

Sentor reserves the right to change the specifications of the Software or Hardware at any time without notice.

Disclaimer

Sentor absolves itself under National and International Laws from any damages, physical or otherwise, caused during the use, installation, transportation of any of Sentor's supplied products.

Brand name Recognitions

CorelDraw, Windows, Paintbrush, Hayes, Sound Blaster, C-Bus and CE bus Sentor are all registered Trading Names or Trade Marks of their own Corporations.

SENTOR DEALERS

Please Contact this Authorized Dealer in your Area.

If no Distributor location is available please contact Sentor directly on sales@sentorsystems.com

Some of Sentors Customers

- Los Angeles Transit Authority
- City of Corona USA
- Las Vegas Police USA
- US Government (Classified)
- Lattice Tower Systems USA
- Telstra Australia (Mobilnet)
- TransGrid Electricity NSW
- New South Wales Police
- Gosford City Council NSW
- M1 Cellular Singapore
- Motorola USA
- Rapid Wireless USA
- Dimension Data (South Africa)

