



# **G-POS**

# - a fully integrated real time location system for container terminals

- > Equipment, container and workforce identification and location management
- > Fleet availability, Scheduling, Fleet Telemetrics
- Process automation at the Quay, at the Gate, Yard and Reefer Monitoring
- Safety and security
- Network Connectivity Options(GPRS, WIFI or RF Narrow Band)

G-POS is a Real Time Location System (RTLS) incorporating GPS technology. It is embedded unobtrusively into any type of Container Handling Equipment (CHE), be it a Rubber Tired Gantry crane (RTG), Transtainer, Rail Mounted Gantry crane (RMG), Straddle Carrier, Reach Stacker, Empty Handler or Tractor Unit, G-POS will automatically track of every piece of mobile equipment on site.

## **Port Security**

- > Do you know who is on the terminal, who is operating equipment and moving containers?
- > Do you know exactly where all the containers are and if they are moved?





Not only can ITS provide this level of monitoring but can also ensure only planned moves are carried out by authorized personnel.

G-POS automatically monitors the storage and retrieval locations for every container handled on the terminal. It is a flexible solution and can be configured to meet the specific operational needs of any terminal with various additional modules and options.

G-POS helps the CHE operators by reducing/removing the need to constantly enter data in order to keep the computerized Terminal Operating System (TOS) up to date. It provides clear and concise guidance to the CHE operator to help him efficiently perform the task of moving, storing and retrieving containers.

With G-POS, automated, real-time, error free data is a reality. This allows the TOS to have a live accurate database and make the optimal storage and retrieval decisions and optimize equipment utilization.

The elimination of data entry errors and failures to manually update positions is a pre-requisite for the reduction and elimination of many common container terminal issues.





#### **Position Accuracy and Visibility**

The G-POS system monitors the 3 axis of the spreader in real time and is able to calculate it's exact location in terms of the container stacking co-ordinates. The system is based on multiple sensors including RTK (Real Time Kinematic) carrier phase Differential GPS (DGPS). This provides G-POS with the right balance for a cost effective solution with reliability and full upgrade capability. G-POS is fully integrated with your existing infrastructure and systems in a way that provide high levels of transparent automation and user friendliness.



#### **G-POS ease of use**

The G-POS system is designed to offer flexible connectivity, a customizable configuration and provides the optimal interface for the equipment operator.

#### **G-POS touch screen option**

Based on a full colour touch screen monitor the system is designed to operate as a keyless operation allowing the operator to move containers without constantly having the disruption of entering data or confirming positions.



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Straddle Carrier Map View screen

Working in synergy with the TOS in real-time G-POS shows the CHE operator the equipment's present location, the container move instruction (or work queue) and pick and place locations, all in clear and easy to see text or graphical map formats, and in a language your CHE operators understand.

#### **Basic RDT terminals**

If required G-POS can also be configured without a touch screen, and instead to connect directly to an existing Radio Data Terminal (RDT) mounted in the operators cab.

Job Step screens (for straddle carrier operation) are clear and automatically change to the next step without input from the operator. The system also manages and displays twin 20' moves and, provides the operator with pre-advice of the container length for pick-up, allowing the spreader

SC 95	Laden To Ship	QUAY
20'	ISFU250026	6
	6BSTOW	
	CC 6 (15B)	
141 10	SOIT May Ye	- 8m 8m





50 90	Empty To	Ship	Q	JAY
40'				
	Drive	CC 1		
600 ¥10	100	Section 1	Story	-

Typical job step screen

# **G-POS integration**

The G-POS system is designed to offer connectivity flexibility.

#### Wireless connectivity

G-POS can be supplied to connect using WiFi LAN networks or Narrowband radio frequencies, some G-POS modules can also connect using GPRS. If your site has limited or unreliable connectivity FSN can supply a dedicated stable and reliable Narrowband network.

#### to be pre-set.



#### **TOS Synergies**

The G-POS system is connected to many leading Terminal Operating Systems (TOS) with interfaces that are fully compatible and 100% TOS compliant using XML or other protocols. The G-POS system helps you get the best out of your TOS with transparent data flow, high levels of data automation and operational optimization.

#### **Customizable flexibility**

The G-POS system has multi connectivity capability with its middleware Message Routing System (MRS).

The middleware component allows G-POS to connect to many management and supervisory systems for security, maintenance and operational monitoring. The MRS also allows the differential GPS correction data to be transmitted directly to the CHE without the use of secondary radio frequencies.

### **Driver interface options** Full colour driver friendly touch displa Or Legacy text based terminal **G-POS** mounted on equipment Wireless **GPS** Base Connectivity Station Options WiFi Option Option GPS WIFI Narrowband Correction Network RDT Link TL. ı XML Security, Maintenance, Remote Manager Other Optional Links Link Other container terminal Support Optimisation applications Terminal Operating System

**G-POS modular flexibility and other options** 



Screen options

The G-POS system can be configured to use an existing RDT terminal or for greater functionality can be provided with a full colour touch screen.





#### **D-Mon security**

CHE mounted card readers connect to the G-POS server to monitor and authorize equipment operators. Ensure only trained authorized users drive the CHE.



#### V-TRAX auto-steering

Automated gantry steering systems can be added to G-POS equipped RTG's using the same G-POS computer. A safer operational environment can be achieved for all.



#### **E-SMART status monitoring**

E-SMART equipment status visualization and reporting allows the terminal operations and maintenance to share and report on the status of all plant and equipment.



#### **AVID Auto identification**

Using RFID technology the Auto vehicle IDentification (AVID) system allows the CHE to identify the truck carrying the container (For RTGs) or the STS crane (for Straddle Carriers) to allow fully automated data automation.





**Move Compliance** 

The G-POS system can be installed with a move compliance module to ensure the container picked up is the correct one. the system can also be configured to allow the container to only be placed in the planned location.



#### **Exclusion zones**

With this module exclusion zones can be set up to ensure the equipment is prevented from traveling in to a danger area. This could be in an area where inadequate height clearance exists under STS cranes or other yard areas.



Job-Step automation

G-POS installed on Straddle Carriers is provided with fully automated Job step features. The system automatically confirms to the TOS when steps are complete and requests the next available work step.

In poor weather the ability for G-POS to advise the driver of his current location is invaluable in circumstances where the ground slot markings are not visible.

## **Customer Testimonial:**

"The first phase of implementation saw G-POS applied to the road interchange and has assisted in providing benefits which equate to a 22% increase in available stacking area and productivity



enhancements of up to 20%. The benefits of the investments have been realised immediately from 'golive' and have helped the terminal to a 30% improvement in vehicle turnaround times."

#### **Improved Customer Service**

"The implementation of the new systems took place without even a temporary dip in performance. In fact the Port has already seen improvements in productivity in line with our expectations, Liverpool is now recording the fastest turnaround times of any UK port, with 95% of truck drivers processed through the Port within an hour, and 65% within 30 minutes"



#### David Huck, Head of Port Operations for Peel Ports Mersey

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## **Port Data Communication Systems**

Most mobile systems utilize wireless data communication in one form or another. ITS systems such as G-POS and E-SMART are developed to utilize a range of common Wireless data infrastructures. For these ITS are able to provide the right technical solution for the terminals circumstances. We are able to offer a narrow band solution operating in the 380 to 480 MHz frequency band or can utilize existing WIFI backbones already installed.

The ITS Narrow Band (NB) Data communication system can also be installed as a standalone system providing a low cost, minimal infrastructure wireless data communication system for the port.

![](_page_8_Figure_5.jpeg)

Due to the robustness of the data link and good data propagation our narrow band solutions have been implemented on many terminals. The systems are ideal for terminals where a 380 to 480 MHz dedicated frequency user license is available. Range can be up to 10 Km and is ideal in difficult RF environments such as in container stacks.

The system is based on a Radio Network Server (RNS)

![](_page_8_Picture_8.jpeg)

middleware component that runs on a standard desktop PC. This connects to all the mobile units via a single transmitter and does not require any distributed access points or repeaters.

The RNS interfaces are implemented to suit the integration requirements of your infrastructure. This could be Serial data, a TCP IP connection or XML interface. We have connected to various Terminal

![](_page_9_Picture_1.jpeg)

Operating Systems (TOS) and using our extended MRS middleware components can connect to security systems, maintenance reporting systems, and many other systems.

The system can be provided with a variety of mobile formats, all running a Windows embedded operating system to allow customisable mobile user interfaces. What is presented to the mobile user is born of years of input from terminal operators. Yard handling requires an easy to understand interface with minimal operator key strokes, or better still fully automated. Our touch screen interfaces provide this simplicity, with full functionality to support the operational requirements. The STS Interface option for vessel load and discharge has full flexibility with features such as load and discharge lists, twin lift tools, berthing and chassis loading settings.

Chassis / Carrier Spreader Allignment Systems

Designed to ensure that Trailers and Straddle Carriers stop in exactly the right position under the quayside or gantry crane.

- Increased speed of operation
- •Reduced accidental damage
- •Reduced driver fatigue

#### Trailer Positioning Systems

![](_page_9_Picture_10.jpeg)

![](_page_9_Picture_11.jpeg)

ITS' Trailer Positioning Systems (TPS) provide a simple, cost-effective solution to container/trailer positioning. TPS uses infrared sensors, indicator lights and a programmable logic controller to control the system. Systems can cope with any combination of container size as well as tug and multi-trailer units.

The Advanced Trailer Positioning System (ATPS) exclusively designed and developed by our engineers is a simple, rapid and effective method of positioning single and multiple trailers for all truck and crane transactions. The truck is equipped with an ATPS controller, display and sensors and provides the driver with slowdown and stop information for each trailer / container position directly in his cab.

![](_page_10_Picture_1.jpeg)

Straddle Carrier Positioning Systems

The ITS Straddle Carrier Positioning System cannot only build up a twin 20' foot load at the quay crane, but can also use multiple lanes simultaneously. Providing pin-point accuracy and adjustable stopping zones the solution is configured to provide not only a stopping zone but also a 2 stage slow down and overshoot indication. This is achieved by specially designed signals with a red and amber low maintenance LED matrix and crane mounted laser sensors.

LoadVIEW System for Chassis and Straddle Carriers

The ITS LoadVIEW system allows the driver of a truck or Straddle Carrier to view the vehicle in relation to the stopping position. It is an electronically augmented birds eye view.

Unlike most systems, with LoadVIEW the driver gets a real time view of the container or vehicle in relation to the stopping position. Most existing systems use a light or series of lights to show the driver the stopping point making it difficult to judge the exact position. The LoadVIEW system allows the driver to adjust his speed to suit as he is able to see the exact distance to the stopping point. With LoadVIEW he doesn't have to look sideways to the crane, he can look forward with obvious safety benefits.

LoadVIEW is rapid to implement and very cost effective. It does not require an external operator and can be configured to load and unload any combination of containers; 20', 40', 45', twin 20s. The system can even align 2 empty or loaded chassis side by side simultaneously for a Tandem lift, and can also position empty chassis with twistlocks. The LoadVIEW system does this without additional hardware or an operator or complex, expensive software.

LoadVIEW works by positioning cameras on the crane pointed at the loading area both under the crane and in the back reach. Target markers are overlaid on the image and the composite image transmitted to the vehicle driver. The driver has a wireless display and selector enabling him to display the images from the appropriate crane.

Prime Mover Identification and Automatic Vehicle Identification (AVID) system can be used to identify the truck when it is at a point of work such as delivering a container to the Yard crane. AVID is based on RFID technology and provides a seamless automated method to identify which container are been picked up or placed on which truck. This allows the containers to be fully and automatically tracked around the yard.

The system can be implemented as an additional module to G-POS and can also be provided with an interlock to stop yard movements being carried out incorrectly, preventing containers including high security or suspect cargo being misidentified or placed in the wrong location.

The system is paperless and operator input free leaving no scope for yard operatives to misidentify the containers or yard locations. The system ensures full data integrity allowing the terminal to plan with

![](_page_11_Picture_0.jpeg)

confidence for the optimum stack locations, knowing that the plan will be followed correctly without error.

Benefits of AVID:

- Increased yard density
- Reduced yard checking
- •Reduced number of re-handles

Click here for a data sheet

![](_page_11_Picture_8.jpeg)

#### **Port Safety**

Providing invaluable safety for operators and equipment throughout the terminal.

- •Operator welfare
- Reduced operational stoppages
- •Less equipment damage
- •Reduced insurance premiums

Despite well designed equipment and thorough training, accidents are all too common. The cost of such accidents in equipment/operation down time and repair costs alone are substantial. Combine this with the potential risk to life and insurance premiums and it is time to consider your quay and yard equipment safety.

ITS have integrated an advanced high-speed laser scanning system into Quay Crane control systems. The non-contact system detects ship superstructure, radar masts, crane masts, handrails, even whip aerials, and can be retrofitted to any existing crane, or installed with your new crane. A single, low profile, scanning unit is mounted on each side of the boom. Configurable software divides the approach area into control zones, the system intelligently limits crane operation as the risk of collision approaches.

For the yard, the automatic collision avoidance system tracks the movement of each piece of yard handling equipment and in the event of a collision hazard an audio-visual warning is given to the operator, shortly followed by the automatic activation of safety speed reductions.

#### Automatic Steering

V-TRAX: Effective Automated Steering For Reduced Equipment Operating Costs

![](_page_12_Picture_1.jpeg)

The ITS V-TRAX passive automated steering system is the cost-effective solution to automatically steer an RTG crane or Straddle Carrier along a container stack runway.

V-TRAX automatically and accurately steers the container handling equipment along a virtual track as it travels along the runway. Preventing equipment and container collisions and subsequent damage. The system improves terminal safety and driver productivity, reducing driver fatigue and equipment maintenance.

V-TRAX uses high precision Differential GPS to locate the equipment and provide both the current position and heading. V-TRAX uses a twin antenna calculation allowing the system to determine the heading even before the equipment starts to move. This provides a superior heading resolution allowing earlier steering corrections than most other systems and providing a smooth accurate motion for the equipment and driver alike.

The V-TRAX system is designed to offer the minimum invasion into the existing equipment controls, allowing a rapid installation without the risk associated with hosting the Auto Steer application on the existing equipment PLC. With years of RTG experience ITS have developed simple to use interfaces making the V-TRAX system easy to set up and configure. The runway map can be quickly and automatically uploaded to each item of equipment using an existing wireless LAN or manually using a USB memory stick if a LAN is not available.

The V-TRAX system has a number of in-built safety devices to provide fail-safes to avoid collisions. The driver has full override control allowing manual steer at any time. Clear signalling and audible warnings are provided to inform and advise. At all times the driver knows what the system is doing and who is steering, V-TRAX or the driver.

V-TRAX can be fully stand-alone or incorporated as part of a position location system (G-POS positioning system). Designed to retrofit to existing equipment as well as install on new, the V-TRAX system is not tied to any particular crane or control package manufacturer, or owned by a competing terminal operator or stevedore. This independence gives you the freedom to select the most cost effective materials handling equipment supplier for your operation and not be compelled to stay with the same manufacturer for your future requirements. It provides you with the ability to install on any drives and control package, and ensures continuity of system supply if you elect to buy your handling equipment from multiple vendors.

#### What is E-SMART?

E-SMART is a management tool providing an instant visualization of the plant and equipment operated in your business.

It alerts your operatives to quickly identify breakdowns and unplanned maintenance requirements allowing you to take immediate remedial action. It provides the operational status of the equipment across departments to key personnel in a clear format.

![](_page_13_Picture_1.jpeg)

New features in E-SMART also includes planned maintenance, minor fault monitoring and general status information. E-SMART also provides KPI data to allow the equipment operational availability and reliability to be assessed with various statistics.

#### Why change?

Many organizations manage their equipment assets on spread sheets, or manual means such as white boards, paper or alike, and many utilize legacy systems. In most cases the methods used lack visibility across the organization, with many systems or methods operating in isolation or without flexibility to easily share key data across the operation. E-SMART can also interface to your legacy system to provide full visibility whilst maintaining your other systems if required.

#### **Real operational benefit**

E-SMART can be implemented at low cost and zero risk and is an excellent ROI (return on investment) for ports and depots looking to improve their equipment availability through transparency. It has been developed with the direct input of container terminal operations and engineering staff, and has been installed on several ports on equipment such as Straddle Carriers, Top Picks, Side Loaders, Reach Stackers, RMG cranes, RTG cranes, Ship to Shore cranes etc.

#### Information sharing

E-SMART provides remote access for management and key terminal personnel. From their desktops they can view the terminal status in real-time with live information and also access details on equipment history.

#### Practical, useful tools

E-SMART is used by the maintenance team to alert them of equipment faults; it allows them to automatically keep the management team informed of the status, and reports the

![](_page_13_Picture_11.jpeg)

equipment as operational again once repaired. The maintenance supervisor can instantly see the status of all the equipment in real-time using simple clear icons. The yard location can also be displayed allowing the rapid dispatch of a repair crew. Simply by clicking on the icon the supervisor can see the detailed history and status of the equipment. He can change the status of the equipment or mark the equipment for planned maintenance. The Maintenance team can also monitor fuel, scheduled maintenance as well as monitor and report on major and minor fault repairs.

#### **E-SMART Configuration**

Smart data capture

![](_page_14_Picture_1.jpeg)

E-SMART can be implemented as a standalone system or provided with a direct data link to the equipment. The direct data link is where status data comes directly from the mobile equipment via a GPRS, WiFi or Narrow Band wireless data network. Sites that opt for the E-SMART direct data link can report faults directly from the equipment automatically, capture operating hours and other features to provide a level of automation to the maintenance call outs, re-fuelling and other features.

In standalone mode the maintenance requirements are entered by the maintenance supervisor simply with a few clicks of the mouse.

![](_page_14_Figure_4.jpeg)

#### Integration

E-SMART can also be connected to an ERP system to allow automated EDI transfers of equipment status to the ERP system allowing automatic generation of work orders and many other benefits including the utilization of the E-SMART data sharing and a rapid overview of the equipment status across departments.

![](_page_15_Picture_0.jpeg)

#### Modular monitoring

![](_page_15_Figure_3.jpeg)

At a glance key personnel can identify when equipment breaks down and its current status.

#### Minor fault reporting and visualization

In addition to E-SMART showing the major fault status of the equipment minor faults are also indicated on the main visualization screen. Minor fault reporting assists the operations department to identify equipment that can be operated (within the limitations of the minor faults) during times of high equipment demand, and also allow the maintenance department to record, report, and clear minor equipment faults.

#### **Planned maintenance**

The Maintenance supervisor can see at a glance items due and shortly becoming due for scheduled maintenance. Each individual item of equipment also has its own detailed screen and schedule of maintenance.

SC 62 Maintenance Schedule	
ingine	Running Hours
	Previous 0 23/11/2011 09:45
0 200 400 600 800 1000 1200 1400 1600 1800 2000	Current 0 23/11/2011 09:45
Engine	
Reset	Update Cancel
łydraulics	
Hours Since Last Maintenance	Running Hours
	Previous 0 23/11/2011 09:45
0 50 100 150 200 250 300 350 400 450 500	Current 0 23/11/2011 09:45
Hydraulics	Update Cancel
Reset	
Spreader	
Hours Since Last Maintenance	Running Hours
	Previous 0 23/11/2011 09:45
0 100 200 300 400 500 600 700 800 900 1000	Current 0 23/11/2011 09:45
Spreader	
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0 20 40 60 80 100 120 140 160 180 200	Current 0 23/11/2011 09:45
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	Current 0 23/11/2011 09:45
Other	Lindate Cancel
Reset	

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![](_page_16_Picture_1.jpeg)

#### **Tire warnings**

Tire condition is critical to the safe operation of the equipment. E-SMART has a feature for the last inspection of the tire to be noted and when the next inspection is due. Based on tire age, a warning will also be given when the tires should be replaced.

#### **Fuel consumption**

E-SMART provides estimated fuel levels and warnings to help the operation achieve a more efficient fuelling routine by not filling lightly used equipment unnecessarily and ensuring priority is given to equipment that needs it most.

![](_page_16_Figure_6.jpeg)

#### General characteristics and calendar

For items of equipment that may be loaned or operated across different operations an assignment calendar is available showing the equipment's assignment and duration. E-SMART can also show general equipment characteristics such as type, lifting capacity, fuel capacity, equipment age, and other features.

## **Equipment shock sensing**

E-SMART also receives direct data from the Equipment Shock Sensing System. These advanced accident management features allow incidents detected by the system to be immediately reported and shown on

![](_page_17_Picture_1.jpeg)

the E-SMART visualisation screen. Any incident is flagged and potentially damaged or unsafe equipment does not continue to operate undetected.

## **Engineers notes**

Engineers notes allows the engineers to pass on information to the next person working on an item of equipment and can be viewed by supervisors to assess the condition of the equipment and is particularly useful when longer term issues exist and information may well be forgotten or overlooked.

#### - U × R Fault Re Start Date End Date - Al -13 June 2006 -13 June 2006 🔫 : Þ -June 2000 🛨 Delete Mon Tue Wed Thui Fii Sati Su 📑 Save 🕒 Generate 5 6 7 8 9 12 (1) 73 15 16 19 20 21 22 23 26 27 28 29 30 10 17 24 11 18 25 Faull Report(s) Equipment Fault Type Faults Down Time di BTG RTG 03 Gantry 08 🔁 Today 14/06/200 00:49 **RTG 50** 08/06/06 13/06/06 01:09 Gantry 05 BTG 21 Indley 01/06/06 05/06/06 04 02:22 All QC Hois 20/05/06 13/06/06 05:17 23 -

## KPI data

Using the statistical analysis tool provided with E-

SMART authorised users can analyse the operational outages and KPI's in various different ways.

All departments have the same data in a format that is easily exported into Microsoft Office products to allow management to fashion custom reports as required.

## **Fleet Telemetrics module**

E-SMART can also be implemented with a telemetry module to provide a live feed from the equipment. The exact nature of the data will depend on the type of equipment but common items E-SMART includes are:

General parameters

- Running hours
- Current speed
- Spreader height
- Container weight
- Parallel Fuel levels
- Image: Many others

#### **Status Warnings**

Engine over temperature

![](_page_17_Picture_21.jpeg)

![](_page_17_Picture_22.jpeg)

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![](_page_18_Picture_1.jpeg)

- Coolant level low
- Engine oil pressure low
- Engine oil level low
- Many others

To meet the various operational requirements for the different types of equipment, various other status and general parameters can be included together with remote fault resets. In addition to automated status and alarms ESMART supports operator reported alarms via an E-SMART reporting screen available on the operators Radio Data Terminal (RDT).

#### Safety alerting module

Along with equipment status information and alerts used in maintenance and engineering E-SMART can be implemented to monitor critical safety status for items such as fire detection, emergency stop, equipment stability, and many other metrics to provide key operational safety information.

Alerting the management to these safety related events is a significant step forward in safer terminal operations. As well as the equipment operator being alerted to a potentially unsafe situation it is important that the management also know as soon as possible to allow the immediate implementation of an appropriate emergency plan or some other form of action.

For safety alarms the E-SMART system instantly alerts the management with a prominent warning icon with an optional audible warning.

#### **Equipment shock sensing**

E-SMART can also receive direct data from the Equipment Shock Sensing System. This advanced accident management feature allows incidents detected by the system to be immediately reported and shown on the E-SMART visualization screen. Any incident is flagged and potentially damaged or unsafe equipment will not continue to operate undetected.

**Reefer Monitoring** : We integrate RFID, Network Connectivity options(GPRS, WIFI or Narrow Band) and GPS, the E-Smart application, developed by ITS and client operational systems. Terminal operators can better manage reefer containers and use it as a strategic competitive advantage.

- Wireless tags(Active or Battery-Assisted Passive(BAP) with integrated temperature sensors, and on site WIFI connectivity to standard reefer ports for real-time monitoring and control of temperature and other potential conditions, such as shock, tilt, light, humidity, etc. Strategically placed RFID readers then transmit tag and sensor data between reefer tags and control software via wireless LAN, Narrow Band RF or Ethernet/POE.
- 2. E-Smart software provides graphical views and reports on key parameters:
  - Container ID/serial number and location
  - Software version

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![](_page_19_Picture_1.jpeg)

- Datalogging and alarm initiation based on defined business rules and thresholds
- Controller mode
- Set point
- Ambient, supply and return temperature
- Alarms in queue
- Most recent alarm activities

![](_page_19_Picture_8.jpeg)

![](_page_19_Picture_9.jpeg)

![](_page_19_Picture_10.jpeg)

**FALKEN Secure Networks Inc** 

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![](_page_19_Picture_13.jpeg)

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