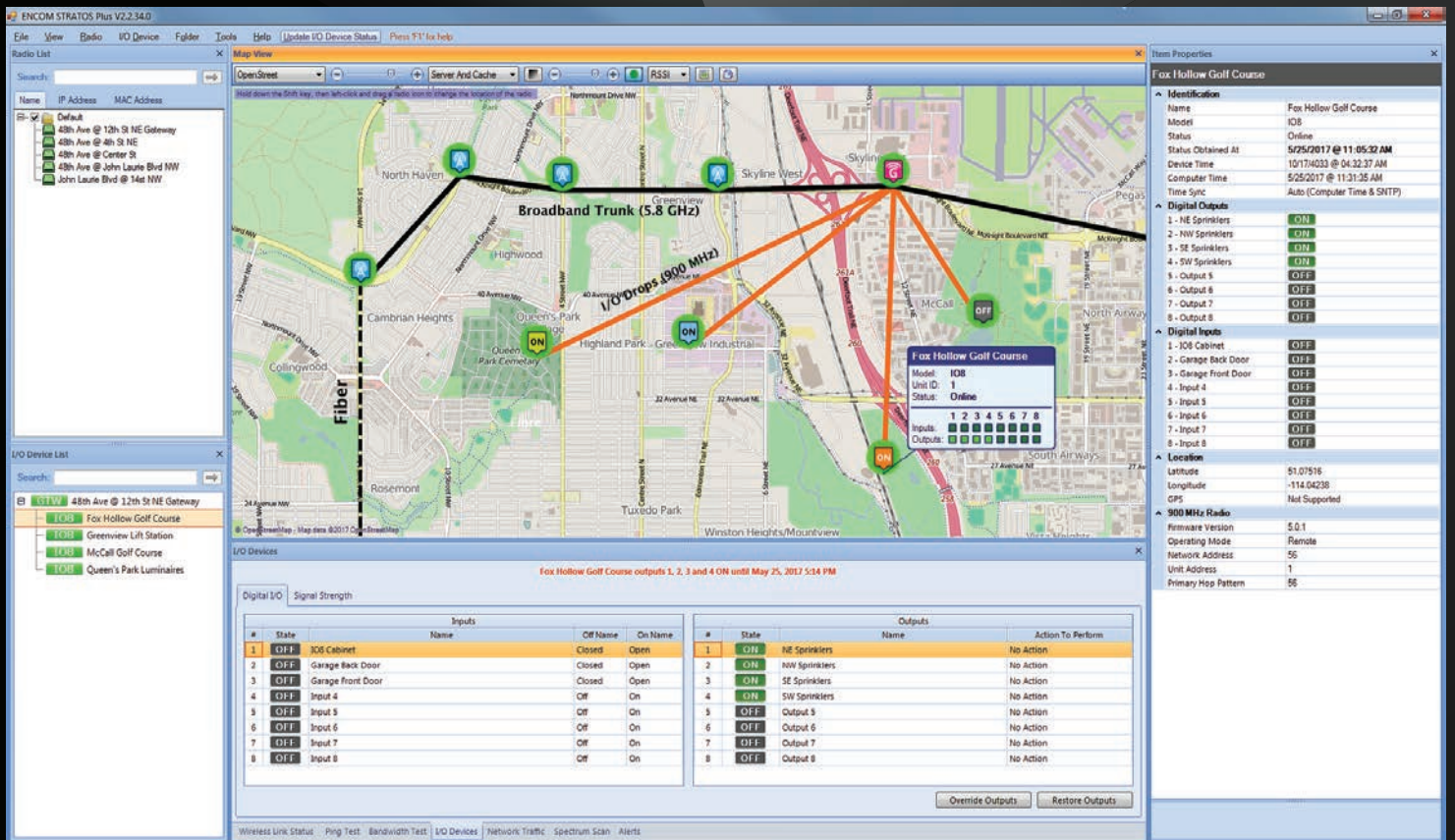


CONNECT EVERYTHING. ANYWHERE. EVERYTIME.



STRATOS I/O

**NOW WITH I/O
CONTROL & MONITORING**

ENCOM STRATOS I/O provides a powerful yet simple interface for rapid wireless network deployment, effective management, and crystal clear system visualization. Not only can you control and manage your ENCOM broadband network with STRATOS I/O, but **now you can also Monitor and Control external devices through any ENCOM contact closure product, even on non-ENCOM networks!**

EASILY ACCESS
ENCOM I/O DEVICES
FROM ANY
BROADBAND
OR FIBER
NETWORK.



You can access
I/O devices from
any network



Works with any
broadband network
(ENCOM or other)



One I/O gateway provides
access to hundreds of sites
(instead of one expensive
LTE device per site)

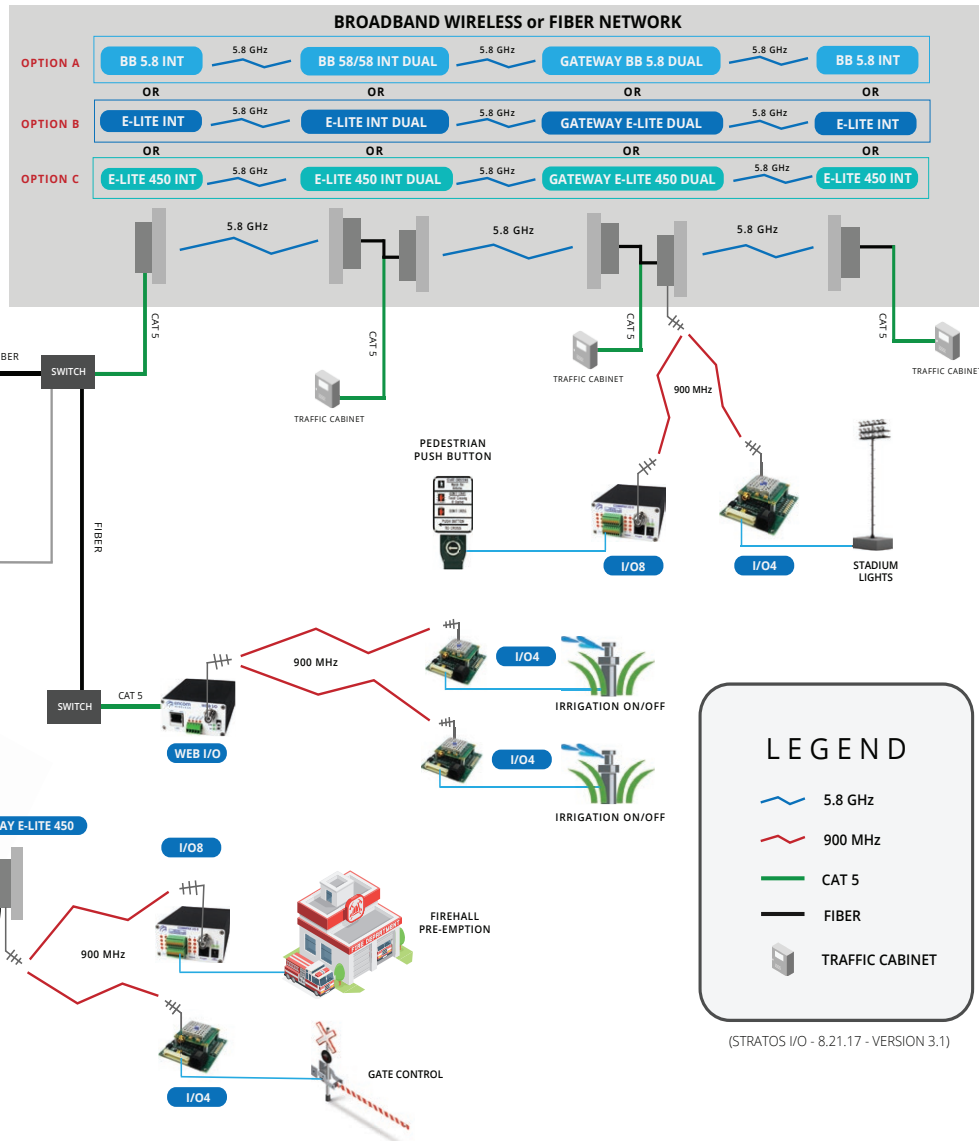
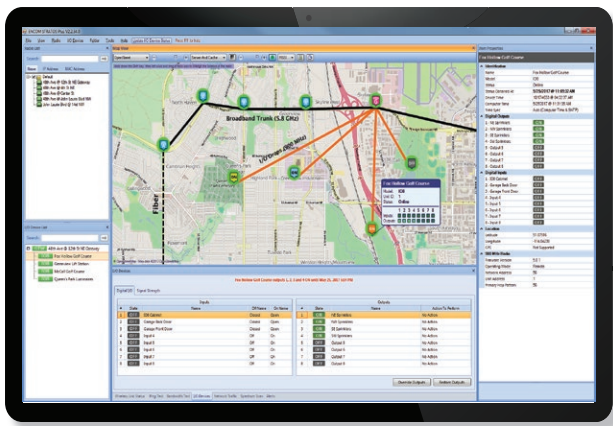


Monitor and control
up to 8 digital inputs
and outputs per site



Alarms can be generated
for any input change (door
open sensor, temperature
changes, etc.)

CENTRAL MANAGEMENT WITH STRATOS I/O



CONSIDER
THE
POSSIBILITIES!

ENCOM Gateway Devices and the I/O family of products have been integrated within STRATOS, making it the ideal control platform for municipal applications.

WATER/WASTE MANAGEMENT



SCHOOL FLASHING BEACON



LIGHTING CONTROL





Complete Visualization, Control and Monitoring of your Encom Wireless Network

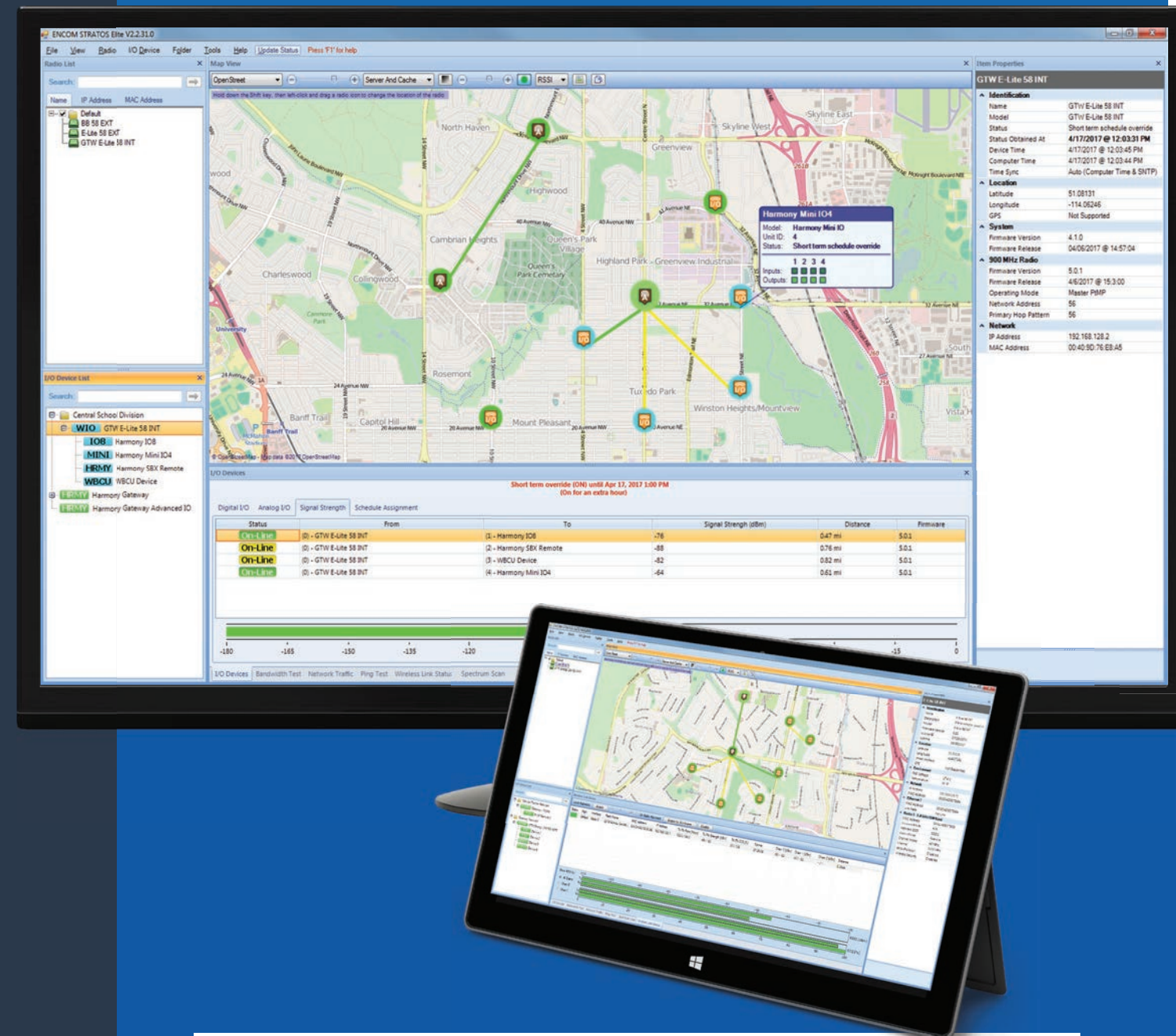
FLEXIBILITY TO CONNECT EVERYTHING

No matter what your network mix currently is, ENCOM STRATOS ELITE software and Harmony wireless devices can bring connectivity, visibility, and manageability to sites and systems that were previously not 'online'. Our platform is interoperable with any private Ethernet network (fiber optic, copper or wireless) and can also be used in conjunction with 3/4G Cellular networks to bring back valuable data from any type of field device, no matter its age or type, and no matter where it is located.

Devices that were never meant to be viewed and managed remotely now can be monitored from a central site with ease with Harmony. Valuable data about the health of each site can be seen in real time and logged for analysis. This enables dramatic improvements in preventative maintenance planning. Take the example of a stand alone solar power site with a vehicle counter. Most of these sites consist of a solar panel, a non intelligent charge controller, a battery, and a vehicle sensor. Typically these sites were not designed to be a part of a communication network and there is no place to connect a standard Ethernet or serial port.

Before Harmony, the only way to monitor and maintain these sites was by scheduled visits or report by exception events - when a good samaritan calls the city to let them know that something is not working. These systems can be costly to maintain from a manpower perspective, and sites can be non functional for extended periods of time simply because no one knew there was a problem.

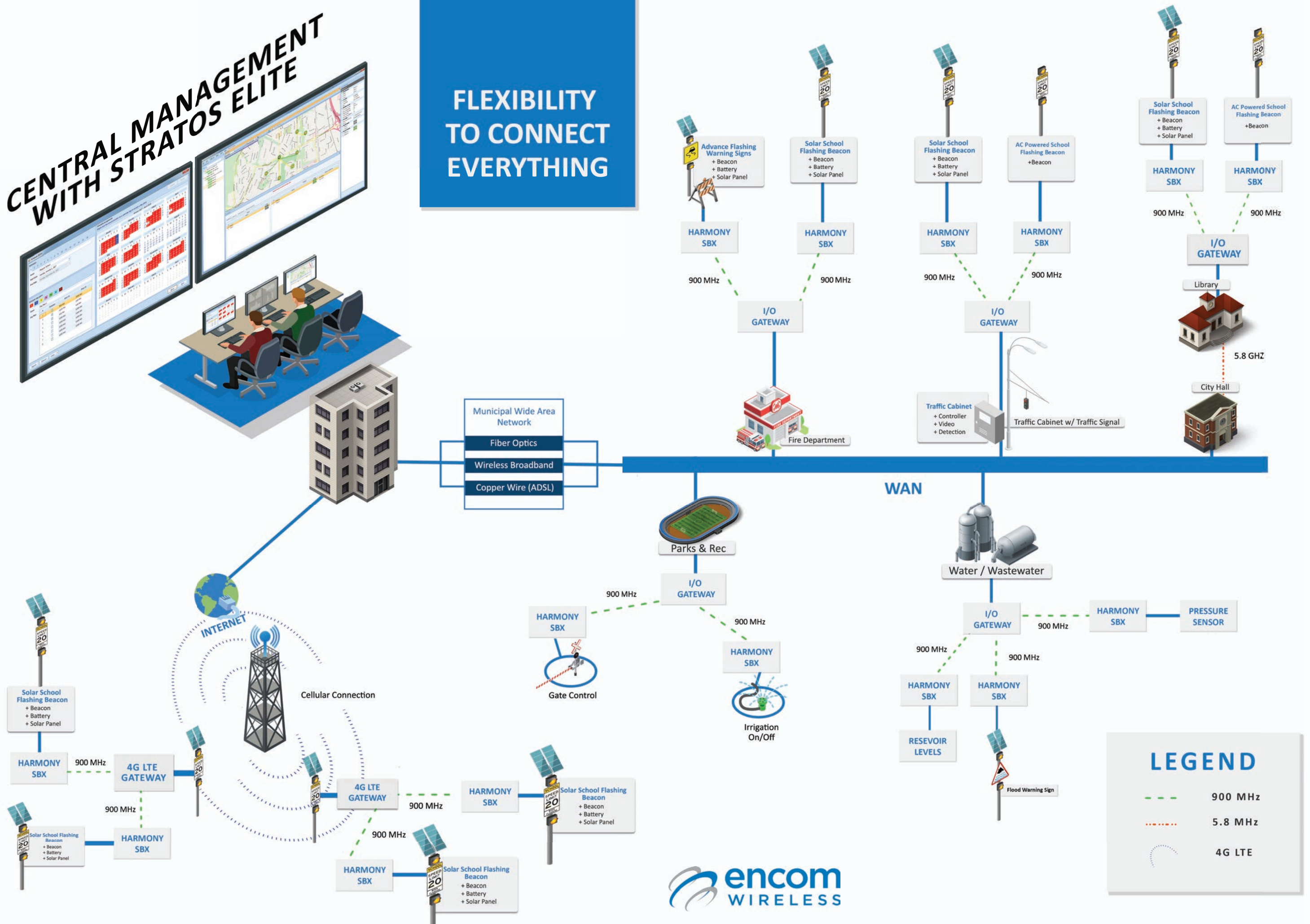
NETWORK VISUALIZATION MANAGEMENT SYSTEM

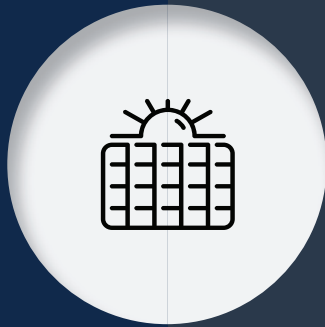


Bring connectivity, visibility, and manageability to sites and systems that were previously not 'online'.

CENTRAL MANAGEMENT WITH STRATOS ELITE

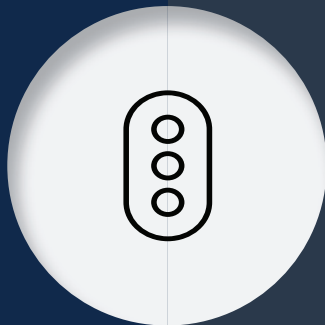
FLEXIBILITY TO CONNECT EVERYTHING





CORE APPLICATIONS

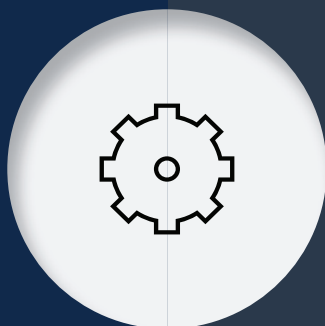
Solar Power Site
Monitoring



School Zone Flashing
Beacon Management
Systems



Upgrading SCADA Sites
with existing 900 MHz
serial systems



Virtually any application
using digital I/O or
5V analog signals for
measurement and control



STRATOS ELITE and Harmony Series Devices are not exclusive to ENCOM Broadband network. Harmony devices can be used on all municipal and industrial networks, including fiber optic, 3/4G cellular, copper, coax. They provide a simple, easy-to-use monitoring and control network for your remote sites. Over the past 20 years, municipal networks have grown to become a mix a different communication media, private networks (City wide LAN), public networks (internet), etc. Stratos ELITE and Harmony allows you to leverage every piece of technology you have in your city or state to simply connect everything. Our system is designed to integrate seamlessly with existing city owned networks. Harmony Gateway I/O devices can be installed at any existing network location, where they will extend communication up to 20 miles using a powerful 900 MHz industrial ENCOM wireless network.

This new end-to-end system from ENCOM

Wireless which consists of the STRATOS ELITE Software and the ENCOM Harmony wireless devices, simply connects everything. Through a series of elegant software tools and multi-purpose wireless devices, we can bring your remote sites to life like never before. With STRATOS ELITE, site conditions (such as solar power system status) can be monitored and logged to a central database for later analysis. School zone beacons can be scheduled, controlled and confirmed without leaving your office. Your maintenance costs can be significantly reduced and your systems can operate at higher levels of efficiency. Issues can be detected sooner and major problems avoided.



GATEWAY BASIC

- Cabinet Mounted
- LAN Port
- 900 MHz Master Radio
- No Local I/O



GATEWAY ADVANCED I/O

- Cabinet Mounted
- LAN Port
- 900 MHz Master Radio
- I/O Available



GATEWAY ADVANCED I/O 4G

- Cabinet Mounted
- 4G LTE Connectivity
- 900 MHz Master Radio
- Local I/O Available



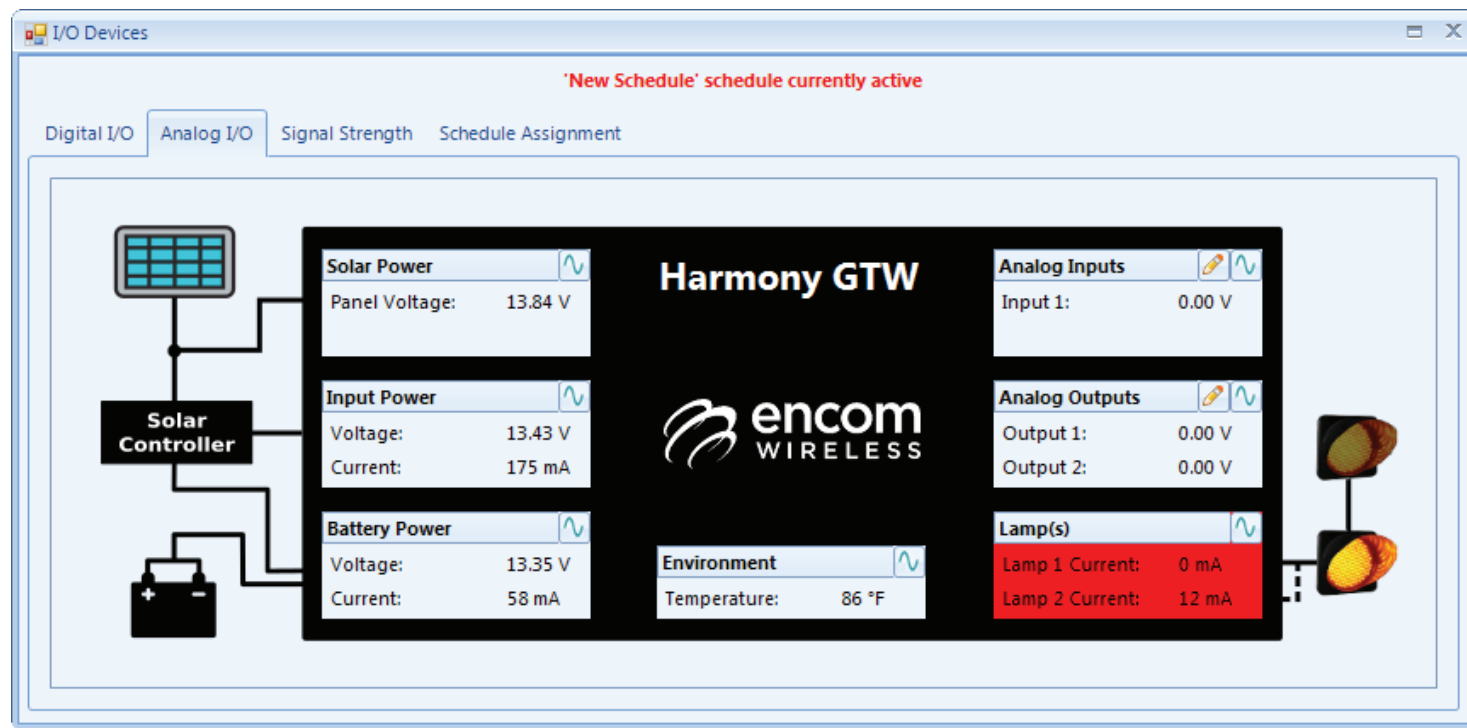
SBX REMOTE I/O

- 900 MHz Remote Radio
- Connects Wirelessly to Gateway Units
- Local IO



GATEWAY ELITE 450

- Web I/O with Elite 450 Radio
- Broadband Radio for WAN connection
- 900 MHz Master Radio
- NO Local IO



REAL TIME SITE MONITORING WITH HISTORICAL LOGS

STRATOS ELITE and Harmony devices can easily monitor and display key flashing beacon and solar site information including:

- Solar panel output voltage
- Charge controller output current
- Battery voltage
- Battery Load levels
- Temperature
- LED beacon status
- Plus a number of user configurable inputs and outputs

STRATOS ELITE and Harmony devices turn your operation and maintenance programs from reactive to proactive through the intelligent use of wireless technologies to enable connectivity to every single device under your control. All monitored data is stored in a searchable historical database, enabling analytics that were never possible before STRATOS ELITE.

Centralized Control of Remote Devices

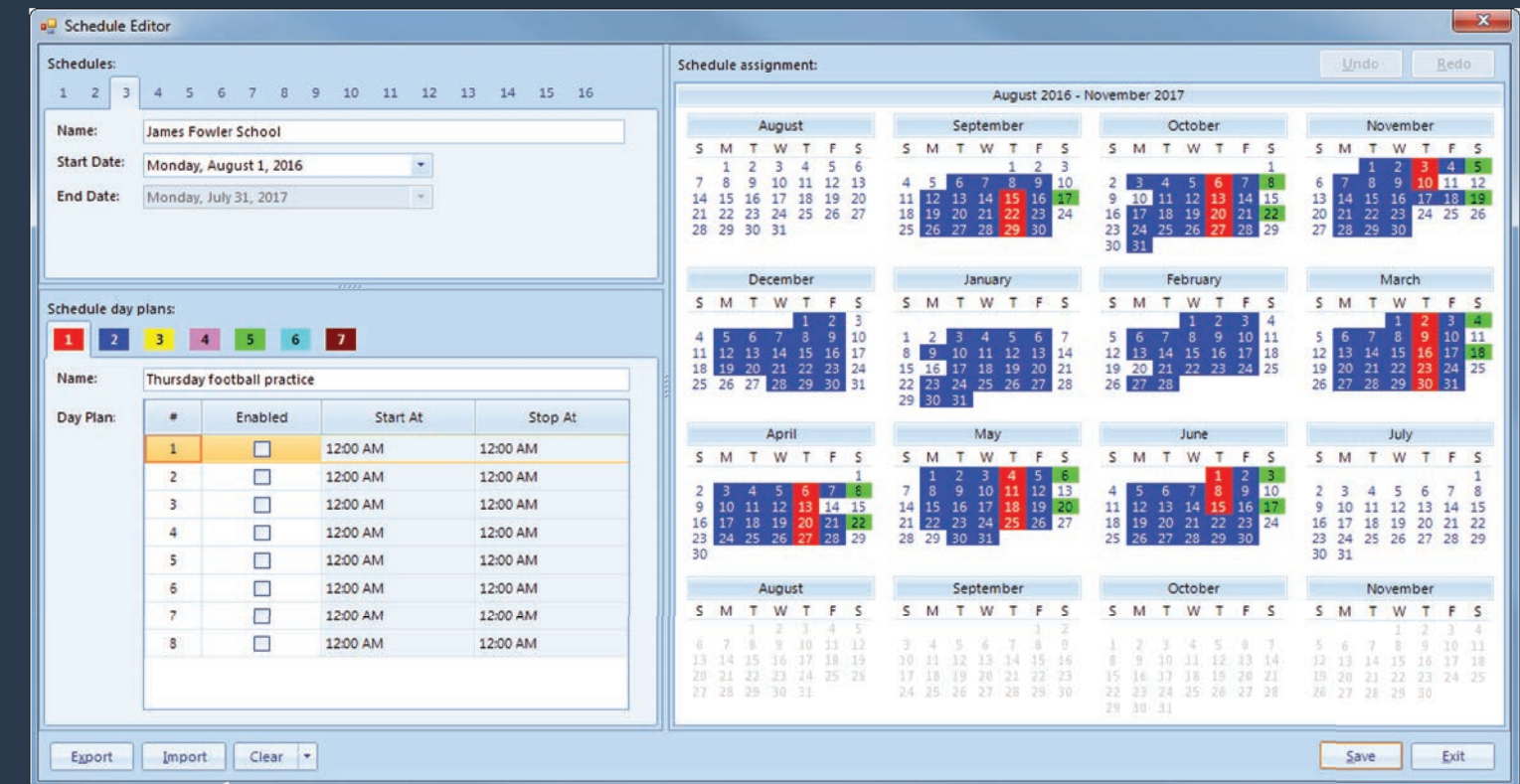
Not only can this system bring back crucial performance data from your sites, it also provides an intelligent control mechanism for applications such as School Zone Beacons, Irrigation Systems, Gate Controls, Security Alarms, Water Level Monitoring, Environmental Stations, and a variety of other digital On/Off or Analogue I/O applications. Harmony devices and STRATOS ELITE can easily be integrated into a wide range of applications, bringing intelligence to virtually any field device.

SCHOOL FLASHING BEACON

CENTRAL CONTROL AND MONITORING

For school safety applications, you can replace existing school zone flashing beacon timers with Harmony SPX wireless control devices and instantly bring connectivity to the site. All timer schedule programming is accomplished with STRATOS ELITE from a central location, such as the Traffic Management Center (TMC). All school zone beacons will have accurate schedules without needing site visits. Once a site is online, the clocks are automatically synchronized. Schedules are created and downloaded from the comfort of your office, and STRATOS ELITE will monitor the operational status of the site.

This system can send email alarms and alerts if an issue is detected at a site. STRATOS ELITE and Harmony devices are so intelligent that they can tell you if the LED lamp is working properly or not, and send an alarm if it is not flashing at the scheduled time. If you have solar powered sites, Harmony devices can monitor all important operational parameters. You have complete control and visibility into the operation of your site.



Seamless Integration with 3/4G Cellular - wireless connectivity everywhere

For applications where a city/ or state owned network is not located nearby, we have 3/4G Cellular solutions that allow Harmony devices to simply connect everything no matter where your sites are located. As long as there is a cell signal in the area, you'll be able to access your sites. With Harmony, you can install one Gateway I/O 4G LTE Cellular device and communicate with all surrounding sites via a dedicated 900 MHz wireless system. This application leverages the flexibility of a cellular connection, but minimizes the on-going monthly costs of a cellular data plan at each site. Only the Harmony 4G Gateway needs a cellular connection.

STRATOS ELITE

SOFTWARE DETAILS



ENCOM STRATOS shows the location and status of all sites within the network - ENCOM Broadband and Harmony devices, all on one map. Imagine being able to view and log the status of all your solar powered sites in the entire city/ county. View and manage city/ state wide school zone beacons from the comfort of your central office or on your smartphone/tablet.

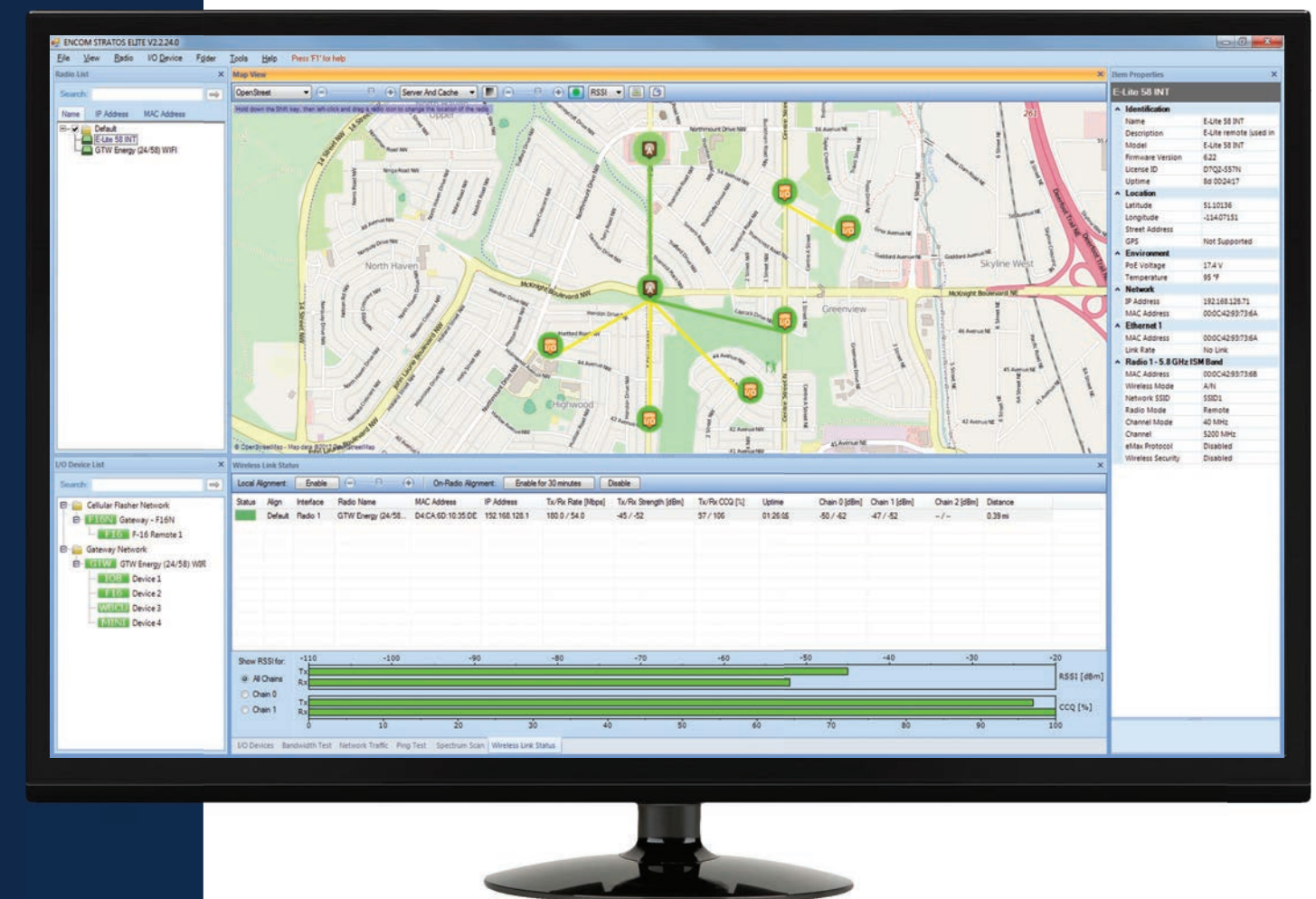
As with STRATOS+, the main map dashboard in STRATOS ELITE is the focal point for monitoring and managing all of your wireless devices. Not only does this dashboard show you the status of the ENCOM wireless network devices, it also shows the real-time health status of YOUR site equipment.

On the map, you will see all of the ENCOM broadband radios, the Harmony devices and the status of your solar powered sites and flashing beacons. Managing the network is simple with color coded 'link' lines showing the status of all the wireless links in the network. Hover over or click any icon to view detailed information for each site.

REAL-TIME DEVICE HEALTH AND SITE EQUIPMENT STATUS

Hover over or click any icon to view the detailed information for each site.

Hover over the map icons or select site from the list to see detailed real-time site status information from your site through the Harmony Devices:

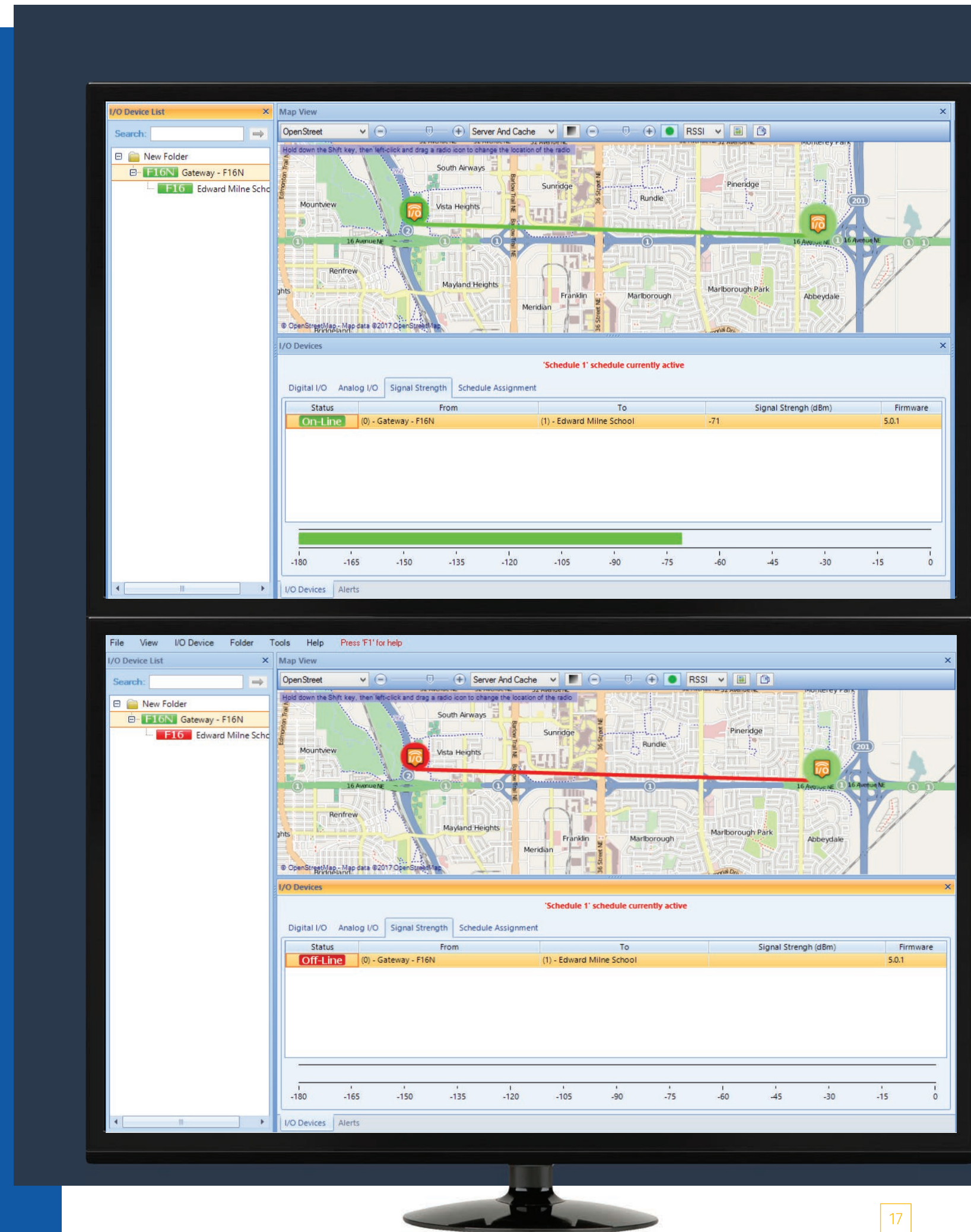


Wireless Signal Level

The signal level to each site is shown on the map with color coded link lines that provide a clear picture of the performance of the wireless network.

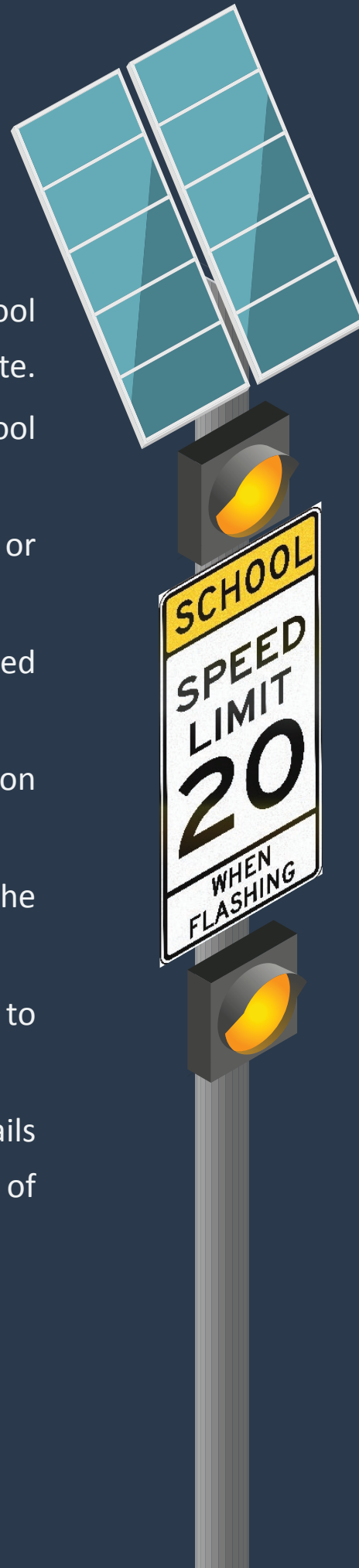
Online / Offline Status

With easy to identify color coded icons, you can easily see if sites are online or offline. You can also view the historical logs to see if there are any persistent issues with a particular site. Then, when you send out a maintenance crew, they can already have an idea of what the problem may be and they can ensure that they have the appropriate tools to repair or replace the faulty equipment.

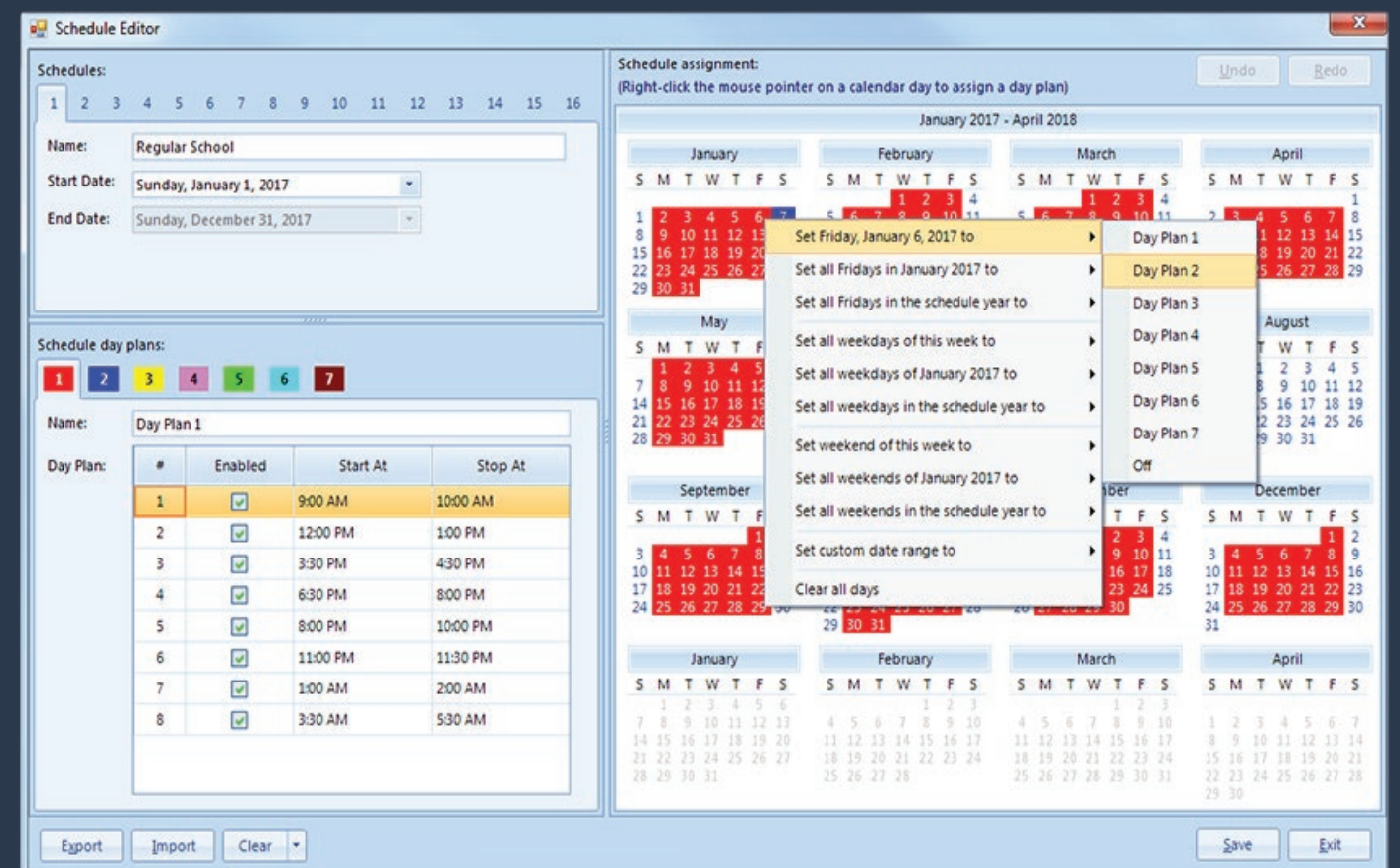


For School Zone Flashing Beacon Sites, STRATOS ELITE can:

- Easily create and download schedules to all School Zone Flashing beacon sites in your city, county or state.
- Centrally create, download, and manage all school zone beacon schedules
- Easily send schedules to groups of beacons or individual beacons
- Manually override beacons, with automatic timed resumption
- Use a simple and powerful schedule editor to creation and download schedules.
- Import/ Export schedules across any beacon in the system and reduce programming time.
- Synchronize the time across all school zone clocks to ensure on-time operation.
- Click on any site within the system and see the details of their schedule, the current time, and the status of the beacon.

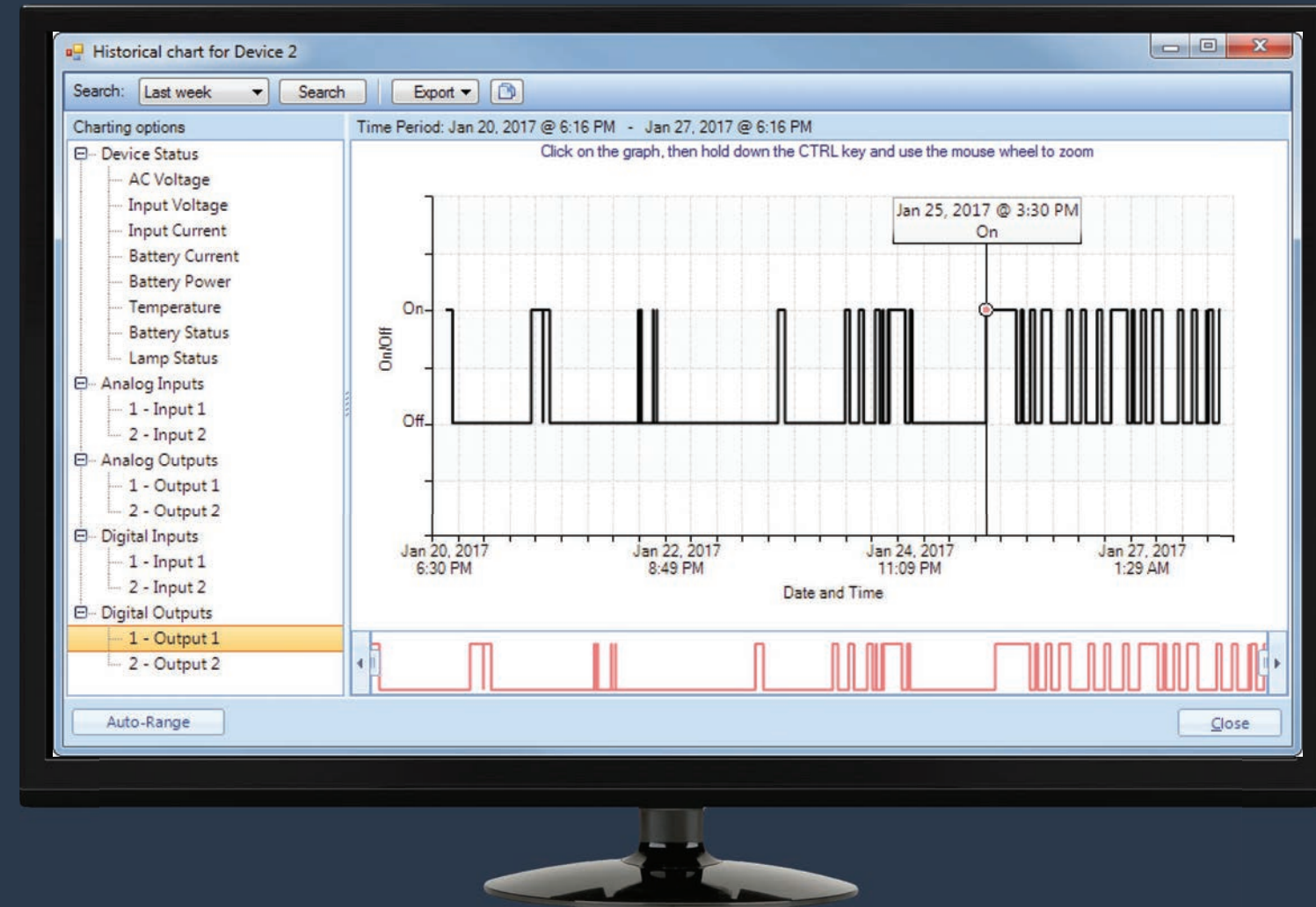


STRATOS ELITE and Harmony devices are extremely flexible and can be applied to a wide range of applications. We have optimized the functionality specifically for monitoring and controlling Flashing Beacons such as School Zone Beacons, and for monitoring power system information at solar powered sites.



LAMP STATUS

STRATOS ELITE can directly monitor LED Lamp status so you will know the flashing beacons are actually working. Most systems don't even show beacon lamp status. If they do, it is typically only the status of the relay driving the lamp. With Harmony devices, we are actually monitoring and reporting the current flowing through the LED. ENCOM STRATOS can monitor up to 2 flashing beacons at each site.

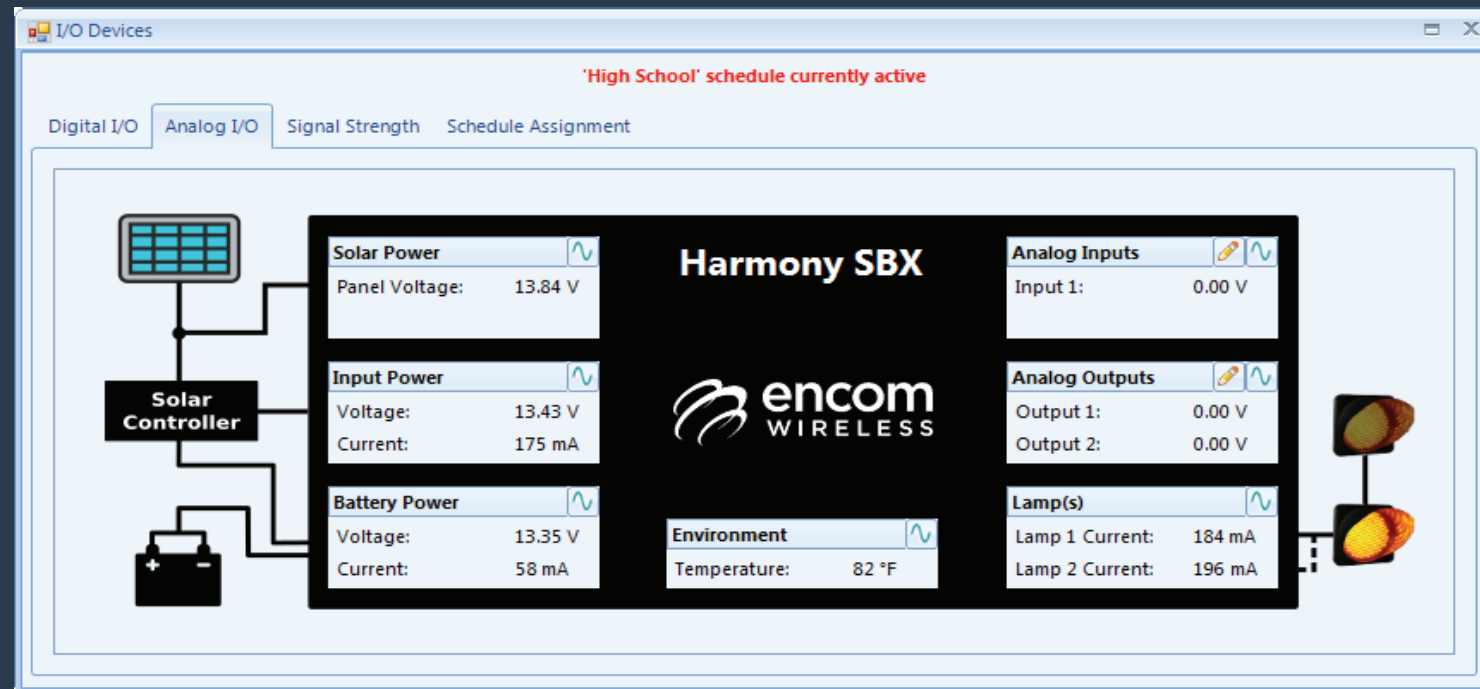


With STRATOS ELITE you can:

- Monitor and display the current draw from each lamp
- Not only know that the relay is engaged or not, but actually know that power is flowing through the LED. As the LED module ages and degrades, you will see a reduction in power consumption and can plan for a preventative upgrade.
- Lamp current is compared with the time of day and the specific schedule to generate a Lamp Fail alarm.
- Email alerts can be sent out to any number of operations personnel, as well as being logged historically for review.



SOLAR SYSTEM DETAILS MONITORING



Solar Panel Output Voltage

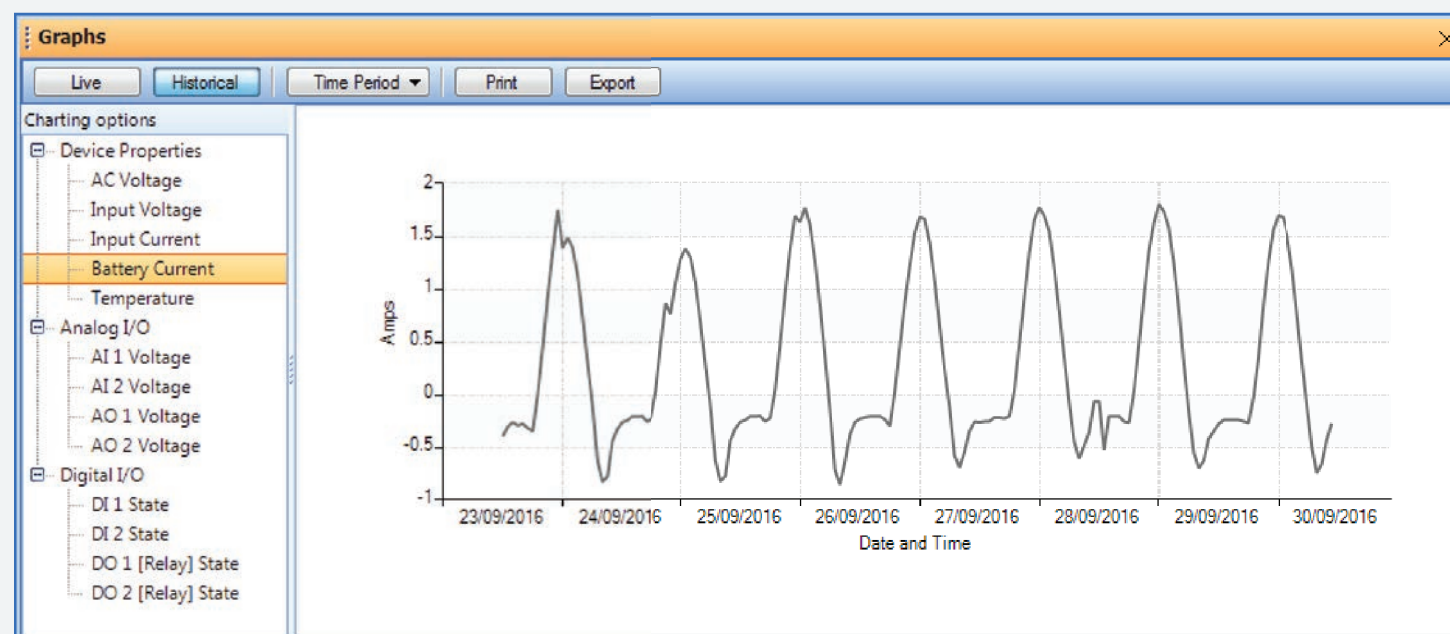
From a central location, you can see exactly how much power each and every solar array is generating at any time during the day. This information is displayed in real time, and also logged for historical comparison.

Harmony devices has powerful features than allow you to monitor and visualize every aspect of the solar power system at each site within your system. This system is designed specifically to monitor, report, and log the solar panel output, battery charge / discharge status, battery voltage, and also provides detailed information on the load within the system (sensors, beacons, radios, etc). Here is an overview of the built in monitoring capabilities of ENCOM STRATOS coupled with HARMONY devices.

Charge Controller Output Current

The charge controller takes the power from the solar panel and controls the battery charging process. The more efficient and effective the solar panels, the more charge current is present and the faster the battery gets charged during daylight hours. By measuring and displaying the charge controller output current, you can truly understand the health of your solar power charging system. Dirty or misaligned panels will have lower charge output than panels operating under optimal conditions. By reviewing real-time and historical charge output information, you will know when to schedule preventative maintenance like panel cleaning. If no charge current is present during the day, you can be alerted to a problem such as wiring disconnection, vandalism, or theft.

STRATOS ELITE records and stores historical logs of the solar system performance:



Battery Voltage

Correct battery operating voltage is critical for battery longevity. By ensuring that your batteries are being charged as completely as possible and that they are not being drawn down too far, the life expectancy of the battery can be increased by 2-3x over a poorly charged battery. Since batteries are a major investment in a solar powered system, extending their life means you get a better return on your investment. STRATOS ELITE enables you to monitor the voltage in your batteries during all parts of the day and can send out alerts when your batteries are approaching under voltage situations.

System Load Current

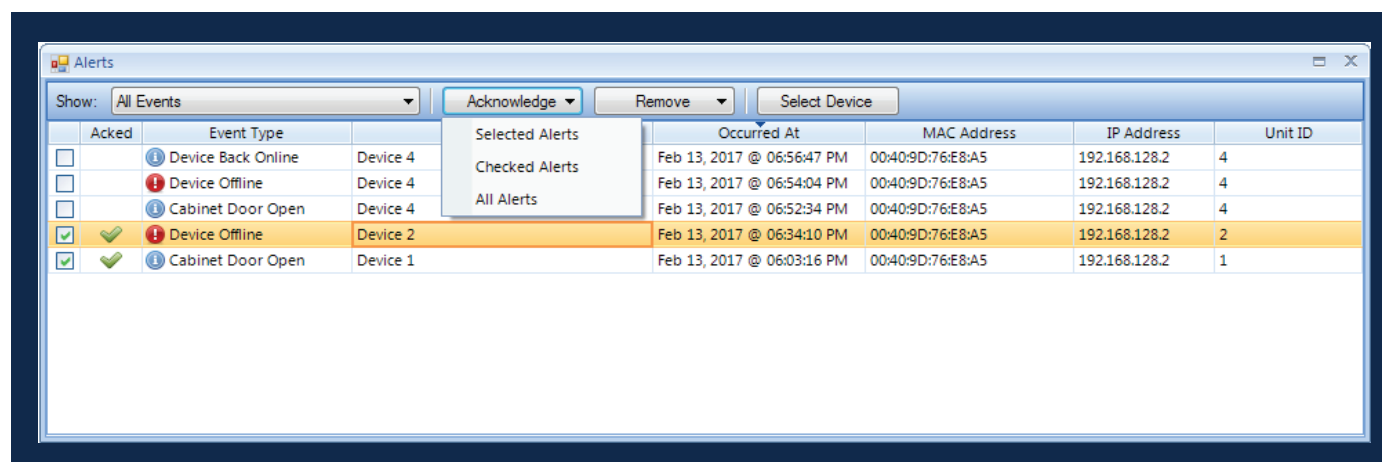
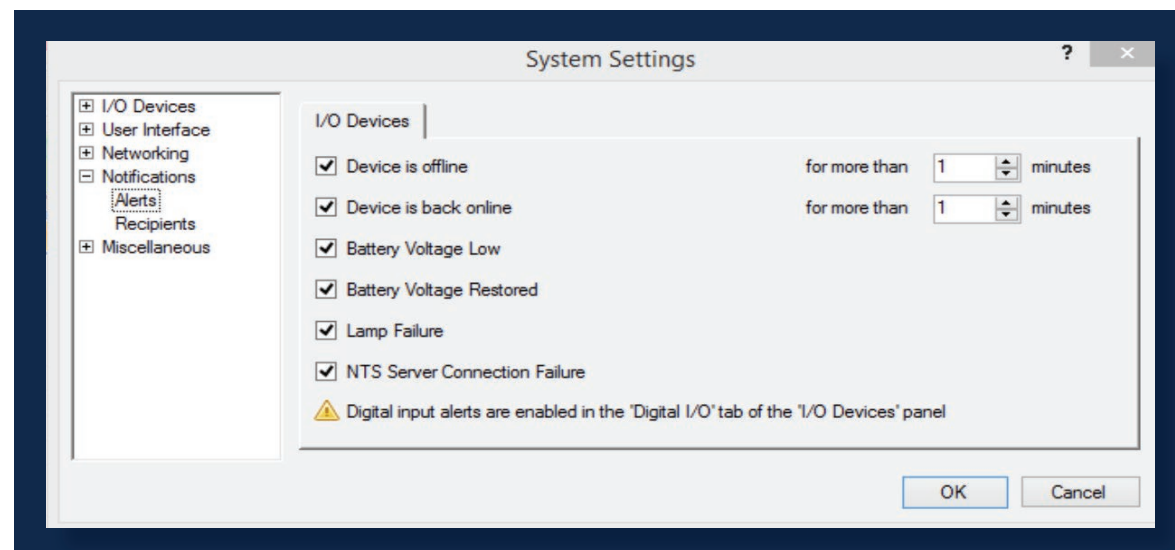
By monitoring the total load that is put on the batteries during the day and night, you can truly understand the capabilities of the system.

ALARM REPORTING

User definable pop up alerts in STRATOS ELITE and email notifications can be sent out to any number of personnel responsible for the maintenance and operation of the system - alerting them to a potential problem well in advance of a total site failure.

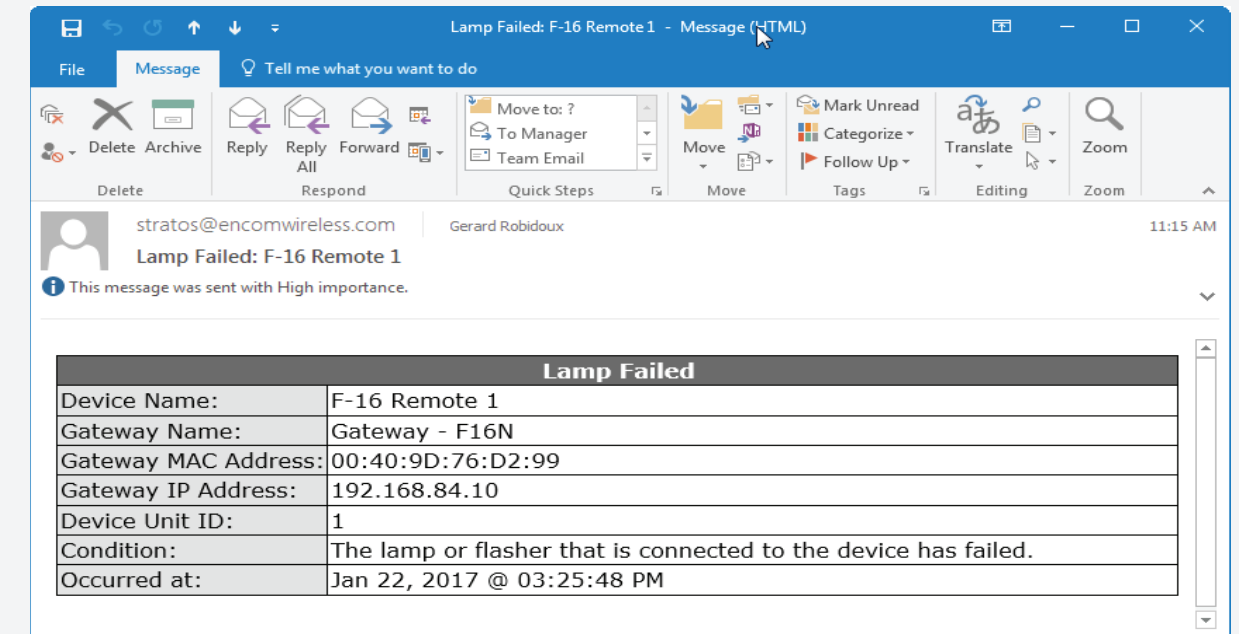
Historical log of alerts/ alarms

All alarms and alerts are saved within Stratos Elite for future review. This running error log can provide important data about problematic sites and enabled operators to make informed decisions about which sites require additional maintenance or upgrades.



Acked	Event Type	Device	Occurred At	MAC Address	IP Address	Unit ID
<input type="checkbox"/>	Device Back Online	Device 4	Feb 13, 2017 @ 06:56:47 PM	00:40:9D:76:E8:A5	192.168.128.2	4
<input type="checkbox"/>	Device Offline	Device 4	Feb 13, 2017 @ 06:54:04 PM	00:40:9D:76:E8:A5	192.168.128.2	4
<input type="checkbox"/>	Cabinet Door Open	Device 4	Feb 13, 2017 @ 06:52:34 PM	00:40:9D:76:E8:A5	192.168.128.2	4
<input checked="" type="checkbox"/>	Device Offline	Device 2	Feb 13, 2017 @ 06:34:10 PM	00:40:9D:76:E8:A5	192.168.128.2	2
<input checked="" type="checkbox"/>	Cabinet Door Open	Device 1	Feb 13, 2017 @ 06:03:16 PM	00:40:9D:76:E8:A5	192.168.128.2	1

EMAIL ALERTS



Standard - out of the box alarm conditions:

- Low Wireless signal level
- Site offline for X time
- Site back online
- Low Battery
- Lamp fail
- Low Solar Output
- Low Beacon Current (Beacon 1 or 2)
- Power Outage (needs battery backup on the radio)
- User Configurable Alarms and Alerts
- Thresholds for above alarms
- And/ Or conditions to generate more specific alarms.
- Low solar

Data Logging:

Provides ability to review historical data on site performance

All the data that is available to be viewed in real time is also captured in a historical log within STRATOS ELITE. Automatically every site within the system will have log files generated as soon as they connect to the server.

The frequency of data logging can be set with the software and it is super easy to review the log files. Search by hour, day, week, month, year, or a custom date range to understand the performance of the system over time. Through analysis of the data patterns and anomalies, it is possible to dramatically improve.



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