
SMT Analytics Overview

SMT Analytics is a web-based application used to analyze data sent by a SMT BiG (Building Intelligence Gateway).

A BiG represents a gateway and is assigned a gwID (Gateway ID) from Analytics. For large projects, multiple BiGs can share gwID's allowing data can be accumulated in Analytics under the same projects.

Data within BiG and analytics is separated by Jobs. A Job is a collection of Nodes, Sensors and Sensor Data. Jobs are typically created within the BiG and are pushed to Analytics on an export. The export file sent from BiG includes a list of Jobs created in BiG along with their names and Sensor Data group by Job ID. Both Analytics and BiG maintain separate JobID's.

Some features described in this manual maybe unavailable depending on your user permissions.

Logging in

The screenshot shows the login interface for SMT Building Analytics. At the top left is the SMT Research Ltd. logo with the tagline 'Structure Monitoring Technology'. To the right is the text 'Building Analytics'. Below the logo is a blue 'Login' button. The main heading is 'Building Analytics'. The login form contains the following elements:

- A label 'SMT Login' above the input fields.
- A label 'username:' followed by a text input field.
- A label 'password:' followed by a password input field.
- A 'signin' button below the password field.

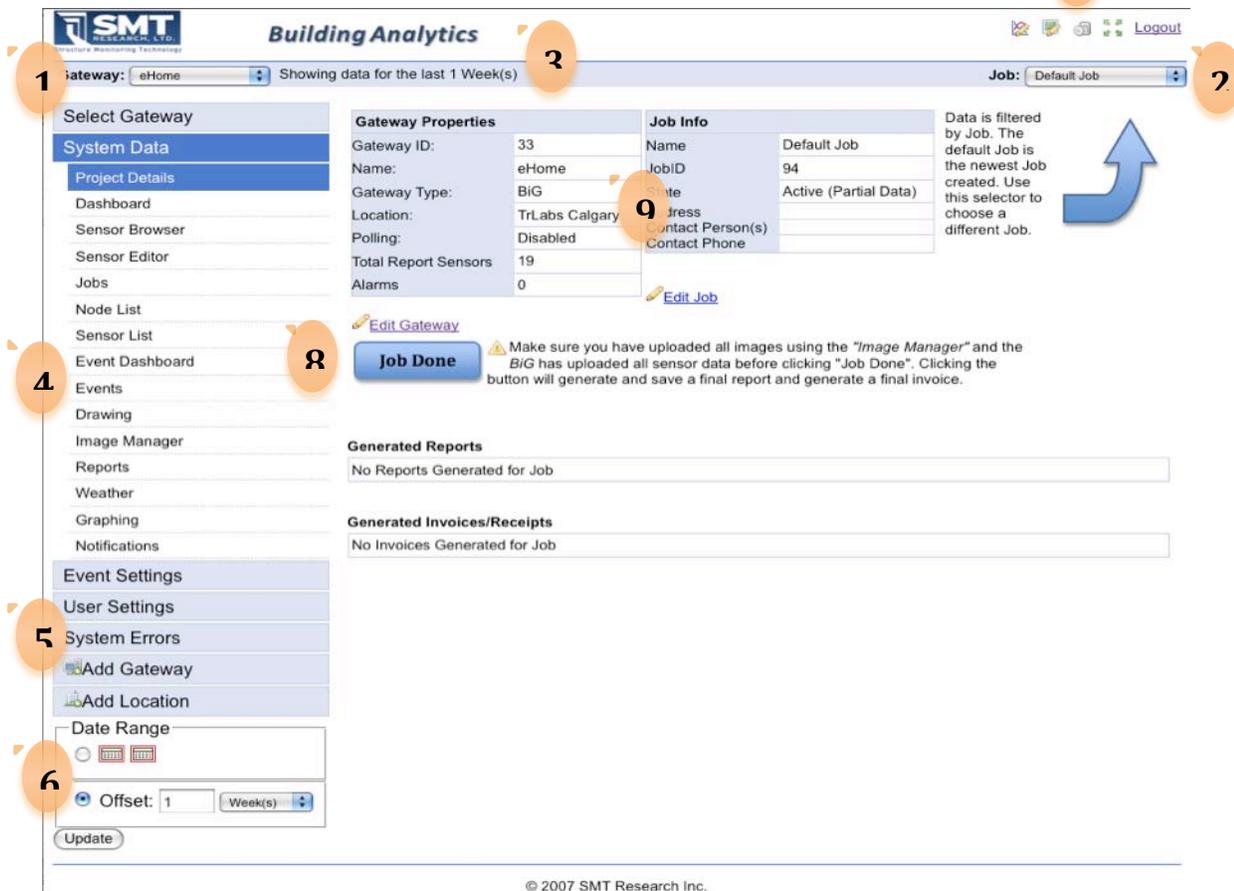
At the bottom of the page, there is a copyright notice: '© 2007 SMT Research Inc.'

Logging in creates a new user session in Analytics.

After a user logs in a Gateway is chosen and the last created Job for the gateway is set as the active job for the session.

The term active Job is used throughout this manual and is defined as the current selected Job to be viewed in analytics. It does not imply the state of the job nor imply that nodes are actively transmitting data to the Job.

Layout



1	Gateway Selection. If multiple gateways have been assigned to a user use this tool to quickly switch between them
2	Job Selection. If a gateway contains multiple Jobs use this tool to quickly switch between them
3	Data Date Range. The data date range located in the middle of the tool bar shows the date range applied to data sets. This date range is applied to graphs and viewing data logs. For active jobs the default setting is one week, otherwise the date range is set to the min and max dates for sensor data.
4	System Data Navigation Options. Navigation items under the System Data are tools used to view/manipulate data for a Gateway/Job
5	Analytics Navigation Options. These options are used for the administration of Analytics. Many of these options are not available to normal users
6	Date Selection. This tool is used to modify the Data Date Range.
7	Session Settings. Session settings allow the user to change the graph size, graphing options, clear session variables, and log out
8	Job Done button. The Job Done button is used in restoration project to produce a final report and invoice
9	Gateway and Job Properties

Project Details

Gateway Properties		Job Info	
Gateway ID:	33	Name	Default Job
Name:	eHome	JobID	94
Gateway Type:	BiG	State	Active (Partial Data)
Location:	TrLabs Calgary	Address	
Polling:	Disabled	Contact Person(s)	
Total Report Sensors	19	Contact Phone	
Alarms	0		

[Edit Gateway](#) [Edit Job](#)

Job Done

 Data is filtered by Job. The default Job is the newest Job created. Use this selector to choose a different Job.

 Make sure you have uploaded all images using the "Image Manager" and the BiG has uploaded all sensor data before clicking "Job Done". Clicking the button will generate and save a final report and generate a final invoice.

Generated Reports
No Reports Generated for Job

Generated Invoices/Receipts
No Invoices Generated for Job

The Project details page is the default page shown after a user logs in. This page includes gateway information and details of the current job.

The Job Done button is used in restoration projects. Pressing the button generates a final report and invoice.

Any generated report and invoices are accessible on the project details page.

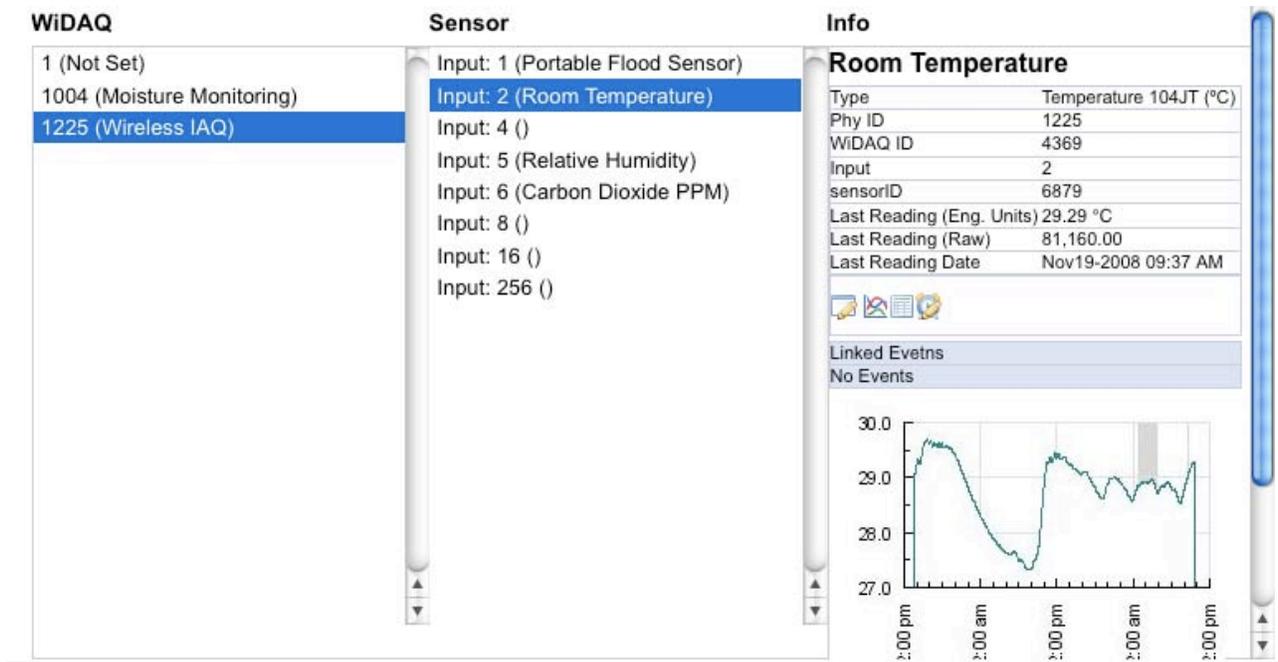
Dashboard

PhyID	Input	Name	Type	Last Reading (Eng. Unit)	Last Reading Time
1225	1	Portable Flood Sensor	Resistance	449,291,700.00 Ω	Nov 19-2008 09:31 AM
	2	Room Temperature	Temperature 104JT (°C)	29.29 °C	Nov 19-2008 09:32 AM
	5	Relative Humidity	II EE RH (uV)	17.54	Nov 19-2008 09:32 AM
	6	Carbon Dioxide PPM	II EE CO2 (uV)	437.89	Nov 19-2008 09:32 AM
	16		Unknown	10,042.00	Nov 19-2008 09:32 AM
	256		Unknown	0.00	
1004	1	Wall Moisture	Moisture (%)	11.38% MC	Nov 19-2008 09:32 AM
	2	Flood Detection Under Sink	Resistance	1,000,000,000.00 Ω	Nov 19-2008 09:33 AM
	16		Unknown	5,796.00	Nov 19-2008 09:33 AM
	256		Unknown	9.00	Nov 3-2008 01:32 PM
1	2		Unknown	200.00	Oct 22-2008 02:54 PM

The Dashboard provides a snapshot of the active Job in Analytics. Sensors are grouped by phyID or device ID and sorted by input number

Only sensors that are flagged to be included in reports are shown in the dashboard

Sensor Browser



The Sensor browser is the fastest way to view sensor data in Analytics.

The Sensor browser is made up of 3 panels: a Node/WiDAQ panel, a sensor panel, and Sensor info panel.

The Node/WiDAQ panel lists all devices reporting data for the active job. After selecting a Node in the first panel, the Sensor panel loads with sensors attached to the device. Selecting a sensor in the Sensor panel load detailed information in the Sensor Info panel.

Sensor Option

	Edit Sensor settings
	View graph of sensor data
	View sensor data log
	View/Modify Alarms attached to Sensor

Sensor Editor

Update All

PhyID	Input Name	Include in Report	Sensor Type	Wood Species	Temperature Sensor	Sensor Image	Sensor Drawing	
1225	1	Portable Flood Sensor	<input checked="" type="checkbox"/>	Resistance	Unknown	Disabled	none	none
	2	Room Temperature	<input checked="" type="checkbox"/>	Temperature 104JT (°C)	Unknown	Disabled	none	none
	4		<input type="checkbox"/>	Unknown	Unknown	Disabled	none	none
	5	Relative Humidity	<input checked="" type="checkbox"/>	II EE RH (uV)	Unknown	Disabled	none	none
	6	Carbon Dioxide PPM	<input checked="" type="checkbox"/>	II EE CO2 (uV)	Unknown	Disabled	none	none

Use the Update all button to commit settings

Column	Description
phyID	Physical ID of the device
Input	Input on device sensor is attached to
Include in Report	Flag used to indicate if sensor should be included in reporting
Sensor Type	Sensor Type. Indicates engineering unit formula to be applied to raw sensor data
Wood Species	Wood species used for moisture content formula. If not required set as "Unknown"
Temperature Sensor	Temperature Sensor to be used for Engineering Unit conversions that require temperature compensation.
Sensor Image	Sensor Image used in reports
Sensor Drawing	Sensor Drawing used in reports

Note: Use caution when updating any settings that effects the engineering unit conversion such as Sensor Type, Wood Species or Temperature Sensor. Updates those settings results in the removal of cached engineering units from the data table. The next time data is requested for a sensor cached engineering units will be updated, but it could take significant time to perform the conversion and updates result sets.

Jobs

*Active	**Default	Job ID	Title	State	BiG Job ID	Date Created	Options
(Active)		94	Default Job	Active (Partial Data)	0	Aug12-2008	
		4	Default	Closed		Mar17-2008	

[Add Job](#)

Column	Description
Active	Data will appear in the Active Job if not jobID is pass by the export file from BiG. BiG version >0.5 send a jobID in the export file.
Default	If a Default Job is set, newly created jobs will copy Node and Sensor definitions from it.
JobID	Internal Analytics ID assigned to Jobs
Title	Name assigned to Job
Status	The status is determined by Analytics nightly by analyzing sensor data to determine the state of the Job. If all sensors set with the “Include in Report” have new sensor data for the current day the Job is in the “Active” state
BiG Job ID	The Job ID assigned by BiG
Date Created	The date the Job was created in Analytics. The newest Job is the default Job when a user logs in or switches Gateways
Options	List of Options to perform on Jobs

A user with proper permission can update Job Title, Job Status, Address, Contact Person and Contact Phone

Number for a Job by clicking on the icon in the Options column.

Node List

Node ID	Name	phyID	options
4367	Not Set	1	
4368	Moisture Monitoring	1004	
4369	Wireless IAQ	1225	

Column	Description
Node ID	Internal Identifier assigned to nodes. This Identifier is unique between all Jobs
Name	Name given to device
phyID	Physical ID of the device
Options	List of Options to perform on Nodes

Edit Node ✕

Node Name

Node ID

PHY ID

Node Type

Description

Comment

Nodes can be edited by clicking on the  icon in the options column

Sensor List

ID	Name	Node ID	Node Name	#/Input	options
  6878	Portable Flood Sensor	4369	Wireless IAQ	1225/1	    
  6879	Room Temperature	4369	Wireless IAQ	1225/2	    
Nme Room Temperature Sensor Type: Temperature 104JT (°C) Wood Species: Unknown Events Attached to this Sensor: No Events Images: No Images					
  6930	Not Set	4369	Wireless IAQ	1225/4	    
  6880	Relative Humidity	4369	Wireless IAQ	1225/5	    
  6881	Carbon Dioxide PPM	4369	Wireless IAQ	1225/6	    

Column	Description
ID	
Name	
Node Name	
#/Input	Combination of Physical ID and Input separated by /
Options	List of Options to perform on Nodes

Icon	Description
	Expands the column to display addition information. This information is show in the pink area above
	A green check mark indicates there are no active alarms on the Sensor
	Edit Sensor setting
	View graph of sensor data
	View sensor data log
	View/Modify Alarms attached to Sensor

Edit Sensor

Sensor Name: Portable Flood Sensor

Wood Species: Unknown

Sensor Type: Resistance

Comment:

Input: 1

Probe Pairs: 0

Temperature Sensor: Unknown

Hidden: Yes | No

Raw Offset: 0

Report Options

Include in report: Yes | No

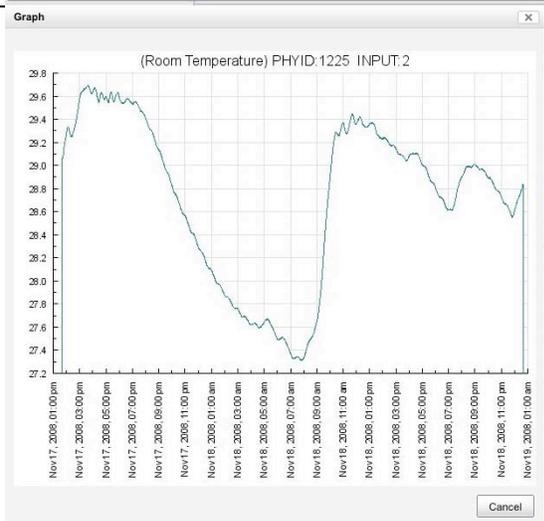
Sensor Image: none

Sensor Drawing: none

Submit Cancel

Sensor Edit Panel

The Sensor Edit Panel is used to update settings for Sensors



Sensor Graph

Sensor Graphs display data for the data date range set in analytics. Graphs are automatically scaled using the min./max. data values. If weather data is available it is displayed as bands in the background of the images. Yellow bands indicate sunny periods, blue band indicate precipitation and gray bands indicate snow.

Sensor 6878 - (1225/1) Log

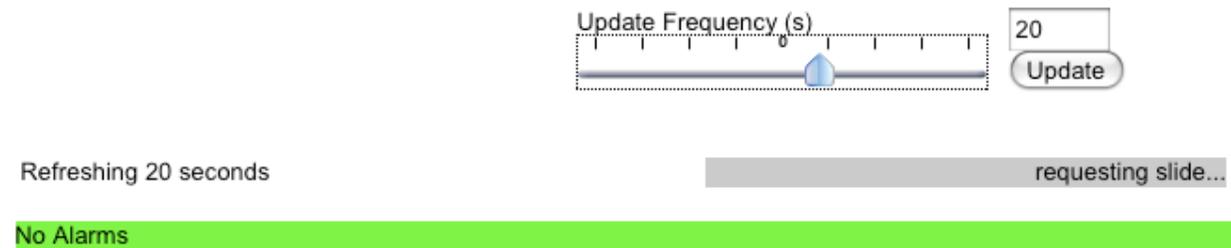
DataID	RAW	Eng. Unit	TS
58839643	398004328	398004328 Ω	Nov17-2008 01:39:48
58841501	502995241	502995241 Ω	Nov17-2008 01:40:43
58841557	474686314	474686314 Ω	Nov17-2008 01:41:41
58841584	417231760	417231760 Ω	Nov17-2008 01:42:39
58841613	443117004	443117004 Ω	Nov17-2008 01:43:37
58841700	397966376	397966376 Ω	Nov17-2008 01:45:35
58841727	545535823	545535823 Ω	Nov17-2008 01:46:33
58841735	531417435	531417435 Ω	Nov17-2008 01:47:31
58841797	410350842	410350842 Ω	Nov17-2008 01:48:29
58841880	418329397	418329397 Ω	Nov17-2008 01:50:27

Submit Cancel

Sensor Log Panel

Data presented in the Sensor Log Panel is tab-delimited in a textarea allowing for easy copy and paste to other programs such as Microsoft Excel

Event Dashboard



The event dashboard is a tool used to display active alarms. The slider at the top right defines the frequency Analytics is checked for new alarms. When an alarm is triggered an alarm is sounded and event table is updated showing alarm details. When a event is cleared a “swoosh” sounds is played to notify the user.

Note: Events are processed by Analytics after data has been sent from the BiG. The notification delay it limited by the reporting frequency set in BiG and time to process data in Analytics.

Events

TriggerID	EventID	Event Name	sensorID	Sensor Name	PhyID	Input	Time Set	cleared	Time Cleared	Time ManualCleared
5884	28	eHome Flood Detector	4122	Flood Detection Under Sink	1004	2	2007-11-28 14:29:09-06	1	2007-11-28 16:07:53.050178-06	
5885	31	eHome Room Temperature	4116	Room Temperature	1016	2	2007-11-28 15:33:27-06	1		
5886	30	eHome Relative Humidity	4118	Carbon Dioxide PPM	1016	6	2007-11-28 18:38:52-06	1		
5887	28	eHome Flood Detector	4122	Flood Detection Under Sink	1004	2	2007-11-30 09:28:02-06	1	2007-11-30 11:38:31.520963-06	

An Event is an instance of an Alarm. The events section lists the last 50 events trigger.

Image Manager

Upload Images

 (Click on the Icon to upload multiple images at once)

Title: File:

Job Image	Thumb	Image ID	Title	Description	Options
		152	Rec Room Interior Walls		  
			<input type="text" value="phyID: 1200 Input: 20"/>		
		153	Rec Room Exterior Walls		  
			<input type="text" value="phyID: 1197 Input: 18"/>		

The Image manager is used to manage images Sensors. The image manager allows the user to upload multiple images in one click. The first image referenced to a sensor will be selected at the default image to appear the report

The Images differ by Drawing by:

- Sensor cannot be overlaid on images
- Sensors are referenced to an image. Drawings are meant to be schematics or layouts while Images are meant to be photographs of the actual sensors.

How to use the Image Manager:

1	Upload your images using the form at the top of the page. Use the "Browse.." button to locate the image on your computer. A title should be provided, but not required. Additional images can be uploaded at the same time by pressing  icon.
2	After uploading your images the images can be tagged with the sensors they represent. A sensor can be associated to a image by using the  icon. Tagging sensors in images lets SMT Analytics know which pictures contain which specific sensor. You can tag multiple sensors in an image. The first image a sensor is tagged in is used as the default image for reports.
3	A default image for a Job can be set by clicking the  icon. The default image is usually representative of the job, and can be a picture of the building or typical location for monitoring. If an image is already selected as the default image it will be show with the icon. Only one image can be set as the default image, therefore selecting a different image will overwrite the previously selected choice.

Drawings

[Add Drawing](#)

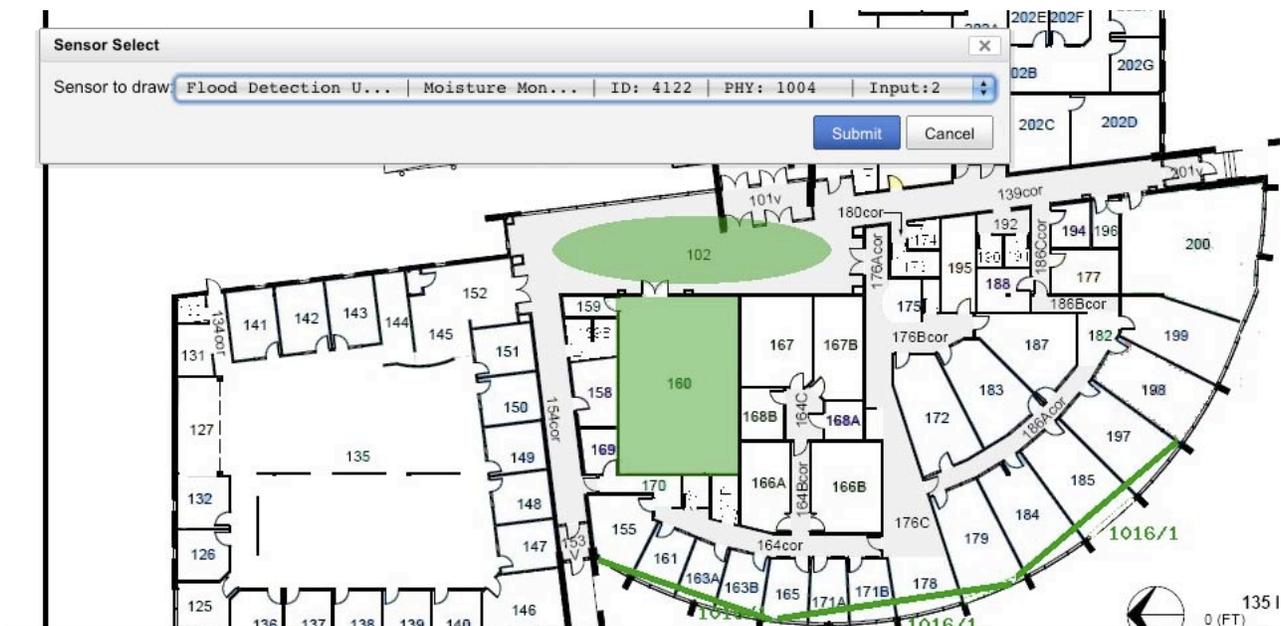
Order	Title	Filename	Options
1	Building Layout	Smartpark.jpg	    
1	eHome Lab	TR Labs Electrical.png	    
1	eHome Multifunction Sensor	eHome 074.JPG	    
2	Demonstration Wall	WiDAQs 015.JPG	    
3	Demonstration Wall - Siding View	WiDAQs 014.JPG	    

Update Sort Order

Column	Description
Order	Order drawings appear in reports
Title	Name assigned to drawing
Filename	Original filename of drawing. Note: drawings are not stored in analytics with the original file name. Analytics assigns new filenames to avoid file name conflicts.
Options	List of Options to perform on Nodes

Icon	Description
	Pencil Tool. Use this tool to identify sensor location on drawings
	Drawing Time Elapse Tool
	Drawing Snapshot of drawing
	Edit Drawing properties
	Delete drawing

Drawings Pencil Tool



The Drawings Pencil Tool is used to overlay sensors on drawings. This tool displays the drawing in the full resolution it was uploaded in.

“Sensors PopUp” link displays the sensor select tool. A sensor must be selected before it is overlaid on the drawing.

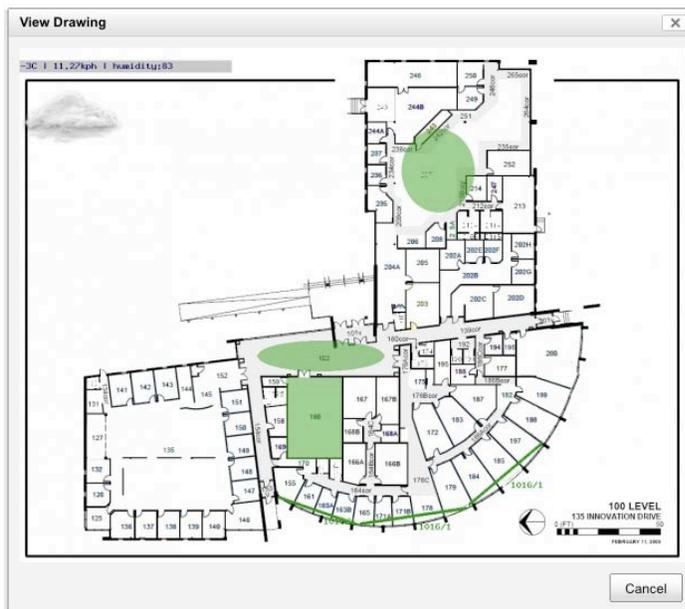
How to Overlay sensors:

1. Click on the “Sensors PopUp” tool and select a sensor
2. Two clicks are required to register a sensor on a drawing. The default sensor object is the line. The first click registers the start of a line and the second click registers the end point. After the seconds point the image is reloaded with the sensor overlaid.
3. Sensor objects and be updated using the table below the drawing

dsID	SensorID	phyID	startX/startY/endX/endY									
5173	4118	1016/6	441	546	532	680	Area	Midd	Botto	<input checked="" type="checkbox"/>	update	delete
5174	4116	1016/2	393	485	604	536	Area	Midd	Botto	<input checked="" type="checkbox"/>	update	delete
5175	4115	1016/1	428	744	558	789	Tape	Midd	Botto	<input checked="" type="checkbox"/>	update	delete
5176	4115	1016/1	563	788	739	762	Tape	Midd	Botto	<input checked="" type="checkbox"/>	update	delete
5177	4115	1016/1	743	757	864	655	Tape	Midd	Botto	<input checked="" type="checkbox"/>	update	delete
5178	4117	1016/5	632	272	753	133	Area	Midd	Botto	<input checked="" type="checkbox"/>	update	delete

The table below a drawing is updated real-time as sensors are overlaid on the drawing. Object can be removed or updated using the options in this table.

Drawing Snapshot



A drawing Snapshot comprises of a drawing with sensors overlaid. Three objects can represent sensors: lines rectangles, and ellipses.

Typically the line object represents a segment of moisture detection tape. The ellipse and rectangle tools would be suitable for temperature, relative humidity, CO2, or moisture probe.

The top right corner of the drawing contains the time and weather conditions. Sensor objects are displayed as either green or red. A Green sensor indicates no alarms are triggered while a red sensor represents a sensor with alarm event currently active.

Drawing Time Elapse Tool



The Drawing Time Elapse Tool is used to view event triggering and visually identify problems by correlating event locations.

The two sliders at the top of the window are used to adjust the update frequency. The slider on the left adjusts the step time in hours for drawing updates. The slider on the right adjusts the frequency the drawing is updated on the screen. For example the sliders can be used to view the building status every 4 hours updating on the screen every 20 seconds.

The text box above the drawing is used to set the base time of the drawing the sliders use to manipulate

Graphing

Layout:

The screenshot shows the 'Compare Graphing Options' interface. At the top, there is a sensor selection bar with 'Relative Humidity | Wireless IAQ | ID: 6880 | PHY: 1225 | Input:5' and an 'Add' button. Below this are two radio buttons: 'Graph Raw Data (Resistance, Voltage)' and 'Graph Engineering Unit (Moisture Content, Temperature)'. There are also 'Log Scale' and 'Line Weight' options. The date and time selection area includes 'Start Date' (Nov 17, 2008, 00:00:00) and 'End Date' (Nov 19, 2008, 23:59:59), along with a 'Data Average Period' of 15 Mins. A table below lists sensors: 'Room Temperature | Wireless IAQ | ID: 6879 | PHY: 1225 | Input:2' and 'Relative Humidity | Wireless IAQ | ID: 6880 | PHY: 1225 | Input:5', each with a 'Remove' button. At the bottom of the options are 'Generate Graph' and 'Export' buttons. The graph below shows two data series: 'Room Temperature (1225/2)' in green and 'Relative Humidity (1225/5)' in black, plotted against time from Nov 17, 2008, 01:00 pm to Nov 19, 2008, 11:00 am.

1	Sensor List. Choose sensor to be added to list to Graph
2	Choose to either graph raw data or engineering units.
3	Data range selection
4	Data average selection. To compare data sets, data must be averaged over a specified period for each sensor data set.
5	Sensor List. This list shows sensors added to the graph
6	Graph / Export Action. After setting all the graphing options, choose to either generate a graph or export data (CSV format)
7	Generated graph

Report Generator

Report Generator

Start Date Oct 31 2008 

End Date Nov 19 2008 

Reports can be generated at any time for any period of data by using the report generator.

Predefined report templates have been created and are automatically selected depending on the type of project your gateway is assigned to.

Weather

<u>Build date</u>	<u>temp</u>	<u>Direction</u>	<u>Speed</u>	<u>Humidity</u>	<u>Visibility</u>	<u>Pressure</u>	<u>Rising</u>	<u>Sun Rise</u>	<u>Sun Set</u>	<u>Desc</u>
Nov19-2008 12:00 PM	-4	360	12.87	83	1607.69	1041	0	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	light snow showers
Nov19-2008 11:04 AM	-4	30	8.05	0	1607.69	0	0	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	light snow showers
Nov19-2008 10:27 AM	-4	40	11.27	0	1607.69	0	0	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	light snow showers
Nov19-2008 09:00 AM	-3	350	11.27	83	1607.69	1038	0	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	cloudy
Nov19-2008 08:32 AM	-3	0	0	0	1607.69	0	0	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	light snow showers
Nov19-2008 07:00 AM	-3	50	4.83	91	1607.69	1036	1	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	cloudy
Nov19-2008 06:00 AM	-3	40	9.66	91	1607.69	1035	1	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	cloudy
Nov19-2008 05:00 AM	-3	30	19.31	83	1607.69	1034	0	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	cloudy
Nov19-2008 04:03 AM	-2	40	19.31	0	16.09	0	0	Nov19-2008 08:00 AM	Nov19-2008 04:42 PM	cloudy

Weather data is collected at a city level for each Gateway. Weather data is overlaid on drawings and showing in the background of graphs as weather bands

Export

Start Date

Oct 31 2008 
 00:00:00 (HH24:MM:SS)

End Date

Nov 19 2008 
 23:59:59 (HH24:MM:SS)

<input type="checkbox"/>	<u>ID</u>	<u>Name</u>	<u>Node ID</u>	<u>Node Name</u>	<u>#/Input</u>
<input type="checkbox"/>	6878	Portable Flood Sensor	4369	Wireless IAQ	1225/1
<input type="checkbox"/>	6879	Room Temperature	4369	Wireless IAQ	1225/2
<input type="checkbox"/>	6930	Not Set	4369	Wireless IAQ	1225/4
<input type="checkbox"/>	6880	Relative Humidity	4369	Wireless IAQ	1225/5
<input type="checkbox"/>	6881	Carbon Dioxide PPM	4369	Wireless IAQ	1225/6
<input type="checkbox"/>	6931	Not Set	4369	Wireless IAQ	1225/8
<input type="checkbox"/>	6882	Not Set	4369	Wireless IAQ	1225/16
<input type="checkbox"/>	6929	Not Set	4369	Wireless IAQ	1225/256
<input type="checkbox"/>	6871	Wall Moisture	4368	Moisture...	1004/1
<input type="checkbox"/>	6872	Flood Detection Under Sink	4368	Moisture...	1004/2

The Export tool exports all data for sensors selected. Select a sensor by checking the checkbox in the first column. Unlike the Graphing Tool's export function where data is averaged, the Export tool exports all data for each sensor. Each sensor data point is given its own row in the export file, while the Graph tool's export function gives each time frame its own rows with an average of each sensor's data.

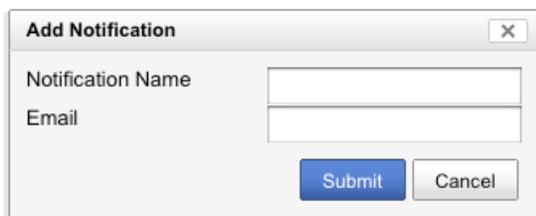
The Export tool generates an export in CSV format.

Notifications

Name	email	options
Greg Jaman	greg@smt-research.com	

Notifications Engine alters emails by email when an alarm event occurs and clears. To receive notification a notification address and name must be provided and events added to the entity. Changes to the name and email address can be made by clicking on the  icon.

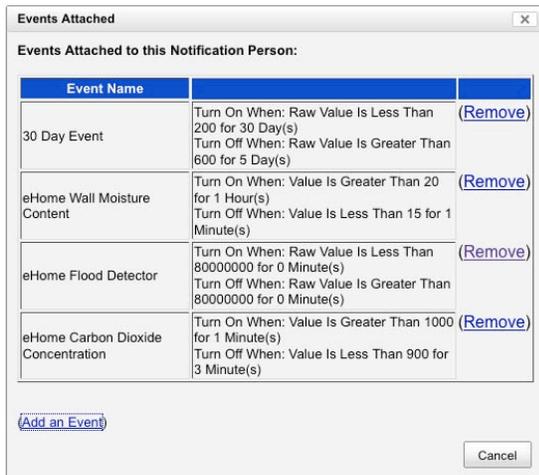
Add Notification



The "Add Notification" dialog box contains two input fields: "Notification Name" and "Email". Below the fields are "Submit" and "Cancel" buttons.

Click on the "Add Notification" link at the bottom of the Notification list table. A pop-up window appears prompting for a Name and Email address.

View Events Attached



The "Events Attached" dialog box displays a table of events attached to the notification person. Each row includes an event name, its conditions, and a "Remove" link.

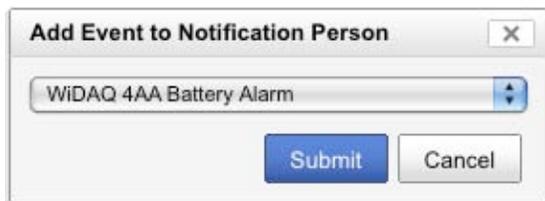
Event Name	Conditions	Action
30 Day Event	Turn On When: Raw Value Is Less Than 200 for 30 Day(s) Turn Off When: Raw Value Is Greater Than 600 for 5 Day(s)	(Remove)
eHome Wall Moisture Content	Turn On When: Value Is Greater Than 20 for 1 Hour(s) Turn Off When: Value Is Less Than 15 for 1 Minute(s)	(Remove)
eHome Flood Detector	Turn On When: Raw Value Is Less Than 80000000 for 0 Minute(s) Turn Off When: Raw Value Is Greater Than 80000000 for 0 Minute(s)	(Remove)
eHome Carbon Dioxide Concentration	Turn On When: Value Is Greater Than 1000 for 1 Minute(s) Turn Off When: Value Is Less Than 900 for 3 Minute(s)	(Remove)

At the bottom of the dialog, there is an "Add an Event" link and a "Cancel" button.

Clicking on the  icon in the options column pops-up a window displaying a list of events attached to the notification email.

In this windows alarms can be added and removed.

Add Event



The "Add Event to Notification Person" dialog box features a dropdown menu with "WiDAQ 4AA Battery Alarm" selected. Below the dropdown are "Submit" and "Cancel" buttons.

Clicking on the "Add Event" link in the "Events Attached" Window allows the user to add events to a notification email.

Multiple Events can be added to an notification email address

Internal Functions

Notification

Notification are handling by a notification engine that continuously processes the Events table for new events that have been created or cleared and emails any notification email address if the criteria for setting or clearing an alarm is meet.

Engineering Unit conversion Caching

For fast data retrieval, sensor data engineering unit values are cached. If any settings are changed that effect the derivation of an engineering unit value, the cached values are flushed and regenerated the next time data is requested.

Engineering Units cached data is first generated when data enters analytics. The checking for valid engineering units is handled in the SQL Sensor Data view. Using this view to access sensor data will insure correct engineering unit values

BiG Data Processing

Sensor Data is stored in the Analytics database in complex partition tables. Using partition tables help speed up data access and aggregate functions, especially when sequence scans are used.

All partition tables inherit their definitions from a parent Sensor Data table. A trigger on the parent table decides which child partition table to insert date into by analytics the sensor data's timestamp.

Alarms Processing

Insert triggers on Sensor Data partition tables handle alarm processing. To minimize the overhead in analyzing a window of data, the current sensor data is first compared against all Alarm definitions attached to the Sensor. If the current data point meets any of the criteria to turn on an alarm if an alarm if no alarm event is active, or clear an alarm if a alarm event is active, then the alarm handling engine will continue to process a windows of sensor data. Processing the window of data requires a selecting and using aggregate function, that if avoided improve performance.

Job States

At the end of each day each active or idle Job is processed to determine a state change. A Job is considered *active* if all sensors with the "Include in Report" flag checked received data for the pervious day. If a job received data from some sensors but not all, the job becomes partially active. If no data was received the job becomes *idle*. State changes are logged to a state change history table.

Partition tables

Vocabulary

gwID Gateway ID

jobID Job ID assigned by analytics

phyID Physical ID of the device. Analytics assigned Devices a nodeID used for internal tracking of Devices between jobs

WiDAQ Wireless Data Acquisition Unit. Also referred to as a Node